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"GAMIFIED STRATEGIES FOR IMPROVING AVIATION ENGLISH TECHNICAL VOCABULARY IN PILOTS, AIR TRAFFIC CONTROLLERS, AND MAINTENANCE PERSONNEL OF THE ECUADORIAN ARMY AVIATION"

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That the research work has been reviewed in all its sections, and I consider that it meets the necessary requirements and merits to be submitted for public presentation and evaluation by the designated examiners.

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……..……

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DECLARATION OF AUTHENTICITY

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Ambato, January 7th, 2025

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Héctor Daniel Llerena Culcay

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APPROVAL OF THE EXAMINATION COMMITTEE

The thesis has been reviewed, approved, and authorized for printing and binding on the topic: “GAMIFIED STRATEGIES FOR IMPROVING AVIATION ENGLISH TECHNICAL VOCABULARY IN PILOTS, AIR TRAFFIC CONTROLLERS, AND MAINTENANCE PERSONNEL OF THE ECUADORIAN ARMY AVIATION”, as a prerequisite for obtaining the Master's degree in Pedagogy of National and Foreign Languages with mention in English. It meets both the content and formatting requirements for the student to proceed with the public defense of the thesis.

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DEDICATION

I dedicate this achievement to God, the source of all wisdom and strength. Thank you for lighting my path.

To my parents, thank you for your unwavering support, for always teaching me that personal growth is achieved through effort and dedication.

To my wife and son, my greatest source of strength and comfort, I am deeply grateful for always being by my side.

I dedicate this work with all my heart, knowing that without your support, none of this would have been possible.

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Daniel Llerena

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TEMA: "ESTRATEGIAS GAMIFICADAS PARA EL MEJORARAMIENTO DEL VOCABULARIO TÉCNICO EN INGLÉS AÉRONAUTICO EN PILOTOS, CONTROLADORES DE TRÁFICO AÉREO Y PERSONAL DE MANTENIMIENTO DE LA AVIACIÓN DEL EJÉRCITO ECUATORIANO"

AUTOR: Héctor Daniel Llerena Culcay
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RESUMEN EJECUTIVO

Esta investigación explora la efectividad potencial de las estrategias de gamificación para mejorar el vocabulario técnico en inglés de aviación en pilotos, controladores de tráfico aéreo y personal de mantenimiento del Grupo de Aviación del Ejército N°44 "Pastaza". La problemática radica en la necesidad de una comunicación precisa, donde el dominio de la terminología técnica es esencial para la seguridad en operaciones aéreas. El estudio tiene como objetivo explorar el potencial de herramientas gamificadas, como Kahoot y Mentimeter, para fomentar la participación y apoyar la retención de vocabulario técnico en un entorno de aprendizaje dinámico. Basado en teorías de aprendizaje constructivista y conectivista, el estudio diseña una guía didáctica con cuestionarios interactivos, mecanismos de retroalimentación y actividades colaborativas orientadas a mejorar la retención de vocabulario y el compromiso de los estudiantes. Esta investigación emplea un enfoque cuantitativo con una metodología exploratoria-descriptiva complementada por una técnica cualitativa, incluyendo la triangulación y la validación por expertos, para respaldar la potencial efectividad teórica de la guía didáctica de enseñanza. Los resultados esperados subrayan el potencial de la gamificación para mejorar el dominio de vocabulario técnico en aviación, fomentando el compromiso y la motivación, y contribuyendo, en última instancia, mejorar la comunicación y la seguridad de las operaciones de vuelo.

Palabras clave: aviación, gamificación, inglés técnico, vocabulario

UNIVERSIDAD TECNOLÓGICA INDOAMÉRICA

FACULTY OF EDUCATION SCIENCES

MASTER IN PEDAGOGY OF NATIONAL AND FOREIGN LANGUAGES

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ABSTRACT

GAMIFIED STRATEGIES FOR IMPROVING AVIATION ENGLISH TECHNICAL VOCABULARY IN PILOTS, AIR TRAFFIC CONTROLLERS, AND MAINTENANCE PERSONNEL OF THE ECUADORIAN ARMY AVIATION

The current research work explores the potential effectiveness of gamification strategies to increase practice in aviation technical English vocabulary among pilots, air traffic controllers, and maintenance personnel of Army Aviation Group No. 44 "Pastaza". The research problem centers on the critical need for precise communication, where mastery of technical terminology is essential for safety in aviation operations. The investigation aims to explore the potential of gamified tools, such as Kahoot and Mentimeter, to foster engagement and support the retention of technical vocabulary in a dynamic learning environment. Grounded in constructivist and connectivism learning theories, the study designs a didactic guide featuring interactive quizzes, feedback mechanisms, and collaborative activities. The primary goal of this guide is to enhance vocabulary retention and student engagement. This research employs a quantitative approach with an exploratory-descriptive methodology complemented by a qualitative technique, including triangulation and expert validation, to support the potential theoretical effectiveness of the teaching didactic guide. The expected findings highlight the potential of gamification to improve mastery of technical vocabulary in aviation, fostering engagement and motivation, and ultimately contributing to enhanced communication and safety in flight operations.

KEYWORDS: aviation, gamification, technical English, vocabulary

INTRODUCTION

In recent years, the integration of gamified strategies into education has emerged as a transformative approach, capturing attention for its potential to enhance learning outcomes. Gamification, as defined by Deterding et al. (2011), involves incorporating game design elements—such as points, badges, and leaderboards—into non-game contexts to boost engagement and motivation. This innovative approach has demonstrated particular promise in specialized fields like aviation English, where technical vocabulary learning is critical.

Hamari et al. (2014) characterize gamification as creating "gameful experiences," while Werbach (2014) describes it as "making activities more game-like." This perspective aligns with the notion that embedding gaming elements into the learning process can make vocabulary acquisition more enjoyable and effective. As such, gamified strategies are increasingly seen as a means to improve retention and engagement compared to traditional methods as they create a more relaxed and enjoyable atmosphere.

This study will explore the implementation of gamified strategies to improve the technical vocabulary proficiency of pilots, air traffic controllers, and maintenance personnel within the Ecuadorian Army Aviation. By taking advantage of digital tools and game-based elements, this study tries to address the current challenges these aviation professionals face in mastering essential technical terminology.

Zou, Huang, and Xie (2021) highlight that the digital era has introduced a range of tools that have transformed traditional vocabulary learning from a passive, monotonous task into an interactive and enjoyable experience. Platforms like Kahoot and Mentimeter exemplify this shift, offering engaging methods for vocabulary acquisition. These

platforms offer interactive and enjoyable approaches to vocabulary acquisition, making the learning process more stimulating and effective compared to traditional techniques.

Gamified tools like Kahoot and Mentimeter have proven to be highly effective in enhancing vocabulary learning. Kahoot, a game-based learning platform, allows learners to engage in interactive quizzes that promote active participation, improve motivation, and enhance knowledge retention through real-time feedback and competition (Wang, 2015). Similarly, Mentimeter, an interactive presentation tool, enables instructors to create polls, quizzes, and real-time feedback sessions, promoting a collaborative and engaging learning environment (Blasco-Arcas et al., 2013). The use of these tools not only enhances the dynamic and enjoyable aspects of learning but also could help aviation personnel in retaining and applying complex technical terms and phraseology. This, in turn, contributes to improved communication and safety in aviation operations. Furthermore, by promoting active participation, these tools will facilitate the acquisition of specialized aviation vocabulary, making the learning process more engaging and effective.

By creating an interactive learning environment, gamified approaches encourage learners to actively engage in their training, leading to improved technical vocabulary retention and application (Kapp, 2012). Despite its potential, the effectiveness of current strategies for teaching technical vocabulary poses a significant challenge, especially in specialized fields such as aviation. As a result, aviation personnel often face difficulties in acquiring the necessary skills and knowledge to excel in their roles. The main issue lies in finding and implementing suitable gamified strategies that effectively facilitate the learning of technical aviation vocabulary. When executed correctly, these strategies can

revolutionize the learning process, making it more captivating and significantly enhancing learning outcomes for aviation professionals.

Lee and Kim (2017), in their study titled *Gamification in Learning and Education: Enjoy Learning Like Gaming*, published in *Educational Technology & Society*, discuss how traditional vocabulary learning methods are often seen as dull and unstimulating, particularly in an age of constant digital distractions. However, advances in technology have introduced a variety of digital tools that significantly enhance the vocabulary learning experience. This technological shift has transformed vocabulary learning from a passive, unengaging task into an interactive and enjoyable process. Digital tools allow learners to engage with the material in a more meaningful and relevant way, making the learning experience more dynamic and immersive. As a result, integrating these tools into the vocabulary learning process can greatly enhance both the effectiveness and enjoyment of language acquisition.

According to Blattner and Fiori, 2009, p. 18, “Learning takes place in the form of constructivism, where knowledge is constructed in a community of practice where users share similar interests and have pedagogical potentials that can be utilized in language classes in varieties of constructive manners”. Thus, gamified strategies are based on Constructivism. Certainly, the incorporation of gamified strategies has been recognized as a means of enhancing students' educational experience by working together and competing for rewards. Learning games, in particular, have been demonstrated to improve students' comprehension, recall, and retention of new language. Gamified techniques can support the learning process more effectively and interactively by generating a dynamic and engaging learning environment. To enhance learning results and promote student

engagement, instructors must consider incorporating gamification tactics into their training.

The learning of technical English vocabulary through innovative teaching methods, such as gamification, plays a crucial role in improving the safety and performance of Ecuadorian Army Aviation personnel. By integrating game-like elements—such as challenges, rewards, and competition—training becomes more engaging and motivating, resulting in improved retention and application of technical vocabulary. This approach not only increases learning outcomes but also contributes to greater safety and operational efficiency in the roles of army aviation personnel.

Currently, mastering technical vocabulary in aviation remains a significant challenge, particularly for personnel in the Ecuadorian Army Aviation. Proficiency in specialized vocabulary is essential for ensuring clear and effective communication during flight operations. However, traditional teaching methods often prove to be monotonous and disengaging, leading to low motivation and limited retention of technical terms. The underlying cause of this issue lies in the passive nature of conventional methods, which fail to engage learners or provide to modern learning styles. As a result, this can lead to communication errors that, in the aviation context, can have severe consequences, such as misunderstandings that endanger safety and operational efficiency. The implementation of gamified strategies presents an innovative solution to this problem. By incorporating game elements into the learning process, these strategies make vocabulary learning more interactive and engaging, improving retention and the practical use of technical terms. Consequently, this can reinforce communication accuracy, reduce errors, and improve aviation operations' safety and performance.

In the aviation industry, the risks are especially high. The International Civil Aviation Organization (ICAO, 2018) *Annex 1 to the Convention on International Civil Aviation: Personnel licensing*. Montreal, Canada: ICAO, has standardized communication procedures in 193 countries around the world including Ecuador in order to ensure effective and safe communication between pilots and air traffic controllers who adhere to strict guidelines when interacting. Thus, the International Civil Aviation Organization. (2016), *Procedures for air navigation services: Air traffic management (PANS-ATM, Doc 4444, 16th ed.),* aims to improve safety and operational efficiency in air navigation, contributing to the overall effectiveness of the global air transport system by giving specific procedures for air traffic controllers and other aviation personnel to follow during different phases of flight, including departure, en route, and arrival.

Similarly, maintenance personnel must interpret aircraft manuals accurately to guarantee the continued airworthiness of aircraft (Knezevic, 2015, p.250-257). The significance of maintenance personnel in ensuring safe flight operations and the continued airworthiness of aircraft cannot be overstated. They utilize technical English to document maintenance procedures, logs, and manuals, which are crucial in maintaining aircraft to the highest standards and performing maintenance tasks safely and accurately. Standardized vocabulary is a key component of this process, ensuring that maintenance instructions are clear and uniform. Consistent communication among maintenance personnel is essential to ensure that everyone is aligned when executing maintenance tasks, avoiding errors, confusion, and misunderstandings that could potentially jeopardize the safety of the aircraft and passengers.

ICAO (2010) proposed Language Proficiency Requirements (LPRs) described in Doc 9835 along with the Language Proficiency Scale. Undoubtedly, Proficiency in this specialized language is considered essential as it contributes significantly to developing critical skills required by the industry to ensure safe and efficient operations. Standardized technical English vocabulary in the aviation industry enables clear and precise communication between pilots, air traffic controllers, and maintenance personnel. It is critical to convey complex information accurately and efficiently, thereby reducing the risk of misunderstandings. Miscommunication in aviation can have serious safety implications, hence the industry's need for a standardized technical language.

Clark (2017) states in a report commissioned by the Civil Aviation Authority (CAA) of the United Kingdom, that native English speakers (NESs) contribute to miscommunications on the radio as a result of "overuse or overreliance on plain language". In fact, Native English speakers (NESs) and non-native English speakers (NNES) must follow standardized phraseology to avoid the use of plain language, including slang, varied vocabulary, and wordy transmissions different from it. Miscommunication in aviation can have serious safety implications. Using standardized technical English reduces the risk of errors and enhances the overall safety of air travel. Pilots and ATC personnel rely on accurate and unambiguous language to execute procedures, issue clearances, and respond to emergencies. In emergency situations, clear, quick, and precise communication is crucial. Proficiency in technical vocabulary becomes vital for pilots and aviation professionals to respond appropriately and follow emergency procedures. Effective communication within the cockpit crew is vital for the immediate and accurate handling of various situations, from routine procedures to emergency scenarios. For aviation

professionals, such as pilots, air traffic controllers, and maintenance personnel, proficiency in technical English is not only essential but critical to ensuring safety and efficiency in aviation operations. Mastery of this specialized vocabulary and phraseology allows for clear, precise communication that minimizes the risks of misunderstandings, which could otherwise lead to accidents or delays, and other aviation-related issues. Therefore, it is essential to analyze the dangers generated by misunderstandings and lack of vocabulary.

Federal Aviation Administration. (2009). Phraseology (Advisory Circular No. 91-73). U.S. Department of Transportation, emphasizes that radio communication is the main channel for pilot interaction and air traffic control (ATC). The effectiveness and safety of aircraft operations at airports with active control towers rely heavily on this "communication loop." To ensure that pilots accurately understand clearances, controllers use standardized phraseology and expect readbacks and other forms of confirmation from the pilots. Hence, proficiency in technical phraseology is crucial in ensuring effective communication among pilots within the cockpit crew, particularly in emergencies. Accurate usage of aviation phraseology is imperative for pilots to receive and follow instructions correctly from air traffic controllers. The significance of this skill cannot be overstated, as it plays a key role in maintaining the safety of flights.

(Friginal et al., 2019) Doc 9835 states that all participants in international radiotelephony (R/T) communications – specifically pilots and air traffic controllers – should be subject to the LPRs. The aviation industry depends on professionals with extensive training in technical aviation vocabulary, including pilots, air traffic controllers, and maintenance personnel. Proficiency in this specialized language is fundamental as it contributes to developing essential skills required for the industry. Technical English

vocabulary is crucial for aviation personnel because clear and precise communication is vital to ensure safety. Pilots, ATC, and maintenance personnel need to convey complex information accurately and efficiently. Standardized technical English vocabulary helps avoid misunderstandings and ensures that instructions and information are communicated clearly.

In this sense, the Ecuadorian Army Aviation, like its counterparts worldwide, adheres to the International Civil Aviation Organization's regulations (ICAO), which stipulate that pilots and air traffic controllers must communicate using standardized phraseology to convey information clearly and avoid misunderstandings. Furthermore, the maintenance personnel of the Ecuadorian Army Aviation are tasked by the Airplane Manufacturing Companies with the critical responsibility of interpreting aircraft manuals to ensure the proper maintenance and repair of the aircraft. This underscores the importance of a standardized language in the aviation industry, which helps ensure safe and efficient operations of flights to preserve human lives.

Army aviation personnel are essential for ensuring the safety and security of flight operations. As such, proficiency in aviation English technical vocabulary is critical for their success in this field. Learning technical terminology is a complex process requiring suitable teaching methods and learning theories. To address this need, the research line is determined on the investigation line 3, stated by Universidad Tecnológica Indoamérica, specifically about Language Teaching and Learning, focused on studying the processes of teaching and learning foreign languages. This line explores effective pedagogical methodologies and approaches for language teaching, the development of communicative and linguistic competencies, as well as aspects such as the evaluation of language learning

and interculturality. Within this framework, the research also explores innovative teaching and learning methodologies, particularly through the use of technological tools.

In addition, this research line extends to educational approaches for language learning, specifically the use of gamified strategies to increase practice for the learning of aviation English technical vocabulary. It involves examining suitable teaching methods and learning theories that support the effective learning and mastery of technical terminology among pilots, air traffic controllers, and maintenance personnel in the Ecuadorian Army Aviation. By exploring and integrating game-based elements into the learning process, in order to improve vocabulary retention, comprehension, and practical application, ultimately enhancing communication and safety within the aviation industry. Despite the potential benefits, the effectiveness of gamified strategies for teaching technical vocabulary remains a challenge. Aviation personnel often struggle with acquiring and retaining technical vocabulary and phraseology, which are crucial for safe and efficient flight operations in the Ecuadorian Army Aviation. This research will investigate how gamified approaches can be effectively employed to overcome these challenges and improve communication and safety in aviation.

Problem

Mastering technical aviation English vocabulary is crucial for aviation personnel to perform their duties effectively and prevent misunderstandings. However, traditional methods used by the Ecuadorian Army Aviation for teaching this specialized vocabulary have proven insufficient in ensuring long-term retention. Gamified strategies, which create a dynamic and engaging learning environment, have emerged as a promising alternative to

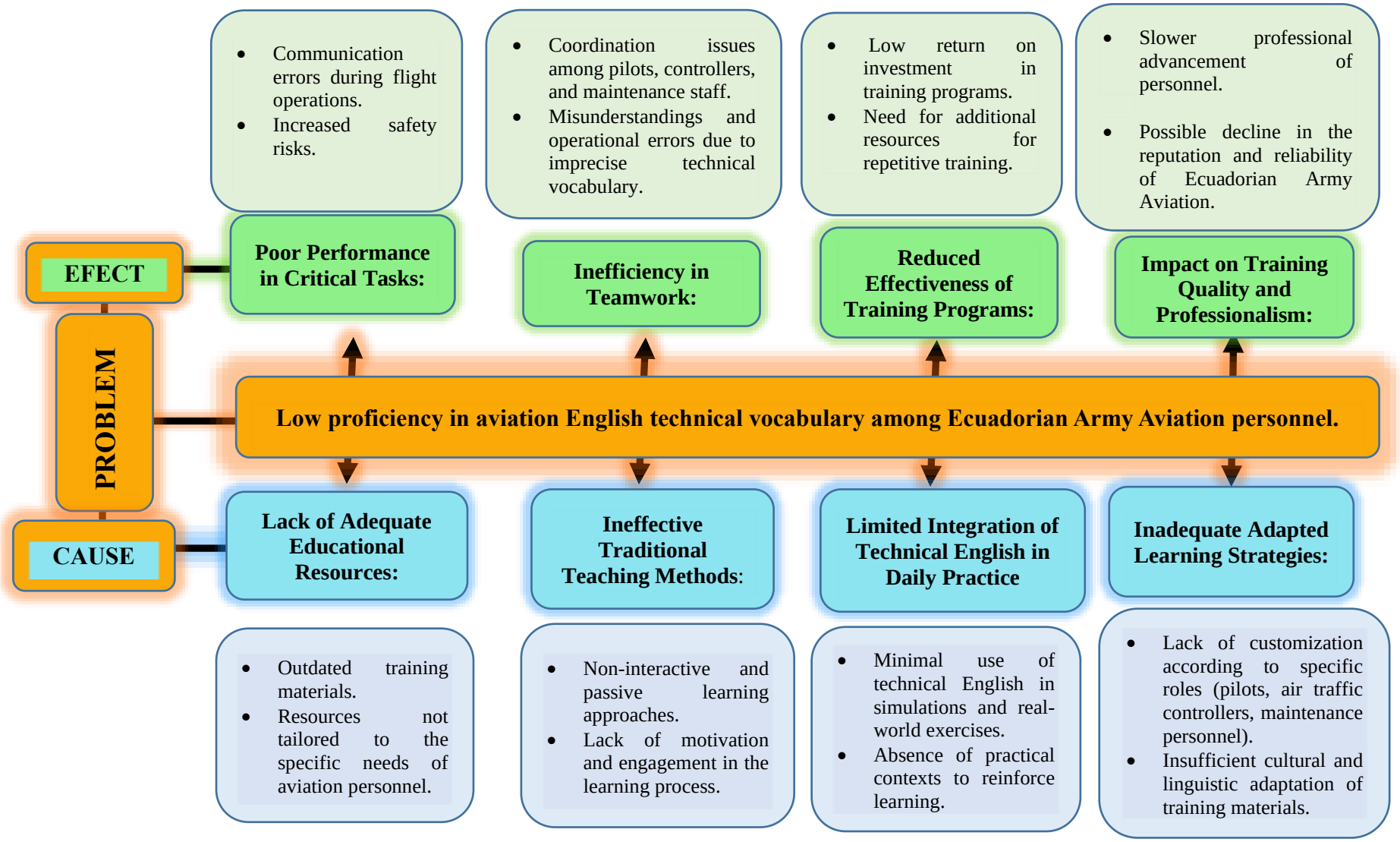
reinforce the learning and retention of aviation terminology among the members of the Ecuadorian Army Aviation.

Hua (2020) emphasizes the critical role of vocabulary in communication, stating that ‘if a learner has not got sufficient vocabulary, no matter how well he grasps the grammar and how idiomatic his pronunciation and tone may sound, it is hard for him or her to communicate efficiently and freely with others” (p. 427). In the aviation industry, where precise communication is vital for safety and operational efficiency, a strong command of technical English is essential. Army aviation personnel must be able to communicate accurately to avoid misunderstandings. By implementing gamified strategies, it is possible to reinforce the learning of aviation English technical vocabulary, thus improving both communication skills and performance.

The current approaches to learning technical aviation vocabulary are inadequate because they lack the integration of gamified elements that can improve language proficiency and overall performance. By incorporating game-like mechanics, such strategies promote a more immersive and motivating learning experience, allowing Army aviation personnel to better understand, recall, and retain essential technical vocabulary and phraseology.

Problem Tree

Illustration 1 *Problem tree*



Elaborated by: Llerena, D (2024)
Source: Direct Research

Research question

How can gamified strategies reinforce the learning of aviation English technical vocabulary in aviation personnel?

Research idea

Incorporating gamified strategies into the teaching of aviation English technical vocabulary will significantly improve aviation personnel's language vocabulary learning proficiency.

Beneficiaries

This research will benefit the personnel of Army Aviation Group No. 44 "Pastaza" by introducing innovative gamified learning strategies to improve the learning of specialized aviation terminology. By applying game-based learning principles, the approach will create a more engaging, interactive, and enjoyable training experience. This method increases motivation for effective learning, leading to a deeper and more efficient understanding of critical technical vocabulary.

The study will explore the potential effectiveness of gamified strategies in comparison to traditional vocabulary learning methods, focusing on improvements in learning outcomes and performance. It will also analyze factors such as time efficiency and knowledge retention to provide a comprehensive analysis of the proposed approach. By integrating interactive tools such as Kahoot and Mentimeter, the research seeks to reinforce the learning experience and measure their impact on vocabulary retention. Finally, this study will develop more effective and engaging techniques for mastering technical vocabulary within the context of aviation English.

Objectives

General objective:

To explore gamified strategies designed to support the learning of aviation English technical vocabulary among pilots, air traffic controllers, and maintenance personnel of the Ecuadorian Army Aviation.

Specific Objectives:

- To identify the level of aviation English technical vocabulary in the army aviation personnel.
- To design a didactic guide based on gamified activities in order to enhance the learning of aviation English technical vocabulary in the army aviation personnel.
- To validate the proposal of gamified strategies in the learning process of the aviation English technical vocabulary.

CHAPTER I

THEORETICAL FRAMEWORK

Previous Studies:

The theoretical framework provides a foundation for the research by grounding it in established theories and concepts. In the context of this study, it serves to explain the underlying principles of gamification and its relevance in improving technical aviation English vocabulary for pilots, air traffic controllers, and maintenance personnel in the Ecuadorian Army Aviation. By integrating learning theories such as Constructivism and Connectivism, this framework helps to justify the use of gamified strategies that promote active engagement, motivation, and practical application of specialized terminology. Understanding these theories allows for the exploration of effective methods for vocabulary learning in a high-risk, technical field like aviation.

The following studies have been concerned with implementing gamification strategies for the effective acquisition of technical English aviation vocabulary. Tomcho (2019) addressed the topic of "Motivating Airmen to Engage with Technical Education, Experimentation, and Analysis Using Modern Gamification Techniques" and spoke about "The development and integration of computer systems into today's society and the subsequent growth of cyber as a warfighting domain has led to changes in military and civilian conflict. Several traits unique to cyber, including disruption and fast pace of change, have led to issues never before seen in the military environment,

especially with education and training. A new approach that takes advantage of crowd-sourced content has been proposed. This approach relies on motivating military members to voluntarily engage in technical (cyber) education. The application of gamification, a design practice aimed at increasing user engagement by targeting core motivators in humans, in the military context is presented in this paper. The adaptation and evaluation of unique game elements onto the platform are also discussed. A human-subject study involving a survey and engagement-tracking experiment is implemented. Results are analyzed using visualization software and a novel framework we created.".

Tomcho's research findings shed light on the critical relationship between user engagement and platform design, particularly in the context of cyber education and aviation training programs. The study showed that platforms with well-designed features can be highly motivating for users, leading to increased engagement and ultimately better learning outcomes. One of the key conclusions from the research is the importance of user-centered design by prioritizing the needs and preferences of users where designers can create platforms that are more effective and engaging. Tomcho's study has significant implications for the development of effective cyber education and aviation training programs.

The study conducted by Tomcho is highly relevant to the present research, as it intends to investigate gamification strategies aimed at enhancing technical aviation English vocabulary. The research will build on this foundation by exploring ways to integrate gamification strategies that stimulate increasing brain activity, which is critical for cognitive growth in learning and retaining technical aviation vocabulary. To this end, the study will propose the use of cognitive enhancement games that offer a range of diverse challenges and puzzles to reinforce the brain's capacity to process and retain technical aviation vocabulary more efficiently. By integrating cognitive

enhancement games and puzzles into the learning experience, learners can be stimulated to actively practice and retain technical vocabulary more effectively. This is particularly important in technical aviation English vocabulary, where learners must understand and remember complex concepts and terminology. Therefore, cognitive enhancement games can promote cognitive development, providing an interactive and engaging learning experience for pilots, air traffic controllers, and maintenance personnel in the Ecuadorian Army Aviation.

By incorporating diverse challenges, these games will stimulate different regions of the brain, thereby enhancing cognitive skills such as memory, attention, and problem-solving which will help with memorization and learning of the technical aviation English vocabulary. Furthermore, the proposed research takes advantage of the principles of gamification by promoting motivation and engagement among army aviation personnel, which is fundamental for achieving learning outcomes. Overall, the proposed research is expected to improve the proficiency of learners in technical aviation English vocabulary through cognitive enhancement games that will allow learners to develop the cognitive skills required for the effective learning of technical aviation English vocabulary.

Mcsorley (2022) conducted a study focused on the incorporation of gamification elements into aviation weather training programs as a means to enhance engagement and motivation levels among participants, leading to better learning outcomes. Specifically, the study was centered on the underdeveloped area of Next Generation Radar (NEXRAD) training for pilots, which has been identified as an area in need of improvement in terms of gamification. The study hypothesized that the implementation of gamification elements, such as "Achievements" and "Stories," could increase the motivation and engagement of pilots-in-training, given their competitive and goal-oriented nature. The study aimed to assess the effectiveness of two types of gamification

mechanics, narrative and leaderboard, in enhancing participants' motivation, engagement, and learning outcomes in a NEXRAD online training program. In addition, the study utilized a pre-and-post-training knowledge acquisition test and a post-training survey to measure the effectiveness of these mechanics on participants. However, the study's results did not support the hypothesis that gamification elements significantly impacted motivation, engagement, or learning outcomes among participants. Despite the study's limitations, it highlights the need for further research and development in the area of aviation weather training programs for pilots, particularly in the underdeveloped area of NEXRAD training, to improve pilots' understanding of the material and ensure flight safety.

The study developed by Mcsorley (2022) has similarities to the current research on integrating gamified strategies to enhance the motivation and effectiveness of airmen when acquiring technical aviation English vocabulary. While the study was specifically focused on the effect of gamification on knowledge acquisition in aviation weather training programs, the findings may have connections to this related area of research because aviation weather is an area of technical aviation English where there is a lot of technical vocabulary for pilots and air traffic controllers that must be acquired in order to develop their roles. The potential for innovative strategies, such as gamification, to improve the learning outcomes of technical vocabulary among members of the Ecuadorian Army Aviation is another challenge to be addressed in this research. As the members of the Ecuadorian army aviation require technical aviation English vocabulary to perform their duties effectively, it is crucial to identify effective gamified strategies to engage and motivate them to learn such vocabulary. Consequently, this study contributes to the present investigation to keep the top priority in aviation which is flight safety.

Jordan (2021) conducted a comprehensive research study to investigate the effectiveness of the Gamification Strategy in vocabulary acquisition for English language learners. The research project was carried out on first-semester students of the Pedagogy of National and Foreign Languages Program at Universidad Técnica de Ambato. The research used a descriptive and correlational methodology to evaluate the efficacy of the gamification strategy. Data was collected through pre and post-tests to assess the extent of vocabulary acquisition. The findings of the study indicated that a significant proportion of students exhibited limited English vocabulary, and therefore, the study proposed the use of the Duolingo learning platform as a gamification strategy to enhance their vocabulary. The platform was designed to provide an interactive and engaging learning experience to students, which would encourage their active participation and hence facilitate their vocabulary acquisition. Following the implementation of the gamification strategy, a post-test was administered to evaluate the effectiveness of the proposed intervention. The results of the post-test demonstrated a substantial improvement in the student's vocabulary levels, with most students progressing from a basic to an intermediate level. Therefore, the study concluded that the use of a gamification strategy, particularly the Duolingo learning platform, was an effective approach to enhancing language skills and vocabulary acquisition.

The study extended by Jordan (2021) on the efficacy of gamification strategy in enhancing vocabulary acquisition among English language learners has significant relevance to the present research. The study proposed the use of the Duolingo learning platform as a gamification strategy to improve vocabulary levels among first-semester students of the Pedagogy of National and Foreign Languages Program at Universidad Técnica de Ambato. Meanwhile, the present research extends this idea by exploring the viability of implementing a gamified strategy to expand technical aviation English vocabulary among the staff of the Ecuadorian Army Aviation. The proposed

gamification strategy is expected to provide motivation and engagement to the learners, thereby facilitating their vocabulary learning. The similarities between the target populations of both studies make Jordan's study relevant to the present research. By incorporating the best practices and lessons learned from Jordan's study, the present research can develop a gamification strategy that is adapted to the specific needs of the staff in the Ecuadorian Army Aviation. The proposed gamification strategy is expected to be effective in reinforcing the learning of technical aviation English vocabulary of the aviation personnel, while also providing motivation and engagement in the learning process. Therefore, the present research is expected to make a significant contribution to the existing literature on the efficacy of gamification strategies in the way of learning technical aviation English vocabulary among adult learners. The proposed gamification strategy, if successful, could have far-reaching implications for the field of technical aviation English training programs.

The study extended by Temel and Cesur (2024) “The Effect of Gamification with Web 2.0 Tools on EFL Learners’ Motivation and Academic Achievement in Online Learning Environments”, aims to investigate the effects of gamification using Web 2.0 tools (Kahoot, Socrative, Quizizz, and Mentimeter) on the motivation and academic achievement of EFL learners in online environments. It highlights the importance of motivation in online learning and addresses a gap in existing ELT research regarding the application of gamification in EFL contexts

The study argues that gamification can enhance learner engagement by providing an interactive and dynamic learning environment. It suggests that the use of game elements in educational settings can increase motivation and, subsequently, academic achievement. It employed a quasi-experimental research method within a mixed-method sequential explanatory design. The participants were 60 freshman EFL learners at a state university in Türkiye.

Quantitative data were collected through scales and an achievement test, while qualitative data were gathered via semi-structured interviews. The results showed a statistically significant improvement in motivation and academic achievement for the experimental group using gamified tools compared to the control group.

Temel and Cesur's study presents a strong methodology and provides clear evidence of the positive impact of gamification on learner motivation and achievement. However, it has certain limitations. The sample size is relatively small (60 participants), which may affect the generalizability of the findings to other contexts. The study is also limited to a specific cultural and educational context (Türkiye), which might not reflect the experiences of EFL learners in different regions.

Considering this investigation on improving the learning of technical aviation vocabulary, the integration of personalized gamified tools specific to this content can yield more relevant results for the project.

Definition of Gamification

Gamification is defined as game-based mechanics, aesthetics, and game thinking to make students feel motivated in the learning process and make them able to solve learning problems (Kapp, 2012). Therefore, gamification is established as a technological tool that is designed to help students find motivation when learning, particularly in the context of language acquisition. Huotari and Hamari (2012) provide another relevant definition. They define gamification as a way to offer any service in the business to support users. This definition is related to the theory of service marketing which is why this definition is applied to other contexts but teaching. The definition

proposed by Chou (2015) focuses on gamification as an umbrella term to apply game-like which means to integrate designed elements or activities into a technological educational context.

Werbach (2014) defined gamification as “the process of making activities more game-like” (p.3). The definition under consideration focuses on the process of gamification, which indicates that it originates from a non-game context. It is imperative to highlight the activities that possess game-like characteristics. The definition also emphasizes the development of games to facilitate students' learning. For this thesis, Werbach's definition has been selected as the most appropriate, given its wide acceptance in most studies on the subject. This enables the researcher to proceed with the investigation into the implementation of gamification strategies to acquire technical aviation English vocabulary.

Gamification and Games

Gbas and Zimmerman (2004) described the term game as an artificial conflict where players must follow rules and where there is a quantifiable result. Not only rules are 6 present, but game elements are also part of the games. It means that there are reward structures, progress tracking, rapid feedback, trial, and failure (Buckley & Doyle, 2016). While failure is usually seen as a negative aspect in real life, it has a different connotation in games. Failure in games is considered essential and natural to move forward, as games are designed to have multiple levels of difficulty. This process is different from real life, where failure can have more profound consequences and is often associated with unfavorable emotions. Understanding these differences helps individuals develop a better understanding of motivation and learning dynamics in both contexts.

According to Marczewski (2015), the main objective of games is to entertain students while learning. Chou (2015a), for instance, considers games as incredibly powerful tools that teachers have in their hands to make students engage and interact with technology learning at the same time. However, he also notes that games must be used with a clear teaching-learning purpose, such that students feel motivated to learn while playing.

Game design elements

Zichermann and Cunningham (2011) use the Mechanics-Dynamics-Aesthetics (MDA) framework to describe game design elements. Game mechanics, the first element of the MDA framework, refers to the rules, procedures, and constraints that define the gameplay experience. It governs player interactions with the game world, making it crucial for game designers to understand.

Game Mechanics

According to Zichermann and Cunningham (2011), game mechanics are rules and procedures that guide the player through the game. In other words, game mechanics are the way that the player interacts in the game to achieve the goal. The advantage of game mechanics is that students feel comfortable interacting through the game following rules and processes.

It appears that gamification relies on seven key game mechanics, including points, levels, leaderboards, badges, challenges/quests, onboarding, and customization. Furthermore, seven additional game mechanics can be incorporated into a gamified system, such as feedback, collecting, and surprises. A well-known example of a gamified application that employs all of

these mechanics is Duolingo, which is widely used for vocabulary learning in English. In addition, Kapp (2012) highlights the importance of replay and do-overs as other significant game mechanics that are integral to Duolingo.

Points are necessary for any gamified system. It means that five-point systems have different functions in a game. These points are part of the process in a game, and they cannot be taken away from the player because they track the overall progress that a player gets through the game (Zichermann & Cunningham, 2011). These redeemable points make the player feel encouraged because they give support to the player on the different levels of a performed task. The skill points: on the other hand, are bonus sets of points that help a player gain experience while playing.

Another game mechanic is a leaderboard. It is connected to points. It provides a ranking system for the player to evaluate how well he or she is doing in the game so that the user can compare results with others and try again. This is another way that a gamified system motivates students and, of course, provides a competitive climate in which students try to demonstrate their talents while simultaneously learning.

Another game mechanic is the level. According to Nah et al. (2014), the major objective of the game is to display players' progress via a progress bar. Because it allows teachers to interact with students while they are learning vocabulary, this game mechanism is particularly popular in educational gamified applications. This is another method for creating a competitive climate in the classroom where students are the main agents of the game. In addition, there are badges, which are rewards, that symbolize the achievement of the player (Cunningham and Zichermann, 2011). This game mechanic aspect lets the student realize that his or her progress is being recognized and appreciated. Badges can also be used as a standard 8-point grading system. Obtaining badges is a

strategy to incentivize students to continue their education and expand their vocabulary in the English language.

Challenges or quests are the fourth game mechanism. In other terms, it refers to a quest for a specified outcome in which players are given instructions within the game. This feature encourages pupils to be more competitive while learning. It also encourages students to develop new abilities and advance in many areas of study.

Customization is the fifth game mechanism. It refers to the player's direct impact on a game. In a nutshell, it refers to how the player interacts with the game. This aspect transforms pupils into exceptional snowflakes by providing the gamer with an additional flavor when playing a game. Customization allows gamers to build something one-of-a-kind in the gaming world.

Onboarding is the final core game technique given by Zichermann and Cunningham (2011). It refers to the first encounter a new player has so that he or she can select whether or not to return to the game and play it again and again.

This is critical in the teaching-learning process because the student decides whether or not to learn with the game that you, as the teacher, have chosen for them. As a result, the goal here is to accommodate your users and persuade them to use your product. It is vital to use games that catch learners' interest.

Game Dynamics

Vogel et al. (2006) on his study using virtual reality games to enhance vocabulary learning,, emphasized that game dynamics such as competition and collaboration significantly enhance engagement in gamified vocabulary learning. These dynamics allow learners to interact with both the game environment and their peers, creating a motivating context that encourages continuous

participation. The study highlights that such engagement promotes vocabulary retention and improves learning outcomes.

Deterding et al. (2011), From Game Design Elements to Gamefulness: Defining "gamification" highlighted that game dynamics such as progression, feedback loops, and competition play a significant role in enhancing vocabulary acquisition. These dynamics drive long-term engagement, which is crucial for sustained vocabulary learning, particularly in gamified educational environments. They argue that dynamics help learners stay motivated by providing continuous feedback and allowing them to monitor their own progress as they advance through vocabulary lessons.

Werbach and Hunter (2012) in the study *For the Win: How Game Thinking Can Revolutionize Your Business*, discussed how game dynamics such as challenges, progression systems, and feedback are key components of gamified vocabulary learning. They argue that these dynamics help learners set achievable goals, track their development, and stay motivated. These elements work together to boost learners' retention of new words and improve their overall performance in vocabulary acquisition tasks.

Game aesthetics

Hunicke, LeBlanc, and Zubek (2004), introduced the concept of aesthetics as a core element of the MDA Framework (Mechanics, Dynamics, Aesthetics). They argue that the visual appeal of a game is crucial for eliciting an emotional response from players. This aspect is particularly important in educational contexts, where well-designed aesthetics can increase student engagement and motivate them to take part in learning activities actively.

Salen and Zimmerman (2004), discussed how game aesthetics contribute to the overall experience of gameplay. They argue that the artistic elements and visual design of a game are essential in creating an immersive environment that engages players. This is especially significant in educational contexts, as appealing aesthetics can improve the enjoyment and relevance of learning activities, such as vocabulary acquisition. game

According to Schell (2008) in the study *The Art of Game Design: A Book of Lenses*, discussed that aesthetics are an essential factor in determining a game's success, as they significantly influence players' emotional responses. He explains that aesthetics are vital for eliciting **emotional reactions** from players, which directly influences their **motivation** to engage with the content and enjoy the learning process, especially in educational settings.

Gamification in English language teaching

Gamification is becoming more popular in all contexts, particularly education. According to Dicheva & Dichev (2015), gamification is the "introduction of game elements and gameful experiences in the design of learning processes" (p.1). Many opportunities emerge in the teaching-learning process when gamification is used in the educational context. As teachers, one of these chances is to see how gamification tactics drive pupils to learn a language while having fun. As a result, gamification has become an important teaching tool for language teachers.

In order to gain a deeper understanding of the application of gamification in educational settings, this text presents two examples of successful gamified programs. Firstly, it is worth noting that gamification strategies can be employed not only in whole courses but also in individual subjects. One such subject is English, where gamification has proven to be effective in vocabulary acquisition. *Class Dojo* is an interactive online platform for classroom management that aims to

promote interactive student participation through gamification. The platform in question incorporates various game elements, including avatars, a progress bar, and engaging illustrations, as well as rewarding students with points for desirable and undesirable behavior (Silver-Bonito, 2014). Other similar gamified applications, such as GoalBook, Coursera, and Course Hero, focus on general classrooms where gamification elements are introduced. These programs offer comprehensive study materials and leverage badges to reward students for their progress (Chou, 2015b).

Gamification in education is regarded as a new and novel experience to be implemented in the teaching-learning process, however many studies about gamification have been published. This research provides a comprehensive overview of this intriguing method. They emphasize the necessity of using gamification to inspire and help students feel at ease when learning vocabulary in the English language.

Gamification and vocabulary

When learning a language, vocabulary knowledge is considered the foundation since it allows people to have a mental dictionary where words come out without much effort when articulating any idea. It allows for a more in-depth comprehension when reading and writing.

However, even though vocabulary is an essential tool for communication, teachers do not place enough emphasis on it. As a result, children are limited in their ability to express themselves due to a lack of language. Even though technology has enabled us to discover new and unique ways to learn vocabulary through gamified strategies. Because digital games have become an essential part of learners' lives, these gamification tactics make the teaching and learning process more dynamic (Krokfors, Kangas, & Kopisto 2014, p.13).

Although gamification has been used in education for some time, the use of digital games as a tool for teaching and learning is a relatively new development. Researchers have conducted numerous experiments to determine whether gamification has a positive or negative impact on language learning, particularly in vocabulary acquisition. According to Vesterinen and Mylläri (2014), digital games can be used by teachers to teach outside of the traditional classroom setting, allowing students to learn vocabulary in any location. This approach offers both formal and informal learning opportunities for teachers and students alike (Krokfors et al., 2014). However, as Kapp (2012) notes, creating games that are both engaging and educational can be a challenging task.

The study by Thambirajah and Krish (2023) "Acquiring Technical Terms for Report Writing Using Online Resources: A Case Study with Aircraft Maintenance Learners", provides a significant contribution to understanding how online resources can be effectively used for technical vocabulary acquisition in specialized fields such as aircraft maintenance. The research demonstrates that using a variety of online tools, including e-books, video lectures, e-dictionaries, and forums, enables learners to integrate and apply technical terms in their assignments. Based on Vygotsky's social constructivism, the study emphasizes the importance of social interaction and collaborative learning, which are facilitated through online forums and peer discussions.

This study highlights the effectiveness of online resources in promoting active learning, engagement, and retention of technical vocabulary. The qualitative case study approach provides detailed insights into the learners' experiences, showcasing how they navigate and utilize online resources to enhance their technical language skills. This approach aligns well with the principles of social constructivism, where knowledge is constructed through interaction and collaboration.

The results found that learners effectively used a variety of online resources to acquire and integrate technical terms into their assignments. Online resources provided a realistic work environment that supported the contextualization of technical vocabulary.

This study supports our investigation by highlighting that the use of online resources is beneficial for technical vocabulary learning due to their accessibility and the realistic context they provide. Online learning environments can replicate real-world scenarios, learning technical terms more relevant and practical.

The study's findings that online resources are highly effective for acquiring technical vocabulary, particularly in specialized fields like aircraft maintenance. However, for the specific context of the Ecuadorian Army Aviation personnel, incorporating gamified strategies can further improve this process. Thus, gamification can add an additional layer of engagement and motivation, which is crucial for aviation staff who find traditional learning methods less appealing.

Game-based Learning

It refers to the borrowing of certain gaming principles and applying them to real-life settings to engage users (Trybus 2015). Game-based learning and gamification is a trend that has been implemented in many settings including workplace training and education. Thus, students can interact with instructional materials dynamically and enjoyably because of the motivating psychology incorporated into game-based learning. Creating learning activities that may progressively introduce concepts and direct users toward a final objective is what is meant by game-based learning, which goes beyond simply making games for students to play. Conventional games can include feedback mechanisms, points, incentives, and competitiveness. To get students interested in learning, these ideas are becoming more and more common in education.

According to research studies in the education domain, computer games provide an enjoyable and comfortable learning environment for students and improve their problem-solving skills (Ebner & Holzinger, 2007). In addition to this, games provide an effective learning environment by enabling students to use their prior knowledge, giving immediate feedback, and giving active roles to the students (Oblinger, 2004). Computer games are seen as motivating learning tools by the learners (Kirriemuir & Mcfarlane, 2004). Also, mobile games provide opportunities to engage students in several studies like social studies, science, mathematics, and language (Liu, Geurtz, Navarette, Ko, & Lim, 2014). Language teaching is one of the educational contexts that have been affected by technological improvements (Yaratan & Kural, 2010). Computer-assisted language learning (CALL) is using technology, especially multimedia applications, to support different areas of language learning, such as grammar, writing, and vocabulary acquisition. Computer games are one of the examples of CALL applications in language learning (Levy, 2009). Mobile Assisted Language Learning (MALL) enables students to learn the language anytime and anywhere (Valarmathi, 2011). Vocabulary acquisition, while learning a foreign language, is seen as a difficult part of learning the language (Meara, 1980). Vocabulary acquisition is important, since without vocabulary, the language cannot be used effectively. In order to use a foreign language, the learner needs to know a large number of words to understand written texts and spoken expressions. This means that learners of a language should extend their vocabulary to communicate meaningfully in that language. To enhance learners' vocabulary acquisition in learning a foreign language, games can be used as effective vocabulary learning tools: games can take the attention of students and motivate them because they like playing games (Yip & Kwan, 2006). The present study looks to apply gamified strategies that could keep aviation personnel motivated and engaged in learning technical aviation vocabulary.

The study of Ray and Ilangovan (2024), “A Digital Game-Based Learning in Higher Education: ESL Teachers and Students Perceptions”, aims to investigate the effectiveness of digital game-based vocabulary learning (DGBVL) by examining the existing literature on DGBVL, Identify the benefits and limitations of using digital games for vocabulary learning, Explore the methodologies and tools used in studies on DGBVL and Assess the overall impact of DGBVL on learners of different age groups and language proficiencies.

The results obtained in the review included 13 studies that met the inclusion criteria. Key findings from these studies are:

- **Effectiveness:** All six quasi-experimental studies found that digital games effectively enhanced vocabulary learning. Four of these studies reported that the experimental group outperformed the control group in both immediate and delayed post-tests.
- **Engagement and Motivation:** Digital games created engaging learning environments and provided an interesting way to learn vocabulary. They also helped learners build self-confidence and promoted autonomous learning behaviors.
- **Age Groups**: The studies covered a wide range of age groups, from elementary school students (11 years old) to older adults (60 years old). Teenagers were the most frequent research group.
- **Methodologies:** Commonly used methods included quasi-experiments, semi-structured interviews, and questionnaires. There was a lack of standardized tests for assessing gaming vocabulary, indicating the variable nature of games.

The benefits found in the investigation of DGBVL:

- Cognitive and Behavioral Outcomes: Digital games facilitated vocabulary acquisition and enriched grammatical competence. They increased exposure to the target language and engagement among learners.
- Motivational Outcomes: Games provided a personalized learning experience, making learners feel safe and less anxious about making mistakes. This was particularly beneficial for adults, who might not be digital natives.
- Game-Enhanced Learning: Apart from digital game-based learning, the review also discussed game-enhanced learning, where commercial off-the-shelf games were used for educational purposes. These games, popular among the general public, could enhance cultural awareness and language learning through authentic communication.

  In the context of our investigation about improving aviation English technical vocabulary for pilots, air traffic controllers, and maintenance personnel, these tools offer several benefits:

  - **Contextualized Learning:** Using Kahoot! and Mentimeter to create quizzes and polls based on real-life aviation scenarios can help learners practice and retain technical vocabulary in relevant contexts.
  - **Enhanced Engagement:** The gamified elements of Kahoot! and the interactive features of Mentimeter can make learning technical vocabulary more engaging and less daunting, particularly for adult learners who may find traditional methods less motivating.

- **Immediate Feedback:** Immediate feedback on quizzes and polls allows learners to quickly correct mistakes and reinforce correct vocabulary usage, aiding in better retention and understanding.
- **Collaborative and Competitive Learning:** These tools can promote a sense of community and healthy competition among aviation personnel, encouraging them to learn from each other and strive for improvement.
- **Adaptability and Inclusivity:** The tools' flexibility and inclusivity ensure that all learners, regardless of their initial proficiency level, can participate actively and benefit from the learning process. This is crucial for a diverse group like the Ecuadorian Army Aviation personnel.

The study of Vnucko and Klimova (2023) "Exploring the Potential of Digital Game-Based Vocabulary Learning", offers a comprehensive analysis of the effectiveness and potential of digital game-based learning (DGBL) for vocabulary acquisition. It highlights the motivational benefits, increased engagement, and improved retention rates associated with gamified learning environments. By critically assessing a range of studies, the review identifies both the strengths and limitations of DGBL, noting that while digital games can significantly enhance vocabulary learning, their effectiveness is contingent on factors such as game design, implementation context, and learner characteristics.

Thus, digital games are effective tools for vocabulary learning due to their interactive nature and ability to provide contextualized language experiences. Key findings from the systematic review indicate that digital games enhance learner motivation and engagement through interactive and competitive elements, provide immediate feedback allowing learners to correct

mistakes, and reinforce learning in real-time, create immersive environments where vocabulary is learned in context, making it more relevant and easier to remember.

The Results found in this review showed that digital games can significantly improve vocabulary acquisition. The success of DGBL depends on the design of the game, the context in which it is used, and the characteristics of the learners.

As follows, the present investigation is related to the systematic review's findings that digital games can enhance vocabulary learning. However, for the specific context of aviation English, which involves highly technical and specialized vocabulary, additional considerations must be taken into account. The gamified strategies must be modified to address the unique needs of pilots, air traffic controllers, and maintenance personnel, ensuring that the vocabulary is relevant and practical for their professional tasks. Therefore, while the review provides a strong foundation, it is necessary to adapt and expand upon these strategies to fit the specific requirements of aviation English learners.

For the Application in Aviation English there are specific needs:

- **Pilots:** Need to understand and use technical terms related to aircraft operations, navigation, and emergency procedures.
- **Air Traffic Controllers:** Require a comprehensive vocabulary to communicate effectively with pilots and ensure safety and efficiency in air traffic management.
- **Maintenance Personnel:** Must be proficient in technical terms related to aircraft maintenance, repair, and troubleshooting.

Addressing Needs with Gamified Learning

- **Contextualized Vocabulary:** Games can simulate real-life scenarios where aviation English is used, helping learners understand the practical application of the vocabulary.
- **Engagement:** The competitive and interactive nature of games increases learner engagement, making the learning process more enjoyable and effective.
- **Immediate Feedback:** Games provide instant feedback, allowing learners to quickly identify and correct mistakes.
- **Retention:** The immersive and repetitive nature of games helps reinforce vocabulary retention.

The present study explores the most suitable gamified strategies in order to get potential benefits from them as a way of enhancing the motivation and engagement of pilots, air traffic controllers, and maintenance personnel in the learning of technical aviation vocabulary. The study tries to investigate the effectiveness of gamified approaches in promoting a positive learning experience and encouraging active participation among personnel. To achieve this goal, the study will examine some gamification techniques like Kahoot and Mentimeter where we can find game-based learning, badges, points, leaderboards, and challenges, among others. Each of these techniques will be analyzed based on their potential to enhance aviation personnel engagement, motivation, and retention of technical aviation vocabulary. The study will also explore the role of feedback and rewards in promoting a positive learning experience. The study will be conducted using a quantitative research method that can help to identify the English lingual level of aviation personnel from different levels and roles, including pilots, ground crew, and air traffic controllers.

The study will theoretically explore participants' engagement, motivation, and satisfaction with the proposed gamified learning experience. The study's expected outcomes include exploring the most effective gamification techniques to promote aviation personnel engagement and motivation in technical aviation vocabulary learning. Consequently, the development of effective gamification strategies will help in aviation training programs to increase personnel performance and safety.

The study developed by Gokbulut (2020), about "The Effect of Mentimeter and Kahoot Applications on University Students", explores the impact of these gamified tools on student engagement and learning outcomes. By employing an experimental design with a control group and a pretest-posttest model, the research demonstrates that these applications significantly enhance students' motivation, participation, and comprehension. The study suggests that the interactive and competitive elements of Mentimeter and Kahoot create a more stimulating learning environment compared to traditional methods, resulting in better retention and understanding of the material.

The objectives looked to determine the effect of Mentimeter and Kahoot on student engagement and motivation and to assess the impact of these tools on learning outcomes and retention of course content. In this sense the results obtained were that the experimental group using Mentimeter and Kahoot showed significantly higher levels of engagement and motivation compared to the control group. And the students in the experimental group demonstrated better retention and understanding of the course material.

This investigation supports the idea that gamification in educational contexts can lead to improved learning outcomes by increasing student engagement and motivation. The positive results from the use of Mentimeter and Kahoot can be extrapolated to other learning environments, such as aviation English training for military personnel. The interactive nature of these tools aligns

with constructivist learning theories, which emphasize active participation and collaboration as essential components of effective learning. Integrating similar gamified strategies could provide a robust theoretical foundation for enhancing aviation English vocabulary proficiency through increased aviation staff engagement and motivation. Consequently, gamified tools like Mentimeter and Kahoot create a competitive and enjoyable learning environment, which increases student motivation and participation. The interactive features of these tools facilitate better comprehension and retention of information.

The investigation developed by Hernández and Belmonte (2020), "Assessment of the Use of Kahoot! On Face-to-Face and Virtual Higher Education", provides an insightful evaluation of Kahoot as a pedagogical tool in different educational settings. It effectively highlights the increased engagement and motivation that Kahoot can raise among students, which aligns with the broader literature on gamification and active learning (Licorish et al., 2017; Silva et al., 2018). The authors note that Kahoot contributes to a more dynamic and interactive learning environment, particularly benefiting remote learners who might otherwise struggle with engagement in traditional lecture formats.

The results indicate that students in virtual learning environments rated Kahoot more favorably compared to their face-to-face counterparts. This finding suggests that Kahoot may offer unique benefits in virtual settings where traditional engagement strategies are less effective.

Thus, this study supports our investigation because it positively influences student engagement and satisfaction with learning vocabulary with motivation even in a virtual mode. The evidence supporting higher ratings from virtual learners is consistent with the idea that gamified tools can counteract some of the challenges of remote education, such as lack of interaction and motivation

The study by Navinkumar and Sivakami (2024) “Learning by Gaming: Investigating the Effectiveness of Kahoot! on Young ESL Learners’ Language Performance" provides substantial evidence of the positive impact of gamification in language learning. It demonstrates that the interactive nature of Kahoot!, a game-based learning platform, significantly enhances students' engagement, motivation, and performance in acquiring English grammar skills. The study employed a pre-experimental design with pre-tests and post-tests, revealing that students who participated in Kahoot!-based activities showed marked improvements compared to traditional teaching methods. The authors argue that gamification, through its competitive and interactive elements, creates a more stimulating learning environment, promoting better retention and application of language skills. The results showed a significant improvement in grammar acquisition among students using Kahoot! Also, students reported increased motivation and engagement levels

The present investigation agrees with the study's findings that gamified platforms like Kahoot! can significantly enhance language learning. The evidence that gamification boosts engagement and motivation is particularly relevant for our investigation on improving aviation English technical vocabulary. These elements are crucial for maintaining the attention and interest of adult learners, such as pilots, air traffic controllers, and maintenance personnel, who may otherwise find technical vocabulary learning monotonous. In this sense, Aviation English involves highly specialized vocabulary and contexts. Thus, the gamified strategies should incorporate vocabulary used in real-life aviation scenarios, simulations, and terminology relevant to the field. This goes beyond the general ESL focus of the Kahoot! study, necessitating the development of customized content for aviation personnel.

This investigation is intended to help aviation staff facilitate technical vocabulary learning through gamified activities that provide real-world aviation scenarios. Incorporating gamified strategies for aviation English technical vocabulary is a promising approach, supported by the positive outcomes of gamification in general language learning contexts. However, the unique demands of aviation training require a specialized approach, integrating context-specific content, practical application assessments, and strategies adapted to adult learners. This investigation wants to contribute significantly to the aviation field by addressing these specific needs and demonstrating the efficacy of gamified learning in a highly specialized and professional context.

The study by Alsswey and Malak (2024) "Effect of using gamification of Kahoot! as a learning method on stress symptoms, anxiety symptoms, self-efficacy, and academic achievement among university students", explores the impact of gamified learning through Kahoot! on various psychological and academic outcomes among university students. This research is particularly relevant in the context of modern educational challenges, where traditional teaching methods often fall short in engaging students and addressing their psychological well-being.

By implementing a pre-posttest control group design, the study demonstrates that the use of Kahoot! significantly reduces stress and anxiety while enhancing self-efficacy and academic achievement. The findings suggest that gamified learning can create a more interactive and enjoyable learning environment, leading to better educational outcomes and psychological health.

For our investigation on improving aviation English technical vocabulary, this study provides a strong theoretical foundation. It highlights the effectiveness of gamified learning in reducing stress and anxiety which are critical factors in the high-stakes environment of aviation. The improved self-efficacy and academic achievement observed in the study suggest that similar

strategies could enhance the technical vocabulary proficiency of pilots, air traffic controllers, and maintenance personnel.

Our investigation agrees with the study's findings that gamified learning can positively impact stress, anxiety, self-efficacy, and academic achievement. These outcomes are crucial for the context of aviation, where high levels of stress and the need for precise communication and technical knowledge are prevalent. However, the study focuses on university students in general, not specifically on technical vocabulary or the high-stress environment of aviation that's why for the present investigation it is essential to:

- **Contextualize Gamified Learning:** Adapt gamified activities specifically to aviation English, incorporating technical vocabulary and real-life scenarios that aviation personnel encounter.
- **Address Domain-Specific Needs:** Focus on the unique stressors and communication challenges faced by pilots, air traffic controllers, and maintenance personnel.
- **Reduction of Stress and Anxiety:** Implementing gamified learning through tools like Kahoot or Mentimeter can help reduce stress and anxiety among aviation personnel, creating a more conducive learning environment for mastering technical vocabulary.
- **Enhanced Self-Efficacy:** By using gamified learning, aviation personnel can gain confidence in their language skills, which is crucial for effective communication and performance in high-pressure situations.

The connection between these theoretical foundations and gamification strategies is crucial for addressing the learning needs of aviation professionals. Studies such as Tomcho (2019) and Mcsorley (2022) have highlighted the potential of gamification to increase engagement, motivation, and knowledge retention, especially in technical fields. These findings are relevant to

this study as they demonstrate how game-like elements can enhance vocabulary acquisition. The current research builds on these studies by adapting gamified tools like **Kahoot!** and **Mentimeter** to the specific challenges of learning technical aviation English. The aim is to create a more interactive and stimulating learning environment that helps aviation personnel retain complex vocabulary while improving safety and communication efficiency.

THEORIES

The theoretical foundation of this study is built on two primary learning theories: **Constructivism** and **Connectivism**. Constructivism, as proposed by Piaget and Vygotsky, emphasizes that learners construct their own knowledge through experiences and reflection, making it particularly relevant for the practical learning of technical aviation vocabulary. By engaging in gamified activities, aviation personnel can interact with content in a meaningful way, reinforcing their learning through real-world application. On the other hand, **Connectivism**, as outlined by Siemens, recognizes the importance of digital networks and collaboration in the learning process, especially in today's interconnected world. This theory highlights how learners can benefit from digital tools and online platforms, such as **Kahoot!** and **Mentimeter**, to build knowledge networks that facilitate active engagement and retention of aviation technical vocabulary. These theories together provide a robust framework for examining how gamified strategies can increase the learning of aviation English technical vocabulary for pilots, air traffic controllers, and maintenance personnel.

This research is based on the following learning theories: Connectivism, and Constructivism, and its methods are Game-Based Learning and Gamification in EFL METHODS for teaching technical vocabulary. First, the Connectivism Learning Theory by George Siemens

and Stephen Downes developed a theory for the digital age, called connectivism, denouncing boundaries of behaviorism, cognitivism, and constructivism.

Connectivism states its learning theory as a social learning that is networked. Stephen Downes described it as: "… the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks" (Downes, 2007, p.1). Connectivism is seen as a reflection of our fast changing society. Society is becoming increasingly complicated, socially and globally connected, and mediated by technological improvements. It is the orchestration of a complex jumble of concepts that have been networked to produce specific information sets. Different points of view lead to different ways of knowing. The person has no control; rather, it is a partnership of contemporary ideas as seen through the lens of current reality. The ability to detect connections between knowledge sources and sustain those connections to support continuous learning is an essential skill. Decisions are backed by fast-changing fundamentals, as new knowledge is rapidly assimilated to generate a new mental climate. This ongoing updating and shifting of knowledge can also be stored outside of the learner, for example, in a database or other specialized information source. It is more crucial for the learner to be connected to this outside information than his or her current state of knowing.

"The first point of connectivism is the individual. Personal knowledge consists of a system of networks, which supplies an organization, which in turn gives back to the system. The individual continues the cycle of knowledge growth by his or her access back into the system. The advantage is that the learner can remain current on any topic through the connections they have created. Within any defined social network, there is a focus on groups of people with a common goal. They can promote and sustain a well-organized flow of knowledge" (Siemens, 2004).

Siemens stated that: “Exponentially developing knowledge and complexification of society requires nonlinear models of learning (process) and knowing (state). We cannot sustain ourselves as learning/knowing beings in the current climate with our current approaches” (Siemens, 2009, p. 3).

With increasing technological connection through the Internet, digital cities that collaborate on a wide array of topics have become a collective network that links communities both locally and globally. This paradigm shift and proliferation of social networks have caused educators to embrace this new option for knowledge for use in the classroom. From his viewpoint, Siemens (2006) pointed out that “knowledge has changed from categories and hierarchies to networks and various ecologies”. Knowledge is based on the two ideas that it explains some part of our existence, and that the knowledge is useful for some kind of action. “Viewing learning and knowledge as network phenomena alters much of how we have experienced knowledge in the last century” (Siemens, 2004, p. vii).

Concepts can be viewed much like a mind map, as a network, rather than as a linear progression of ideas. He asserts that this networking is how an individual receives learning. Therefore, with such a dramatic change that is continually developing through technology, its institutions, and schools are all “stretching under the heavy burden of change. New epistemological and ontological theories are being formed…” (Siemens, 2006, p. 3).

The main objective of the present research is to explore gamified strategies to support the learning of aviation English technical vocabulary among pilots, air traffic controllers, and maintenance personnel of the Ecuadorian Army Aviation, taking guidance from the learning theories related to the study, such as the Connectivism Learning Theory. The Connectivism

Learning Theory is a relatively new learning theory that has emerged in response to the arrival of the internet and the subsequent explosion of digital information.

The theory suggests that learning is best achieved by connecting with others and engaging in interactive and collaborative activities that take advantage of the vast collection of information and knowledge available on the internet. According to this theory, the creation and sharing of knowledge are integral to the learning process, and technologies that enable learners to connect with others and build networks of knowledge are key to effective learning.

The emergence of Web 2.0 technologies has made it possible for learners to access a wide range of opinions and views, opening up the way for new channel forms of communication and knowledge formation that can used for learning.

By taking advantage of learning games, the research tries to create an engaging and interactive learning environment that promotes learning and improves knowledge retention among army aviation personnel.

Connectivism is among the most prominent network learning theories that have been developed for e-learning environments, offering useful insights into understanding and managing teaching and learning digital technologies. By focusing on the Connectivism Learning Theory, the research attempts to provide a comprehensive view of how gamified strategies can be exploited to improve the learning of technical vocabulary in aviation. Ultimately, the study aims to contribute to the development of more effective pedagogical practices that can be adopted in various educational contexts.

Secondly, Constructivism is a theory of learning based on observation and scientific study about how people learn. It says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences (Bereiter, 1994).

When we encounter something new, we have to reconcile it with our previous ideas and experiences, maybe changing what we believe or discarding the new information as irrelevant. In any case, we are active creators of our own knowledge. To do this, we must ask questions, explore, and assess what we know.

In the classroom, the constructivist view of learning can point toward several different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. The teacher makes sure he or she understands the students' preexisting conceptions and guides the activity to address them and then build on them (Oliver, 2000).

Constructivism has roots in philosophy, psychology, sociology, and education. But while it is important for educators to understand constructivism, it is equally important to understand the implications this view of learning has for teaching and teacher professional development (Tam, 2000). Constructivism's central idea is that human learning is constructed and that learners build new knowledge upon the foundation of previous learning. This view of learning sharply contrasts with one in which learning is the passive transmission of information from one individual to another, a view in which reception, not construction, is key. Two important notions orbit around the simple idea of constructed knowledge. The first is that learners construct new understandings using what they already know. There is no tabula rasa on which new knowledge is etched. Rather, learners come to learning situations with knowledge gained from previous experience, and that prior knowledge influences what new or modified knowledge they will construct from new learning experiences (Phillips, 1995).

The second notion is that learning is active rather than passive. Learners confront their understanding in light of what they encounter in the new learning situation. If what learners encounter is inconsistent with their current understanding, their understanding can change to accommodate new experiences. Learners remain active throughout this process: they apply current understandings, note relevant elements in new learning experiences, judge the consistency of prior and emerging knowledge, and based on that judgment, they can modify knowledge (Phillips, 1995).

According to Driscoll (2000), constructivism learning theory is a philosophy that enhances students' logical and conceptual growth. The underlying concept within the constructivism learning theory is the role that experiences or connections with the adjoining atmosphere play in student education. The constructivist learning theory argues that people produce knowledge and form meaning based on their experiences. Two of the key concepts within the constructivism learning theory that create the construction of an individual's new knowledge are accommodation and assimilation. Assimilation causes an individual to incorporate new experiences into their old ones. This causes the individual to develop new outlooks, rethink what were once misunderstandings, and evaluate what is important, ultimately altering their perceptions. Accommodation, on the other hand, is reframing the world and new experiences into the mental capacity already present. Individuals conceive of a particular fashion in which the world operates. When things do not operate within that context, they must accommodate and reframe the expectations with the outcomes.

Constructivism is often compared to objectivism, which is usually quoted as being the counterpoint or direct opposite of constructivism. Much of objectivist theory is based on the work of behaviorists such as Skinner (1953). Objectivists believe that information itself is knowable

outside the bounds of any human mind and that any individual interpretation of knowledge can be said to be either correct or incorrect. Objectivists view individual pieces of information as symbols or currency that can be acquired by humans and transferred from humans to humans should the correct learning conditions exist.

Jonassen, (1991) While much of the early work in formal instructional design derived from objectivist theory, modern academic minds have come to accept that learning environments that more closely match the needs of constructivist learning may be more effective.

The perceived benefits of constructivist learning may be particularly valuable where the teaching of complex skills, such as problem-solving or critical thinking skills, are concerned (Tam, 2000.)

Tam (2000) lists the following four basic characteristics of constructivist learning environments, which must be considered when implementing constructivist instructional strategies:

1) Knowledge will be shared between teachers and students.

2) Teachers and students will share authority.

3) The teacher's role is one of a facilitator or guide.

4) Learning groups will consist of small numbers of heterogeneous students."

Pedagogical Goals of Constructivist Learning Environments

Honebein (1996) summarizes what he describes as the seven pedagogical goals of constructivist learning environments:

1) "To provide experience with the knowledge construction process (students determine how they will learn).

2) To provide experience in and appreciation for multiple perspectives (evaluation of alternative solutions).

3) To embed learning in realistic contexts (authentic tasks).

4) To encourage ownership and a voice in the learning process (student-centered learning).

5) To embed learning in social experience (collaboration).

6) To encourage the use of multiple modes of representation, (video, audio text, etc.)

7) To encourage awareness of the knowledge construction process.

Principles of Constructivism

Caine and Caine (1991) suggest that brain-compatible teaching is based on 12 principles:

1) " The brain is a parallel processor. It simultaneously processes many different types of information, including thoughts, emotions, and cultural knowledge. Effective teaching employs a variety of learning strategies.
2) Learning engages the entire physiology. Teachers can't address just the intellect.
3) The search for meaning is innate. Effective teaching recognizes that meaning is personal and unique and that students' understandings are based on their own unique experiences.
4) The search for meaning occurs through 'patterning'. Effective teaching connects isolated ideas and information with global concepts and themes.
5) Emotions are critical to patterning. Learning is influenced by emotions, feelings, and attitudes.
6) The brain processes parts and wholes simultaneously. People have difficulty learning when either parts or wholes are overlooked.

7) Learning involves both focused attention and peripheral perception. Learning is influenced by the environment, culture, and climate.
8) Learning always involves conscious and unconscious processes. Students need time to process 'how' as well as 'what' they've learned.
9) We have at least two different types of memory: a spatial memory system, and a set of systems for rote learning. Teaching that heavily emphasizes rote learning does not promote spatial, experienced learning and can inhibit understanding.
10) We understand and remember best when facts and skills are embedded in natural, spatial memory. Experiential learning is the most effective.
11) Learning is enhanced by challenge and inhibited by threat. The classroom climate should be challenging but not threatening to students.
12) Each brain is unique. Teaching must be multifaceted to allow students to express preferences."

Brooks and Brooks (1993) summarize a large segment of the literature on descriptions of constructivist teachers‟. They conceive of a constructivist teacher as someone who will:

- Encourage and accept student autonomy and initiative; use a wide variety of materials, including raw data, primary sources, and interactive materials and
- Encourage students to use them;
- Inquire about students‟ understanding of concepts before sharing his/her understanding of those Concepts.
- Encourage students to engage in dialogue with the teacher and with one another;
- Encourage student inquiry by asking thoughtful, open-ended questions and encourage students to ask.

- Questions to each other and seek elaboration of students‟ initial responses;
- Engage students in experiences that show contradictions to initial understandings and then encourage them.
- Discussion; provide time for students to construct relationships and create metaphors;
- Assess students‟ understanding through the application and performance of open-structured tasks.”

According to Bada (2015), one of the key concepts in education is constructivism. It has far-reaching effects on how teachers instruct and are instructed. Students must be the center of our efforts if we are to successfully improve education for all students. Possibly the most significant contribution of constructivism to date is its emphasis on student-centered learning. Thus, as a paradigm for instruction and learning, constructivism learning theory is covered in this article. Constructivism is a psychological theory of learning that describes how individuals might pick up information and learn. As such, it directly relates to education. According to his study, people derive meaning and knowledge from their experiences.

Bada's study indicated that teachers who adopted a constructivist approach to education inspire their students to engage in constant self-reflection, analyzing how their learning activities are contributing to their overall understanding. This pedagogical methodology requires instructors to be reflective practitioners, continuously evaluating and adjusting their teaching methods to effectively apply these principles to their work. As a result, the present research tries to encourage army aviation personnel to incorporate gamification strategies into their learning processes, promoting a more interactive and engaging approach to acquiring technical aviation vocabulary.

The learning theories of **Constructivism** and **Connectivism** are integral to understanding how gamified strategies can reinforce the learning of technical aviation English vocabulary in the context of military aviation. Constructivism supports the idea that learners build new knowledge by connecting it with prior experiences, which is especially important for aviation personnel who need to relate complex technical terms to real-life scenarios. This theory aligns with the use of game-based learning platforms, as they allow learners to actively engage with vocabulary in practical, meaningful contexts. **Connectivism**, on the other hand, emphasizes the role of digital tools and networks in modern learning environments, which is particularly relevant given the digital nature of gamified tools like **Kahoot!** and **Mentimeter**. These platforms promote collaboration and allow for dynamic, interactive learning, essential for mastering aviation-specific terminology. Together, these theories provide a strong foundation for the research, showing how gamified strategies can make technical vocabulary learning more engaging, interactive, and effective for aviation professionals.

CHAPTER II

METHODOLOGICAL DESIGN

This study adopts a quantitative approach, emphasizing the systematic collection and analysis of numerical data to address the research objectives effectively. Questionnaires and surveys were used to obtain preliminary results. The research design is descriptive and exploratory, focusing on analyzing the potential impact of gamified strategies on technical aviation English vocabulary learning. Furthermore, the research aims to develop and validate a didactic guide designed to support vocabulary retention and engagement through the use of tools such as Kahoot and Mentimeter. This chapter outlines the methodology employed to investigate these strategies and their relevance in supporting technical vocabulary proficiency among pilots, air traffic controllers, and maintenance personnel in the Ecuadorian Army Aviation.

The methodology outlined presents a clear and well-structured approach, aligned with the research goals. It is divided into five key sections. The first section details the research approach and design questions to be addressed. The second section describes the research context. The third section focuses on data collection methods, including an operationalization chart and study categories, providing a thorough explanation of the techniques, methods, and instruments used to implement the gamified didactic proposal for reinforcing the learning of aviation English technical vocabulary. The fourth section discusses the reliability of the research process and outlines the

phases followed, ensuring consistency with the chosen research design. Finally, the fifth section analyzes the didactic proposal based on gamified activities, offering insights into the potential effectiveness of the proposed strategy. Overall, this methodology provides a robust foundation for the research, demonstrating thoughtful planning and a well-defined structure.

Research approach and design

According to Creswell (2018), "Quantitative research involves the collection and analysis of numerical data to identify patterns, relationships, and trends, typically using statistical methods" (p. 5). This study follows a quantitative research approach because it aims to collect and analyze numerical data to assess the proficiency level of aviation English technical vocabulary among pilots, air traffic controllers, and maintenance personnel. By using statistical methods, the study will identify patterns and trends in vocabulary proficiency that will guide the development of the didactic proposal.

In addition to being quantitative, this study adopts a descriptive exploratory design. According to Leedy and Ormrod (2015), exploratory research aims to investigate a phenomenon, identify patterns, and generate insights into a problem when there is limited understanding. This design is particularly useful in this study to describe and explore the current proficiency levels of technical vocabulary and how gamified strategies could influence the learning process. The study aims to uncover patterns in the current proficiency and examine the potential role of gamification in vocabulary learning. To achieve this, the research will use questionnaires and surveys during the diagnostic phase to gather relevant data, which will inform the design of the didactic guide. The study will also integrate tools such as Kahoot and Mentimeter to incorporate interactive learning methods into the vocabulary learning process.

Exploratory Descriptive Design

The goal of using a quantitative approach is to explore how participants learn technical vocabulary and evaluate the feasibility of the proposed gamified strategies. Through data collection tools such as questionnaires and surveys, the study aims to assess the proficiency levels of aviation English technical vocabulary among pilots, air traffic controllers, and maintenance personnel in the Ecuadorian Army Aviation. This data will provide a solid foundation for understanding the current state of technical vocabulary learning and the potential of the proposed tools.

The research adopts an exploratory descriptive design. This design is particularly suitable when studying phenomena that are not well-understood or when the research aims to explore new areas without preconceived hypotheses (Creswell, 2018). In this case, the aim is to describe and understand how participants learn technical vocabulary and evaluate whether the proposed gamified approach is feasible within the context of aviation English. The study will explore how tools such as Kahoot and Mentimeter can impact the learning process and potentially enhance engagement in a real-world educational setting. This design allows for a detailed examination of the learning process and provides insights into how gamification might influence vocabulary learning.

Data collection process:

a) The variable operationalization chart or Categories of study

Table 1

Operationalization chart

Research question	Type of Research - Method	Specific objectives	Techniques for data collection	Instruments	Purpose of the instrument
How can gamified strategies reinforce the learning of Aviation English Technical Vocabulary in Aviation personnel?	Quantitative Research with a Descriptive and Exploratory Design for the Validation of a Didactic Proposal.	To identify the level of aviation English technical vocabulary in the army aviation personnel.	Questionnaire	Test of technical aviation English technical vocabulary	To assess the level of aviation English technical vocabulary in the army aviation personnel
		To design a didactic guide based on gamified activities in order to enhance the learning of aviation English technical vocabulary in the army aviation personnel.	Survey	Multiple choice questions	To know the most suitable gamified strategies to reinforce the learning of aviation English technical vocabulary
		To validate the proposal of gamified strategies in the learning process of aviation English technical vocabulary.	Expert validation	Survey validation	To validate the didactic proposal in order to know the effectiveness of gamified strategies in the learning process of the aviation English technical vocabulary

Elaborated by: Llerena, D (2024)
Source: Direct Research

Table 2

Categories of study Gamified Strategies

Category	Conceptual Definition	Dimension	Indicators	Technique and Instrument	Items
Gamified strategies	"Gamification strategies make the teaching and learning process more dynamic because digital games have become an important part of learners' lives." (Krokfors, Kangas, & Kopisto 2014, p.13).	Types of gamified strategies	- Visually Appealing Designs - Competitions - Storylines - Challenges - Point Systems - Badges - Leaderboards	Survey Questionnaire	Develop a questionnaire to know the preferences in types of gamified strategies.
		Technical vocabulary	- Pilots and ATC phraseology - Maintenance aircraft vocabulary		
		Resources	- Videos - Interactive activities		

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Table 3

Categories of study Aviation English Technical Vocabulary

Category	Conceptual Definition	Dimension	Indicators	Technique and Instrument	Items
Aviation English Technical Vocabulary	"Technical Vocabulary is subject-related, occurs in a specialist domain, and is part of a system of subject knowledge" (Chung & Nation, 2004, p.252)	Pilots and Air traffic Controllers' phraseology	Aeronautical phraseology.	Questionnaire	Develop a questionnaire about aviation English technical vocabulary for pilots, air traffic controllers, and maintenance personnel. Use a questionnaire with multiple choice questions about aviation English technical vocabulary.
		Maintenance personnel vocabulary	Technical maintenance vocabulary		

Elaborated by: Llerena, D. (2024)
Source: Direct Research

b) Techniques and Data collection instruments

The proposed research explores the effectiveness of gamified strategies in learning aviation English technical vocabulary. To achieve this, the study will employ various data collection techniques, including detailed questionnaires, comprehensive surveys, and expert validation. These methods will help develop a robust test designed to assess participants' existing knowledge of aviation English vocabulary, their preferences for gamified learning strategies, and the potential effectiveness of these strategies.

Data will be systematically collected through these questionnaires and surveys, capturing both current proficiency levels and feedback on the gamified approaches used. Expert validation will further ensure the reliability and relevance of the methods employed. Additionally, a documentary review of pertinent aviation manuals and ICAO standards will guide the design of the vocabulary learning tools, ensuring they meet industry requirements and effectively address the needs of the Ecuadorian Army Aviation personnel.

The instruments detailed in the category chart are designed to theoretically analyze the potential effectiveness of the proposed gamified strategies in the study. This research will use a comprehensive approach to analyze the potential impact of gamification in the learning of aviation English technical vocabulary. The evaluation will include a combination of questionnaires, surveys, tests, and beneficiary validation. Data collected from these instruments will play a crucial role in refining the didactic guide, ensuring its effectiveness in the learning of aviation English technical vocabulary among Ecuadorian Army Aviation personnel.

This innovative methodology, which integrates gamified strategies with industry standards, has the potential to significantly improve the teaching of technical vocabulary in aviation English.

The findings are anticipated to inform best practices in language education and could have substantial implications for the learning of technical vocabulary among Army Aviation members.

Questionnaire

- **Purpose**: To assess the initial level of aviation English technical vocabulary among participants.
- **Target Group:** Pilots, air traffic controllers, and maintenance personnel.
- **Items:** Multiple choice questions focused on aviation-specific terminology and phraseology.
- **Implementation:** Aviation personnel complete the questionnaire at the beginning of the study to establish a baseline vocabulary proficiency level.

Survey

- **Purpose:** To gather data on Aviation personnel preferences and perceptions regarding different gamified strategies.
- **Target Group:** Aviation personnel
- **Items:** Questions designed to gauge the effectiveness, engagement, and motivational aspects of various gamified elements (e.g., point systems, challenges, leaderboards).
- **Implementation:** Conducted after implementing gamified activities to understand their impact and gather feedback.
-

Expert Validation

- **Purpose:** To validate the didactic proposal and the effectiveness of gamified strategies.

- **Target Group:** aviation specialists.
- **Items:** Comprehensive surveys and feedback forms will focus on analyzing the feasibility, applicability, and potential improvements of the proposed gamified strategies.
- **Implementation:** Aviation experts review the proposal and provide detailed feedback on its strengths, weaknesses, and suggestions for improvement.

Dimensions and Indicators

1) **Aviation English Technical Vocabulary**

Pilots and Air traffic Controllers

- **Dimension:** Pilots and Air Traffic Controllers' Phraseology
- **Indicator:** Knowledge and use of aeronautical phraseology.
- **Technique and Instrument:** Questionnaire with multiple choice questions tailored to aviation terminology.

Maintenance Personnel

- **Dimension:** Maintenance Personnel Vocabulary
- **Indicator:** Understanding of technical maintenance vocabulary.
- **Technique and Instrument:** Questionnaire and vocabulary tests focusing on maintenance-specific terms.

2) **Gamified Strategies**

- **Dimension:** Types of Gamified Strategies
- **Indicator:** Preferences and effectiveness of different gamified elements (e.g., visually appealing designs, competitions, storylines).
- **Technique and Instrument:** Survey questionnaire to determine the most engaging and effective gamified strategies for vocabulary learning.

Techniques and Data Collection Instruments

1) **Detailed Questionnaire:**
   - **Purpose:** To assess participants' baseline vocabulary knowledge and track progress.
   - **Implementation:** Administered at the start and periodically during the study.
2) **Extensive Survey:**
   - **Purpose:** To collect detailed feedback on participants' experiences with gamified learning.
   - **Theoretical Analysis:** Conducted after participants have engaged with the proposed gamified activities to explore their potential impact.
3) **Expert Validation:**
   - **Purpose:** To ensure the reliability and validity of the didactic proposal.
   - **Implementation:** Experts review the proposal and provide structured feedback through surveys and feedback forms.

Reliability

To ensure the reliability of its findings, the current research employs Quantitative Research with a Descriptive and Exploratory Design complemented by a well-designed didactic proposal. This proposal, aimed at reinforcing the learning of aviation English technical vocabulary through gamified strategies, will undergo validation by subject-matter experts. Ensuring reliability is crucial to confirming that the results regarding the effectiveness of these gamified strategies are both dependable and replicable.

The research strengthens its reliability by integrating standardized procedures, expert validation, statistical analysis, and diverse data sources. This comprehensive approach provides a robust framework for achieving high reliability in the study's outcomes, thereby enhancing the credibility and generalizability of the findings.

Documentary Analysis

To provide solid support for the structure of the proposal and enhance the foundations of the research, a documentary analysis was conducted. This approach involved reviewing existing literature and relevant studies to gather insights into gamified learning strategies and their application in aviation English. Additionally, to ensure a comprehensive and well-rounded understanding, a triangulation of authors was employed. By incorporating perspectives from multiple experts in the field, the analysis allowed for cross-validation of concepts and ensured the reliability and depth of the findings. As More (1994) **e**xplains, triangulation is crucial in research as it combines various sources of information to ensure a more accurate and robust understanding of the research topic. Moreover, Bowen (2009) highlights that documentary analysis is a systematic approach to reviewing and analyzing existing documents to extract meaningful insights, providing a solid foundation for theory-building and proposal development. This method not only strengthened the theoretical framework but also aligned the proposal with established research, providing a solid basis for the development of the gamified strategies outlined in the study.

Analysis through the authors' triangulation

The research uses a documentary review of aviation manuals and ICAO language standards to ensure that the vocabulary taught aligns with industry requirements. The findings from questionnaires, surveys, and expert validation will be triangulated to validate the reliability of the results. By comparing different data sources, the study will build a comprehensive understanding of how gamified strategies influence technical vocabulary learning and ensure accuracy in its conclusions.

Triangulation

Impact of Gamification on Education Currently

Table 4

Triangulation on the Impact of Gamification on Education Currently

Author	Summary of Study
Kapp, K. M. (2012).	Kapp discusses how gamification enhances motivation and engagement in educational contexts by integrating game elements such as points, badges, and levels.
Wang, A. I. (2015).	Wang focuses on the use of Kahoot in classrooms, showing that game-based learning improves student participation and creates a competitive yet collaborative learning environment.
Hamari, J., Koivisto, J., & Sarsa, H. (2014).	Hamari et al. analyze multiple studies and conclude that gamification generally increases student engagement and academic performance across various educational platforms.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The integration of game mechanics like points, badges, and challenges (Kapp, 2012) transforms learning environments by increasing motivation and making the educational process more engaging. Additionally, tools such as Kahoot (Wang, 2015) create interactive and collaborative spaces that promote student participation and provide a fun, yet competitive learning experience. In contrast, the empirical evidence provided by Hamari et al. (2014) shows that gamification improves academic performance by enhancing student motivation and ensuring better knowledge retention.

Finally, these insights underline that gamification not only makes learning more dynamic but also improves engagement, collaboration, and academic outcomes across diverse educational settings.

Subcategory: Game-Based Learning (GBL)

Table 5

Triangulation on Game-Based Learning (GBL)

Author	Summary of Study
Trybus, J. (2015). Game-Based Learning: *What it is, Why it Works, and Where it's Going.*	Trybus defines game-based learning as applying gaming principles to real-life settings, to engage users. He highlights how GBL has been successfully implemented in education and workplace training, providing an enjoyable and motivating environment that enhances interaction with instructional materials.

Ebner, M., & Holzinger, A. (2007). ***Successful implementation of user-centered game-based learning in higher education: An experimental study.***	Ebner and Holzinger argue that computer games provide an enjoyable and comfortable learning environment, improving students' problem-solving skills. Their study also shows that games promote an effective learning environment by encouraging students to use their prior knowledge and offering immediate feedback.
Vnucko, M., & Klimova, B. (2023). ***Exploring the Potential of Digital Game-Based Vocabulary Learning.***	Vnucko and Klimova's study offers a **comprehensive analysis** of digital game-based learning for vocabulary acquisition. It emphasizes that digital games significantly enhance **engagement, motivation,** and **retention rates**. They also highlight that effectiveness depends on factors like **game design** and **learner characteristics**.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

All three authors concur on the positive impact of Game-Based Learning (GBL) on student engagement, motivation, and the development of skills such as problem-solving and vocabulary acquisition. Trybus (2015) focuses on the application of gaming principles to engage users in both educational and workplace settings, illustrating how GBL makes instructional material more dynamic and enjoyable. Similarly, Ebner and Holzinger (2007) provide empirical support for the learning benefits of computer games, demonstrating that they create comfortable learning environments that enhance problem-solving skills while offering immediate feedback to students. In addition, Vnucko and Klimova (2023) build on these ideas by exploring the potential of digital

game-based learning for vocabulary acquisition, highlighting the importance of game design and learner engagement in ensuring the success of the learning process.

Consequently, these perspectives emphasize that Game-Based Learning provides an interactive and immersive approach to education, enhancing both cognitive and language skills. While all three studies agree on the motivational and engaging aspects of GBL, they also acknowledge the significance of factors like game design, learner characteristics, and the implementation context in maximizing its impact.

Subcategory: Game Mechanics

Table 6

Triangulation on Game Mechanics

AUTHOR	Summary of Study
Zichermann, G., & Cunningham, C. (2011). *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. O'Reilly Media.	Zichermann and Cunningham define game mechanics as the core rules and procedures that guide player interactions in a game. They focus on key game mechanics like points, levels, leaderboards, badges, and challenges, emphasizing their role in motivating players to progress and achieve their goals.
Kapp, K. M. (2012). *The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education*. John Wiley & Sons.	Kapp highlights the importance of game mechanics such as replay, do-overs, and feedback loops. He stresses that these mechanics are central to enhancing learning retention and student engagement, particularly through repetition and continuous improvement in the learning process.

Nah, F. F., et al. (2014). ***Gamification of Education: A Review of Literature*.**	Nah et al. describe progress bars, levels, and leaderboards as essential mechanics for gamified learning. These elements create a competitive learning environment, where students can track their progress visually and compare their performance with others, increasing motivation through healthy competition.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The three authors align on the idea that game mechanics play a fundamental role in motivating learners and guiding them through the learning process. Zichermann and Cunningham (2011) introduce the MDA framework and identify core game mechanics such as points, levels, leaderboards, and badges, which drive player interaction and engagement. These mechanics make the learning experience more structured and goal-oriented by offering feedback and rewards that keep learners motivated. Additionally, Kapp (2012) emphasizes the role of mechanics like replay and do-overs, which are critical in educational settings because they allow students to revisit and improve their performance. He views game mechanics not only as a source of motivation but also as a way to enhance learning retention through continuous feedback and repetition. Moreover, Nah et al. (2014) highlight progress bars, levels, and leaderboards as key motivators in educational gamification, underlining how these mechanics promote a sense of competition and achievement. They argue that visual progress tracking helps students stay motivated by showing them how far they've progressed and how they rank compared to their peers.

Overall, these perspectives indicate that game mechanics are crucial in promoting engagement, motivation, and learning progress in both educational and gamified environments.

Whether through points, feedback, or replay, mechanics provide the structure and rewards necessary to drive students to engage, learn, and improve.

Subcategory: Gamification and Games

Table 7

Triangulation on Gamification and Games

Author	Summary of Study
Tekinbas, K. S., & Zimmerman, E. (2004). *Rules of Play: Game Design Fundamentals*. MIT Press.	**Table 6.** *Triangulation on Gamification and Games*Tekinbas and Zimmerman describe games as artificial conflicts where players must follow rules to achieve quantifiable outcomes. They highlight that games include failure as a natural component, which encourages players to learn and advance through trial and error, a process that encourages learning persistence.
Buckley, P., & Doyle, E. (2016). *Gamification and Student Motivation*. Educational Review.	Buckley and Doyle explain that in gamification, elements such as reward structures, progress tracking, and feedback enhance student motivation and encourage persistence. They note that failure in games is seen as a stepping stone toward success, promoting resilience and continuous learning, unlike the fear of failure in real life.
Chou, Y. K. (2015). *Actionable Gamification: Beyond Points, Badges, and Leaderboards*. Octalysis Group.	Chou emphasizes that games are powerful tools that help teachers engage students with technology while learning. However, he stresses that games must have a clear teaching-learning purpose, which ensures that students remain motivated to learn while interacting with the game's mechanics.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The three authors agree that both games and gamification can significantly influence learning and motivation, though each emphasizes different aspects of how games function in educational contexts. Tekinbas and Zimmerman (2004) focus on the structure of games, arguing that rules and failure are central to how games operate. They explain that failure in games is not punitive but rather a learning mechanism that encourages players to try again and progress through levels. This is a key distinction from real-life experiences of failure, which are often seen as more negative. Also, Buckley and Doyle (2016) extend this idea by focusing on the motivational aspects of gamification. They argue that game elements like reward structures, progress tracking, and feedback drive student engagement and resilience. By positioning failure as a learning opportunity rather than a setback, gamified environments encourage a growth mindset, where students learn from their mistakes and remain motivated to continue learning. Additionally, Chou (2015) builds on these concepts, emphasizing that games are powerful educational tools, but only when used with a clear teaching-learning purpose. Chou underscores the importance of aligning game mechanics with educational goals, ensuring that students are not just engaged with the technology but also motivated to learn through intentional interaction with game elements.

Altogether, these perspectives illustrate that while games and gamification offer unique advantages in engaging learners and encouraging motivation, their effectiveness depends on how failure is approached, the presence of rewards and feedback, and the purposeful integration of game elements into the learning process. By embracing the trial-and-error nature of games, educators can create environments where students feel safe to fail and learn, ultimately enhancing their resilience and motivation to achieve learning outcomes.

Subcategory: Game Aesthetics

Table 8

Triangulation on Game Aesthetics

Author	Summary of Study
Hunicke, R., LeBlanc, M., & Zubek, R. (2004). ***MDA: A Formal Approach to Game Design and Game Research*****.**	Hunicke et al. define **Aesthetics** as a core element of the MDA framework, focusing on the **emotional responses** a game evokes in its players. They argue that the **visual appeal** and **design** of a game contribute to its overall enjoyment and player engagement, which are essential for educational games to enhance learning.
Salen, K., & Zimmerman, E. (2004). ***Rules of Play: Game Design Fundamentals*****. MIT Press.**	Salen and Zimmerman highlight the importance of game aesthetics in creating an immersive learning experience. They emphasize that visual and artistic elements are key in motivating learners and making educational games, particularly those for vocabulary acquisition, more engaging and effective.
Schell, J. (2008). ***The Art of Game Design: A Book of Lenses*****.**	Schell views game aesthetics as one of the primary lenses through which a game's success can be evaluated. He explains that aesthetics are vital for eliciting emotional reactions from players, which directly influences their motivation to engage with the content and enjoy the learning process, especially in educational settings.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The three authors unanimously agree that game aesthetics are crucial in shaping the emotional and motivational experiences of players, especially in educational contexts. Hunicke, LeBlanc, & Zubek (2004) introduce aesthetics as a key component of the MDA Framework, emphasizing that the visual and emotional appeal of a game is critical for promoting engagement and enhancing the overall player experience. Specifically, in educational games, aesthetics play an important role in sustaining attention and involvement, thereby making learning more enjoyable. Moreover, Salen & Zimmerman (2004) further highlight that visual design and aesthetics are essential for creating immersive learning environments, particularly in gamified activities like vocabulary acquisition. They argue that well-designed game aesthetics can transform the learning experience into something significantly more engaging and motivating, which encourages students to participate and learn more effectively. In addition, Schell (2008) views aesthetics as one of the critical lenses of game design, emphasizing its role in eliciting emotional responses and driving player engagement. He asserts that the visual appeal of a game significantly influences a player's willingness to interact with and enjoy the learning process, which is particularly important for maintaining motivation in educational settings.

Taken together, these perspectives indicate that game aesthetics are not merely about visual attractiveness but are deeply intertwined with a game's ability to engage learners emotionally and enhance motivation. Therefore, in educational contexts, especially in gamified learning, effective aesthetics lead to higher levels of learner engagement, making the educational content more immersive and enjoyable.

Subcategory: Game Dynamics

Table 9

Triangulation on Game Dynamics

Author	Summary of Study
Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification." In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* (pp. 9-15). ACM. https://doi.org/10.1145/2181037.2181040	Deterding et al. explore how key game dynamics like progression, feedback loops, and competition enhance vocabulary acquisition. They argue that these dynamics maintain long-term engagement, helping learners stay motivated while providing continuous feedback and allowing them to monitor their progress in gamified environments.
Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Wharton Digital Press.	Werbach and Hunter discuss the role of dynamics such as challenges, progression systems, and feedback in gamified vocabulary learning. They emphasize that these elements help learners set achievable goals and track their development, leading to improved retention of new words and better performance in vocabulary tasks.
Vogel, J. J., Greenwood-Ericksen, A., Cannon-Bowers, J., & Bowers, C. A. (2006). Using virtual reality games to enhance vocabulary learning. *Journal of Educational Computing Research, 34*(2), 145-169. https://doi.org/10.2190/FLHV-K4W2-4THW-8A77	Vogel et al. highlight the importance of competitive and collaborative game dynamics in gamified vocabulary learning. They argue that these dynamics encourage engagement and interaction among learners, which leads to increased motivation and improved vocabulary retention, demonstrating the effectiveness of these dynamics in educational contexts.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The three authors collectively underscore the significance of game dynamics in enhancing engagement and motivation within gamified vocabulary learning environments. Deterding et al. (2011) focus on fundamental dynamics such as progression, feedback loops, and competition, illustrating how these elements keep learners engaged over time. They emphasize that effective dynamics help students stay motivated and track their progress, making vocabulary acquisition a more interactive experience. Besides, Werbach and Hunter (2012) build on this by detailing how dynamics like challenges and feedback enable students to set specific goals and assess their development. This process fosters a sense of achievement and encourages persistence in vocabulary learning, ultimately enhancing retention and performance. As well, Vogel et al. (2006) expand this discussion by emphasizing the roles of competition and collaboration in educational settings. They highlight that integrating these dynamics not only encourages students to participate actively but also enhances interaction among peers, which further supports vocabulary retention and engagement.

In summary, these perspectives illustrate that game dynamics are essential in creating effective gamified learning experiences. They emphasize that when thoughtfully integrated, dynamics can motivate learners, enhance engagement, and significantly improve vocabulary acquisition outcomes. By taking advantage of these dynamics, educators can create more impactful and enjoyable learning experiences for students.

Importance of Aviation Technical Vocabulary

Table 10

Triangulation on the importance of Aviation Technical Vocabulary

Author	Summary of Study
Friginal, E., Mathews, S., & Roberts, J. (2019).	This study explores the critical role of aviation English for communication between pilots, air traffic controllers, and ground staff, emphasizing the need for standardized technical vocabulary to ensure safety and efficiency
Chung, T., & Nation, P. (2004).	This research defines technical vocabulary as domain-specific language, stressing its importance in fields like aviation where precise communication is critical to avoid misunderstandings and ensure operational clarity
ICAO (2010). *International Civil Aviation Organization. (2010). (Doc 9835).*	ICAO sets out language proficiency requirements for aviation professionals, highlighting the importance of technical aviation vocabulary in preventing miscommunications and ensuring safe and precise operations in aviation contexts.

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The key concepts from the three authors underscore the critical role of standardized technical vocabulary in aviation for ensuring safety, precision, and clarity in communication. Friginal, Mathews, and Roberts (2019) emphasize the necessity of a unified aviation terminology

across global networks to prevent misunderstandings during high-stakes operations. Similarly, ICAO (2010) focuses on language proficiency standards, stressing the importance of using specific technical terms to avoid miscommunication and guarantee safe operations. Furthermore, Chung and Nation (2004) underscore that technical vocabulary reduces ambiguities in specialized fields like aviation, ensuring that professionals communicate with accuracy and efficiency.

Consequently, standardization, proficiency, and clarity emerge as central themes, with all authors agreeing that aviation technical vocabulary is essential for operational safety and effective global communication.

Analysis of the results.

The current research project will utilize Quantitative Research with a Descriptive and Exploratory Design combined with a didactic guide and incorporating gamification strategies to facilitate the learning of aviation English technical vocabulary among members of the Ecuadorian Army Aviation. After the project, the potential effectiveness of these gamified strategies is supported through the design and validation of the didactic guide. The integration of gamification in technical vocabulary learning holds significant promise for improving learning outcomes among Army Aviation personnel. The insights will be reviewed and validated by the beneficiaries, providing critical feedback on the didactic guide's effectiveness.

Description of the sample and context of the research

The study will involve personnel from the Army Aviation Group No. 44 "Pastaza", including pilots, air traffic controllers, and maintenance staff. These individuals play a crucial role in ensuring flight safety, making proficiency in aviation English technical vocabulary essential for

effective performance in their roles. To establish a baseline in order to know participant proficiency levels, the study will first assess participants' current levels of technical English vocabulary through questionnaires. This initial diagnosis will be crucial for understanding the baseline and theoretical potential of progress with the proposed gamified strategies. This study focuses on personnel from the Army Aviation Group No. 44 "Pastaza", including pilots, air traffic controllers, and aircraft technicians. These specific roles are critical in aviation operations, each requiring proficiency in specialized aviation English technical vocabulary to ensure effective communication and operational safety. The total sample consists of the following personnel:

Table 11

Total sample personnel Army Aviation Group No. 44 "Pastaza"

Army Aviation Group No. 44 “Pastaza”	MEMBERS	SAMPLE
PILOTS	28	15
AIR TRAFFIC CONTROLLERS	7	6
AIRCRAFT TECHNICIANS	105	66
TOTAL	**140**	**87**

Elaborated by: Llerena, D. (2024)
Source: Direct Research

This population has been selected exclusively for diagnostic purposes. The objective is to assess their current proficiency level in technical aviation English, specific to their professional roles, through a detailed questionnaire. This diagnostic phase is crucial for establishing a baseline from which their knowledge of aviation English vocabulary will be evaluated and further developed. By categorizing participants according to their roles, the study ensures that the technical vocabulary challenges faced by each group are properly identified.

The questionnaire is tailored to address the distinct linguistic demands of each role:

- Pilots need proficiency in communication protocols, standard phraseology, and emergency language.
- Air Traffic Controllers require a strong command of precise, clear language to manage air traffic safely.
- Aircraft Technicians must be able to comprehend and apply technical vocabulary related to aircraft maintenance and repair.

The data collected from this initial diagnostic assessment will form the foundation of the study's analysis, providing a clear understanding of the current technical English proficiency among aviation personnel. This baseline will allow the identification of specific areas where gamified learning strategies can be most effectively applied, ensuring that the proposed strategies are designed specifically to the unique needs and challenges faced by the aviation staff.

By evaluating this carefully chosen sample, the study can address the current technical English challenges faced by the Ecuadorian Army Aviation personnel and propose actionable strategies for reinforcing their communication skills in critical operational environments.

Diagnostic stages using the questionnaire technique

The diagnostic phase of this research involves several carefully structured stages to evaluate the current level of technical English proficiency among pilots, air traffic controllers, and aircraft technicians of the Army Aviation Group No. 44 "Pastaza". The following steps outline the process:

1. **Questionnaire design and role-specific adaptation:**

The first step involves creating a comprehensive questionnaire personalized to each professional role: pilots, air traffic controllers, and aircraft technicians. The questionnaire includes questions that reflect the specific technical vocabulary and phraseology relevant to each group's daily tasks. For example, pilots will answer questions related to standard aviation phraseology and emergency procedures, while aircraft technicians will focus on maintenance terminology. (Appendices 1, 2, and 3)

2. Implementation and data collection:

Once designed, the questionnaire will be administered to the participants in a structured environment. Each participant will complete the questionnaire according to their respective role, ensuring that the results accurately reflect their technical English proficiency. The questionnaire is not only focused on vocabulary knowledge but also on the participants' ability to apply the language in context, simulating real-life scenarios they may encounter during aviation operations.

3. Analysis and baseline establishment:

The responses will be analyzed to establish a baseline for each group’s proficiency in technical aviation English. This baseline will serve as the starting point to measure the effectiveness of gamified strategies implemented later in the study. The analysis will provide insights into areas where the personnel may face difficulties, such as specific terms, communication protocols, or comprehension of technical documentation.

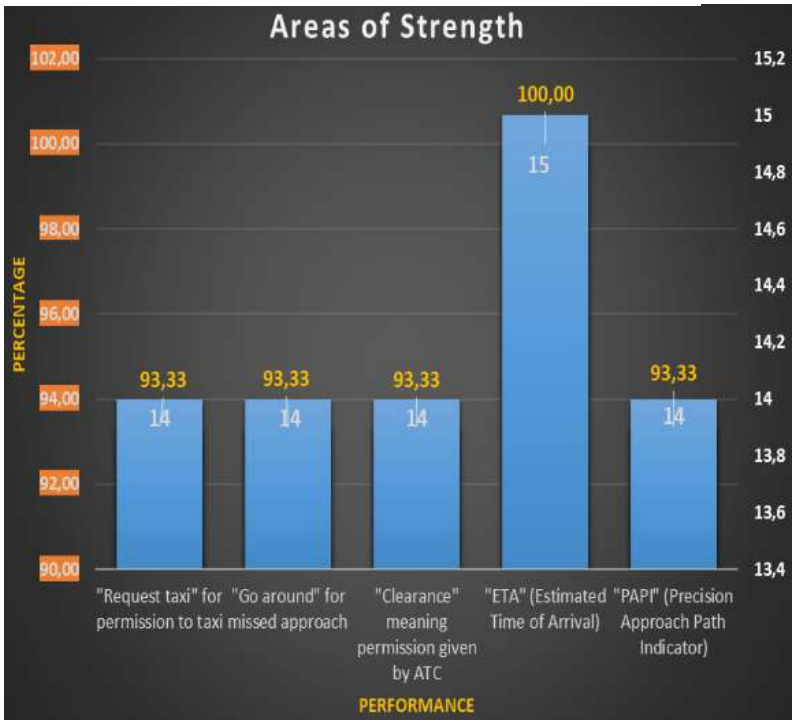
Interpretation of Diagnostic Results – Pilots of Army Aviation Group No. 44 “Pastaza”

Table 12

Interpretation of diagnostic results pilots– areas of strength, moderate proficiency, significant deficiencies

Category	Performance	Correct responses out of 15	Percentage
Areas of Strength	"Request taxi" for permission to taxi	14	93.3%
	"Go around" for missed approach	14	93.3%
	"Clearance" meaning permission given by ATC	14	93.3%
	"ETA" (Estimated Time of Arrival)	15	100%
	"PAPI" (Precision Approach Path Indicator)	14	93.3%

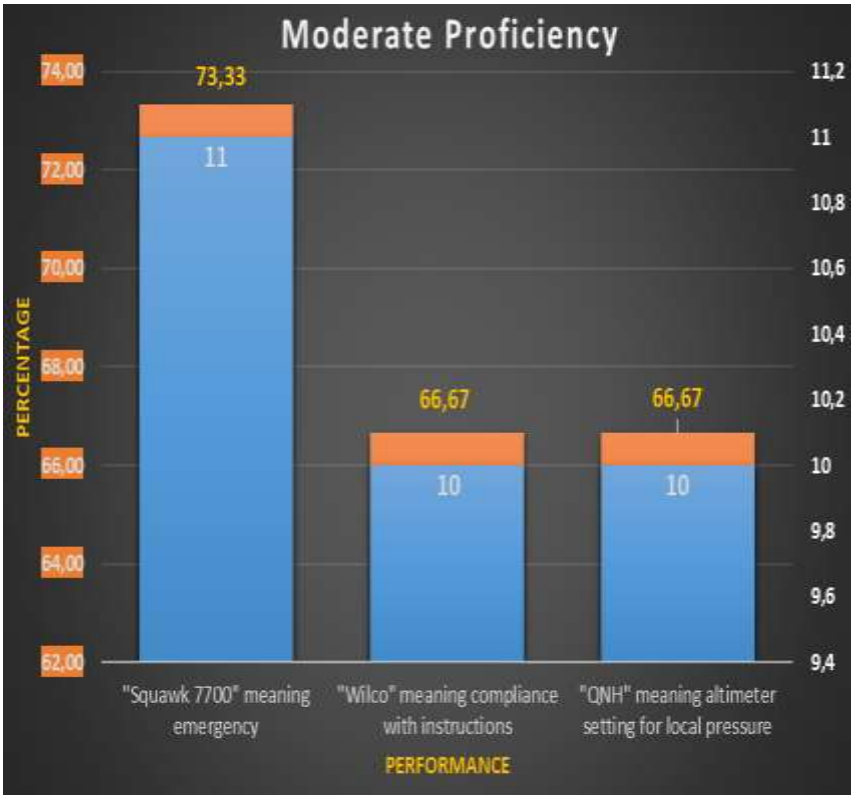
Figure 1 *Areas of strength pilot*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Moderate Proficiency	"Squawk 7700" meaning emergency	11	73.3%
	"Wilco" meaning compliance with instructions	10	66.7%
	"QNH" meaning altimeter setting for local pressure	10	66.7%

Figure 2 *Moderate proficiency pilots*



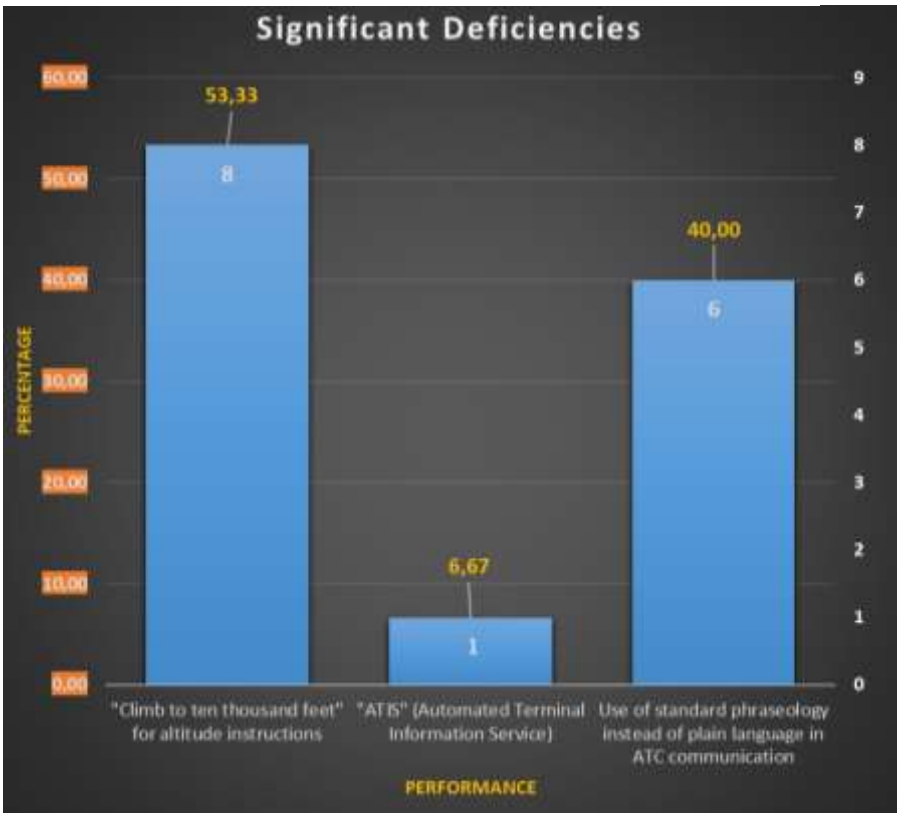
Elaborated by: Llerena, D. (2024)
Source: Direct Research

Significant Deficiencies	"Climb to ten thousand feet" for altitude instructions	8	53.3%

	"ATIS" (Automated Terminal Information Service)	1	6.7%
	Use of standard phraseology instead of plain language in ATC communication	6	40%

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Figure 3 *Significant deficiencies pilots*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The diagnostic results from the questionnaire reveal significant deficiencies in the technical English proficiency of the pilots from Gupo de Aviación del Ejército N°44 “Pastaza”. While the pilots demonstrate a solid grasp of basic phraseology, they face challenges with specialized terminology, particularly in altimetry, phraseology standards, and automated services. Critical gaps include low familiarity with terms like **"ATIS"** (6.7% accuracy), inconsistent use of **altitude instructions** (53.3% accuracy for "Climb to ten thousand feet"), and limited adherence to **standardized phraseology** (only 40% recognized the importance of avoiding plain language in ATC communications). These deficiencies will be the focus areas where the present study’s proposal will reinforce learning, using enhanced gamified strategies to provide a more engaging and effective way of mastering technical aviation English. By focusing on these areas, the proposed strategies will help pilots to better retain and use essential terminology, enhancing both the safety and the effectiveness of their operations.

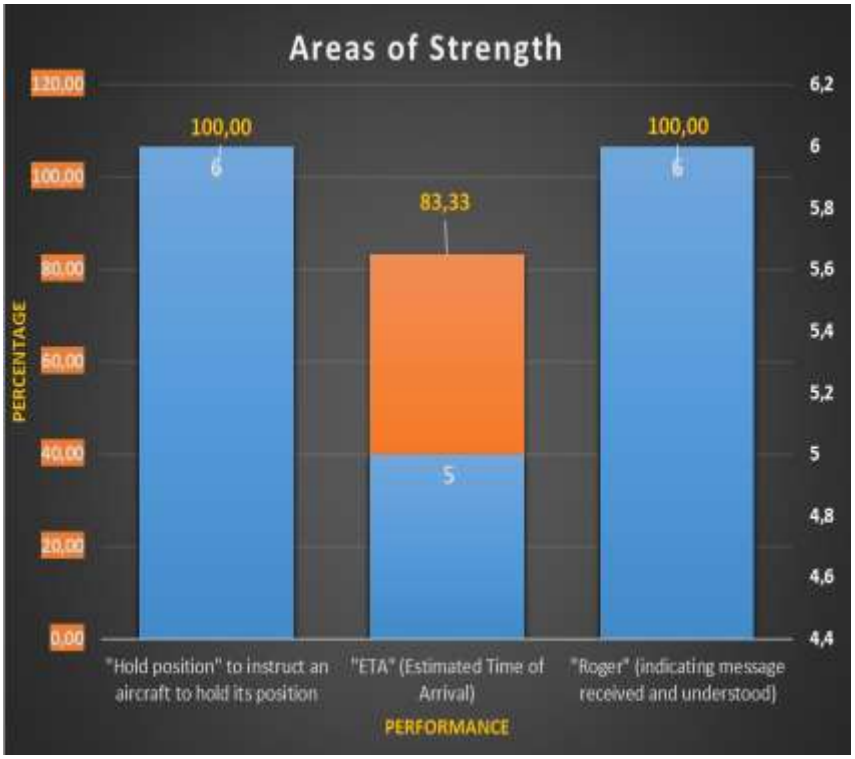
Interpretation of Diagnostic Results – ATC of Army Aviation Group No. 44 "Pastaza"

Table 13

Interpretation of diagnostic results air traffic controllers– areas of strength, moderate proficiency, significant deficiencies

Category	Performance	Correct responses out of 6	Percentage
Areas of Strength	"Hold position" to instruct an aircraft to hold its position	6	100%
	"ETA" (Estimated Time of Arrival)	5	83.33%
	"Roger" (indicating message received and understood)	6	100%

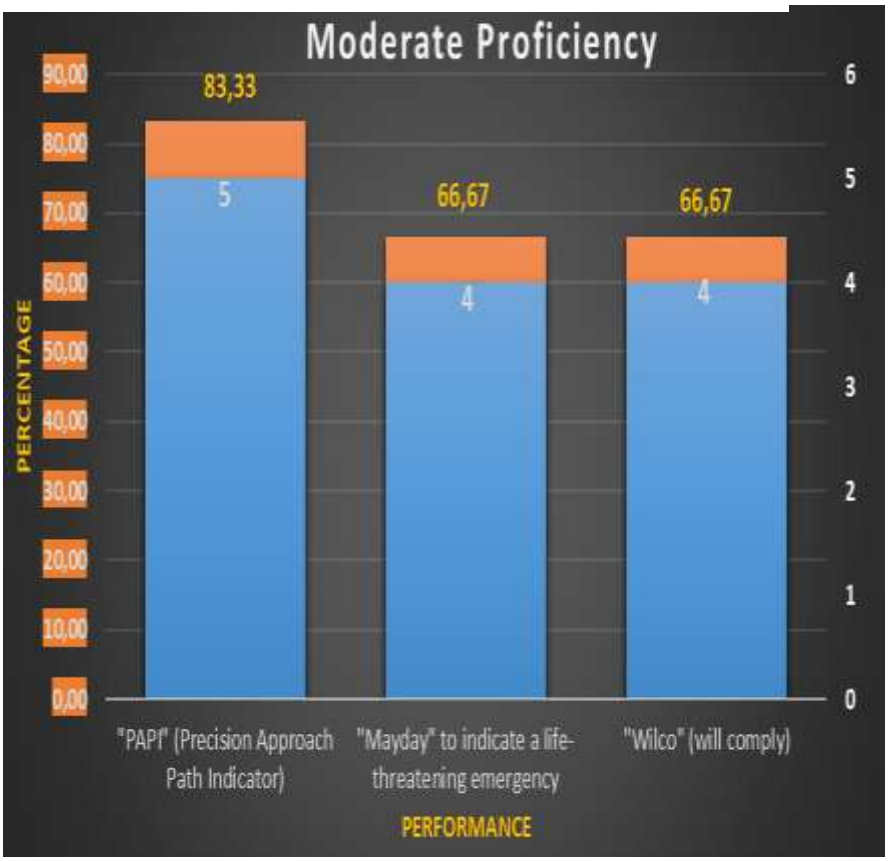
Figure 4 *Areas of strength air traffic controllers*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Moderate Proficiency	"PAPI" (Precision Approach Path Indicator)	5	83.33%
	"Mayday" to indicate a life-threatening emergency	4	66.67%
	"Wilco" (will comply)	4	66.67%

Figure 5 *Moderate proficiency air traffic controllers*



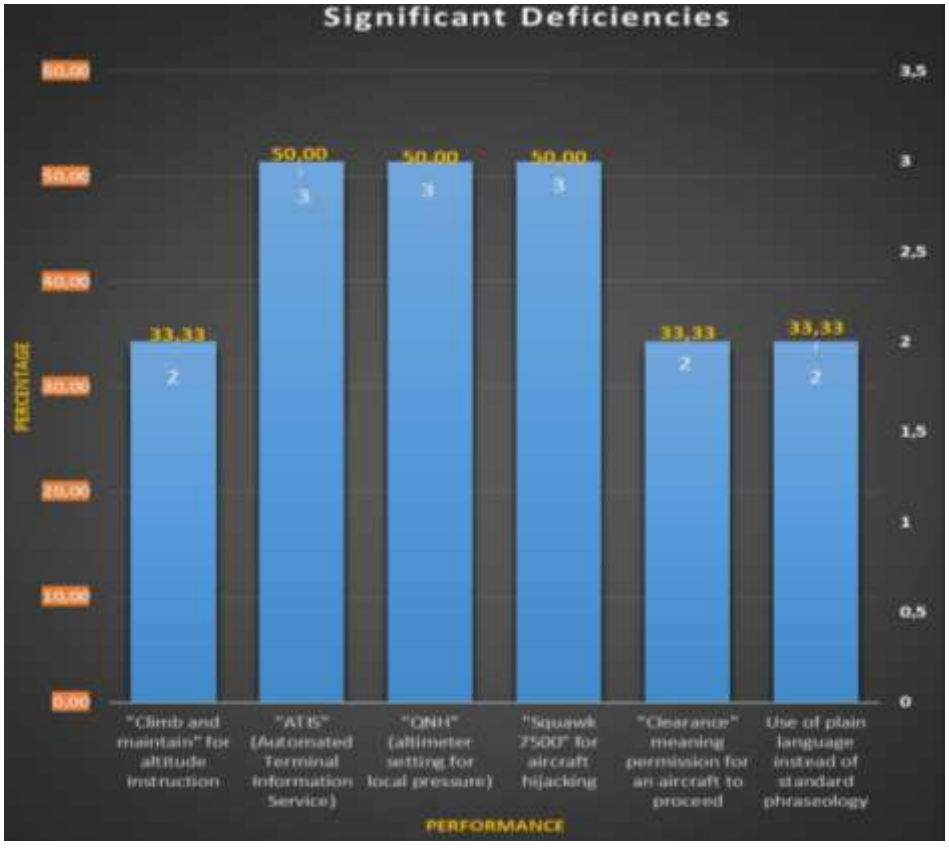
Elaborated by: Llerena, D. (2024)
Source: Direct Research

Significant Deficiencies	"Climb and maintain" for altitude instruction	2	33,33
	"ATIS" (Automated Terminal Information Service)	3	50,00

	"QNH" (altimeter setting for local pressure)	3	50,00
	"Squawk 7500" for aircraft hijacking	3	50,00
	"Clearance" meaning permission for an aircraft to proceed	2	33,33
	Use of plain language instead of standard phraseology	2	33,33

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Figure 6 *Significant deficiencies air traffic controllers*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The ATC personnel of Gupo de Aviación del Ejército N°44 “Pastaza” display moderate proficiency in key areas of technical phraseology and emergency terminology. However, they face significant deficiencies in essential terms related to altimetry, clearance instructions, and communication codes like **"Squawk 7500"** (only 42.9% accuracy). Low familiarity with **altimeter settings** (50% accuracy for "QNH") and **clearance phraseology** (28.6% accuracy for "Climb and maintain") further underscores these challenges. These gaps in knowledge highlight the need for enhanced training, particularly focused on critical ATC instructions and emergency communications. The present study’s proposal will focus on reinforcing these identified deficiencies through gamified learning strategies, which will effectively target these weaknesses and improve the ATC personnel's operational proficiency.

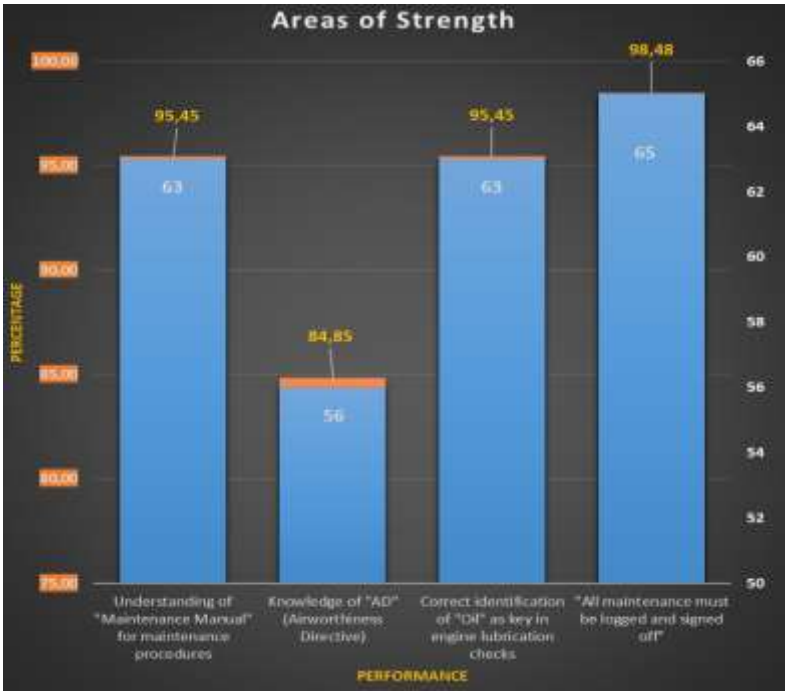
Interpretation of Diagnostic Results – Maintenance staff of Army Aviation Group No. 44 "Pastaza"

Table 14

Interpretation of diagnostic results Maintenance staff– areas of strength, moderate proficiency, significant deficiencies

Category	Performance	Number of Correct Responses (out of 66)	Percentage
Areas of Strength	Understanding of "Maintenance Manual" for maintenance procedures	63	95.45%
	Knowledge of "AD" (Airworthiness Directive)	56	84.85%
	Correct identification of "Oil" as key in engine lubrication checks	63	95.45%
	"All maintenance must be logged and signed off"	65	98.48%

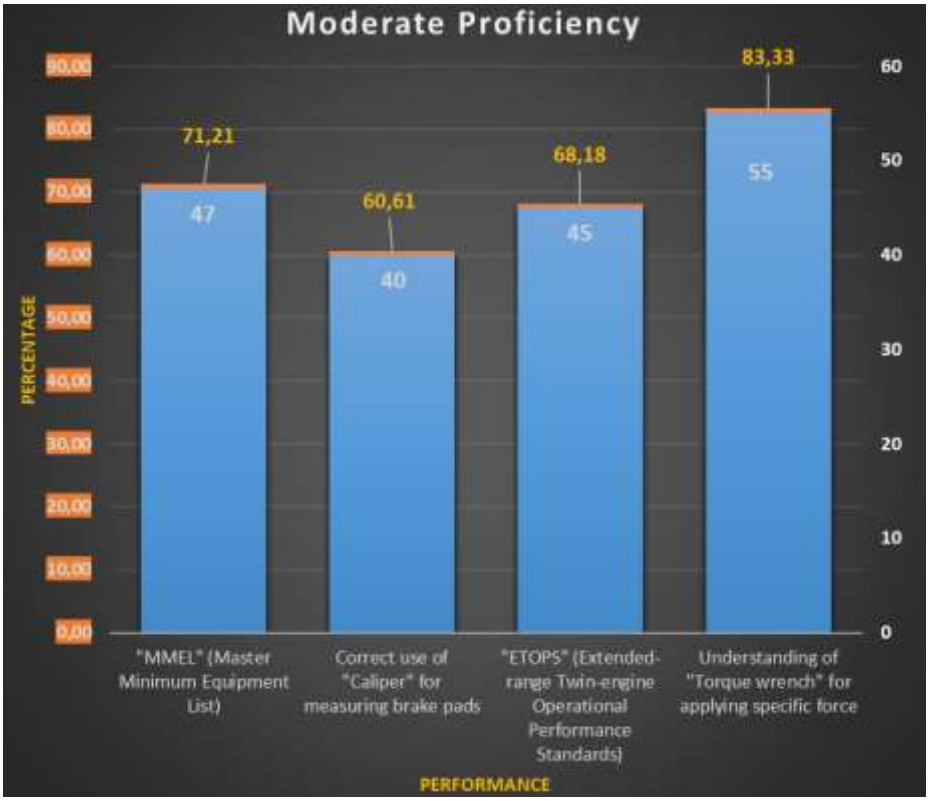
Figure 7 *Areas of strength maintenance staff*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Moderate Proficiency	"MMEL" (Master Minimum Equipment List)	47	71.21%
	Correct use of "Caliper" for measuring brake pads	40	60.61%
	"ETOPS" (Extended-range Twin-engine Operational Performance Standards)	45	68.18%
	Understanding of "Torque wrench" for applying specific force	55	83.33%

Figure 8 *Moderate proficiency maintenance staff*

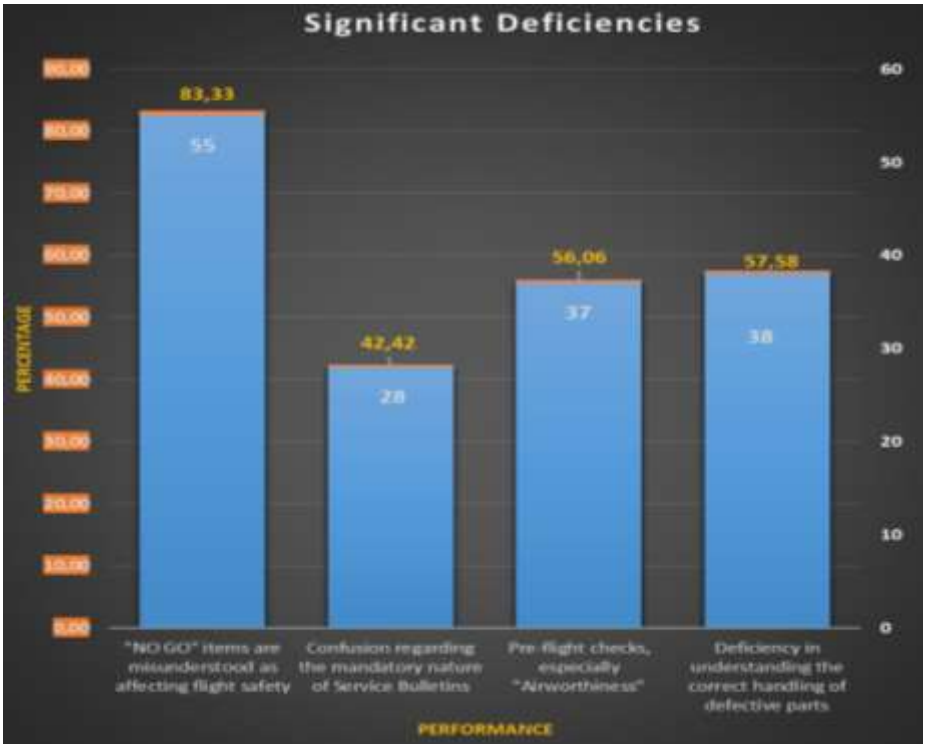


Elaborated by: Llerena, D. (2024)
Source: Direct Research

Significant Deficiencies	"NO GO" items are misunderstood as affecting flight safety	55	83.33%
	Confusion regarding the mandatory nature of Service Bulletins	28	42.42%
	Pre-flight checks, especially "Airworthiness"	37	56.06%
	Deficiency in understanding the correct handling of defective parts	38	57.58%

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Figure 9 *Significant deficiencies*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The maintenance staff of Gupo de Aviación del Ejército N°44 “Pastaza” demonstrate a strong understanding of key technical terms and procedures, particularly in documentation, airworthiness directives, and engine checks. However, there are critical gaps in understanding, including **"NO GO" items** (83.3% misunderstanding), **mandatory compliance with Service Bulletins** (42.4% accuracy), and **pre-flight checks**, especially regarding airworthiness (56.1% accuracy). Additionally, there is only moderate familiarity with **handling defective parts** (57.6% accuracy), which poses safety risks if procedures are not followed correctly. These deficiencies will be the focus of the present study’s proposal, which will reinforce safety-critical procedures through gamified learning strategies, providing a more engaging and effective approach to address these operational weaknesses.

Bibliographic Review Based on Diagnostic Results

Following the diagnostic phase, a thorough bibliographic review will be conducted to support the findings from the questionnaire. This review will focus on identifying existing studies, methodologies, and best practices related to the learning of technical English vocabulary in aviation contexts through gamified strategies like **Kahoot and Mentimeter**. The purpose of the bibliographic review has two parts:

- **Correlating Findings**

By comparing the results obtained from the diagnostic questionnaire with existing literature, the study will confirm whether the observed challenges align with documented issues in the field of aviation English. This comparison will ensure that the proposed gamified strategies address the specific vocabulary needs identified during the diagnostic phase.

- **Informing Strategy Development**

The bibliographic review will also be used to inform the design of the gamified strategies. By analyzing relevant studies and theoretical frameworks, the research will identify which methods, tools, and approaches have proven effective in learning technical vocabulary. These insights will guide the development of a didactic proposal adapted to the specific needs of the Ecuadorian Army Aviation personnel.

The combination of questionnaire results and the bibliographic review will create a solid foundation for implementing and validating gamified strategies designed to reinforce the learning of aviation English technical vocabulary.

Given the critical nature of their responsibilities, extensive training in aviation English is necessary for these personnel. Current proficiency levels in technical English among Army Aviation members are average with significant deficiencies, and many experience challenges in mastering the vocabulary required for optimal job performance. To address this, the study will explore a gamification approach to English Language Teaching (ELT). Gamification has demonstrated the potential to engage learners and enhance their ability to acquire new vocabulary effectively. The integration of gamified strategies seeks to improve participants' technical vocabulary and overall learning

Diagnostic Stages using the survey technique

To assess the acceptance of gamified strategies for learning technical aviation vocabulary, a survey was conducted with pilots, air traffic controllers (ATC), and maintenance staff from Army Aviation Group No. 44 "Pastaza." This survey aimed to measure their interest and attitudes toward using gamified elements such as points, badges, certificates, and interactive simulations as part of their English language training (appendix 4). The results provide insights into how receptive these

personnel are to gamification as a method to reinforce their learning and retention of specialized aviation vocabulary.

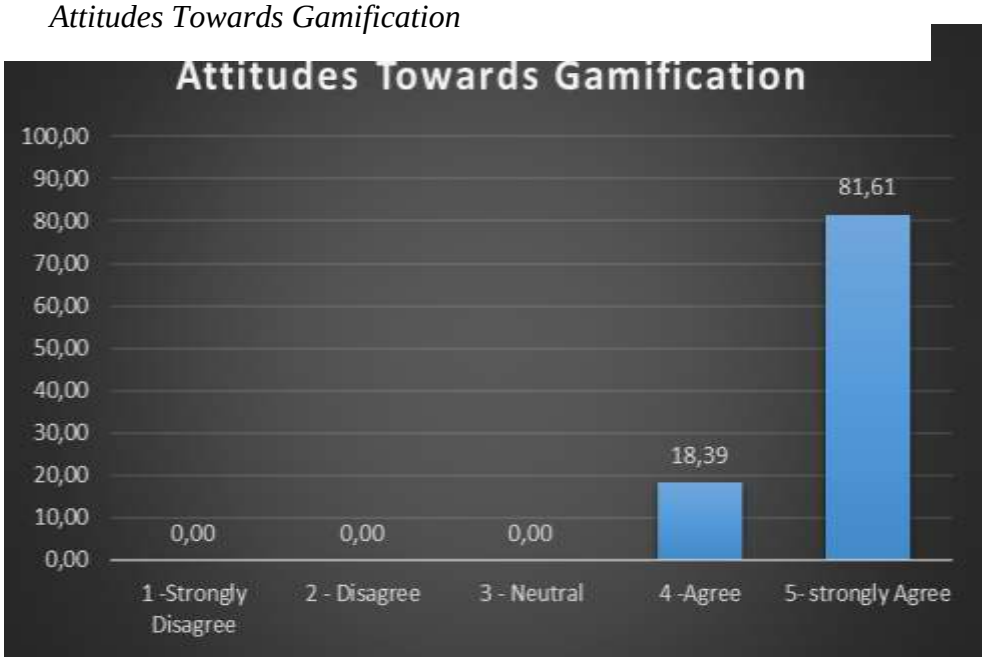
Identifying Suitable Gamified Strategies for Learning Aviation English Technical Vocabulary

Section 1: General Attitudes Towards Gamification

Table 15
General Attitudes Towards Gamification

SECTION	SCALE	PERCENTAGE
Section 1: General Attitudes Towards Gamification	1 -Strongly Disagree	0%
	2 - Disagree	0%
	3 - Neutral	0%
	4 -Agree	18,39%
	5- strongly Agree	81,61%

Figure 10
Attitudes Towards Gamification



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The results from Section 1 reveal strong support for members of Army Aviation Group No. 44 “Pastaza” for gamification in learning aviation English technical vocabulary. A combined **81,61%** of participants "Strongly Agree" that incorporating game-like elements enhances their motivation and improves their retention of technical terms compared to traditional methods, with an additional **18,39%** respectively agreeing with these statements. This high level of agreement demonstrates a clear preference for gamified strategies to improve engagement and effectiveness in vocabulary learning.

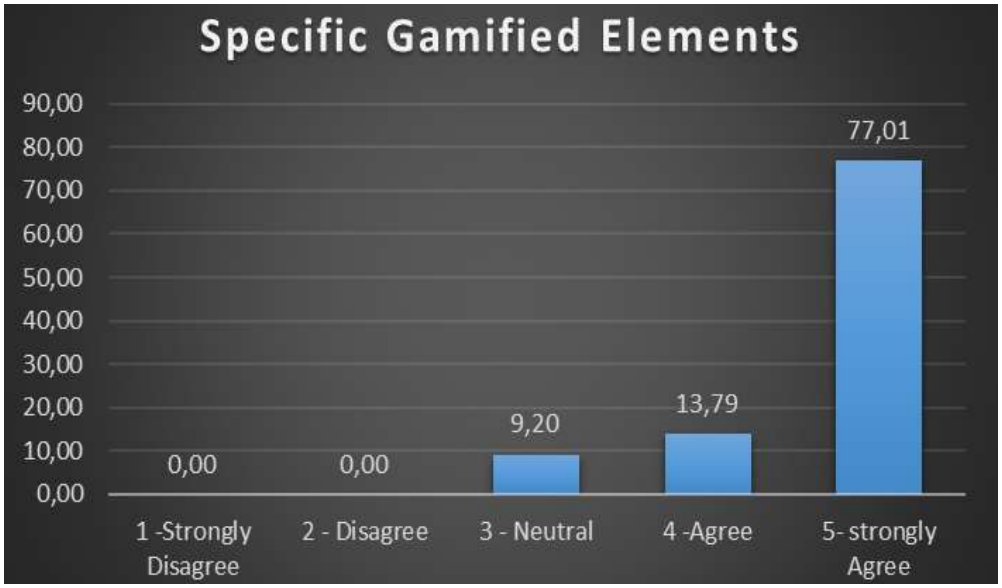
Section 2: Specific Gamified Elements

Table 16
Specific Gamified Elements

SECTION	SCALE	PERCENTAGE
Section 2: Specific Gamified Elements	1 -Strongly Disagree	0%
	2 - Disagree	0%
	3 - Neutral	9,20%
	4 -Agree	13,79%
	5- strongly Agree	77,01%

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Figure 11
Specific Gamified Elements



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The results from Section 2 indicate strong support among members of Army Aviation Group No. 44 “Pastaza” for specific gamified elements in learning technical aviation vocabulary. A notable **77%** of participants "Strongly Agree" that elements like earning points, competing with peers, receiving badges, progress tracking, and interactive simulations motivate and enhance their understanding of technical terms. An additional **13,79%** agree with these benefits, while **9,20%** are neutral. These findings highlight a high level of interest in gamified components as effective tools for engaging and supporting vocabulary learning.

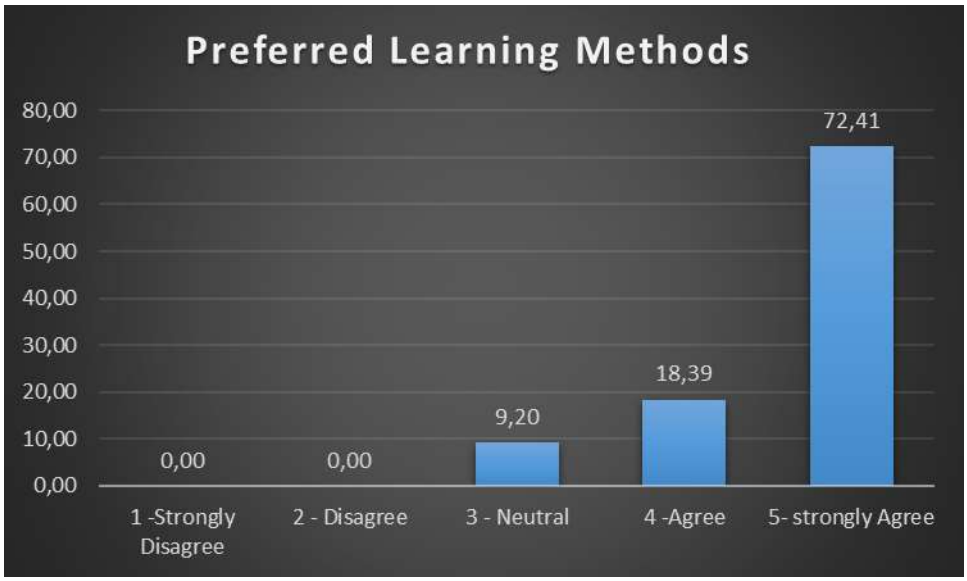
Section 3: Preferred Learning Methods

Table 17
Preferred Learning Methods

SECTION	SCALE	PERCENTAGE
Section 3: Preferred Learning Methods	1 -Strongly Disagree	0%
	2 - Disagree	0%
	3 - Neutral	9,20%
	4 -Agree	18,39%
	5- strongly Agree	72,41%

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Figure 12 *Preferred Learning Methods*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The results from Section 3 demonstrate that members of Army Aviation Group No. 44 “Pastaza” strongly prefer gamified learning methods to support their mastery of technical aviation vocabulary. Specifically, **72,41%** of participants "Strongly Agree" that tools like mobile apps, online platforms, group activities, and interactive quizzes aid their learning, while an additional **18,39 %** agree. Only **9,20%** remain neutral. This data underscores a clear interest in digital and collaborative gamified tools as convenient and effective methods for improving vocabulary retention and comprehension.

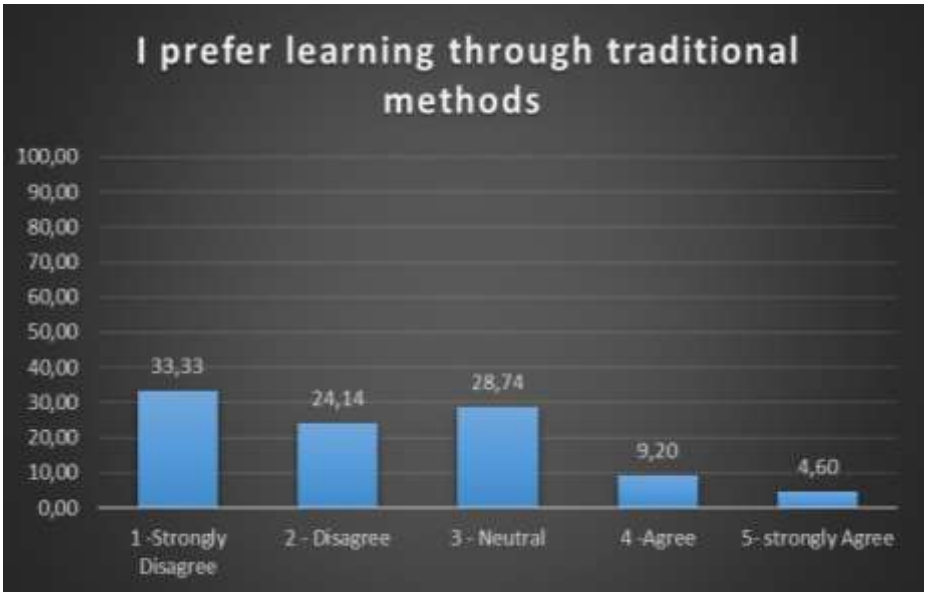
Section 4: Feedback and Suggestions

Tabla 18
Prefer learning through traditional methods

SECTION	SCALE	PERCENTAGE
Section 4: Prefer learning through traditional methods	1 -Strongly Disagree	33,33%
	2 - Disagree	24,14%
	3 - Neutral	28,74%
	4 -Agree	9,20%
	5- strongly Agree	4,60%

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Figure 13 *Prefer learning through traditional methods*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Interpretation:

The results from Section 4, specifically regarding participants' preference for learning through traditional methods, show a generally low inclination towards non-gamified approaches among members of Army Aviation Group No. 44 “Pastaza”. A significant **33.33%** "Strongly Disagree" with traditional-only learning, and an additional **24.14%** "Disagree." **28.74%** of participants remain neutral, while only **9.20%** "Agree" and **4.60%** "Strongly Agree." These findings indicate that most participants do not favor traditional methods alone, underscoring a strong preference for more innovative, interactive approaches like gamified learning to support their technical vocabulary learning.

CHAPTER III

PRODUCT

"Fly High with Aviation English Technical Vocabulary".

The present research will have as an innovative proposal a Didactic Guide for reinforcing the learning of Aviation English Technical Vocabulary Proficiency through Gamified Strategies.

According to Asinsten (2011), a didactic guide refers to all materials that provide information to familiarize students with the subject so that “they do not have to guess or look for clues” such as information about what they are going to study and for what purpose; how, when, with what, and with whom they will study; and how evaluation will be conducted.

The didactic guide titled "Fly High with Aviation English Technical Vocabulary" is designed to reinforce the learning of technical aviation English vocabulary among members of Ecuadorian Army Aviation through gamified learning strategies. It targets pilots, air traffic controllers, and maintenance technicians, providing them with four comprehensive modules that cover basic aviation vocabulary, cockpit communication, air traffic control language, and maintenance terminology. Each module incorporates interactive lessons, real-scenario simulations, gamified quizzes, and listening activities developed in Kahoot and Mentimeter platforms to make learning engaging and effective.

The objective of the didactic guide is: To reinforce the learning of the technical aviation English vocabulary among pilots, air traffic controllers, and maintenance staff of Army Aviation Group No. 44 “Pastaza”, through interactive and gamified learning strategies.

Proposal Specific Objectives

1. To design and implement gamified activities through Kahoot and Mentimeter that reinforce essential aviation vocabulary, fostering learners' engagement and retention.
2. To encourage active participation and motivation by integrating technology-based platforms like Kahoot and Mentimeter, promoting collaborative and competitive learning environments.

This didactic guide is structured into four comprehensive modules, each designed to address the specific needs and roles of aviation personnel:

Module 1: Basic Aviation Vocabulary

- Focuses on common terms and phrases used in aviation.
- Introduces the phonetic alphabet to ensure clear communication.
- Listening activity about phonetic alphabet and numbers.
- Speaking output activity for practicing phonetic alphabet and numbers.

Module 2: Communication in the Cockpit

- Covers standard aviation phraseology for clear and precise cockpit communication.
- Includes emergency communication protocols for critical situations.

- Listening activity about Automatic Terminal Information Service (ATIS).
- Speaking output activity for practicing how to receive an ATIS.

Module 3: Air Traffic Control Language

- Details ATC communication protocols to manage air traffic effectively.
- Provides strategies for handling unusual situations that may arise.
- Listening activity about ground control phraseology.
- Speaking output activity for practicing about ground control phraseology.

Module 4: Maintenance Vocabulary

- Introduces technical terms crucial for aircraft maintenance.
- Covers procedures for reporting and documentation to ensure maintenance accuracy.

The Learning Methodology of the Didactic Guide will employ gamified learning strategies, which include:

- **Interactive Modules:** Lessons with multimedia elements to make learning dynamic.
- **Simulations:** Real-world scenario simulations to practice technical vocabulary in context.
- **Quizzes and Flashcards:** Gamified quizzes and flashcards for continuous reinforcement of learned terms.
- **Peer Collaboration:** Group activities and discussions to foster peer learning and interaction.

- **Progress Tracking:** Regular assessments to monitor progress and identify areas for improvement.

To facilitate these activities, the Didactic Guide will integrate various technological tools such as**:**

- **Mentimeter and Kahoot:** Platforms for interactive quizzes and activities.
- **Projector and Screen:** For displaying educational materials.
- **Tablets or Computers:** For accessing quiz platforms and simulations.

Instructions for Accessing Kahoot

1. **Open Kahoot**:

    - On your computer, tablet, or mobile device, open a web browser.
    - Enter the following URL in the search bar: https://kahoot.it/.

2. **Enter the Game PIN**:

    - Once on the Kahoot homepage, you will be asked to enter a **Game PIN**.
    - Input the **Game PIN** provided by your instructor.

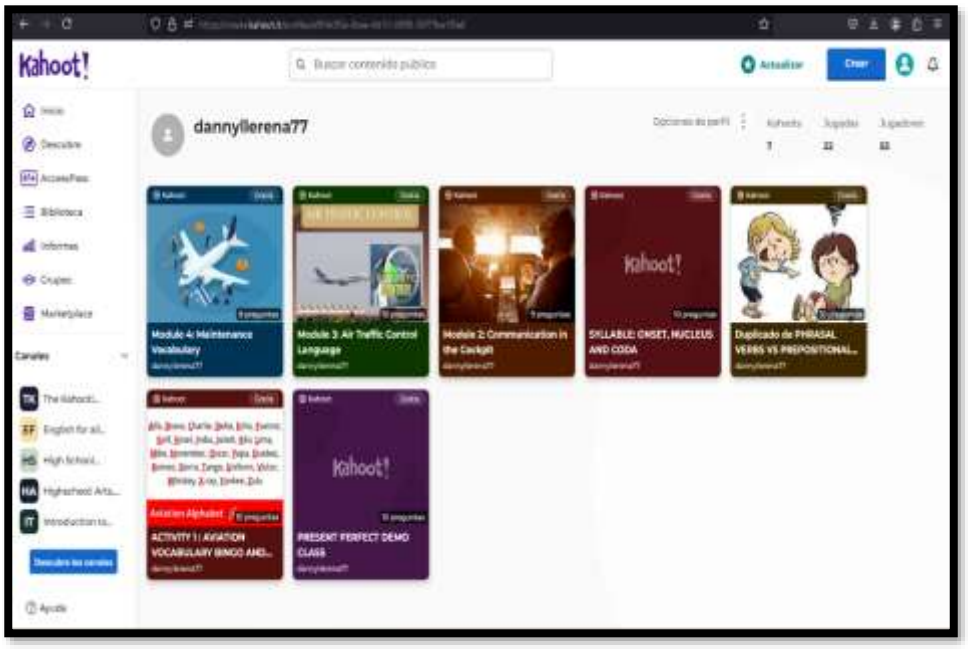
3. **Input Your Name**:

    After entering the PIN, you will be prompted to enter your **name** or a nickname to identify yourself during the game.

4. **Participate in the Quiz**:

- When the instructor starts the quiz, questions will appear on your device screen.
- Select the correct answers as quickly as possible to earn points.

Figure 14 *Main page of Kahoot*



Elaborated by: Llerena, D. (2024)
Source: Direct Research

Instructions for Accessing Mentimeter

1. **Open Mentimeter**:

   Open your web browser and go to: https://www.menti.com/

2. **Enter the Code**:

   - On the main page, you will see a space to enter a **Code**.
   - Enter the code provided by your instructor to join the interactive session.

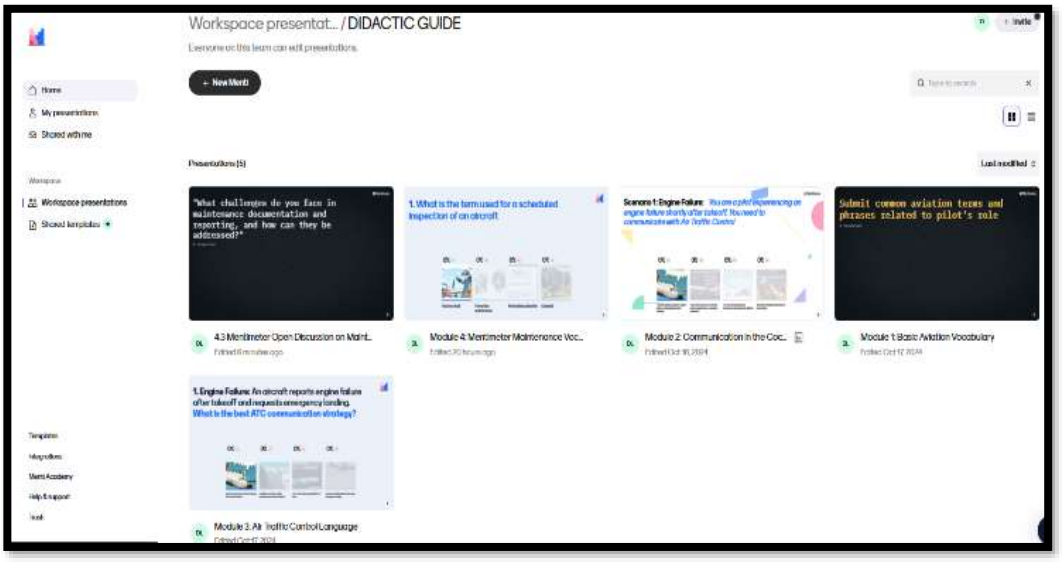
3. **Participate in the Activity**:

- After entering the code, you will see a question or activity on the screen.
- **Unlike Kahoot, only the instructor can advance to the next question in Mentimeter**.
- **Please wait for the instructor to move to the next question** after each response before proceeding.

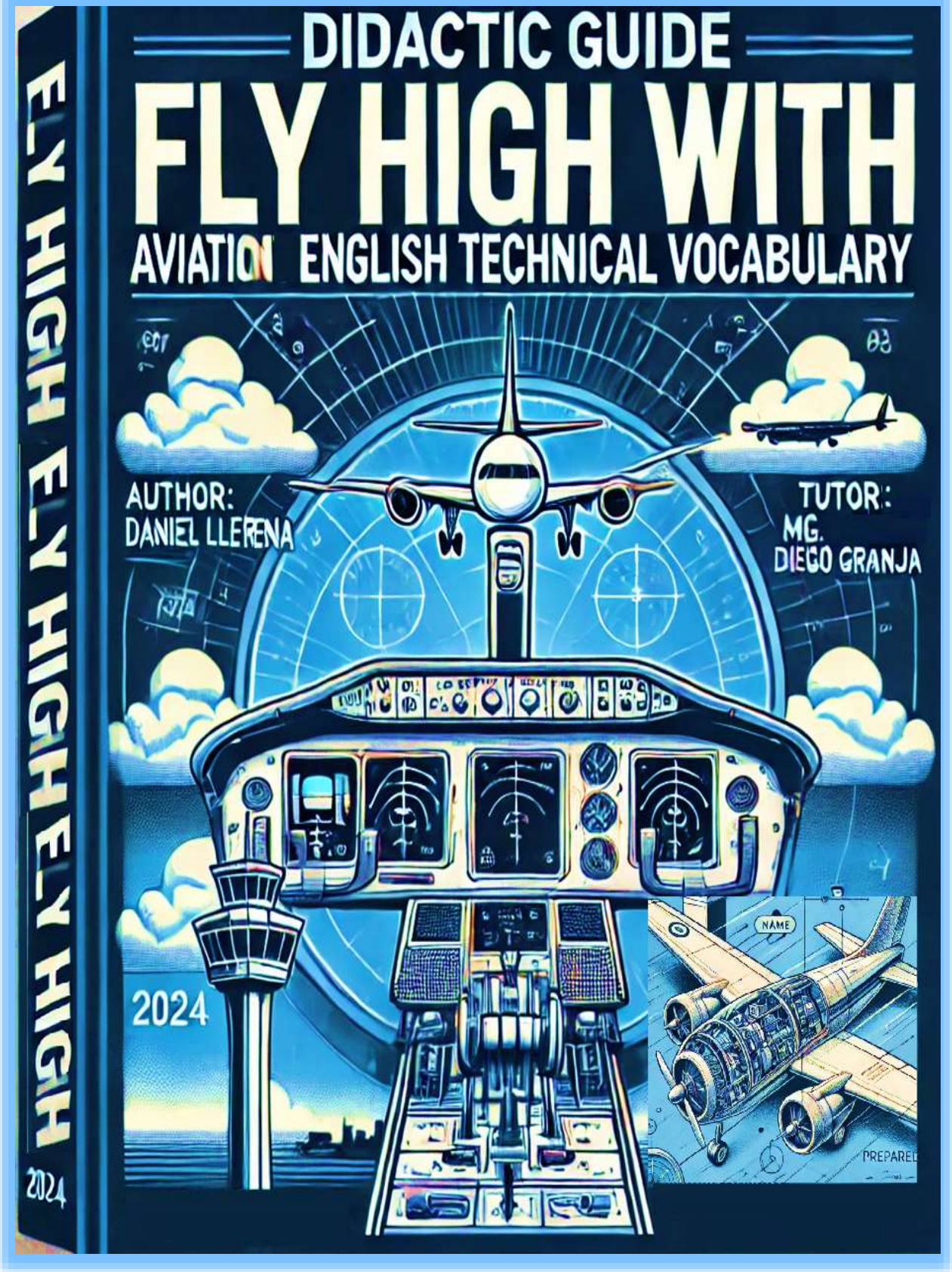
4. **Respond and Collaborate**:

   Read each question carefully and respond as instructed. Your responses will appear in real-time, and the instructor will guide the *activity*.

Figure 15 *Main page of Mentimeter*



Elaborated by: Llerena, D. (2024)
Source: Direct Research


DIDACTIC GUIDE
FLY HIGH WITH
AVIATION ENGLISH TECHNICAL VOCABULARY
AUTHOR:
DANIEL LLERENA
TUTOR:
MG.
DIEGO GRANJA
2024
NAME
PREPARED
FLY HIGH FLY HIGH FLY HIGH
2024

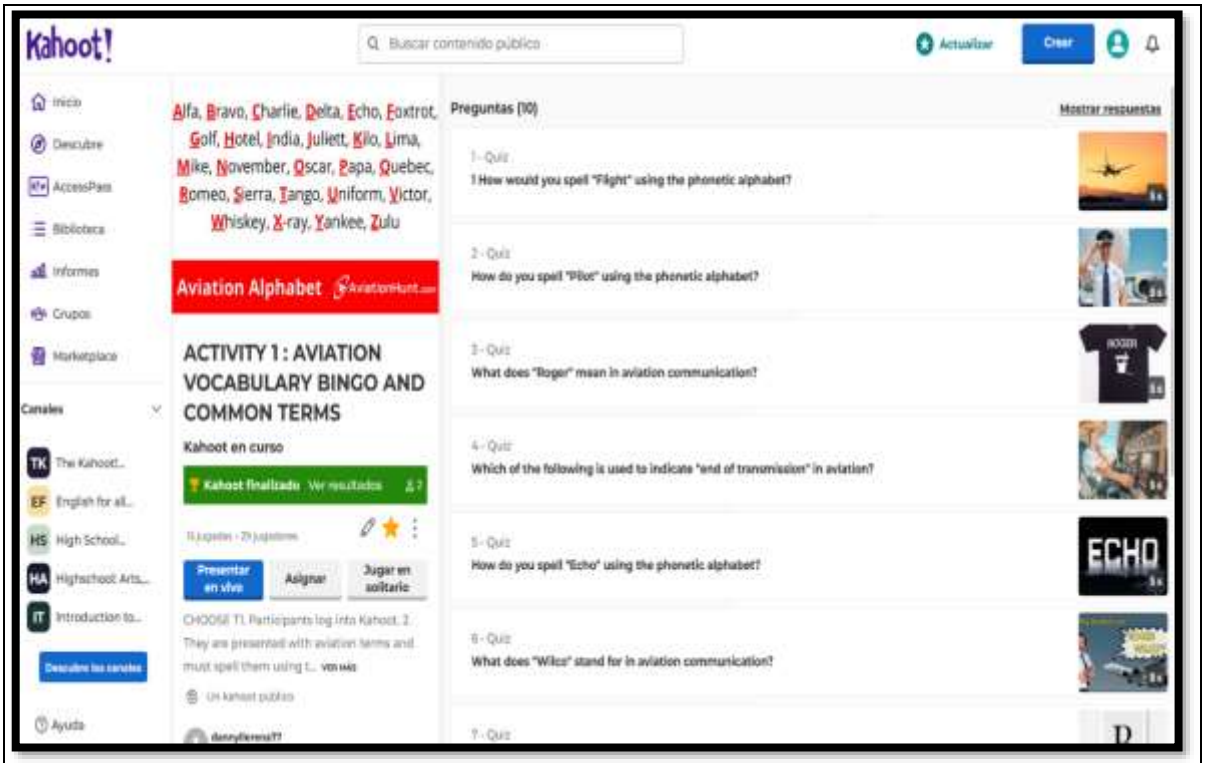
Module 1: Basic Aviation Vocabulary

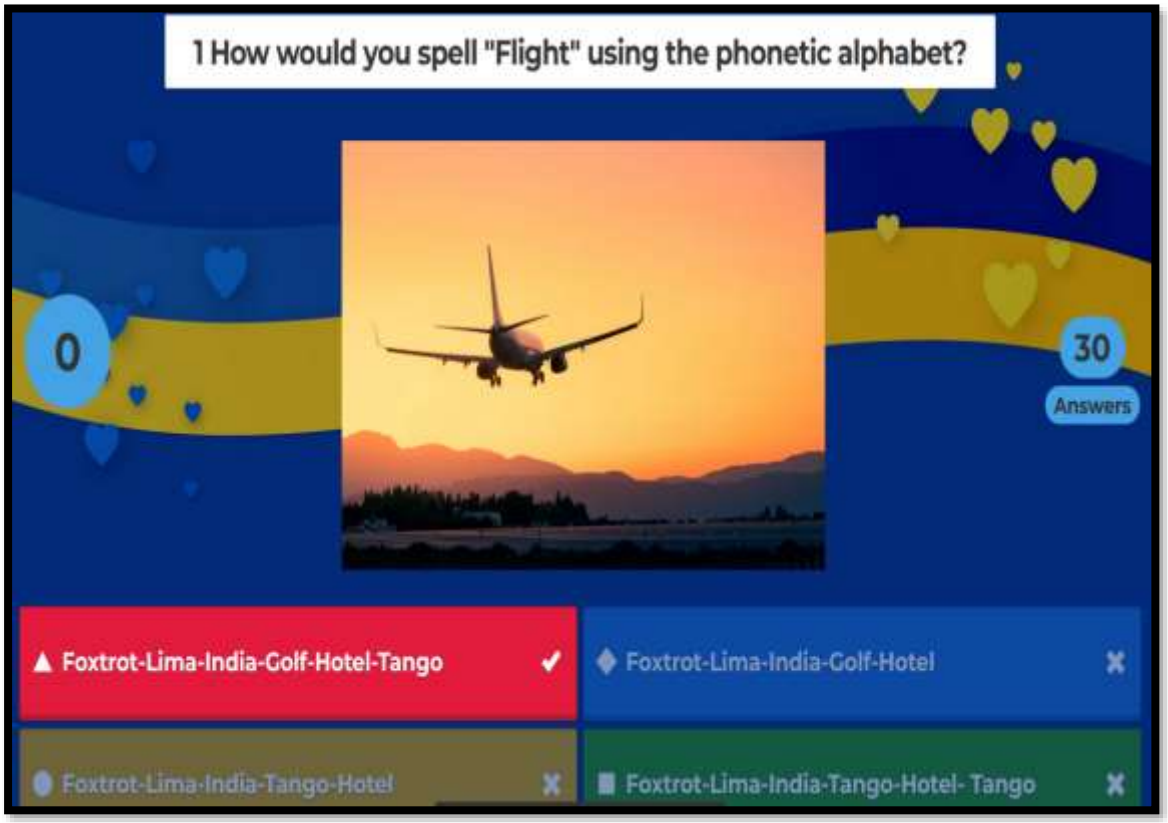
1.1. Common terms and phrases

1.2. Introduction to the Phonetic Alphabet

1.3. Extra practice for listening and speaking: Phonetic Alphabet And Numbers

ACTIVITY 1.1	**KAHOOT AVIATION VOCABULARY BINGO AND COMMON TERMS**
Objective:	To teach and reinforce the use of the phonetic alphabet and basic aviation terminology.
Content:	Phonetic alphabet and common aviation terms
Participants:	Pilots, air traffic controllers, and aircraft technicians.
Time:	15 minutes
Resources	Computer or mobile device with Kahoot access
Gamified strategy:	Participants will compete in a Kahoot quiz focused on the phonetic alphabet. They will be challenged to identify the correct spelling and usage of aviation terms using the phonetic alphabet.
DESCRIPTION	
1. Participants log into Kahoot. 2. They are presented with aviation terms and must spell them using the phonetic alphabet. 3. They will also answer questions about common aviation terms. 4. Points are awarded for correct and timely answers.	
ASSESSMENT AXIS	
The assessment will focus on correct phonetic alphabet usage and familiarity with basic aviation terms.	
PRODUCT	
https://create.kahoot.it/share/activity-1-aviation-vocabulary-bingo-and-common-terms/48c5ce8a-a1ea-41d4-9419-c85477c46a10	


Kahoot!
Buscar contenido público
Actualizar
Crear
Inicio
Descubre
AccessPass
Biblioteca
Informes
Grupos
Marketplace
Canales
Ayuda
Alfa, Bravo, Charlie, Delta, Echo, Foxtrot, Golf, Hotel, India, Juliett, Kilo, Lima, Mike, November, Oscar, Papa, Quebec, Romeo, Sierra, Tango, Uniform, Victor, Whiskey, X-ray, Yankee, Zulu
Aviation Alphabet
ACTIVITY 1 : AVIATION VOCABULARY BINGO AND COMMON TERMS
Kahoot en curso
Kahoot finalizado Ver resultados
Presentar en vivo
Asignar
Jugar en solitario
Preguntas (10)
Mostrar respuestas
1 - Quiz
1 How would you spell "Flight" using the phonetic alphabet?
2 - Quiz
How do you spell "Pilot" using the phonetic alphabet?
3 - Quiz
What does "Roger" mean in aviation communication?
4 - Quiz
Which of the following is used to indicate "end of transmission" in aviation?
5 - Quiz
How do you spell "Echo" using the phonetic alphabet?
ECHO
6 - Quiz
What does "Wilco" stand for in aviation communication?


1 How would you spell "Flight" using the phonetic alphabet?
0
30
Answers
Foxtrot-Lima-India-Golf-Hotel-Tango
Foxtrot-Lima-India-Golf-Hotel
Foxtrot-Lima-India-Tango-Hotel
Foxtrot-Lima-India-Tango-Hotel- Tango

ACTIVITY 1.2	MENTIMETER WORD CLOUD CHALLENGE
Objective:	To familiarize participants with common aviation terms and their correct usage.
Content:	Common aviation terms and ICAO radiotelephony phrases
Participants:	Pilots, air traffic controllers, and aircraft technicians.
Time:	15 minutes
Resources	Computer or mobile device with Mentimeter access.
Gamified strategy:	Participants will use Mentimeter to create a collaborative word cloud, contributing aviation terms they know or learn during the activity. The more participants submit a specific term, the larger the word appears on the cloud. After the word cloud is completed, a discussion follows to correct, confirm, and expand on the vocabulary.

DESCRIPTION

1. Participants access the Mentimeter session on their devices.
2. They submit common aviation terms and phrases related to their roles.
3. As terms are submitted, a word cloud is generated, showing the most commonly submitted terms in larger font sizes.
4. The instructor reviews the terms, explaining or correcting any misunderstandings, and expanding on the vocabulary.

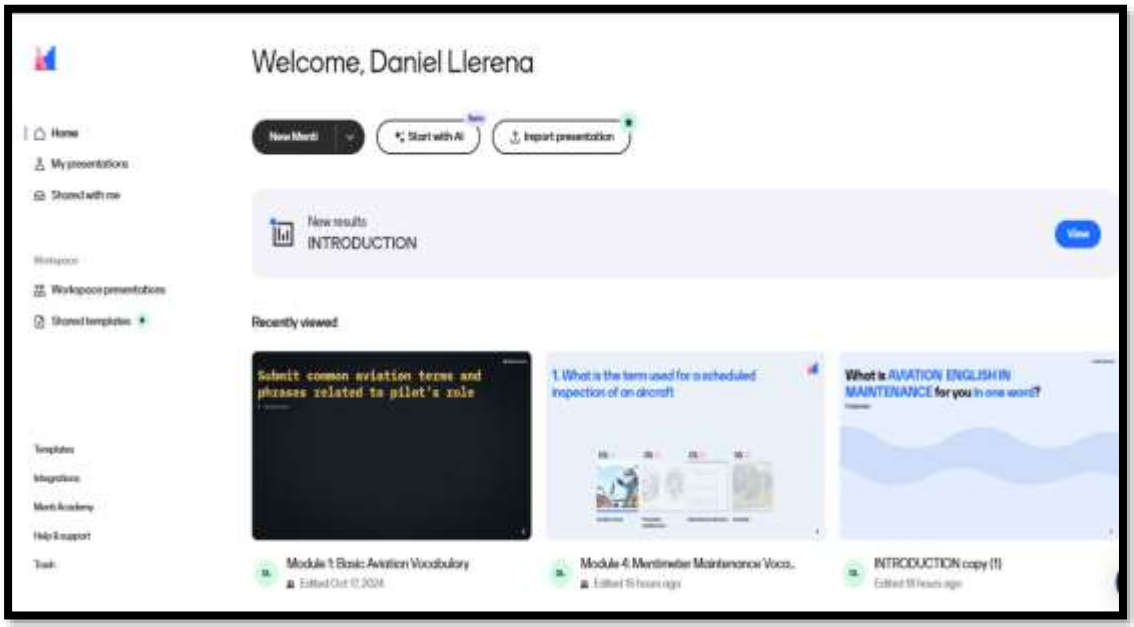
ASSESSMENT AXIS

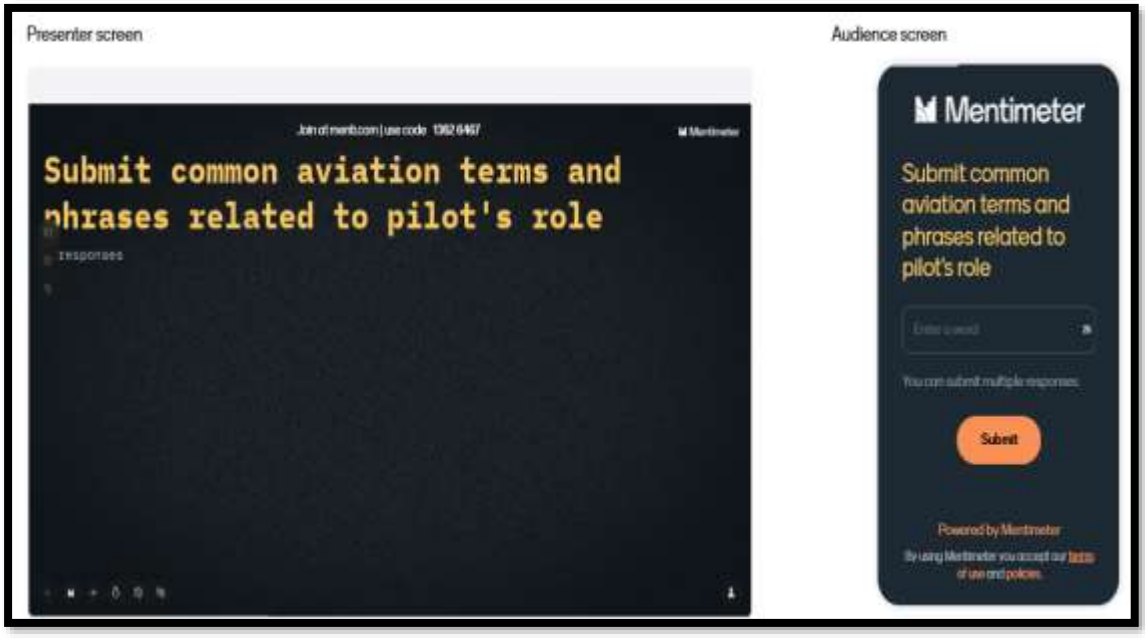
Participants' engagement and understanding of common aviation terms will be assessed based on their contributions and the accuracy of the terms submitted.

PRODUCT

https://www.menti.com/alstmg3v6j9p

code 6855 9697





Elaborated by: Llerena, D. (2024)
Source: Direct Research

<table>
<tr><th colspan="2">1.3 EXTRA PRACTICE</th></tr>
<tr><th colspan="2">PHONETIC ALPHABET AND NUMBERS</th></tr>
<tr><td rowspan="2">LISTENING ACTIVITY</td><td>Participants log into the Kahoot link and practice the next listening activity.

https://kahoot.it/challenge/03878025?challenge-id=e904c95e-8cee-4d10-b998-50f79ce1f0e6_1734702815453</td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="2">SPEAKING ACTIVITY</td><td>Participants work in pairs to practice the next scenarios.</td></tr>
<tr><td>Scenario 1: Flight Confirmation
ATC: "This is Quito Tower. Please confirm your flight number using the phonetic alphabet."
Pilot: "Flight Bravo Tango Two Zero Two Three."

Scenario 2: Aircraft Registration
ATC: "Provide your aircraft registration using the phonetic alphabet."
Pilot: "Hotel Echo Lima One Two Three Four."

Scenario 3: Runway Confirmation
ATC: "Confirm the active runway for departure."
Pilot: "Runway Two Six, Tango Whiskey Oscar Six."

Scenario 4: Decoding a Message
ATC: "Pilot, please decode the following: November Oscar Tango Echo."
Pilot: "NOTE."</td></tr>
</table>

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Module 2: Communication in the Cockpit

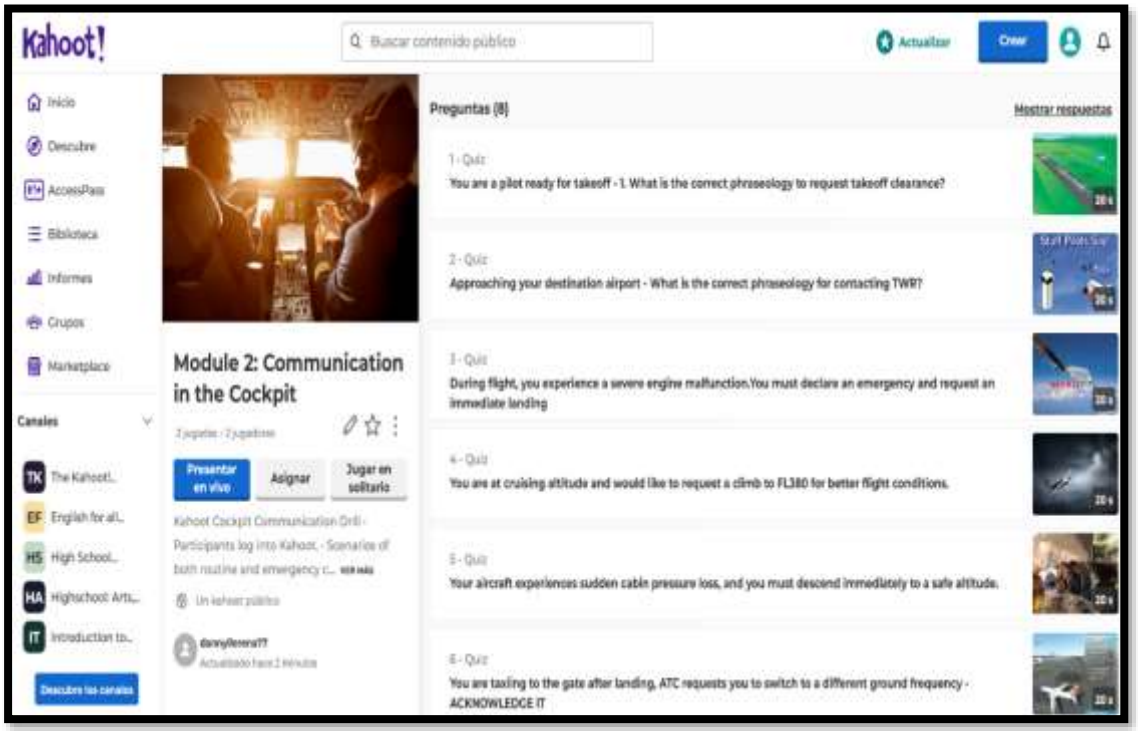
2.1.Standard aviation phraseology for clear and precise cockpit communication.

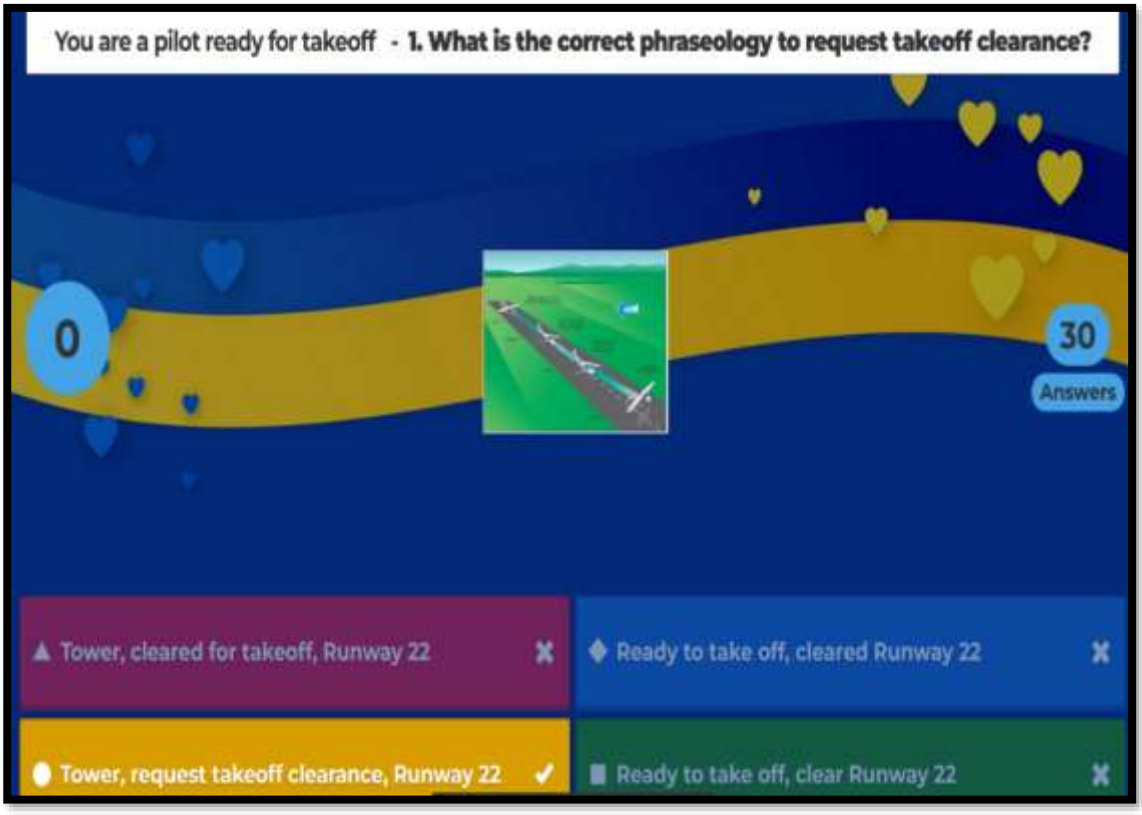
2.2.Emergency communication protocols for critical situations.

2.3. Extra Practice for listening and speaking: ATIS

ACTIVITY 2.1	**KAHOOT COCKPIT COMMUNICATION DRILL**
Objective:	To familiarize participants with standard aviation phraseology and cockpit communication protocols.
Content:	Standard phraseology for cockpit communication and emergency protocols.
Participants:	Pilots and co-pilots.
Time:	20 minutes
Resources	Computer or mobile device with Kahoot access.
Gamified strategy:	Participants will answer a series of questions on Kahoot that simulate cockpit communication scenarios. These include both routine and emergency situations, requiring the correct use of phraseology.
DESCRIPTION	
• Participants log into Kahoot. • Scenarios of both routine and emergency cockpit communication are presented. • Participants must choose the correct phraseology for each situation. • Points are awarded for each correct and timely response.	
ASSESSMENT AXIS	
The assessment will focus on understanding the correct use of standard phraseology and the response time during cockpit communication.	
PRODUCT	

https://create.kahoot.it/share/module-2-communication-in-the-cockpit/13c3b792-01b4-4c51-a3d8-cbc508a14e85





ACTIVITY 2.2	MENTIMETER EMERGENCY PROTOCOL SCENARIOS
Objective:	To understand and practice emergency communication protocols in critical situations.
Content:	Emergency procedures and the associated phraseology for communicating during in-flight emergencies.
Participants:	Pilots, co-pilots, and air traffic controllers.
Time:	20 minutes
Resources	Computer or mobile device with Mentimeter access.
Gamified strategy:	Using Mentimeter, participants will engage in a scenario-based quiz where they select the correct responses to emergency situations. Scenarios will require participants to choose the appropriate communication protocol.

DESCRIPTION

- Participants log into Mentimeter and are presented with various emergency scenarios.
- For each scenario, participants must select the appropriate phraseology and communication steps required.
- Points are awarded for correct responses, and a leaderboard will display the top performers.
- The instructor will provide feedback and discuss each scenario after the quiz.

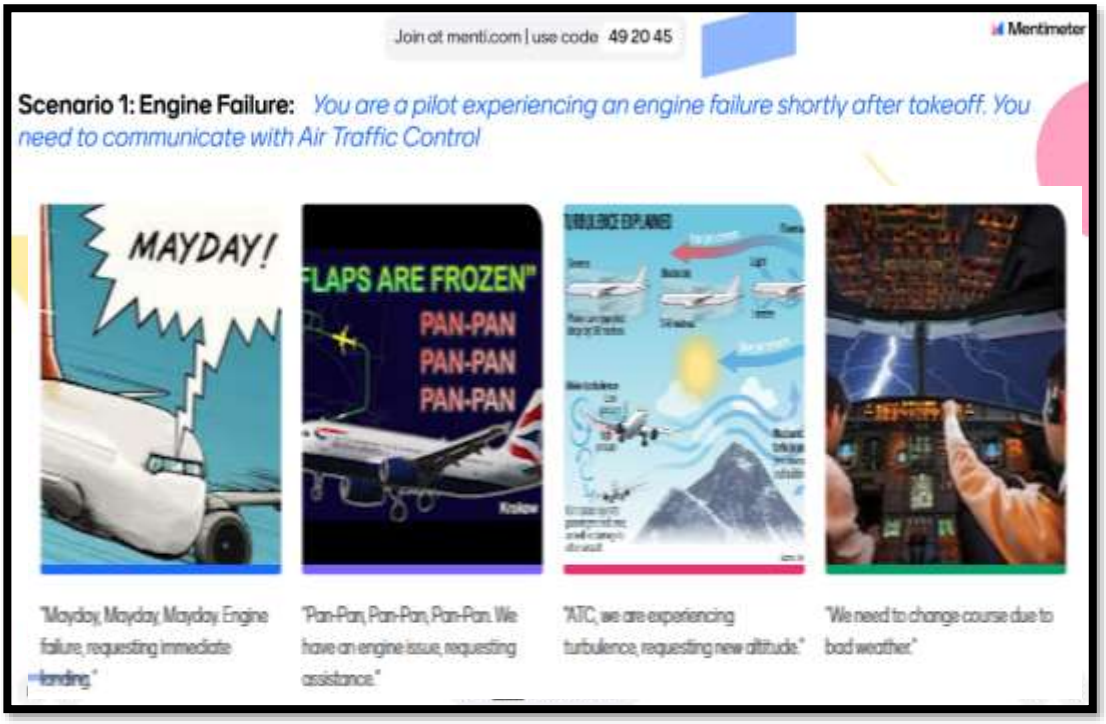
ASSESSMENT AXIS

Participants' ability to apply emergency communication protocols will be assessed based on quiz performance and overall scores.

PRODUCT

https://www.menti.com/alhphmjpaqze

code 49 20 45



Join at menti.com | use code 49 20 45

2. Cabin Pressure Loss: *Your aircraft is experiencing a sudden cabin pressure loss. You must declare an emergency and descend to a safe altitude*

"We have a minor issue, descending to a lower altitude."

Mayday, Mayday, Mayday. Cabin pressure loss, we are descending to FL100."

"Pan-Pan, Pan-Pan, Pan-Pan. We have an issue, reducing altitude."

ATC, can you suggest a new altitude for descent?"

3. Bird Strike on Takeoff: Shortly after takeoff, your aircraft hits a flock of birds, causing engine damage. You must report the situation to ATC.

"Mayday, Mayday, Mayday. We have suffered a bird strike, engine malfunction, requesting immediate return to the airport."

"Pan-Pan, Pan-Pan, Pan-Pan. Bird strike, engine damaged, returning to the airport."

"ATC, we have engine failure, continuing the flight."

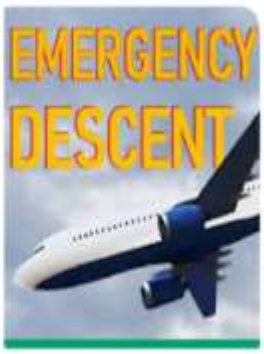
Birds hit the aircraft, requesting altitude change."

4. Medical Emergency on Boa: A passenger on your flight is experiencing a severe medical emergency, and you need to inform ATC for priority landing.

"Pan-Pan, Pan-Pan, Pan-Pan. We have a medical emergency on board, requesting priority landing."

"Mayday, Mayday, Mayday. Passenger unwell, need to land immediately."

"Medical issue on board, continue flight as planned."



"ATC, requesting descent to a lower altitude for a passenger."

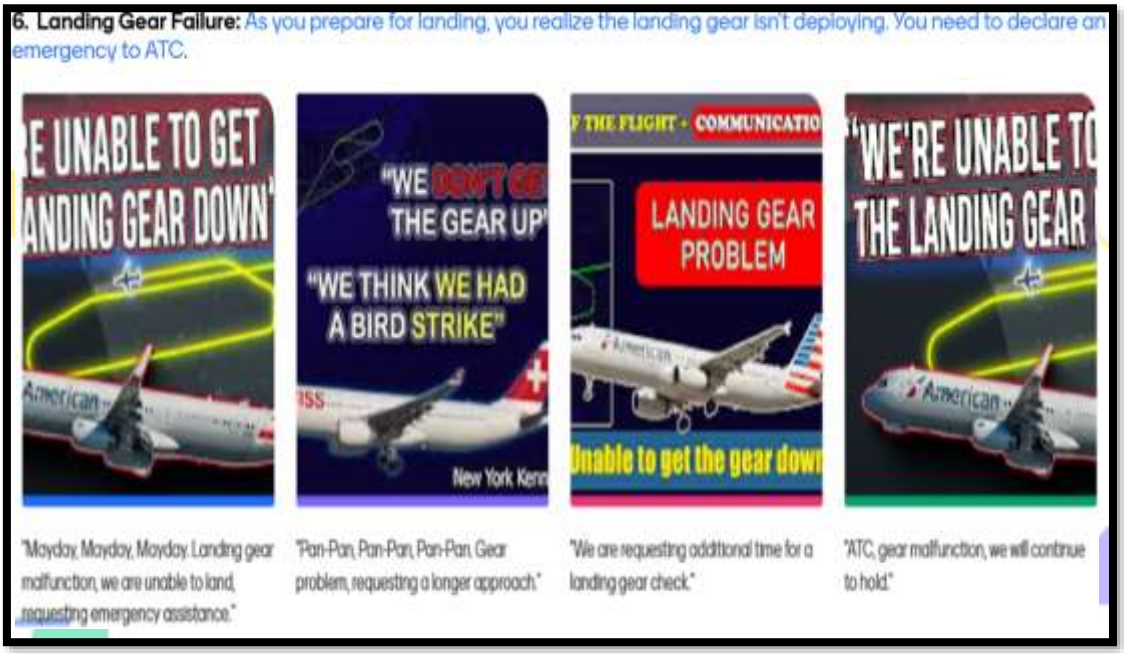
5. Fire in the Cockpit: You detect smoke in the cockpit and suspect an electrical fire. You need to alert ATC and declare an emergency.

"Pan-Pan, Pan-Pan, Pan-Pan. We have smoke in the cockpit, electrical issue."

"Mayday, Mayday, Mayday. Smoke in the cockpit, requesting immediate landing."

"We are returning to the airport due to a technical issue."

"ATC, we are reducing speed due to a problem."



Elaborated by: Llerena, D. (2024)
Source: Direct Research

<table>
<tr><th colspan="2">2.3 EXTRA PRACTICE</th></tr>
<tr><th colspan="2">AUTOMATIC TERMINAL INFORMATION SYSTEM (ATIS)</th></tr>
<tr><td rowspan="2">LISTENING ACTIVITY</td><td>Participants log into the Kahoot link and practice the next listening activity.

<u>https://kahoot.it/challenge/?quiz-id=8fc4d529-e786-4561-a6be-e8da145bb135&single-player=true</u></td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="2">SPEAKING ACTIVITY</td><td>Participants work in pairs to practice the next dialogue:</td></tr>
<tr><td>PILOT: ADDISON GROUND SKYLANE 916, request ATIS information
ATC: SKYLANE 916, Ready to copy.
PILOT: Ready to copy. SKYLANE 916

ATC: ATIS ADDISON with Information FOXTROT – 1547Z - WIND 190 at 8 - visibility 13 - SKY CONDITIONS FEW120- TEMP 26 /DEW 7 - A3028 - VISUAL APPROACHING use LANDING departing runway 16 all arrivals to ADDISON contact regional approach on 124.25 – for all IFR clearance or visual flight following contact Ground Control at 121.6
PILOT: ROGER.
.</td></tr>
</table>

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Module 3: Air Traffic Control Language

3.1.Details ATC communication protocols to manage air traffic effectively.

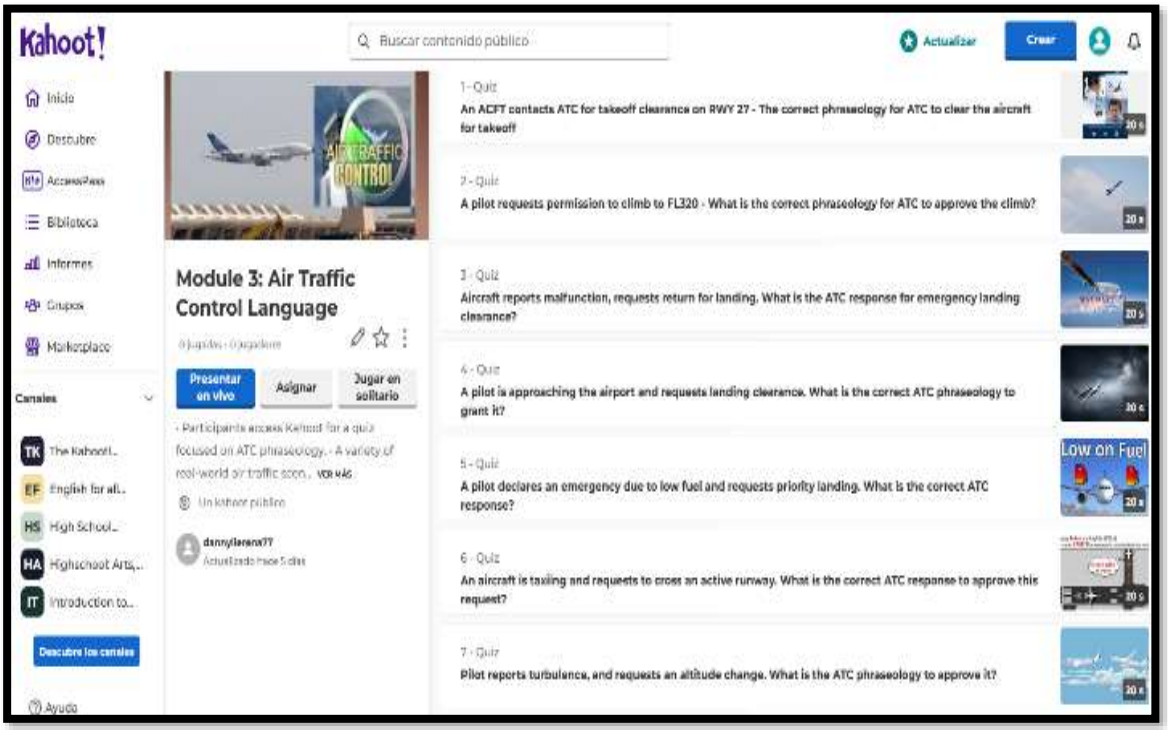
3.2.Strategies for handling unusual situations during communication in flight operations.

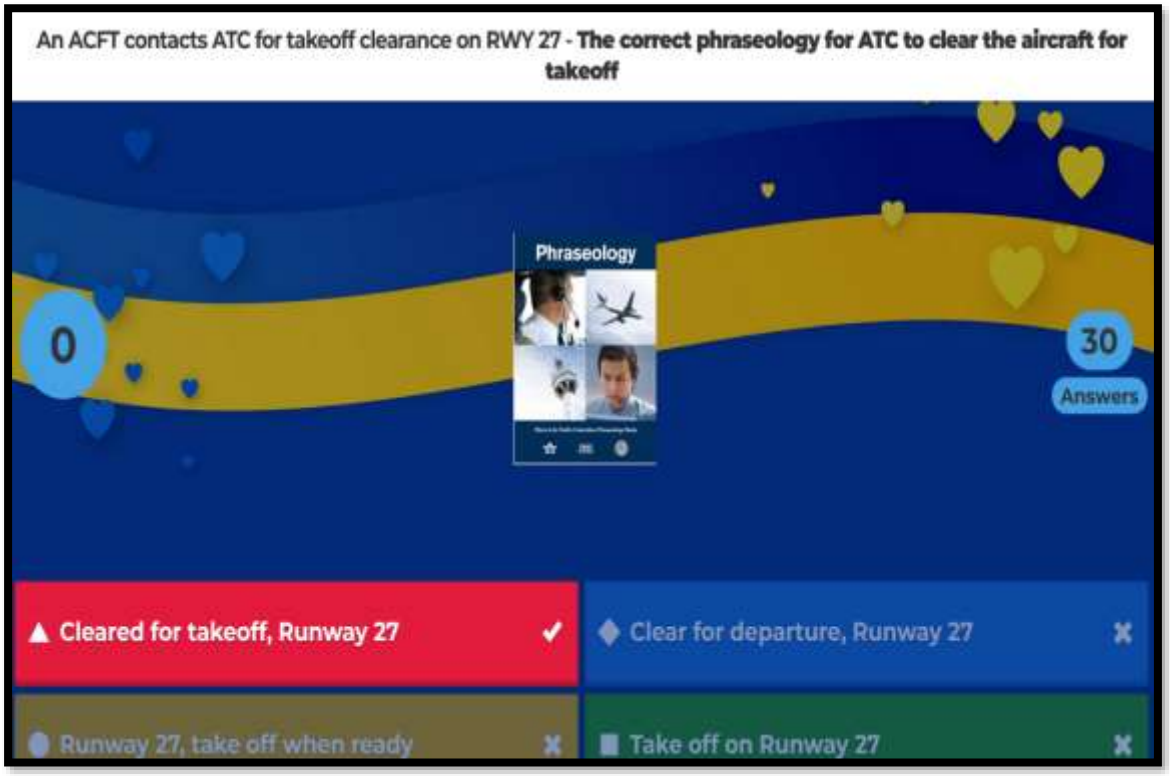
3.3. Extra practice for listening and speaking: Air Traffic Control language

ACTIVITY 3.1	**KAHOOT ATC PHRASEOLOGY RACE**
Objective:	To practice the use of air traffic control (ATC) protocols in various real-life scenarios.
Content:	ATC phraseology and procedures for managing air traffic, including unusual scenarios.
Participants:	Air traffic controllers and pilots.
Time:	20 minutes
Resources	Computer or mobile device with Kahoot access.
Gamified strategy:	Participants will take part in a fast-paced Kahoot quiz on ATC protocols. The quiz will present different traffic scenarios, and participants must select the correct ATC responses.
DESCRIPTION	
• Participants access Kahoot for a quiz focused on ATC phraseology. • A variety of real-world air traffic scenarios are presented. • Participants select the appropriate phraseology and procedures. • Points are awarded for accuracy and speed.	
ASSESSMENT AXIS	
The assessment will focus on the ability to apply ATC protocols accurately and quickly in real-world situations.	
PRODUCT	

Air Traffic Control Language:

https://create.kahoot.it/share/module-3-air-traffic-control-language/657d4685-2946-4f5c-9c8e-f17996ca055d





ACTIVITY 3.2	MENTIMETER UNUSUAL SITUATIONS SIMULATION
Objective:	To develop strategies for handling unusual or emergency situations in air traffic control.
Content:	Strategies and communication protocols for managing unexpected situations.
Participants:	Air traffic controllers and pilots.
Time:	25 minutes
Resources	Computer or mobile device with Mentimeter access.
Gamified strategy:	Using Mentimeter, participants will respond to various scenario-based questions where they must select the appropriate ATC communication strategies for unusual situations.

DESCRIPTION

- Participants access Mentimeter and are presented with different unusual or emergency scenarios (e.g., an aircraft experiencing engine failure, or a sudden weather change).
- For each scenario, participants must choose the most appropriate ATC communication strategy.
- A leaderboard displays the top scorers, encouraging friendly competition.
- The instructor will review the scenarios, discuss the correct strategies, and address any questions.

ASSESSMENT AXIS

will focus on participants' ability to select the appropriate communication strategies in various scenarios, evaluating their critical thinking and problem-solving skills.

PRODUCT

https://www.menti.com/alr2z8ux6gj8

CODE: 4596 0215

Join at menti.com | use code 5166 2927

1. Engine Failure: An aircraft reports engine failure after takeoff and requests emergency landing. What is the best ATC communication strategy?

Mayday received, cleared to land on the nearest runway

Continue on course, engine shutdown procedures required

Pan-Pan received, begin return to base

Hold your position while we arrange emergency landing

2. Sudden Weather Change: A pilot reports entering severe turbulence and requests altitude change. What is the appropriate ATC communication strategy?

Request denied, maintain current altitude

Cleared to descend by 5,000 feet to avoid turbulence.

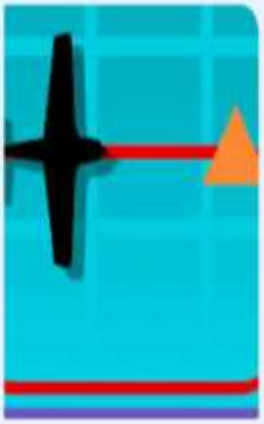
Roger, please report back after leaving the turbulence.

Climb to 40,000 feet immediately.

3. Bird Strike : An aircraft reports a bird strike and declares an emergency due to engine damage. What is the appropriate ATC communication strategy?

Roger, continue on course. Report the bird strike after landing

Mayday received, proceed to the nearest airport for an emergency landing

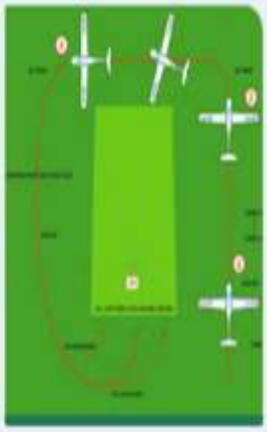


Hold your position, we will arrange emergency services.

Climb to a higher altitude to avoid further damage.

4. Low Fuel Emergency: An aircraft declares a low-fuel emergency and requests priority landing. What is the appropriate ATC communication strategy?

Cleared for an immediate landing, runway is clear



Hold your position, we will prepare for landing.

Descend to 3,000 feet and prepare for a delayed landing.

Continue at your current altitude while we reroute traffic.

5. Instrument Failure: A pilot reports an instrument failure affecting navigation and requests guidance. What is the appropriate ATC communication?

You are cleared to continue flight manually, monitor closely

Proceed to the nearest airport for landing

Roger, turn 90 degrees left and descend to 10,000 feet

Maintain your current heading, prepare to switch to visual flight rules

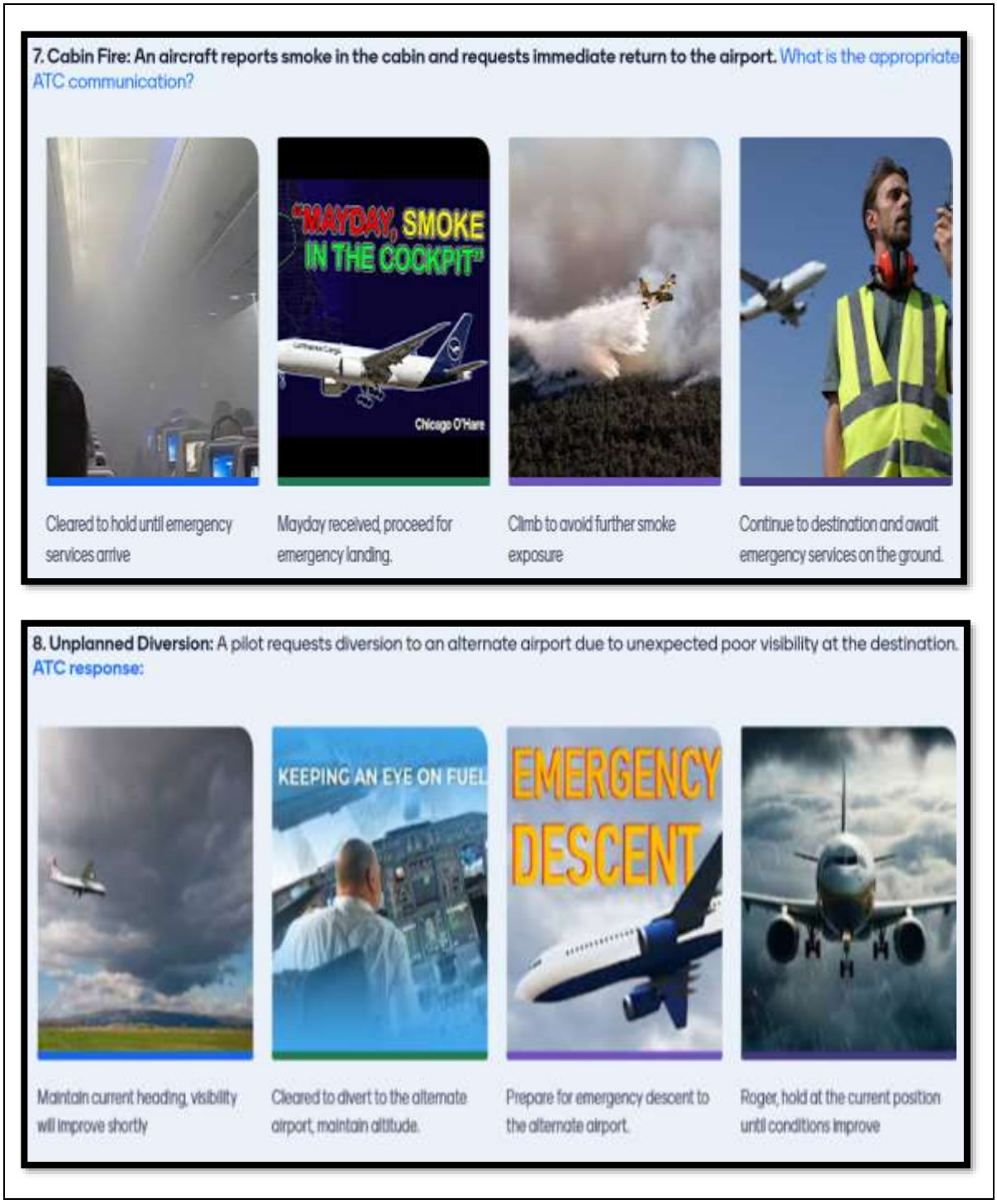
6. Runway Incursion: An aircraft preparing for takeoff reports another aircraft crossing the runway without clearance. What is the ATC communication

Abort takeoff and hold position immediately

Continue with takeoff as planned

Hold at taxiway, prepare for clearance.

Request permission to reroute."



Elaborated by: Llerena, D. (2024)
Source: Direct Research

<table>
<tr><th colspan="2">3.3 EXTRA PRACTICE</th></tr>
<tr><th colspan="2">AIR TRAFFIC CONTROL LANGUAGE</th></tr>
<tr><td rowspan="2">LISTENING ACTIVITY</td><td>Participants log into the Kahoot link and practice the next listening activity.

<u>https://kahoot.it/challenge/04815577?challenge-id=e904c95e-8cee-4d10-b998-50f79ce1f0e6_1734193279902</u></td></tr>
<tr><td> 
</td></tr>
<tr><td rowspan="2">SPEAKING ACTIVITY</td><td>Participants work in pairs to practice the next Ground phraseology:</td></tr>
<tr><td>PILOT: SKYLANE 7241R, ready at Rwy 14R, departing SE bound
ATC: SKYLANE 7241R, ROGER.

PILOT: SKYLANE 7241R, ready for departure".
ATC: SKYLANE 7241R, Standby, N39Q turned right on Alpha, contact ground on 121.7
PILOT: Right on Alpha, contact ground on 121.7, N39Q

ATC: SKYLANE 7241R, Go ahead.
PILOT: SKYLANE 7241R, ready at Rwy 14R.
ATC: SKYLANE 7241R, Hold short Rwy 14R.
PILOT: Holding short RWY14R, SKYLANE 7241R

ATC: SKYLANE 7241R, ready at Rwy 14R, cleared for takeoff.
PILOT: Cleared for takeoff, Rwy 14R, SKYLANE 7241R.</td></tr>
</table>

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Module 4: Maintenance Vocabulary

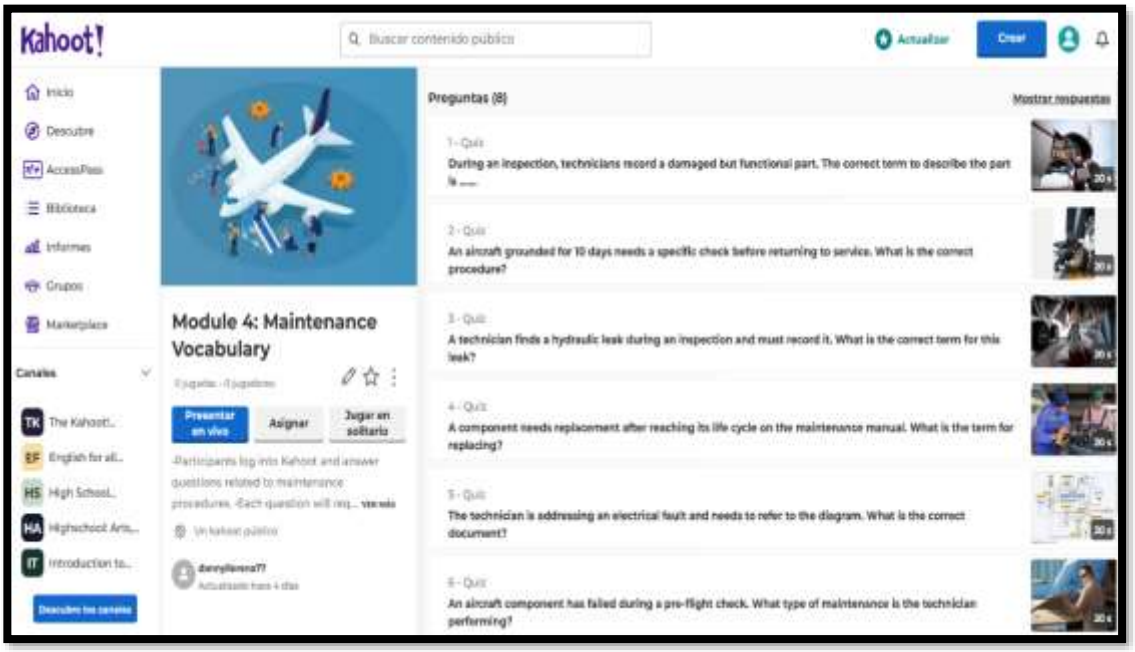
4.1.Technical terms crucial for aircraft maintenance.

4.2. Procedures for reporting and documentation to ensure maintenance accuracy.

4.3. Common issues encountered in aircraft maintenance documentation and effective strategies to overcome them.

ACTIVITY 4.1	**KAHOOT MAINTENANCE TERM SHOWDOWN**
Objective:	To teach and reinforce the use of technical vocabulary related to aircraft maintenance.
Content:	Technical terms used in maintenance procedures and documentation.
Participants:	Aircraft maintenance technicians.
Time:	20 minutes
Resources	Computer or mobile device with Kahoot access.
Gamified strategy:	Participants will engage in a Kahoot quiz where they must correctly identify and apply maintenance-related technical terms. The questions will cover common maintenance procedures and necessary vocabulary for reports.
DESCRIPTION	
• Participants log into Kahoot and answer questions related to maintenance procedures. • Each question will require identifying technical terms within the context of practical maintenance issues. • Points are awarded based on accuracy and speed.	
ASSESSMENT AXIS	
Assessment will be based on the correct identification of technical terms and timely responses during maintenance tasks.	
PRODUCT	
Maintenance Vocabulary:	

https://create.kahoot.it/share/module-4-maintenance-vocabulary/b7a59263-a0b8-4589-bf3a-a7950b2eb0f6



ACTIVITY 4.2	MENTIMETER MAINTENANCE VOCABULARY QUIZ
Objective:	To introduce and reinforce technical terms crucial for aircraft maintenance.
Content:	Key technical terms and phrases related to aircraft maintenance.
Participants:	Aircraft maintenance technicians.
Time:	20 minutes
Resources	Computer or mobile device with Mentimeter access.
Gamified strategy:	Participants will engage in a quiz using Mentimeter, answering questions related to essential maintenance vocabulary to reinforce their technical knowledge.

DESCRIPTION

- Participants log into the Mentimeter session.
- The instructor presents multiple-choice questions regarding technical terms used in aircraft maintenance.
- Participants select the correct responses, and real-time results are displayed.
- Points are awarded for correct answers, and explanations are provided for any incorrect responses.

ASSESSMENT AXIS

Participants' understanding of maintenance vocabulary will be evaluated based on their quiz performance and comprehension of the material.

PRODUCT

https://www.menti.com/alwnpe8pmz2h

CODE: 42 22 60 4

Join at menti.com | use code 2322 5142

1. What is the term used for a scheduled inspection of an aircraft

Routine check

Preventive maintenance

Airworthiness directive

Overhaul

2. Which document outlines the specific maintenance procedures required for an aircraft?

Airframe maintenance manual

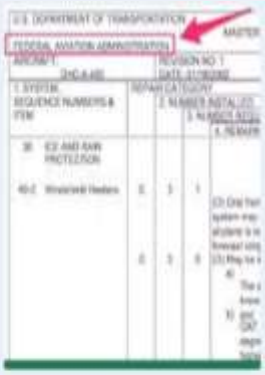
Technical logbook

Aircraft maintenance manual (AMM)

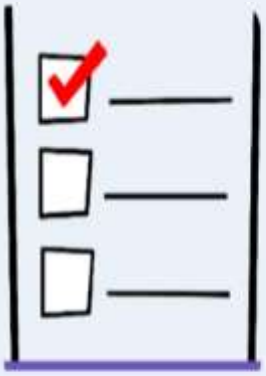
Flight operations manual

3. What does the term "MEL" stand for in aviation maintenance?

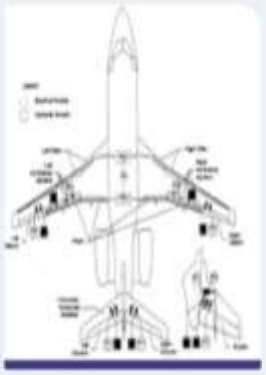
Maintenance Equipment List



Minimum Equipment List



Mandatory Equipment List



Mechanical Equipment List

4. What is the purpose of a "service bulletin" in aircraft maintenance?

To report defects and issues

To provide updates on new procedures or changes

To document flight logs

To record maintenance hours

5. Which term refers to the documentation of maintenance performed on an aircraft?

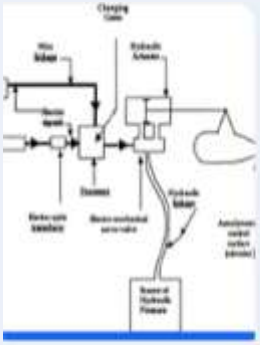
Service report

Maintenance log

Technical report

Inspection report

6. What does the term "overhaul" refer to in aircraft maintenance?



A routine check of systems

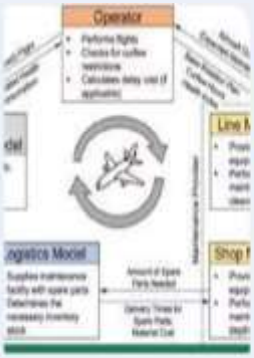
Complete disassembly and reassembly of components

Minor repairs to aircraft

Inspection of critical parts

7. Which term describes the allowable limit for a part's wear before it must be replaced?

Service limit



Maintenance threshold

Life limit

Critical limit

8. What is the term for the procedure of inspecting a part or system in-flight?

In-flight check

Pre-flight inspection.

Visual inspection

Post-flight inspection

ACTIVITY 4.3	MENTIMETER OPEN DISCUSSION ON MAINTENANCE CHALLENGES
Objective:	To discuss the challenges faced in maintenance documentation and reporting.
Content:	Common issues encountered in aircraft maintenance documentation and effective strategies to overcome them.
Participants:	Aircraft maintenance technicians.
Time:	15 minutes
Resources	Computer or mobile device with Mentimeter access.
Gamified strategy:	An interactive open-ended discussion using Mentimeter where participants share their experiences and challenges related to maintenance documentation and reporting.

DESCRIPTION

- Participants log into Mentimeter and respond to the question: "What challenges do you face in maintenance documentation and reporting, and how can they be addressed?"
- Responses are collected and displayed in real-time, creating a collaborative list of challenges and potential solutions.
- The instructor facilitates a discussion based on the responses, highlighting key issues and effective documentation strategies.

ASSESSMENT AXIS

Participants' understanding of maintenance challenges will be evaluated based on the relevance and depth of their contributions during the discussion.

PRODUCT

https://www.menti.com/alp4h5hy7w9i

CODE: 7624 5741

Elaborated by: Llerena, D. (2024)
Source: Direct Research

Validation Process

The validation process involves collecting feedback from aviation experts who will analyze the structure and content of the didactic guide to ensure it meets the research objectives effectively. This feedback will analyze the relevance, practicality, and the potential applicability of the vocabulary and learning methods included in the guide. The validation process includes:

1. **Expert Reviews:**

- Collecting feedback from aviation experts who will review the didactic guide.
- Analyzing the clarity, coherence, and effectiveness of the gamified strategies in enhancing vocabulary proficiency.

2. **Content Evaluation:**

- Gathering input from experts on the relevance of the aviation English technical vocabulary presented in the guide.
- Evaluating the appropriateness of the learning methodologies and activities for the target audience.

3. **Theoretical Analysis of Potential Application:**

- Analyzing expert evaluations regarding the feasibility and potential effectiveness of the proposed gamified strategies in real-world aviation contexts.
- Ensuring that the guide aligns with the specific needs of pilots, air traffic controllers, and maintenance personnel.

Expert Validation Interpretation

Expert validation is a critical technique in educational research, allowing experts to assess the clarity, relevance, and applicability of proposed materials based on their professional experience (Escobar-Pérez & Cuervo-Martínez, 2008). In this sense, this validation process ensures that the instructional resources align with educational objectives and are effective for learning.

The validation of the *Fly High with Aviation English Technical Vocabulary* guide, conducted by three experienced pilots, confirms that the guide is well-structured, effective, and aligned with its intended objectives. Through the Support Matrix (appendix 6), key criteria were analyzed, including content relevance, engagement through gamified activities, vocabulary retention, variety and balance of activities, evaluation methods, technological integration, teacher resources, and clarity of objectives.

The results for the didactic guide indicate a high level of approval from the experts with an overall average score of 4.89, showing high ratings in most criteria, particularly in content relevance, where experts confirmed the alignment of technical vocabulary with essential terms for pilots, ATC, and maintenance staff. High scores were also noted for technological integration and engagement through gamified activities using platforms like Kahoot and Mentimeter, underscoring the guide's ability to promote interactive, motivating learning experiences. Minor recommendations were suggested in the evaluation methods and teacher support resources, which, if implemented, would further enhance the guide's impact on learners.

Overall, the validation highlights a strong acceptance of the guide's approach, with experts affirming its effectiveness and alignment with educational goals to improve aviation technical English proficiency through engaging gamified strategies.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Based on the questionnaires and surveys, the findings revealed significant variability in the level of technical vocabulary knowledge across the roles evaluated (pilots, air traffic controllers, and maintenance personnel). Strengths were observed in basic terminology; however, notable deficiencies were identified in advanced technical vocabulary, among pilots, air traffic controllers, and maintenance personnel.
2. A didactic guide was developed incorporating gamified strategies to address the identified deficiencies in technical vocabulary learning. The guide aligns with the personnel's needs and includes interactive activities according to aviation staff roles, ensuring its relevance to their professional context.
3. The validation process involved expert evaluations, which confirmed the potential effectiveness of the proposed strategies. Feedback from experts highlighted that gamified approaches are well-received and could support vocabulary retention, especially by promoting engagement and collaboration among learners.

Recommendations

1. Army Aviation Group No. 44 “Pastaza” should integrate gamified strategies, such as Kahoot and Mentimeter, into its regular English training programs. Periodic interactive sessions can reinforce technical vocabulary learning and support sustained engagement among aviation personnel.
2. Implementing team-based gamified challenges can promote collaboration and motivation within the aviation staff. These activities encourage peer support and create a dynamic learning environment aligned with real-world aviation operations.
3. Establish ongoing assessments integrated into gamified activities to monitor vocabulary learning progress. This approach allows for the identification of specific areas needing improvement and provides actionable feedback to support learners effectively.

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APPENDICES

Appendix 1 *ICAO Questionnaire Test for Pilots*

ICAO Questionnaire Test for Pilots

This questionnaire is designed to test various aspects of a pilot's knowledge and proficiency in Aviation English, including their understanding of standard phraseology, emergency procedures, and operational protocols. The questions reflect real-world scenarios that pilots may encounter in their daily operations. It consists of 15 questions divided into sections of multiple-choice questions true/false questions and fill in the Blanks, focused on aviation-specific terminology and phraseology.

Instructions

Please answer the following questions based on your knowledge and experience. This test is designed to assess your proficiency in Aviation English and your understanding of standard ICAO procedures and terminology.

Part 1: Multiple Choice Questions (MCQs)

1. **What phrase should you use to request permission to taxi?**
   a. "Request start"
   b. "Request taxi"
   c. "Request move"
   d. "Request roll"

2. **Which of the following is the correct phraseology for reporting a missed approach?**
   a. "Aborted landing"
   b. "Missed landing"
   c. "Go around"
   d. "Turning back"

3. **How do you acknowledge receiving a transmission correctly?**
   a. "Received"

b. "Copy"
c. "Roger"
d. "Acknowledged"

4. **What does the term "Squawk 7700" mean?**

a. Communication failure
b. Hijacking
c. Emergency
d. Routine communication

5. **What phraseology should you use to climb to 10,000 feet?**

a. "Climb to ten thousand feet"
b. "Ascend to ten thousand feet"
c. "Up to ten thousand"
d. "Climbing ten thousand"

6. **What does "ATIS" stand for in aviation?**

a. Automatic Traffic Information System
b. Automated Terminal Information Service
c. Aircraft Traffic Information Service
d. Automatic Terminal Information System

7. **Which term refers to the permission given by ATC for an aircraft to proceed under specified conditions?**

a. Clearance
b. Advisory
c. Directive
d. Notification

8. **What does the term "ETA" stand for?**

a. Estimated Travel Altitude
b. Expected Travel Announcement

c. Estimated Time of Arrival
d. Expected Time of Altitude

9. **Which of the following is the correct meaning of "QNH"?**
   a. Altimeter setting for height above ground
   b. Altimeter setting for pressure altitude
   c. Altimeter setting for local pressure
   d. Altimeter setting for standard pressure

10. **What does "PAPI" stand for?**
    a. Precision Approach Path Indicator
    b. Position Approach Path Indicator
    c. Pilot Assistance Path Indicator
    d. Precision Altitude Path Indicator

Part 2: True/False Questions

11. **You should use the phrase "Wilco" to indicate that you will comply with the instructions given.**
    a. True
    b. False

12. **The phrase "Pan Pan" is used to indicate an urgent situation that is not an immediate danger to life or the aircraft.**
    a. True
    b. False

13. **Using plain language instead of standard phraseology is acceptable when communicating with air traffic control.**
    a. True

b. False

14. **"Mayday" is the standard phrase used to declare a life-threatening emergency.**

a. True

b. False

15. **"Roger" means that you have received and understood the message.**

a. True

b. False

Appendix 2 *ICAO Questionnaire Test for Air Traffic Controllers*

ICAO Questionnaire Test for Air Traffic Controllers

This questionnaire aims to test various aspects of an air traffic controller's knowledge and proficiency in Aviation English, including their understanding of standard phraseology, emergency procedures, and communication protocols. The questions are designed to reflect real-world scenarios that air traffic controllers may encounter in their daily operations. It consists of 15 questions divided into sections of multiple-choice questions true/false questions and Fill in the Blanks focused on aviation-specific terminology and phraseology.

Instructions

Please answer the following questions based on your knowledge and experience. This test is designed to assess your proficiency in Aviation English and your understanding of standard ICAO phraseology and procedures.

Part 1: Multiple Choice Questions (MCQs)

1. **What phrase should you use to instruct an aircraft to climb to a specific altitude?**
   a. "Climb and maintain"
   b. "Ascend to"
   c. "Increase altitude"
   d. “Proceed to”
2. **Which phrase correctly advises an aircraft to hold its current position?**
   a. "Stay there"
   b. "Hold position"
   c. "Do not move"
   d. "Remain"
3. **What is the correct response if you do not understand a pilot's transmission?**
   a. "Repeat"
   b. "Say again"
   c. "What did you say?"
   d. "Clarify"

4. **When should you use the phrase "Go ahead"?**
    a. To tell an aircraft to proceed with taxiing
    b. To instruct an aircraft to take off
    c. To indicate readiness to receive a message
    d. To instruct an aircraft to land

5. **What does "ATIS" stand for in aviation?**
    e. Automatic Traffic Information System
    f. Automated Terminal Information Service
    g. Aircraft Traffic Information Service
    h. Automatic Terminal Information System

6. **Which term refers to the permission given by ATC for an aircraft to proceed under specified conditions?**
    a. Clearance
    b. Advisory
    c. Directive
    d. Notification

7. **What does the term "ETA" stand for?**
    a. Estimated Travel Altitude
    b. Expected Travel Announcement
    c. Estimated Time of Arrival
    d. Expected Time of Altitude

8. **Which of the following is the correct meaning of "QNH"?**
    a. Altimeter setting for height above ground
    b. Altimeter setting for pressure altitude
    c. Altimeter setting for local pressure.
    d. Altimeter setting for standard pressure

9. What does "PAPI" stand for?

a. Precision Approach Path Indicator
b. Position Approach Path Indicator
c. Pilot Assistance Path Indicator
d. Precision Altitude Path Indicator

10. What does the phrase "Squawk 7500" mean?

a. Aircraft hijacking
b. Radio communication failure
c. Emergency descent
d. Engine failure

Part 2: True/False Questions

11. You should use the phrase "Roger" to indicate that you have received and understood a message.

a. True
b. False

12. The term "Wilco" means "will comply".

a. True
b. False

13. Pan Pan" is used to declare an emergency situation.

a. True
b. False

14. You should always use plain language instead of standard phraseology when communicating with pilots.

a. True

b. False

15. "Mayday" is used to indicate a life-threatening emergency.

a. True

b. False

Appendix 3 *ICAO Questionnaire Test for Aircraft Technicians*

ICAO Questionnaire Test for Aircraft Technicians

This questionnaire tests various aspects of an aircraft technician's knowledge and proficiency in Aviation English, including their understanding of standard procedures, technical terminology, and maintenance protocols. The questions reflect real-world scenarios that technicians may encounter in their daily operations. It consists of 15 questions divided into sections of multiple-choice questions true/false questions and Fill in the Blanks focused on aviation-specific terminology.

Instructions

Please answer the following questions based on your knowledge and experience. This test is designed to assess your proficiency in Aviation English and your understanding of standard ICAO procedures and technical terminology.

Part 1: Multiple Choice Questions (MCQs)

1. **What does the term "MMEL" stand for in aviation maintenance?**
    a. Master Maintenance Equipment List
    b. Minimum Maintenance Equipment List
    c. Master Minimum Equipment List
    d. Minimum Master Equipment List

2. **Which document provides the necessary maintenance procedures for an aircraft?**
    a. Operations Manual
    b. Maintenance Manual
    c. Flight Log
    d. Safety Checklist

3. **When performing a routine check, which of the following should be inspected first?**

a. Avionics
b. Engine Oil Levels
c. Tire Pressure
d. Hydraulic Fluid Levels

4. **What does the term "AD" refer to in aviation maintenance?**

   a. Airworthiness Directive
   b. Aviation Directive
   c. Aircraft Documentation
   d. Authorized Directive

5. **Which tool is typically used to measure the thickness of brake pads?**

   a. Caliper
   b. Micrometer
   c. Torque Wrench
   d. Ruler

Part 2: True/False Questions

6. **An MEL (Minimum Equipment List) allows an aircraft to be operated under specific conditions with certain inoperative equipment.**

   a. True
   b. False

7. **"NO GO" items are those which do not affect the safety of flight and can be deferred for later maintenance.**

   a. True
   b. False

8. **All maintenance performed on an aircraft must be logged and signed off by a certified technician.**

   a. True

b. False

9. **A Service Bulletin (SB) is mandatory and must be complied with immediately upon issuance.**

   a. True

   b. False

10. **The term "ETOPS" stands for Extended-range Twin-engine Operational Performance Standards.**

    a. True

    b. False

Part 3: Fill in the Blanks

11. **When inspecting an aircraft engine, you should check the _____ levels to ensure proper lubrication.**

12. **The _____ manual contains detailed instructions on how to carry out specific maintenance tasks.**

13. **During a pre-flight inspection, technicians must verify the _____ to ensure the aircraft is safe for flight.**

14. **If an aircraft part is found to be defective, it should be _____ and replaced according to the manufacturer's guidelines.**

15. **Technicians use a _____ wrench to apply a specific amount of force to a fastener.**

Appendix 4 *Survey*

Survey

This survey aims to gather data on Aviation personnel preferences and perceptions regarding different gamified strategies. It is designed to measure participants' attitudes and preferences toward various gamified strategies. The target group will be pilots, air traffic controllers, and aircraft technicians. It Consists of 14 items categorized into three sections: General Attitudes Towards Gamification, Specific Gamified Elements, Preferred Learning Methods. Feedback and Suggestions. Responses range from 1 (Strongly Disagree) to 5 (Strongly Agree). The questions are designed to gauge the effectiveness, engagement, and motivational aspects of various gamified elements (e.g., point systems, challenges, leaderboards).

Identifying Suitable Gamified Strategies for Learning Aviation English Technical Vocabulary

Instructions

Please indicate your level of agreement with each of the following statements by selecting with an “X” the appropriate response. Use the scale below:

1 - Strongly Disagree

2 - Disagree

3 - Neutral

4 - Agree

5 - Strongly Agree

Section 1: General Attitudes Towards Gamification	**1 Strongly Disagree**	**2 Disagree**	**3 Neutral**	**4 Agree**	**5 strongly Agree**
I believe that incorporating game-like elements in learning can enhance my motivation to study aviation English technical vocabulary.					
Gamified learning can help me retain technical vocabulary more effectively than traditional learning methods.					
Section 2: Specific Gamified Elements	**1 Strongly Disagree**	**2 Disagree**	**3 Neutral**	**4 Agree**	**5 strongly Agree**
Earning points for completing vocabulary exercises would motivate me to learn more.					
Competing with peers in vocabulary challenges would make learning more exciting for me.					
Receiving badges or certificates for mastering specific vocabulary sets would encourage me to continue learning.					

Progress bars showing my advancement in vocabulary acquisition would help me stay motivated.					
Interactive simulations and role-playing scenarios would help me better understand and use technical vocabulary.					
Section 3: Preferred Learning Methods	**1** **Strongly Disagree**	**2** **Disagree**	**3** **Neutral**	**4** **Agree**	**5** **strongly Agree**
Using mobile apps for gamified learning would be convenient and effective for me.					
Online platforms with gamified content would make it easier for me to learn at my own pace.					
Group activities and collaborative games would enhance my learning experience.					
Interactive quizzes and flashcards would help me remember technical vocabulary more effectively.					

Section 4: Feedback and Suggestions	**1** **Strongly Disagree**	**2** **Disagree**	**3** **Neutral**	**4** **Agree**	**5** **strongly Agree**
I prefer learning through traditional methods					
I prefer learning through gamified methods					
I prefer learning through a combination of traditional methods and gamified methods					

Thank you for your participation! Your responses will help us identify the most effective gamified strategies to enhance the learning of aviation English technical vocabulary.

Appendix 5 *Validation request for approval of expert aviation validators*

SOLICITUD

Ambato, 8 de noviembre del 2024

Asunto: Solicitando verificación de perfil de expertos de Aviación, encargados de validar guía didáctica

PhD.
MORA ROSALES JOSÉ CLEMENTE
COORDINADOR DE POSGRADOS DE LA FACULTAD DE CIENCIAS DE LA EDUCACIÓN

De mis consideraciones,

Yo, Héctor Daniel Llerena Culcay con CI 1804154662, solicito muy comedidamente se sirva en verificar el perfil de los expertos en el campo de Aviación, encargados de validar la propuesta con el nombre **"Fly High with Aviation English Technical Vocabulary",** de mi Trabajo de Investigación como requisito para optar al grado de **Magister en Pedagogía de los Idiomas Nacionales y Extranjeros con Mención del Inglés** con el fin de garantizar la experiencia de los expertos que colaboran en la validación de la misma.

A continuación, detallo cada uno de los perfiles:

Tcrn EM Luis Rómulo Mera Pacheco

Teléfono: 0989440814
Email: luchomera168@hotmail.com

EDUCACIÓN:

- MAGISTER EN DEFENSA Y SEGURIDAD, MENCION CONDUCCION MILITAR
- LICENCIADO EN CIENCIAS MILITARES - UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE).

- OFICIAL PILOTO DE AVIACION DEL EJERCITO - ESCUELA DE AVIACIÓN DEL EJERCITO "CAPT. FERNANDO VÁSCONEZ".

ESPECIALIZACIÓN:

- CURSO BÁSICO DE ARMAS Y SERVICIOS TENIENTE A CAPITAN.
- CURSO AVANZADO DE CAPT. A MAYOR DE ARMA Y SERVICIOS.
- CURSO ESTADO MAYOR DE ARMA (MAYO A TCRN E.M.)
- CURSO DE PILOTOS ESPECIALIDAD HELICOPTEROS
- CURSO DE RECONOCIMIENTO EN HELICOPTERO ECUERUIL
- CURSO RECONOCIMIENTO EN EL HELICÓP.LAMA SA-315 B
- CURSO ASALTO AEREO HELICOPTERO MI-171 FUNCIÓN PILOTO

CAPACITACIÓN:

- HABILITACIÓN INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) LEVEL 4 OPERATIONAL
- SUFICIENCIA EN EL IDIOMA INGLES, UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE).
- CURSO DE VUELO INSTRUMENTAL EN HELICÓPTEROS ESCUELA DE AVIACIÓN DEL EJÉRCITO "CAPT. FERNANDO VÁSCONEZ".
- CURSO UNITED NATIONS MILITARY OBSERVER COURSE "UNMOC, COMANDO CONJUNTO DE FUERZAS ARMADAS.
- ENTRENAMIENTO EN PROCEDIMIENTO DE EMERGENCIA EN SIMULADOR DE VUELO DEL HELICÓPTERO MI-171, CROACIA 2019.
- ENTRENAMIENTO EMERGENCIAS EN SIMULADOR DE VUELO DEL MI-171, FRANCIA 2014.
- PASANTÍA DE HELICÓPTERO EN EL REGIMIENTO DE HELICÓPTEROS DE COMBATE, FRANCIA 2012.
- CURSO DE CÁMARA DE ALTURA, ESTADOS UNIDOS 2009

EXPERIENCIA PROFESIONAL:

- COMANDANTE DE SECCIÓN BÚSQUEDA Y RESCATE GRUPO DE AVIACIÓN DEL EJÉRCITO No.43.

- JEFE DE ABORDO GRUPO DE AVIACIÓN DEL EJÉRCITO No. 45 "PICHINCHA"
- COMANDANTE DE ABORDO GRUPO DE AVIACIÓN DEL EJÉRCITO No. 45 "PICHINCHA".
- COMANDANTE DE CENTRO DE CONTROL DE OPERACIONES AÉREAS DE LA 15-BAE "PAQUISHA".
- JEFE DE ABASTECIMIENTO AÉREO DE LA 15-BAE "PAQUISHA".
- COMANDANTE DE CENTRO DE CONTROL DE OPERACIONES AÉREAS DE LA 15-BAE "PAQUISHA".
- COMANDANTE DEL GRUPO DE AVIACIÓN DEL EJÉRCITO No. 44 "PASTAZA"

Capt AE Plto. Segarra Moreno Christian Alejandro

Teléfono: 0999791872

Email: christiansegarra33@gmail.com

EDUCACIÓN:

- LICENCIADO EN CIENCIAS MILITARES - UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE).
- OFICIAL PILOTO DE AVIACIÓN DEL EJÉRCITO - ESCUELA DE AVIACIÓN DEL EJERCITO "CAPT. FERNANDO VÁSCONEZ".

ESPECIALIZACIÓN:

- CURSO BASICO DE ARMAS Y SERVICIOS TENIENTE A CAPITAN.
- CURSO DE PILOTOS ESPECIALIDAD AVIONES.
- CURSO DE RECONOCIMIENTO AEREO AVION CESSNA T-206.
- CURSO DECTRANSP. AEREO AVIÓN CASA C-212-400.

CAPACITACIÓN:

- HABILITACIÓN INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) LEVEL 4 OPERATIONAL.

- SUFICIENCIA EN EL IDIOMA INGLES, UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE)
- CAPACITACIÓN EN PROCEDIMIENTOS DE EMERGENCIA EN SIMULADOR FTD DEL AVIÓN PZL-M28, FINLANDIA 2023.
- CURSO DE PILOTO INSTRUCTOR DEL AVION PZL M28, PZL MIELEC A SIKORSKY COMPANY, POLONIA 2018.
- CURSO DE CÁMARA DE ALTURA, ESTADOS UNIDOS 2018.
- CURSO DE FORMADOR DE FORMADORES, UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE),2022.
- SISTEMA DE GESTION DE RIESGO DE FATIGA PARA PROVEEDORES DE SERVICIOS DE NAVEGACION AEREA, CADEMIA DE AVIACION DE MALASIA (MAVA), 2022.
- ENTRENAMIENTO DE SIMULADOR DE VUELO PARA AVIONETA CESSNA T206, ESTADOS UNIDOS 2015.
- ALUMNO CADEMIA MILITAR WEST POINT, ESTADOS UNIDOS 2007.
- INTERCAMBIO DE CADETES, ESTADOS UNIDOS 2007.

EXPERIENCIA PROFESIONAL:

- PILOTO DEL GRUPO DE AVIACIÓN DEL EJÉRCITO No. 44 "PASTAZA".
- JEFE DE SECCION CONTROL Y SEGUIMIENTO ESCUELA DE AVIACIÓN DEL EJÉRCITO "CAPT. FERNANDO VÁSCONEZ".
- COMANDANTE DE ESCUADRÓN DE RECONOCIMIENTO DEL GRUPO DE AVIACIÓN DEL EJÉRCITO No. 44 "PASTAZA"
- JEFE DE SECCIÓN OPERACIONES DEL GRUPO DE AVIACIÓN DEL EJÉRCITO NRO. 44 "PASTAZA"
- COMANDANTE DE SECCIÓN MANTENIMIENTO DE AVIONES DEL GRUPO DE AVIACIÓN DEL EJÉRCITO No. 44 "PASTAZA".
- JEFE DE SECCIÓN PERSONAL DEL GRUPO DE AVIACIÓN DEL EJÉRCITO No. 44 "PASTAZA".

Capt AE Plto. Gabela Berrones Santiago

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EDUCACIÓN:

- LICENCIADO EN CIENCIAS MILITARES - UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE).
- OFICIAL PILOTO DE AVIACIÓN DEL EJÉRCITO - ESCUELA DE AVIACIÓN DEL EJERCITO "CAPT. FERNANDO VÁSCONEZ".
- LICENCIA AERONÁUTICA PILOTO COMERCIAL- DIRECCIÓN GENERAL DE AVIACIÓN CIVIL.

ESPECIALIZACIÓN:

- CURSO BASICO DE ARMAS Y SERVICIOS TENIENTE A CAPITAN.
- CURSO DE PILOTOS ESPECIALIDAD AVIONES.
- CURSO DE RECONOCIMIENTO AEREO AVION CESSNA T-206.
- CURSO DE TRANSP. AEREO AVIÓN CASA C-212-400.
- CURSO DE TRANSP. AEREO AVIÓN CESSNA CITATION II.

CAPACITACIÓN:

- HABILITACIÓN INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) LEVEL 5 EXTENDED.
- VERSANT AVIATION ENGLISH TEST – CERTIFICATION.
- SUFICIENCIA EN EL IDIOMA INGLES, UNIVERSIDAD DE LAS FUERZAS ARMADAS (ESPE).
- PARTICIPAR EN LA TRANSFERENCIA DE TECNOLOGÍA DEL SISTEMA MODERNIZADO DEL AVIÓN CESSNA CITATION II DE MATRÍCULA IGM-628, ESTADOS UNIDOS 2022.
- CURSO DE CÁMARA DE ALTURA, ESTADOS UNIDOS 2018.

- ENTRENAMIENTO EN PROCEDIMIENTOS DE EMERGENCIA EN SIMULADOR DEL AVIÓN CASA 212-400, ESTADOS UNIDOS 2018.
- CURSO DE TRANSICION TAA PARA EL MODELO CE-T206 TURBO STATIONAIR, TECHNICALLY ADVANCED AIRCRAFT, ESTADOS UNIDOS 2015.
- ENTRENAMIENTO EN CESSNA GARMIN G 1000 CURSO DE CÁMARA DE ALTURA, ESTADOS UNIDOS, ENDEABOUR FLIGHT TRAINING INC. 2015.

EXPERIENCIA PROFESIONAL:

- PILOTO DEL GRUPO DE AVIACIÓN DEL EJERCITO NRO. 44 "PASTAZA"
- JEFE DE SECCION CONTROL Y SEGUIMIENTO ESCUELA DE AVIACIÓN DEL EJERCITO "CAPT. FERNANDO VÁSCONEZ"
- COMANDANTE DE ESCUADRÓN DE RECONOCIMIENTO DEL GRUPO DE AVIACIÓN DEL EJERCITO NRO. 44 "PASTAZA"

Agradezco de antemano su valiosa colaboración.

Atentamente,

Lcdo.Héctor D. Llerena C.
MAESTRANTE PEDAGOGÍA DE LOS IDIOMAS NACIONALES Y EXTRANJEROS CON MENCIÓN DEL INGLÉS

AUTORIZADO POR:

PhD. José Clemente Mora Rosales
COORDINADOR DE POSGRADOS DE LA FACULTAD DE CIENCIAS DE LA EDUCACIÓN

Appendix 6 *Validation of the Proposal by Experts*

UNIVERSIDAD TECNOLÓGICA INDOAMÉRICA (UTI)

MAESTRIA EN PEDAGOGÍA DE LOS IDIOMAS NACIONALES Y EXTRANJEROS CON MENCION INGLÉS

Validation of the Proposal by Experts

Validator's Name: Luis Mena

Specialty: Fuerza Aviación del Ejército

Institutional e-mail: lmena@ejercito.mil.ec

Academic degree: Magister

Author: Lic. Héctor Daniel Llerena Culcay

Academic Technical Sheet of the Proposal Validator

Title of the Proposal: "Fly High with Aviation English Technical Vocabulary". Didactic Guide for Enhancing Aviation English Technical Vocabulary Proficiency through Gamified Strategies

General Objective:

To enhance the aviation English technical vocabulary proficiency among pilots, air traffic controllers, and maintenance staff of **GRUPO DE AVIACIÓN DEL EJÉRCITO N°44 "PASTAZA,** through through interactive and gamified learning strategies.

Specific Objectives

1. To design and implement gamified activities through Kahoot and Mentimeter that reinforce essential aviation vocabulary, enhancing learners' engagement and retention.
2. To encourage active participation and motivation by integrating technology-based platforms like Kahoot and Mentimeter, promoting collaborative and competitive learning environments

Introduction:

Dear evaluator, this validation matrix is designed to assess a proposed Didactic Guide focused on enhancing Aviation English Technical Vocabulary proficiency through Gamified Strategies among pilots, air traffic controllers and maintenance staff of **GRUPO DE AVIACIÓN DEL EJÉRCITO N°44 "PASTAZA**, providing them with four comprehensive modules that cover basic aviation vocabulary, cockpit communication, air traffic control language, and maintenance terminology. Each module incorporates interactive lessons, real-world simulations, gamified quizzes, and flashcards developed in **Kahoot** and **Mentimeter** platforms to make learning engaging and effective.
Your insights and feedback will be invaluable in refining this proposal and enhancing its impact on student learning outcomes.

Instructions:

- Once you have read the proposal, please provide reliable responses for each question based on your observation.
- Each criterion should be evaluated on a scale from 1 to 5, where:

1= low: The proposal does not meet the criteria

2= fair: The proposal partially meets the criteria but requires significant improvement.

3= Good: The proposal meets the criteria adequately but could benefit from enhancements.

4= Very Good: The proposal meets most criteria effectively with minor improvements needed.

5 = Excellent: The proposal fully meets and exceeds the criteria.

VALIDATION MATRIX

Criteria	Indicators	Evaluation Scale: 1 (Low) - 5 (High)					Comments
Relevance of Content	The vocabulary content is aligned with essential technical aviation terms required for pilots, air traffic controllers, and maintenance staff.	1	2	3	4	5	
						✓	
Engagement through Gamified Activities	Interactive, gamified activities using Kahoot, Mentimeter, and real-world simulations promote active student participation.	1	2	3	4	5	
						✓	
Effectiveness in Vocabulary Retention	Gamified strategies help in long-term vocabulary retention, supporting the learning objectives for aviation-specific English.	1	2	3	4	5	
						✓	
Variety and Balance of Activities	There is a mix of digital and hands-on activities that provide a diverse, inclusive learning experience.	1	2	3	4	5	
						✓	
Assessment Methods	Assessment tools accurately measure vocabulary proficiency and progress, providing feedback to learners.	1	2	3	4	5	
						✓	
Technology Integration	Digital tools like Kahoot and Mentimeter are effectively integrated to support learning and provide a seamless experience.	1	2	3	4	5	
						✓	
Teacher Support and Resources	The guide provides teachers with resources and support for implementing gamified strategies effectively.	1	2	3	4	5	
						✓	
Clarity of Objectives	Learning objectives are clearly stated, measurable, and aligned with the goal of enhancing aviation English vocabulary proficiency.	1	2	3	4	5	
						✓	

VALIDITY			
Validated by:	**Signature:**	**CI:**	**Phone number:**
TCRN Luis Mena		1708662976	0989440814

GRUPO AÉREO N° 44 "PASTAZA" COMANDO

Thank you for your time and expertise in this evaluation process.

MAESTRIA EN PEDAGOGÍA DE LOS IDIOMAS NACIONALES Y EXTRANJEROS CON MENCION INGLÉS

Validation of the Proposal by Experts

Validator's Name: Santiago Gabela

Specialty: Piloto Aviación del Ejercito

Institutional e-mail: segabelab@ejercito.mil.ec

Academic degree: Lic. Ciencias Militares

Author: Lic. Héctor Daniel Llerena Culcay

Academic Technical Sheet of the Proposal Validator

Title of the Proposal: "Fly High with Aviation English Technical Vocabulary". Didactic Guide for Enhancing Aviation English Technical Vocabulary Proficiency through Gamified Strategies

General Objective:

To enhance the aviation English technical vocabulary proficiency among pilots, air traffic controllers, and maintenance staff of **GRUPO DE AVIACIÓN DEL EJÉRCITO N°44 "PASTAZA,** through through interactive and gamified learning strategies.

Specific Objectives

1. To design and implement gamified activities through Kahoot and Mentimeter that reinforce essential aviation vocabulary, enhancing learners' engagement and retention.
2. To encourage active participation and motivation by integrating technology-based platforms like Kahoot and Mentimeter, promoting collaborative and competitive learning environments

Introduction:

Dear evaluator, this validation matrix is designed to assess a proposed Didactic Guide focused on enhancing Aviation English Technical Vocabulary proficiency through Gamified Strategies among pilots, air traffic controllers and maintenance staff of **GRUPO DE AVIACIÓN DEL EJÉRCITO N°44 "PASTAZA,** providing them with four comprehensive modules that cover basic aviation vocabulary, cockpit communication, air traffic control language, and maintenance terminology. Each module incorporates interactive lessons, real-world simulations, gamified quizzes, and flashcards developed in **Kahoot** and **Mentimeter** platforms to make learning engaging and effective.
Your insights and feedback will be invaluable in refining this proposal and enhancing its impact on student learning outcomes.

Instructions:

- Once you have read the proposal, please provide reliable responses for each question based on your observation.
- Each criterion should be evaluated on a scale from 1 to 5, where:

  1= low: The proposal does not meet the criteria

  2= fair: The proposal partially meets the criteria but requires significant improvement.

  3= Good: The proposal meets the criteria adequately but could benefit from enhancements.

  4= Very Good: The proposal meets most criteria effectively with minor improvements needed.

  5 = Excellent: The proposal fully meets and exceeds the criteria.

VALIDATION MATRIX

Criteria	Indicators	Evaluation Scale: 1 (Low) - 5 (High)					Comments
Relevance of Content	The vocabulary content is aligned with essential technical aviation terms required for pilots, air traffic controllers, and maintenance staff.	1	2	3	4	5	
						✓	
Engagement through Gamified Activities	Interactive, gamified activities using Kahoot, Mentimeter, and real-world simulations promote active student participation.	1	2	3	4	5	
						✓	
Effectiveness in Vocabulary Retention	Gamified strategies help in long-term vocabulary retention, supporting the learning objectives for aviation-specific English.	1	2	3	4	5	
						✓	
Variety and Balance of Activities	There is a mix of digital and hands-on activities that provide a diverse, inclusive learning experience.	1	2	3	4	5	
						✓	
Assessment Methods	Assessment tools accurately measure vocabulary proficiency and progress, providing feedback to learners.	1	2	3	4	5	
						✓	
Technology Integration	Digital tools like Kahoot and Mentimeter are effectively integrated to support learning and provide a seamless experience.	1	2	3	4	5	
						✓	
Teacher Support and Resources	The guide provides teachers with resources and support for implementing gamified strategies effectively.	1	2	3	4	5	
						✓	
Clarity of Objectives	Learning objectives are clearly stated, measurable, and aligned with the goal of enhancing aviation English vocabulary proficiency.	1	2	3	4	5	
						✓	

VALIDITY			
Validated by:	**Signature:**	**CI:**	**Phone number:**
Capt Santiago Gabela		060381180-3	0996143396

GRUPO AÉREO N° 44 "PASTAZA" COMANDO

Thank you for your time and expertise in this evaluation process.

UNIVERSIDAD TECNOLOGICA INDOAMERICA (UTI)

MAESTRIA EN PEDAGOGÍA DE LOS IDIOMAS NACIONALES Y EXTRANJEROS CON MENCION INGLÉS

Validation of the Proposal by Experts

Validator's Name: Christian Segovia

Specialty: Pilot

Institutional e-mail: casegomm@ejercito.mil.ec

Academic degree: Military degree

Author: Lic. Héctor Daniel Llerena Culcay

Academic Technical Sheet of the Proposal Validator

Title of the Proposal: "Fly High with Aviation English Technical Vocabulary". Didactic Guide for Enhancing Aviation English Technical Vocabulary Proficiency through Gamified Strategies

General Objective:

To enhance the aviation English technical vocabulary proficiency among pilots, air traffic controllers, and maintenance staff of **GRUPO DE AVIACIÓN DEL EJÉRCITO N°44 "PASTAZA,** through through interactive and gamified learning strategies.

Specific Objectives

1. To design and implement gamified activities through Kahoot and Mentimeter that reinforce essential aviation vocabulary, enhancing learners' engagement and retention.
2. To encourage active participation and motivation by integrating technology-based platforms like Kahoot and Mentimeter, promoting collaborative and competitive learning environments

Introduction:

Dear evaluator, this validation matrix is designed to assess a proposed Didactic Guide focused on enhancing Aviation English Technical Vocabulary proficiency through Gamified Strategies among pilots, air traffic controllers and maintenance staff of **GRUPO DE AVIACIÓN DEL EJÉRCITO N°44 "PASTAZA**, providing them with four comprehensive modules that cover basic aviation vocabulary, cockpit communication, air traffic control language, and maintenance terminology. Each module incorporates interactive lessons, real-world simulations, gamified quizzes, and flashcards developed in **Kahoot** and **Mentimeter** platforms to make learning engaging and effective.
Your insights and feedback will be invaluable in refining this proposal and enhancing its impact on student learning outcomes.

Instructions:

- Once you have read the proposal, please provide reliable responses for each question based on your observation.
- Each criterion should be evaluated on a scale from 1 to 5, where:

  1= low: The proposal does not meet the criteria

  2= fair: The proposal partially meets the criteria but requires significant improvement.

  3= Good. The proposal meets the criteria adequately but could benefit from enhancements.

  4= Very Good: The proposal meets most criteria effectively with minor improvements needed.

  5 = Excellent: The proposal fully meets and exceeds the criteria.

VALIDATION MATRIX

Criteria	Indicators	Evaluation Scale: 1 (Low) - 5 (High)					Comments
Relevance of Content	The vocabulary content is aligned with essential technical aviation terms required for pilots, air traffic controllers, and maintenance staff.	1	2	3	4	5	
						✓	
Engagement through Gamified Activities	Interactive, gamified activities using Kahoot, Mentimeter, and real-world simulations promote active student participation.	1	2	3	4	5	You can use some asynchronous apps.
					✓		
Effectiveness in Vocabulary Retention	Gamified strategies help in long-term vocabulary retention, supporting the learning objectives for aviation-specific English.	1	2	3	4	5	
						✓	
Variety and Balance of Activities	There is a mix of digital and hands-on activities that provide a diverse, inclusive learning experience.	1	2	3	4	5	
						✓	
Assessment Methods	Assessment tools accurately measure vocabulary proficiency and progress, providing feedback to learners.	1	2	3	4	5	You can use another kind of assessment.
					✓		
Technology Integration	Digital tools like Kahoot and Mentimeter are effectively integrated to support learning and provide a seamless experience.	1	2	3	4	5	
						✓	
Teacher Support and Resources	The guide provides teachers with resources and support for implementing gamified strategies effectively.	1	2	3	4	5	Theachers must have some experience to guide their students.
					✓		
Clarity of Objectives	Learning objectives are clearly stated, measurable, and aligned with the goal of enhancing aviation English vocabulary proficiency.	1	2	3	4	5	
						✓	

VALIDITY			
Validated by:	Signature:	CI:	Phone number:
Christian Segarra		1713676359	0999791572

Thank you for your time and expertise in this evaluation process.

GRUPO AÉREO Nro. 44 "PASTAZA" COMANDO