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EXPLORING FACTORS OF ENGLISH LANGUAGE PROGRAM DESIGNS FOR
AIRCRAFT MAINTENANCE TECHNICIANS (AMTs) IN COLOMBIA: A CASE STUDY

BY:

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AFFIDAVIT

I, Steven Torres, hereby declare that this master's thesis has not been previously presented as a degree requirement, either in the same style or with variations, in this or any other university.

A handwritten signature in dark ink, consisting of a circle with a vertical line through it and some internal scribbles.

STEVEN R. TORRES OROZCO

Abstract

The current qualitative case study explores the factors of English language programs curriculum designs for Aircraft Maintenance Technicians (AMTs) in Colombia that might suggest adjusting or standardizing. The notion is extremely relevant since AMTs will almost always have to cope with aviation documentation in English at their workplaces, as more Colombian airline companies and airports require the ability to communicate clearly and effectively in English. Fifty-nine aviation students, 71 professionals, and five language teachers participated. Moreover, 15 different aviation programs were analyzed. Student and professional questionnaires, teacher interviews, and a comparison matrix were used to collect data for this study. Results indicate program curricular discrepancies, a need for multiple approaches for students, and a necessity for coordination between language and aviation professionals. The findings highlight the importance of customizing the English curriculum for AMTs students. Future implications include presenting and channeling the findings through the aviation authority in Colombia, Aerocivil, to establish new linguistic guidelines for all aviation schools that offer maintenance programs promoting better communication in English.

Keywords: English language curriculum, English for Occupational Purposes (EOP), Aircraft Maintenance Technicians (AMTs), Vocational aviation schools

This work is dedicated to all my family for all their patience, support, and love. You always trusted in me.

Steven Rafael Torres Orozco

“The Spirit of the LORD will rest on him— the Spirit of wisdom and of understanding, the Spirit of counsel and might, the Spirit of the knowledge and fear of the LORD” Isaiah 11:2

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Chapter 1. Introduction

English has been the *lingua franca* in the aviation sector for many years (Borowska & Enright, 2016), and the Colombian context is no exception. At the beginning of aviation, pilots could not communicate verbally with the ground because air traffic control did not exist, and radio communication was unavailable. Once radios came into existence, Morse code was used to communicate between pilots and the ground. However, this mode of communication did not provide a quick response since its messages were tapped out letter by letter, and messages needed to be as transparent as possible to avoid misunderstandings (Estival et al., 2016). This first attempt to establish communication between pilots and the ground was unsuccessful.

A special event that marked a milestone in the aviation industry was World War II. The English language became more important, as did aviation, because the infrastructure of both Japan and Europe was affected, which resulted in a significant portion of aircraft being designed and produced in the USA. Likewise, commercial aviation grew significantly, and new air routes were opened (Estival et al., 2016). By the war's end in November 1944, the International Civil Aviation Organization (ICAO) was founded (Mackenzie, 2010).

At the first convention of ICAO on December 7, 1944, in Chicago, USA, international standards and recommended practices were agreed upon and signed. Article 37 stated that "each contracting State undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization concerning aircraft, personnel, airways, and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation" (Convention on ICAO, 1944, p.16). As a result, the members of the ICAO worked together, assuring the highest standards of similarity and safety regarding aviation

matters. Likewise, regarding communication standardization, Annex 10 states the language requirements for "Aeronautical Communications" with Civil Aviation (Estival et al., 2016).

With aviation expansion, worldwide institutions expressed an interest in participating in the air transportation business. Thus, many aviation operators appeared rapidly (Estival et al., 2016). When international airline companies expanded their flight operations internationally, it became apparent that pilots and air traffic controllers needed to understand and speak English. Therefore, in March 2003, the ICAO introduced the language proficiency requirements (LPRs) for air traffic controllers and pilots involved in international operations (Borowska & Enright, 2016).

Another important consideration for adopting a standardized language for aviation was the number of incidents and accidents during flight operations. In further support of this safety issue, the *Flight Safety Information* journal reported, "between 1976 and 2000, more than 1100 passengers and crew lost their lives in accidents in which investigators determined that language had played a contributory role" (2004, p. 12). Similarly, the ICAO journal (2013) reported that:

The 32nd Session first addressed language proficiency for pilots and air traffic controllers of the ICAO Assembly in September 1998 as a direct response to fatal accidents. The lack of proficiency in English was identified as a contributing factor (p. 65).

Consequently, the need to master the English language in aviation became more evident and essential.

Annex 1 of ICAO stipulates that pilots and air traffic controllers must speak and understand English and have this endorsed in their licenses before being allowed to fly or control air traffic (ICAO, 2013). There are six levels of language proficiency, but the minimum level required for pilots and air traffic controllers is level 4 (operational), which is the safety threshold.

Level 5 is for extended speakers, and level 6 is for experts. In October 2011, ICAO introduced the Aviation English Language Test Service (AELTS) to assess language to help its member states more accurately assess the speaking and listening ability in English of their pilots and air traffic controllers.

Some studies have reported the central role of English in aviation (Emery, 2016). Aircraft maintenance personnel must deal with various complex tasks involving specific language demands. AMTs use English, whether they are native English speakers or not. This means that using English has become a challenging aspect of professional growth and job performance, increasing the complexity of performing maintenance tasks on an aircraft.

Singh (2021) reported a list of common writing, reading, speaking, and listening tasks. According to the author, written tasks include the preparation of inspection report cards and technical logs; reading tasks encompass the reading of a wide variety of technical texts such as Aircraft Maintenance Manuals (AMM), Airworthiness Directives (ADs), and Service Bulletins (SBs), among others, that usually are written in the English language. Interactive tasks cover discussions on maintenance tasks and aircraft-related problems with international crews, pilots, and other maintenance personnel.

Terenzi (2021) highlights the complexity of the English language demand and states that maintenance manuals contain 100 chapters and roughly 34,000 pages. According to this author, professionals should be familiar with various chapters dealing with different aircraft components, including landing gear, windows, doors, etc. It is worth mentioning that maintenance manuals do not constitute the only documentary reference for ATMs. There are many more.

It is relevant to bring up the role of the international aviation authorities in terms of academic regulation to become an AMT. Shawcross (1993) highlights that AMTs must consult

and comprehend written information, and they also need to register data and justify their actions in logbooks and test reports. These should be written according to the rules in simplified English incorporated in European Association of Aerospace Industries (AECMA) approved words. Therefore, English reading and writing skills are the minimum requirements non-native AMT speakers need to guarantee a standard performance at their workplaces in Europe.

The Federal Aviation Administration (FAA), as defined by Wikipedia, "is a governmental body of the United States with powers to regulate all aspects of civil aviation in that nation as well as over its surrounding international waters" ("Federal Aviation Administration," 2021, para. X). The FAA established in Appendixes B, C, and D to part 147 of its regulations the general curriculum subjects that should be taught to become an AMT. Some subjects are basic electricity, mathematics, fundamental physics, wood structures, aircraft finishes, welding, engine fire protection, lubrication systems, and propellers. These subjects must be covered with a total of 1900 hours of instruction or higher. In terms of English language proficiency for AMTs, the FAA has not stipulated guidelines or language for non-native speakers of English. However, many universities and technical and vocational schools provide language curricula to complement AMTs' training. In Colombia, however, these requirements are frequently not used.

Colombia is a member of ICAO, approved by Law 12 of 1947 in Article 37. The Unidad Administrativa Especial de Aeronáutica Civil (UAEAC) is responsible for enforcing the rules issued in Article 37 and authorized by Article 1782 of the Commercial Code. Moreover, Article 68 of law 336 of 1996 and Article 5 of decree 260 dated 2004 has issued the *Reglamentos Aeronáuticos de Colombia* (RAC) for the reasons set out by the ICAO. These include academic curricular subjects required to become an AMT in Colombia and can be consulted in RAC 147.

For this study is important to define the role of AMTs in the Colombian aviation sector. Aircraft Maintenance Technicians (AMTs) in Colombia are responsible for performing or supervising the maintenance of aircraft along with the inspection of the equipment involved in this operation (UAEAC, 2020). To become a qualified AMT, potential candidates must demonstrate knowledge, skills, and experience concerning 1) aeronautical law and airworthiness requirements; 2) basic science and general aircraft knowledge; 3) aircraft mechanics; 4) aircraft maintenance; 5) human performance; 6) technical documentation, and 7) languages. In this last component, according to the UAEAC (2020), candidates must be knowledgeable in both Spanish and technical English according to license specifications.

RAC 147 also stipulates that Centros de Instrucción Aeronáutica must establish approved compliance with its *Manual de Instrucción y Procedimientos* (MIP) and demonstrate that learners have a good knowledge of reading and interpretation of the English language. Similarly, the RAC 65 establishes the requirements to obtain the license to work for Colombian airlines. In addition, it only mentions that the uncertified AMTs must demonstrate the appropriate aviation technical English knowledge to obtain the license. Hence, RAC provides a vague understanding of what “appropriate” means regarding knowing which language skills should be emphasized.

This study aims to discuss this conundrum. A clearer perspective should arise by analyzing existing English language program designs for AMTs in the field and juxtaposing survey and interview responses from students and teachers of Colombian AMT programs and professionals. The notion is extremely relevant since AMTs will almost always have to cope with aviation documentation in English at their workplaces, as more Colombian airline

companies and airports require AMTs with the ability to communicate clearly and effectively in the English language (UAEAC,2018).

Research Questions

This qualitative case study explores the importance of, and which factors indicate a possible need to standardize English language learning for AMTs in Colombia. Thus, the research question for this study is: What factors, if any, in English language program designs for the field of Aviation Mechanics indicate a need for adjusting or standardizing English language learning for AMTs in Colombia? The sub-questions for this study, then, will be as follows:

1. What are the different actors' perspectives on English language programs for AMTs? Do these perceptions indicate a need for adjusting or standardizing an English curriculum?
2. What are the similarities and differences in English language programs for AMTs? Do these factors indicate a need for adjusting or standardizing an English curriculum?

Objectives:

- Interview and survey different actors across the field.
- Document current English language programs for AMTs in Colombia.
- Compare similarities and differences in English language programs for AMTs.
- Analyze data to determine if a need exists for adjusting or standardizing an English curriculum for AMTs in Colombia.

The Context

This study is a historical review of the English language programs in Colombia that can be found online or in various contexts and sources; thus, there is no physical setting. However, interviews and surveys were conducted, and demographic information will be provided in the methods chapter.

Chapter Summary

This study is divided into five chapters. This chapter introduced the context of English language learning for AMTs in Colombia and highlighted its significance in learning an international language. Also, it described the problem and the rationale of this study, listed the research questions, and portrayed the context where the study took place. The second chapter presents the theoretical framework and literature review, including general theories and earlier studies. In the third chapter, the methodology includes a description of the primary research paradigm, the data collection instruments used, their importance in this investigation, and how data was analyzed. The fourth chapter focuses on the results. The interpretation and description of the importance and previous research in this area are found in Chapter five, discussion. The sixth section is the conclusion of this study, which includes the implications of the research, limitations, and possible future research.

Chapter 2. Conceptual Framework

This study aims to research which factors indicate the possible need for adjusting or standardizing an English language program for Aircraft Maintenance Technicians (AMTs) in Colombia. As such, this chapter begins by reviewing general theories and common frameworks for curriculum development that researchers have proposed to be meaningful during the teaching and learning process. Second, the chapter focuses on language teaching program designs. Then, English language teaching methods are explained, considering the literature on the topic. Next, the definition of ESP and its branches: English for Academic Purposes (EAP) and English for Occupational Purposes (EOP), is found. Finally, a review of relevant recent studies on EOP curriculum development will be portrayed.

Curriculum Design

The curriculum is an essential field for a professional teacher (Murray, 1993), so teachers must be well-informed about a curriculum and comprehend how it may be designed. According to Null (2011), the curriculum is "the heart of education" (p.1). He also states that the curriculum is about teaching and combines thoughts, actions, and purpose. Whereas, with a more elaborated definition, Luke et al. (2013) define curriculum as:

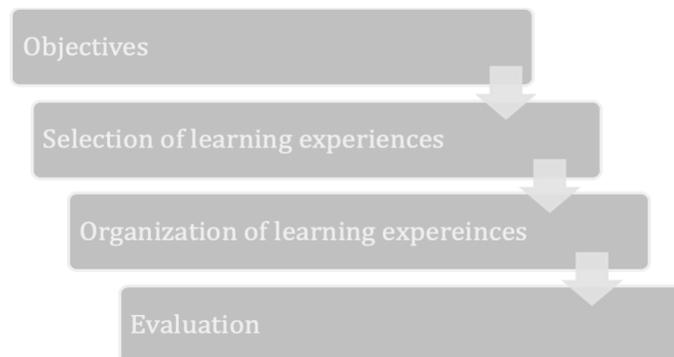
The total resources – intellectual and scientific, cognitive and linguistic, textbook, and adjunct resources and materials, official and unofficial – are brought together for teaching and learning by teachers, students, and in the best-case community, in classrooms and other learning environments (p. 10).

Hence, a curriculum can be used as formal and informal material for teachers and students to learn in any academic setting.

Several theorists have proposed different curriculum design models. American educator Ralph Tyler is one of the most influential theorists who proposed curriculum design steps. Tyler (1949) advocates a model for curriculum design based on the following four fundamental questions: 1) What educational purposes should the school seek to attain? 2) What educational experiences can be provided that are likely to attain these purposes? 3) How can learning experiences be organized for effective instruction?; and 4) How can the effectiveness of learning experiences be evaluated? (p. 1). These questions can be reformulated in four basic steps, as seen in Figure 1.

Figure 1

Tyler's Model of Curriculum Development



Note. Adapted from Tyler (1949).

Tyler's model is a deductive and linear process, moving from general to specific, starting from the objectives and ending with evaluation. In this model, no feedback would allow for redefining objectives.

For step one, Tyler formulates his first question based on objectives from his definition of education as "a process of changing the behavior patterns of people" (p. 4). To do so, Tyler proposes three primary sources to gather and determine educational objectives (1949). First, teachers need to identify students' needed changes in behavior patterns, needs, and current

interests. Secondly, teachers then review and analyze the studies of contemporary life in society and students' learning experiences inside and outside the school. Thirdly, teachers would analyze the study subject-matter specialist through the current curriculum and subject group reports as valuable data to define learning objectives. Once data has been gathered from the sources, Tyler (1949) suggests two screens to filter the attempted learning objectives: The philosophy of the educational institution and the psychology of learning. Once the process is finished, objectives become specific, resulting in a final set of accurate educational objectives.

After the objectives have been set, Tyler (1949) suggests setting the learning experiences. Tyler (1949) considers that the learning process occurs through the active behavior of the learner and his interaction with the environment, what he or she performs and learns, not what the teacher performs. Tyler (1949) also describes five general principles in selecting learning experiences: 1) students should rehearse the behavior implicit in the objective; 2) students should be able to obtain contentment from the behavior implicit in the objective; 3) learning experiences should apply to students' current achievements, preferences, and likes; 4) several learning experiences can be used in order to guarantee the required educational goals are accomplished, and 5) the same learning experiences should intervene in problem-solving.

Tyler discusses that learning experiences help develop social attitudes since they influence students' behavior, contentment, and values. He also states that learning experiences help develop interests since those become the driving force for achieving objectives. Hence, attitudes and interests are vehicles to focus students' behavior, emotions, and beliefs toward specific objectives.

Tyler (1949) continues the discussion by proposing that learning experiences be arranged logically through continuity, sequence, and integration. Continuity refers to the necessity that

students' skills should be practiced and developed without interruption. Furthermore, continuity is considered a critical factor in an effective vertical organization. Sequence, like criterion, progressively draws attention to an extensive and deeper understanding of the previous learning experiences. Likewise, integration refers to the association of learning experiences in different fields. These should not be seen as isolated areas of study because students need to be exposed to different real-life situations.

Concepts, skills, and values should apply to the organizational structure. Once these elements have been identified, several organizing principles are necessary. Tyler (1949) states that chronology is one of the most common principles in a school curriculum because students usually see events over time. Finally, learning experiences should be organized and structured, considering specific subjects, lesson plans, topics, and units. Therefore, this step is crucial in organizing learning experiences coherently to create a more integrated curriculum.

Tyler's final phase is the evaluation of the objectives. Evaluation is a method to discover how the learning experiences were extended, evolved, and arranged to attain the expected outcomes. Additionally, evaluation helps identify strengths and weaknesses and recognize what part of the curriculum needs to be adjusted and improved. It also helps verify the validity of the basic theory in which the curriculum has been arranged and conceived. It also verifies the effectiveness of the teacher and other conditions used to carry out the curriculum. He also considers the evaluation process paramount to defining student behavior changes. Evaluation is a method to resolve the extent to which changes in behavior are held.

Two important aspects of evaluation have been used to appraise students' behavior: An initial moment and a subsequent moment. However, other moments are frequently necessary after the instruction. Finally, Tyler (1949) highlights the importance of creating evaluation

instruments that allow students to demonstrate the expected behaviors, providing individual relevant information about students' behaviors and significantly influencing their learning. Hence, the evaluation is an excellent step to determine what changes are taking place in students, which situations help accomplish curriculum objectives and provides opportunities to make further modifications to obtain an effective and successful curriculum development (Tyler, 1949). The four basic questions mentioned above are what every teacher should answer to develop a curriculum or instructional program. However, the most significant step is the first because all others are developed based on determining the objective (Kliebard, 1970). As Tyler (1949) holds, "If we are to study an educational program systematically and intelligently, we must first be sure as to the educational objectives aimed at" (p. 5). Thus, Tyler's work has significantly impacted the determination of objectives as a primary source to develop a curriculum.

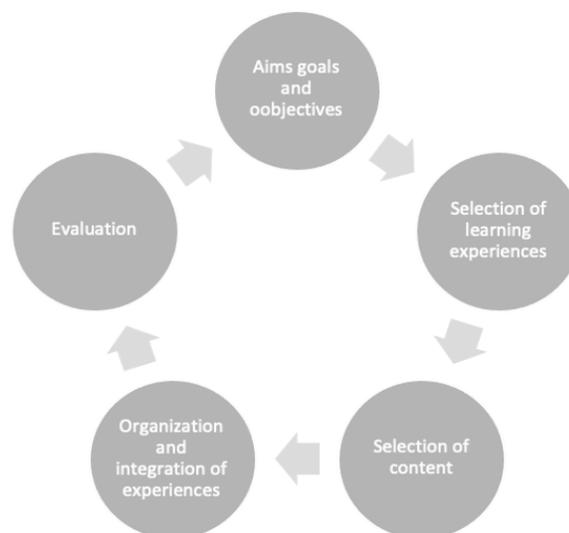
Years later, Taba (1962) proposed a curriculum design that could improve Tyler's model by making an inductive linear model. Taba discussed that a curriculum had a defined logical order, and teachers should develop the curriculum. This "grass-roots approach" puts the needs of the students at the forefront of curriculum development. The model has seven significant steps: Step one, according to Taba (1962), highlights the importance of identifying the needs of the students for whom the curriculum is to be planned. Once learners' needs have been identified, objectives are defined by which needs will be fulfilled in step two. Then in step three, topics are selected based on objectives and determine the content's validity. After that, in the fourth step, the content is arranged in a particular sequence keeping in mind the maturity of learners, academic achievement, and interest. Learning experiences in step five are created to develop multiple objectives: Thinking, knowledge, attitude, and skills.

Moreover, this step facilitates learners' interaction with content through the appropriate instructional methodology. For step five, learning activities are organized according to the content sequence and learners' characteristics. Lastly, step seven assesses the achievement of learning objectives; thus, evaluation procedures need to be planned. In Tuba's model, teachers play a significant role in developing a curriculum, making the model more unique and reasonable. Today, this model is employed in many schools' curriculums (Bhuttah et al., 2019).

On the other hand, Wheeler (1967) proposed an amendment to Tyler's model. After Taba, he introduced that curriculum development should be a continuous cycle, showing that evaluation is not a final step. Thus, it is considered essential data to redefine objectives that influence other stages. Wheeler's model is depicted in Figure 2.

Figure 2

Wheeler's Model of Curriculum Development



Note. Adapted from Wheeler (1967).

Wheeler's model is a cyclical process that indicates the curriculum should always be in motion and never stop from one step to another. According to this model, curriculum development should be responsive to changes in the education sector and make appropriate modifications to account for these changes. Moreover, this model targets situational evaluation

because the context within which the curriculum decisions are taken is considered necessary, and this practice can help make the most effective decisions. Unlike Tyler's model, Wheeler (1967) proposes five interconnected phases.

Similarly, Nichols and Nichols (1976) proposed a model comparable to Tyler's and Wheeler's models, in which goals are the initial stage of a curriculum design. They uphold that the data collected from the local setting and the learner's household might be essential to provide teachers with more information to set up potential objectives Nichols and Nichols (1976). Unlike Tyler's model, Nichols and Nichols's model is a cyclical and dynamic five-step approach, as seen in Figure 3.

Figure 3

Nichols and Nichols's Model of Curriculum Development



Note. Adapted from Nichols and Nichols (1976).

Nichols' and Nichols' (1976) model of curriculum development is a continuous process. Step one requires a situational analysis, and a detailed examination of the curriculum's context should be considered an important source whereby curricular decisions are to be made. Step two involves the selection of the objectives for the unit, and this step is seen as broader than the objectives identified in step three. Step three involves selecting and organizing the content in

which the curriculum designers determine the skills and content they want to identify in a student who finishes the unit with success.

Step four involves selecting the teaching methods and deciding which teaching approach is suitable and benefits students' understanding of the content. The final step, step five, of this model involves evaluation. This step is much more complex since it would not involve evaluating the student through formative and summative assessment but the evaluation of the curriculum development process itself. The approach cyclically provides a flexible process whereby the curriculum designers can develop the curriculum continuously and through an ongoing process (Nichols & Nichols, 1976).

Language Teaching Program Designs

According to Richards (2001), "the history of curriculum development in language teaching starts with the notion of syllabus design" (p. 2). He highlighted that syllabus design takes part in curriculum development, but it is not the same. He also discussed that a syllabus describes a course of study and the topics taught and evaluated. For instance, the syllabus for a speaking course might incorporate different types of oral skills rehearsed throughout the course, functions, topics, or other features of conversation that will be taught, and the sequence they will be presented. However, curriculum development is an all-inclusive process that is employed to determine learners' needs, objectives, suitable syllabus for learners, course organization, teaching approaches, and materials, and to accomplish an evaluation of the language program, taking into consideration the results of the process (Richards, 2001).

For this, language teaching program designs incorporate the guidelines set forth by the Council of Europe (2018) called the Common European Framework of Reference for Languages (CEFR), which helps students reflect on their practice and track their progress. Therefore, the

British Council, on their official website, proposes the following guiding learning hours for the level of language: A2 (beginner), 180–200; B1 (intermediate), 350–400; B2 (upper intermediate), 500–600; C1 (advanced), 700–800, and C2 (mastery), 1,000–1,200 (British Council, 2022). Thus, language teachers have a reference for setting up the timeframe and levels within the context they are involved.

On the other hand, there are some similarities and differences between regular curricula and language curricula. On the one hand, Print (2020) describes a model of regular curriculum development in three main phases (Organization, development, application), including these essential elements to the process: Situational analysis, Aims, goals and objectives, content, learning activities, and instructional evaluation. He also stated that a traditional curriculum design might be categorized into four: Subject-centered designs, learner-centered designs, problem-centered designs, and core designs.

- Subject-centered designs refer to teaching the content through each academic subject.
- Learner-centered designs focus on individual development and curriculum organization based on identifying the student's needs, interests, and goals.
- Problem-centered approach tries to solve individual problems faced in real life.
- Core designs: uses as a reference three basic standard learnings (knowledge, skills, and values) so students can develop themselves successfully in society.

Moreover, according to Richards (1990), “language curriculum activity is concerned with principles and procedures for the planning, delivery, management, and assessment of teaching and learning. Curriculum development processes in language teaching comprise needs analysis, goal setting, syllabus design, methodology, and testing and evaluation” (p.1). There are

numerous methods for designing curricula, but it depends on the main objective of it (Kostka & Bunning, 2017). They cited Christison and Murray's work (2014) which summarizes four different approaches as follows:

- Linguistic-based curriculum organizes language features such as grammatical structures, genres, language functions, and/or language skills.
- Content-based curriculum happens where language instruction occurs concerning a specific subject matter. The linguistic demands of the subject matter or content determine which aspects of language are taught.
- Learner-centered curriculum prioritizes the process of language learning. In this curriculum, learners contribute to the decision-making process about what to learn and how to go about it.
- Learning-centered curriculum focuses on the product of what is to be learned or the outcomes that students will be able to produce, which is often expressed in terms of outcomes, competencies, or standards. (p. 5)

Therefore, the categorizations of a regular curriculum and language curriculum show variations in the constituent elements, considering the context's needs, setting, and purpose. In both cases, the curriculum design is done through a systematic process comprising several stages. For instance, in the first stage, the contextual needs are used as data to define the learning and language objectives. In the second stage, curriculum designers focus on structuring the building blocks for achieving learning and language objectives. At the final stage, students are assessed through testing or other forms of assessment, and the designed course is evaluated in terms of the stated goals proposed at the initial stage.

Additionally, in terms of categorizing the approaches to be used, both curriculum designs have in common two approaches such as subject/content-centered design and learner-centered design. The first approach takes the content as key information, and the second focuses on knowing students' ideas and interests to determine how their curriculum should be developed. However, a distinct difference between them is defined from a linguistic view since language curriculum approaches use this to determine which aspects of the language should be taught. Thus, each curriculum approach mentioned above has its special characteristics, and the selection depends on the context, learners, and the program's purpose.

Language Teaching Syllabus Designs

Syllabus design emerged from the mid-1920s through the latter part of the twentieth century, and scholars have proposed several approaches to syllabus design (Munby, 1978; Wilkins, 1976; Willis, 1996). However, the distinction between curriculum and syllabus has not been delineated within its practical use and principles in the field (Woods et al., 2010). Krahnke (1987) stated that a syllabus is more detailed than a curriculum, including several syllabi. He also provided a more concrete distinction that says that a curriculum may indicate the objectives and what students can demonstrate at the end of the course. In contrast, the syllabus includes the content of the units used to lead the students to achieve objectives. Similarly, Nunan (1988) relates work by Candlin (1984), which says that curricula are focused on making overall statements about language learning purpose, the experience, and the evaluation. Syllabuses, however, are more detailed and based on documents and records of what occurs at the classroom level and how teachers and students use a provided curriculum in their context.

Many changes have occurred in several fields of education. The field of syllabus design in international language instruction is not an exception (Rahimpour, 2010). Syllabus design has

a prominent role in areas in which modern language teaching considers developing knowledge and variant perceptions about the nature of language and the objectives of language teaching, which unavoidably, influence our ideas of suitable content in language programs (Guthrie, 1989). Hence, as English teachers, not having a clear understanding of the implications of designing a syllabus might affect future content choices.

In addition, the appropriate selection of syllabi should be considered pivotal in language teaching. Several scholars have proposed distinct types of language syllabi (Long & Crookes, 1992; Nunan, 1987; Prabhu, 1987; Rabbini, 2000; White, 1988). Karl Krahnke (1987) was one of the scholars that attempted to describe and compare major syllabus types with suggestions for selecting and combining them. He distinguished several syllabus types with a summary of the theoretical construction and historical development. He listed six types of syllabi which can be seen in Table 1.

Table 1

Summary of English Language Syllabus Designs

Design Structure	Syllabus Description/Purpose
Structural Syllabus	Relly (1988) describes this as “a structural (formal) syllabus.” The content of language teaching is a collection of the forms and structures, usually grammatical, of the language being taught. Examples include nouns, verbs, adjectives, statements, questions, and subordinate clauses.
Notional-Functional	The notional-functional approach describes what the learners want to express through the target language and then uses these notions or ideas to arrange language teaching in terms of content rather than the form of the language.
Situational Syllabus	Situational syllabus in which the language teaching content is a compilation of real or imaginary situations in which language occurs or is used. The main objective of this approach is to teach the language that occurs in the situations.
Skill-based Syllabus	A skill-based syllabus is one in which the language teaching content is a compilation of specific abilities that may play a part in using language. The main objective of this approach is to learn specific language skills.
Content-based syllabus	The primary objective of a content-based syllabus is to teach some content or information using the language that students are also learning. The subject matter is first taught, and language learning happens by chance.
Task-based syllabus	In a task-based syllabus, the teaching content is a series of complex and purposeful tasks that the students want or need to do with the language they are learning.

Note. Approaches to syllabus design for international language teaching (Krahnke, 1987, p. 10-12).

These different types of syllabus designs may be implemented in various teaching situations. In sum, the English-language teaching field tends to simplify the syllabus as a guide for teachers who want to implement a particular sequenced approach to teaching English (Breen, 1987).

Approaches to Language Teaching

Anthony (1963) defined an approach as “a set of correlative assumptions dealing with the nature of language teaching and learning” (p. 63-67). Similarly, Richards and Rodgers (2001) stated that an approach "refers to theories about the nature of language and language learning that serve as the source of practices and principles in language teaching" (p. 245). Nevertheless, no one approach guides to a "specific set of prescriptions and techniques to teach a language"

(Richards and Rodgers, 2011, p. 245). By applying these concepts, it can be stated that an approach might be considered a theoretical view used to establish the foundations of language teaching.

Richards (1987) mentioned that at least three distinct perspectives on language and its nature of language proficiency explicitly or implicitly inform current approaches. The structural view is the first and the most traditional of the three approaches, and the second view of language is functional. The last and third approach is called interactive.

Structural Approach

Sinem (2018) stated that the structural approach provides a model for international language teaching that highlights the significance of understanding the structures of the target language. He also mentioned that this approach describes the theoretical view that language teaching can be performed through the systematic selection and gradation of structures or words in a logical pattern. This approach represents the structural view of the nature of language, and therefore, it treats language as a system of structurally related elements to code meaning.

Richards and Rodgers (1986) point out that elements of the structural approach are commonly defined "in terms of phonological units (e.g., phonemes), grammatical units (e.g., clauses, phrases, sentences), grammatical operations (e.g., adding, shifting, joining, or transforming elements), and lexical items (e.g., function words and structure words)" (p. 17). Similarly, Kumaravadivelu (2006) mentions that language as a system and "the language used to combine phonemes to form words, words to form phrases, phrases to form sentences, and sentences to form spoken or written text ... follow[s] its own rules as well the rules for the combination" (p. 5).

Consequently, what matters is that learners should be able to reach a certain degree of proficiency regarding the sounds of the target language, a certain amount of grammar, and a certain number of words (Yalden, 1987). The structural approach allows teachers to incorporate grammar instruction into the international language teaching process. Therefore, some pedagogical implications of this approach are brought into the classroom.

The structural approach provides teachers the liberty and flexibility for personal understanding and changes at the level of planning and organizing the steps of a course for their students. This approach can also be used in designed courses, considering selected and graded sentence patterns (structures) (Sinem, 2018). In terms of designing a syllabus, Richards and Rodgers (1986) state that a structural syllabus should be listed of the "basic structures and sentence patterns of English, arranged according to their order and presentation" (p. 37). Likewise, in classrooms where the approach is employed, students are active participants in the learning process, and teachers have secondary participation (Sinem, 2018). Additionally, this approach has also been applied to teaching vocabulary, and it is believed that morphological features of lexical items help learners identify the meaning of words (Behlol & Dad, 2010; Fillmore & Snow, 2000).

On the other hand, pedagogical implications of the structural approach are inferred from recent studies that put forward why and how this approach should be introduced in international language classrooms, especially in grammar instruction. Bleghizadeh (2010) argues for using a structural syllabus because it helps teachers systematically cover the grammatical structures in the target language. He proposes a "task-supported structural syllabus in which grammatical structures are presented through consciousness-raising tasks, then practiced through meaning-

focused language exercises and communicative activities, and finally produced through focused tasks” (p. 27).

Functionalist Approach

The functional view of language arose in 1920 from the works of Bronislaw Malinowski, a professor of anthropology at the University of London (Ahmed, 2013). He provides two essential concepts to the functional approach: the environment where the language user's performance is necessary to grasp the language and identify emotional and social functions in communication (Yalden, 1987). One of the leading exponents of the functionalist approach is Halliday (1973), who defines language as meaning potential, that is, as a collection of choices in meaning that is at the disposal of the speaker/listener in a social setting. Instead of viewing language as a study of its system and subsystems, he sees language as a tool for functioning in society (Kumaravadivelu, 2006). Therefore, language cannot be studied isolated; in contrast, it must be seen as a potential instrument a human being uses to communicate with others in different environments.

Some pedagogical implications of the functionalist approach have been mentioned as best classroom practices. Further supporting this, research has been conducted to apply the functional approach to second language instruction (Cullen, 1996; Day & Shapson, 2001; Lund, 1997). These studies had similar results, which revealed that the functional approach had impacted positively on helping language learners to develop communicative skills in different real-life scenarios during second language instruction. In addition, this approach can also be used to teach structure patterns, the four language skills, and discourse analysis. Therefore, the effectiveness of the functional approach in developing communicative competence is based on incorporating

language form, function, meaning, and appropriate word choices during the learning and teaching process (Ahmed, 2013).

Adopting a functional approach to teaching grammar enables teachers to adopt a whole text perspective and view language as a communicative resource whose goal is to create meaning. A functional perspective sees language as a set of interrelated systems through which users of the language draw on different types of grammatical resources to express ideas about a topic, negotiate interpersonal aspects of language use, and produce stretches of language (text) that are cohesive and coherent within the context.

Halliday (1973) explains that language is a vital resource. This approach allows the study of the relations between the people and their context. Besides, it is essential for the study of the language use that speakers do. It cannot be studied isolated; it is necessary to recognize that it belongs to one more complex activity, which is communication. Consequently, the functionalist approach is essential for language learning because interacting and understanding the message are fundamental for communication.

Interactive Approach

Brown (2015) asserts that the word "interaction" is essential for language teachers. He also considers interaction "the collaborative exchange of thoughts, feelings, or ideas between two or more people" (p. 259). What usually occurs in a second language classroom Rivers (1987) precisely describes it as "a diet of grammar exercises and drills cannot give the feeling for other living, breathing human beings that are exploring the things they enjoy can do" (p. 14). In addition, the interactive approach "holds that language learning occurs in and through participation in speech events, that is, that talking to others, or making conversation is essential" (Lier, 1988, p. 74). Therefore, the lack of interaction in second language classrooms is a crucial

aspect that language teachers must consider in helping learners become active participants in learning the target language.

Similarly, Richards (1986) mentions that this interactional view is seen as a "vehicle for the realization of interpersonal relations and the performance of social transactions between individuals" (p. 17). According to this view, some pedagogical implications highlight the importance of its use in second language learning. For instance, the teacher acts as a guide to involve students in "task-oriented," "purposeful," and "cooperative" learning (p. 10). The learner is, therefore, not a passive observer but a dynamic participant in the learning process (Rivers, 1987).

English for Specific Purposes

Over the years, English for Specific Purposes (ESP) has been defined differently by several authors. Many of them have concluded that ESP is an approach that should be tailored to learners' needs. In other words, ESP focuses on satisfying the learners' specific needs (Dudley-Evans & St John, 1998; Harmer, 1983; Hutchinson & Waters, 1987; Mackay & Mountford, 1978; Strevens, 1988). Hutchinson and Waters (1987) define ESP as "an approach to language learning, which is based on learner needs" (p. 19). They claimed that ESP should be seen as an approach rather than a product. Besides, they explained that students' needs are the foundation of ESP, specifically related to language and learning situations (Sierocka, 2014).

Moreover, Mackay and Mountford (1978) pointed out ESP as the teaching of English for "clearly utilitarian purposes" (p. 2). They describe that the ESP approach is determined by learners' academic, occupational, or scientific needs. Ibrahim (2010) relates work by Wright (1992), which proposes a similar definition that says, "ESP is, basically, language learning which has its focus on all aspects of language pertaining to a particular field of human activity, while

taking into account the time constraints imposed by learners” (p. 201). Thus, it can be deduced that learners' needs satisfaction and the context where they perform their tasks are critical factors of this approach.

Nonetheless, some authors have perceived the ESP approach differently, adjusting the definition with a more elaborated view. For example, Strevens (1988) distinguished four fundamental characteristics and two variable characteristics. He argues that ESP has been “designed to meet specified needs of learners; related to the content, to particular disciplines, occupations, and activities; and centered on the language appropriate to those activities, in syntax, lexis, discourse, semantics” (p. 84). Consequently, ESP courses should be tailor-made for learners' needs and consider linguistics characteristics needed in a specific professional field.

Moreover, Sierocka (2014) relates the work by Robinson (1991), which uses two criteria and several characteristics to define ESP. Her criteria are that "ESP is normally goal-oriented" and "needs analysis" as a vital factor in designing ESP courses (p. 43). The former criterion focuses on the student's reason for taking a course, and the second criterion focuses on determining what students have to do with English. The latter characteristic directly connected with Hutchinson and Waters' ideas (1987) when they asserted the following words: "Tell me what you need English for, and I will tell you the English that you need." These words turned into the leading rule of ESP (p. 8). Her characteristics are that ESP courses have restricted time to accomplish goals and are taught to adults in "homogeneous classes" regarding the work or specialist studies the students are involved in (p. 43).

One of the most elaborate definitions of ESP was proposed by Dudley-Evans and St John (1998). They altered the amplified original definition by Strevens (1988) and referred to absolute and variable characteristics. These are presented as follows:

- ESP is defined as meeting the specific needs of the learners.
- ESP uses the underlying methodology and activities of the discipline it serves.
- ESP is centered on the language (grammar, lexis, register), skills, discourse, and genre appropriate to these activities.

Variable Characteristics:

- ESP may be related to or designed for specific disciplines.
- In specific teaching situations, ESP may use a different methodology from that of General English.
- ESP is likely to be designed for adult learners at a tertiary level or in a professional work situation. It could, however, be for learners at the secondary school level.
- ESP is generally designed for intermediate or advanced students.
- Most ESP courses assume some basic knowledge of language systems, but they can be used with beginners.

(pp. 4-5)

Regarding the definitions proposed by several authors above, it is essential to highlight that the ESP approach definition has been discussed and modified throughout the years.

However, most authors agree that this approach concerns learners' needs, wants, and contexts.

Types of ESP

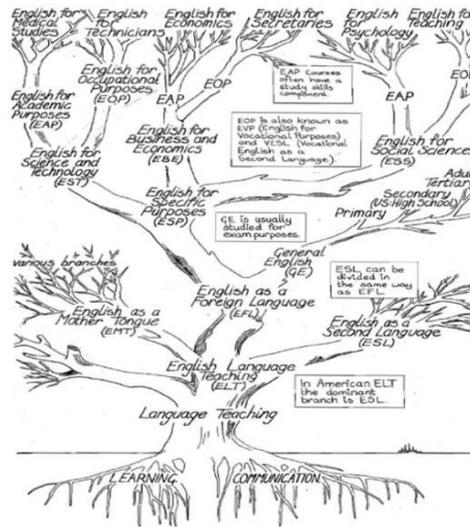
Several types of ESP have been proposed over the years. One of the first proponents was Hutchinson and Waters (1987), who identified two main categories of ESP through the "Tree of ELT" (English Language Teaching) in Figure 4. The main types are: English for Academic Purposes (EAP) and English for Occupational Purposes (EOP) and also known as English for Vocational Purposes (EVP) or Vocational English as a Second Language (VESL). However, ESP

has commonly been classified into two main branches: EAP and EOP (Rahman, 2015). First of all, it is essential to define them. Flowerdew and Peacock (2001) asserted that EAP is "the teaching of English with the specific aim of helping learners to study, conduct research or teach in that language" (p. 8). Likewise, EOP addresses people already employed in the industry, focusing on language labor productivity (Lomperis, 2020).

The tree represents the most common divisions that are made in ELT. The roots of this tree are found, namely in communication and learning. As we go up, the ELT is divided into English as an International Language (EFL), classified into General English (GE) and ESP. ESP is divided into English for science and technology (EST) and English for Social Science (ESS). Those separate strands of language teaching are also established under the umbrella of ESP.

Figure 4.

The Tree of ELT



Note. Taken from Hutchinson and Waters, 1987 p.17.

English for Academic Purposes (EAP)

Over the years, several authors have defined English for Academic Purposes (EAP) differently. Many have concluded that it concentrates on teaching English to facilitate students' academic studies (Flowerdew & Peacock; Hyland & Hamp-Lyons, 2002; Jordan, 1997).

Robinson (1980) uses EAP and study skills synonymously and defines them as "how to study through the medium of English" (p. 7). However, it is important to delimit the extent of EAP. Hyland and Hamp-Lyons (2002) define the extent of EAP as "the linguistic, sociolinguistic and psycholinguistic description of English as it occurs in the context of academic study and scholarly exchange" (p. 89).

The genesis of EAP can be dated back to the 1960s, when an increasing concern in language as a channel of interaction, language changes in situations, and applications of specialized terminology developed the foundations for the birth of EAP (Flowerdew & Peacock, 2001). Nevertheless, several language-independent elements are also essential and entail the necessity of EAP, for instance, the growth of English as a universal language (Harwood & Petric, 2011). In addition, Hamp-Lyons (2011) mentioned that the influence of the English language had lessened the production of academic texts in other languages, which forced academics to publish their work in English. It can be inferred that the rise of the English language is a crucial factor that impacted the growth of EAP.

Other aspects also helped the rise of EAP through the years. For instance, the growth of international candidates for admission to universities in English-speaking countries, either the British Council in Britain or USA universities (Hyland & Hamp-Lyons, 2002). In this situation, learning study skills is necessary, such as: "listening to lectures, taking notes, writing reports,

and reading books will likely take part of the learner's English program" (Kennedy and Bolitho, 1984, p. 4).

Another characteristic that contributes to the expansion of EAP is the arrival of refugees worldwide. This international migration has brought many non-native speakers unfamiliar with academic language into English high-school classrooms. The growth of this population's diversity and academic experiences might present significant challenges for academic personnel (Hyland, 2006). Hence, the expansion of international English users has simultaneously led to increased EAP teachers and courses (Hyland & Shaw, 2016). For instance, Hamp-Lyons (2011) professes that most EAP teachers worldwide might be non-native English speakers. The needs of these non-native teachers are unlike native speakers, and this differentiation has headed the appearance of new EAP resources and teacher preparation.

English for Occupational Purposes (EOP)

Hutchinson and Waters (1987) described English for Occupational Purposes (EOP) as "English for work/training" (p. 16). Moreover, with a more specific and broader definition, Dudley-Evans and St. John (1999) illustrate EOP as "English that is not for academic purposes; it includes professional purposes in administration, medicine, law and business, and vocational purposes for nonprofessionals in work or prework situations" (p. 7). Kennedy and Bolitho (1984) assert that EOP "is taught in a situation in which learners need to use English as part of their work or profession" (p. 4). Similarly, Kim (2008) points out EOP as special training. She mentions that the purpose of EOP is to improve workplace performance, with particular attention to how adults learn a language to interact more appropriately in a job-related context.

Some studies have demonstrated the effectiveness of implementing the EOP approach to enhance students' specific English skills required at their workplaces. For instance, Xie (2016)

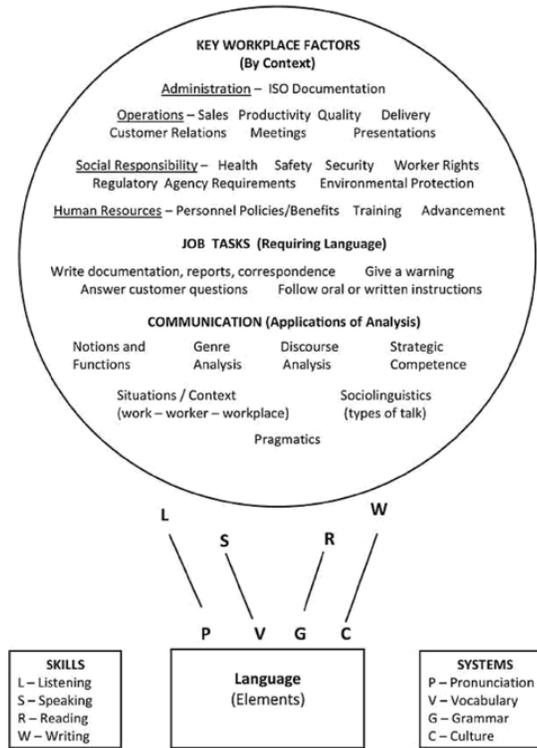
conducted a qualitative study to examine an EOP course in a Chinese university to help students attain a communicative competence suitable for the globalized workplace. This case study used a document analysis method, semi-structured student focus group interviews and a survey with 21 participants, participant observation, and teacher reflection. The results showed that the EOP course improved students' writing skills, professional language use, and confidence. The case study participants also reported positive learning outcomes, while the teacher also observed significant improvement in the participants' workplace communication skills development. Finally, the study concluded that the EOP course helps students be better equipped with the English communication skills required for their future prospective work in a globalized market.

In the design of EOP for AMT English, the more referenced authors are Shawcross (1993) and Lomperis (2020). The former, in his book "*English for Aircraft*," proposed a course that contains 26 modules, four review modules, an exercise key, and an index. This book provides examples of aircraft systems in Airbus Industrie, Boeing, Fokker, McDonnell Douglas, and various suppliers' aircraft maintenance manuals, checklists, structural repair manuals, illustrated parts catalogs, service bulletins, airworthiness directives, flight manuals, training manuals, among many others. However, it seems that this book is not designed to focus on the four abilities of English (listening, speaking, reading, and writing).

Lomperis (2020), on the other hand, proposed the EOP approach to customize aviation English for AMTs, where there are two main kinds of needs assessment, Organizational Needs Assessment (ONA) and Instructional Needs Assessment (INA), serve as a point of departure to develop it. She also provided a sample analysis for an authentic AMT English approach, where authentic AMT job language was analyzed for key patterns that non-native English language speakers should be able to comprehend and use to respond, as seen in Figure 5.

Figure 5

Language, Communication, and the Workplace



Note. Taken from Lomperis (2020), permission was granted by the author.

Figure 5 shows that all these elements may be integrated to customize an English curriculum. The first factor indicates the contexts where the language is used. The second factor relates to the worker’s job tasks to identify the required language skills. The last factor shows communication as a channel to study how language is used in real-life situations through a language analysis approach. Thus, workplace factors and language elements are essential to analyze and identify language tasks and functions in English curriculum customization.

Literature Review

For this review, five articles demonstrated difficulties with English and AMTs. The academic study of the English language components needed for AMTs at their workplaces has been neglected throughout the years.

Werfelman (2007) mentioned in an ICAO journal (1996) that language errors had become more frequent because most airplanes were built in different countries where various languages are spoken. She also remarked on what ICAO said, “sometimes the technical language of the manufacturer does not translate easily into the technical English of the customer, and the result can be maintenance documentation difficult to understand” (p. 17). She also mentioned a case of misinterpretation where English technical documentation in the aviation field happened while reading a service bulletin. The technician thought that the word “proscribed” (prohibited) was “prescribed” (defined, laid down), and he proceeded to perform the forbidden action (Werfelman, 2007).

Another example involves a Japanese airline (International Federation of Airworthiness, 2006). The airplane was in service for five days without batteries for the emergency exit door operation auxiliary system. During a mechanic maintenance check, it was reported that seven of the replacement cases did not contain batteries. Another mechanic that should have checked the existence of the batteries had reportedly misread the maintenance manual.

Some studies mention that the difficulty of English is the problem. Zafiharimalala et al. (2014), for example, conducted an exploratory study to understand the use of maintenance documentation by technicians in the aviation context and why they do not systematically use it. A qualitative survey involving 13 maintenance technicians was carried out, with observations and semi-directed interviews. The semi-directed interview was followed by two fundamental questions: 1) Why do you choose not to use the documentation systematically? and 2) What

would your suggestions be to improve the maintenance documentation? The authors found five main reasons for not using the maintenance document systematically. The principal example was that the document is in English, and English is complex, and they have to translate word by word and are always looking in a dictionary and maintenance manuals in black and white. Likewise, the Aerospace and Defense Industries Association of Europe (ASD) (2013) said that many readers of technical maintenance documents have limited English proficiency and are easily confused by complex sentence structures and the number of meanings and synonyms that English words have.

Consequently, Drury et al. (2005) conducted a multicentric study in four continents: (Asia, Latin America, Europe, and the US) to determine the nature and frequency of English language difficulties and possible interventions to reduce them. In Latin America, 1159 Colombian AMTs were the object of investigation. The results revealed that “misunderstanding English documents” was the highest frequency found and the most significant percentage of the seven scenarios proposed.

This study generally revealed three findings and recommended mitigating language difficulties during maintenance tasks. The first finding reported that communication design is vital in lowering language difficulties. They recommended improving documentation design using standardized methods, non-complicated terminology, and sentence structure, and document forms should follow human factors practices. These practices aid in recognizing and enhancing the variables that influence human performance during maintenance and inspection, including, among other things, motivation and instruction (FAA, n.d.). Additionally, all documentation should be checked, monitoring its usage in the hangar, and establishing standardized protocols for tasks.

The second finding showed that task cards and other documents should be considered a potential language issue. Moreover, non-normal repair forms, shift turnovers, training, maintenance manuals, and contracts with USA companies were usually in English. They recommended evaluating other documentation to verify challenges to language difficulties.

The final finding revealed that time pressure on AMTs and inspectors was the leading cause of language difficulties (errors) and regularly assessed AMTs' English proficiency. The liberty to ask for language help was also found necessary. They recommend that maintenance repair overhauls (MROs) and regulators distinguish the significance of social interaction to reduce language difficulties (errors). Drury et al. (2005) found that non-native AMTs English speakers spend too much time performing maintenance tasks due to misunderstandings in English documents. As a result, time-consuming and component damages are latent issues that might affect airline companies' services, increasing the risk of triggering an incident or accident during airplane operations.

Another study by Pawinee (2018) explores the need for the English language used by AMTs while performing maintenance tasks at Donmuang airport. This quantitative research study employed a survey and questionnaires for participants. This study revealed that listening skills were the most important for AMTs to thrive at their workplace, and the following skills (speaking, reading, and writing) were less important. Finally, the study revealed that the participants preferred that all four skills should be taught equally.

Summary of the Chapter

This chapter discussed some history of curriculum designs, English language syllabus designs, approaches to English language teaching, and the umbrella of ESP. The literature review revealed the existence of difficulties AMTs have with the English language worldwide. It also

appears that this is happening in aviation schools in Colombia since there is probably no clarity about the process of curriculum customization, as well as the lack of experience of some English teachers facing the challenges that aviation technical English requires. Therefore, AMTs programs in Colombia deserve a more in-depth review of how they are addressing the English language and would possibly benefit from the EOP approach in their classroom.

Chapter 3. Methodology

This research project explores similarities and differences in English curriculums and language requirements for AMTs that may indicate a need for adjusting or standardizing an English curriculum for these students in Colombia. This chapter will address the research methodology followed in this study. This includes decisions regarding the research paradigm, type, and design selected, the data collection instruments and techniques used, and the procedure to collect and analyze the data.

Research Paradigm

Defining concepts around research is a point of departure for researchers to analyze and make decisions during the research process. Some authors have defined the word “research” differently. Burns (2000) defines “research” as a systematic inquiry or investigation in which data collection, analysis, and interpretation processes are essential. In the same vein, Creswell (2012) defines research as the “process of steps used to collect and analyze information to increase our understanding of a topic or issue” (p. 3). This process is developed to “understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such contexts” (Mertens, 2005, p. 2). Thus, research is vital for educators since it provides continuous improvement by searching for potential solutions to existing issues.

Additionally, the word "paradigm" has been defined by several authors. A paradigm can be defined as a researcher's specific stance on how knowledge (as defined by that researcher's specific epistemology perspective about the nature of knowledge) can be revealed (Egbert and Sanden, 2014, p. 32). In other words, how researchers see, interpret, and understand reality. Similarly, Mackenzie and Knipe (2006) define this term as describing a researcher's worldview.

Therefore, the word “paradigm” tells the researcher what and how a research project should be conducted.

Santamaría (2013) classifies research paradigms into positivist, interpretivist (hermeneutical), and critical. Egbert and Sanden (2014) mentioned that researchers who use the positivist paradigm consider that “knowledge is based on observed experience and can be obtained through experiment” (p. 33). In this view, knowledge (truth) is objective, measurable, and generalizable. Researchers become objective observers to analyze natural occurrences that exist separately from them, and they do not influence what is being observed (Abdul & Alharthi, 2016).

Additionally, Cohen et al. (2007) claimed that interpretative paradigms attempt to understand and interpret the world in terms of its participants. They also stated that the interpretative paradigm intends to “understand the subjective world of human experience” (p. 21). The interpretive methodology requires that social phenomena can be understood “through the eyes of the participants rather than the researcher” (Cohen et al., 2007, p. 21). In other words, this paradigm allows the researcher to establish closer relationships with stakeholders and, thus, collect, analyze, and interpret the data. Finally, a critical paradigm is subjective, and “it is assumed that no object can be researched without being affected by the researcher” (Abdul & Alharthi, 2016, p. 32). Hence, the purpose of this view is not simply to explain or understand society but to change it (Patton, 2002).

For this study, the researcher will use an interpretative paradigm since having contact with participants can provide a better understanding of the problem and suggest a possible solution. Because this study explores the possible issues and challenges for the programs and people involved, this seems to be the most appropriate paradigm for this research study.

Qualitative Research

The research reported in this document used a qualitative research approach to analyze and interpret the data collected. According to Creswell (2009), “the qualitative approach is a means for exploring and understanding the meaning individuals or groups ascribe to a social or human problem” (p. 4) because qualitative research relies more on the participants' views in the study and less on the direction identified in the literature by the researcher. For qualitative research, problems need to be explored to obtain a deeper understanding. In qualitative research, the researcher is closely interested in keeping and completing the experience with stakeholders (Creswell, 2014).

There are some benefits of using qualitative research methods. For instance, Rahman (as cited in Corbin & Strauss, 2008) remarks that qualitative studies allow researchers to discover the participants' inner experience and to figure out how meanings are shaped through and in culture. Moreover, Maxwell (2012) states that qualitative design (interactive approach) has a flexible structure since the design can be built and rebuilt to a larger extent. Hence, qualitative research allows the researcher to shape the study's interpretations and direction.

This study uses a qualitative approach, collecting student data and obtaining professionals' feedback on monitoring aircraft technicians' performance. This approach enables the researcher to gather in-depth insights on topics, concepts, thoughts, or experiences to adjust, organize, and categorize information.

Research Design: A Case Study

One significant design used in research is the case study. According to Yin (2003), a case study “is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not evident”

(p. 13-14). Instead of focusing on a group, case study researchers may concentrate on a program, event, or activity that involves individuals (Stake, 1995). In contrast, according to Merriam (1998), a qualitative case study is “an intensive, holistic description and analysis of a single entity, phenomenon, or social unit, [and] case studies are particularistic, descriptive, and heuristic and rely heavily on inductive reasoning in handling multiple data sources” (p. 16). Furthermore, Robson (as cited in Cohen et al., 2007) remarks that a case study focuses on the “analytic aspect” rather than “statistical generalization,” aiming to develop a theory that may aid researchers to comprehend other “cases, phenomena or situations” (p. 253).

Several authors have divided case studies into different types, as summarized in Table 2:

Table 2

Types of Case Studies

Author	Year	Classification
Yin, R. K	1984	Exploratory, Descriptive, and Explanatory
Merriam, S.B.	1998	Descriptive, Interpretative, and Evaluative
Merriam, S.B.	1988	Ethnographic, Historical, Psychological, and Sociological
Sturman, A.; Stenhouse, L	1999; 1985	Ethnographic, Single in-depth, Action research, Evaluative, and Educational.
Stake, R. E.	1995	Intrinsic, Instrumental, and Collective.
Robson, C	2002	Individual, Social group study, Studies of organizations and institutions, and Studies of events, roles, and relationships.

Note. Taken from Cohen et al. (2007).

For this study, it is worth mentioning that case studies might comprise numerous studies, called a “collective case study” (Stake, 1995), in which several study cases are discussed and contrasted to gain insight into a problem. For instance, a case researcher may look at different

schools to demonstrate different methods of school choice to students (Creswell, 2012). In sum, case researchers can place cases into a broader context to seek a deeper understanding.

In addition to the types of case studies, it is essential to mention that they have strengths and limitations or “caveats” (Mackey & Gass, 2005, p. 72). They state that one of the most important advantages of case studies is that they permit the researcher to gain a clear view of the individual in a manner that does not commonly happen in a study group. On the other hand, limitations are related to the fact that the researcher must make sure not to be unspecific during a study. In other words, generalizations must be treated carefully.

Context and participants

Fifty-nine students (54 males and 5 females) studying in different aviation schools in Colombia, such as Centro Industrial y de Aviación, SENA Barranquilla, SENA Rionegro-Medellin, Protécnica Barranquilla, Indoamericana, and Academia Antioqueña de Aviación (AAA) participated in the study. Their ages ranged from 16 to 25 years old. Additionally, 71 aircraft maintenance technicians (AMTs) (see Table 3) who work in different aviation companies in Colombia, the United States (USA), Latin America, and Europe participated. AMTs, or aviation technicians, are qualified professionals with more than ten years of experience in the aviation field. Five English language teachers for AMTs at vocational institutions also participated. The teachers have educational backgrounds in international language teaching at the undergraduate level, and only one holds an M.A. in English language teaching. All teachers reported having a C1 level of English. Most of the teachers work in different aviation institutions, except one who is no longer working in the aviation field but has worked for several years in the aviation sector.

Table 3***AMT Demographics***

		<i>n</i> =	Percentage
	City		
In what city are you currently working?	Barranquilla	29	40.8
	Bogotá	28	39.4
	Rionegro	6	8.6
	Soledad	3	4.2
	Medellín	2	2.8
	Chile	1	1.4
	Daytona Beach	1	1.4
	Madrid	1	1.4
	Total	71	100.0
	# of years		
How many years have you worked as an AMT?	11 a 20	21	29.6
	Más de 20	18	25.3
	3 a 6	13	18.3
	7 a 10	12	16.9
	1 a 3	7	9.9
	Total	71	100.0

Data Collection Techniques and Instruments

To respond to the research questions, the researcher applied data collection techniques to compile information related to the study's objectives. The instruments used to collect data involved in this study are questionnaires, interviews, and a comparison matrix.

Questionnaire

Brown (2001) defined questionnaires as “any written instruments that present respondents with a series of questions or statements to which they are to react either by writing out their answers or selecting them among existing answers” (p. 6). The questionnaire is one of the most frequent means of gathering data on attitudes and opinions from many people; as a result, it has been used to explore a wide range of issues in second language research (Brown, 2001). Questionnaires allow researchers to collect information about learners' attitudes and

motives for learning, as well as their reactions to learning and classroom instruction and activities-information that is generally unavailable via production data alone (Mackey & Gass, 2016).

The questionnaires were given to students and professional ATMs'. For students, the questionnaire had eight questions (see Appendix A). The first two questions were closed questions related to students' gender and range of ages, and the third question related to the student's motives for becoming an AMT. The fourth, fifth, and sixth questions were open. They asked the participants to describe the English skills they needed to perform effectively at their future workplace and other situations, the role the English language plays in their future workplace, and the frequency of English skills used. The last two questions asked about the students' perceptions regarding what they liked about their aviation English class and what they would change.

The questionnaire for AMTs had nine questions (see Appendix B). The first four questions were related to AMT's city of work, years in service, the frequency they use English and different English skills at their workplace. Questions five through eight asked about the situations in which English skills are used. The last question asked what kinds of problems AMTs had experienced with the English language at their workplaces.

Interviews

According to Yin (2018), interviews are "one of the most important sources of case study evidence" (p. 160). Adams (2015) affirms that a semi-structured interview is an instrument that employs both close- and open-ended questions and allows the researcher to ask follow-up questions based on the interviewees' answers. Mackey and Gass (2005) state that semi-structured interviews are more flexible than structured interviews. The researcher utilizes a written series of

items as a guide and can go astray and demonstrate more information. Therefore, this technique allows the stakeholders to express their opinions, beliefs, or perceptions of the problem without restriction.

The interview had fifteen questions (see Appendix C) and was presented to the teachers. During the interviews, teachers were asked to respond to demographic and academic information and questions about their experiences teaching English to AMTs trainees. The first five questions asked about the teachers' profiles. Questions 6 and 7 asked about the preparation teachers had received to teach English for Specific Purposes (ESP) and their knowledge related to the aviation field. Question eight inquired about the frequency they use different English skills in their classes. Question 9 asked about teachers' materials for teaching aviation English classes, and question 10 requested a typical description of aviation English classes. Question 11 asked about the existence of an aviation English curriculum in their vocational institutions. The final questions, 14 and 15, inquired about the appropriateness of the materials used to guarantee a better performance of AMTs at their future workplace and any changes they would make to the curriculum to teach English to the AMT trainees.

Comparison Matrix

The final instrument used to collect data was a comparison matrix. According to Croker and Friedel (1991), this “instrument makes possible the integration of functional area data from numerous assessment sources and presentation in a unified composite report” (p. 71).

Comparison matrices are very useful in qualitative research (Cloutier & Ravasi, 2021). One of the most helpful and crucial roles of matrices is to assist qualitative researchers in organizing and managing the large amounts of data they regularly collect (Camoës, 2016). They also help researchers organize data comprehensibly and show research findings and theoretical perceptions

in a condensed, easy-to-understand, and persuasive manner (Cloutier & Ravasi, 2021). Thus, through a matrix, the researcher can find similarities and differences for different topics that a specific population might have and summarize relevant information that helps to provide reliable and reasonable conclusions. This form of displaying data helps the researcher compare each theme's description to construct a narrative and draw possible conclusions.

The matrix for this research was used to organize academic data about the aviation English subject in different aviation schools in Colombia, such as Barranquilla and Medellin. The matrix information sought was arranged by categories: institution name, the city in which they are located, the program duration, the duration of the English component, the content focus of each level, the duration of each English level, and the total number of hours dedicated to English. The matrix also sought information regarding particulars of English programs, such as the current English level of students, output levels, the methodology of the English components, the evaluation frameworks, and CEFR evidence (see Figure 6 in Chapter 4).

Procedure

The researcher collected data from survey respondents using questionnaires, and they were distributed to students and professionals in September 2021 using a *Google* form. Both questionnaires explained the purpose of the study and informed participants of their rights. The surveys were anonymous to obtain more detailed and honest feedback. During the distribution of the surveys, language teachers and an AMT at Avianca airlines helped by sharing them via *WhatsApp* to have quicker responses since electronic data collection provides an easier and faster way of data collection (Mertler, 2001).

Another instrument that was used to collect data was one-on-one interviews. They were performed through *Google Meets* online sessions in September 2021. The participants were

selected considering their work experience in the aviation field. Before interviewing the language teachers, they were contacted via *WhatsApp* to check if they were interested in participating in the study. The five language teachers who were contacted accepted voluntarily. Each interview was held separately in Spanish by the researcher and then transcribed into English and ranged in length from 25 to 30 minutes.

Data analysis

Data analysis, as defined by Seliger and Shohamy (1989), is “sifting, organizing, summarizing and synthesizing the data to arrive at the results and conclusions of the research” (p. 201). Similarly, Creswell (2012) stated that analysis consists of “taking the data apart” to determine individual responses and then “putting together” a summary (p. 10). Thus, data analysis allows the researcher to summarize collected data to determine patterns, relationships, or trends.

Data from the surveys were downloaded into an Excel worksheet. Each closed question was analyzed using descriptive statistics providing frequency and percentages. Then, the open-ended responses were categorized by theme, which “includes an extensive discussion about the major themes that arise from analyzing a qualitative database” (Creswell, 2012, p. 274). Additionally, the information inside the comparison matrix was analyzed by noting the differences and similarities within the abovementioned variables. Finally, teacher interviews were divided into text segments, placed into an Excel table, and categorized by key themes.

The data was then analyzed using triangulation. Triangulation of information is considered a powerful form of showing validity, at the same time, especially in a qualitative study (Cambell & Fiske, 1959). The three data collection instruments help the researcher identify and validate the factors that indicate the possibility of adjusting or standardizing the existing

English curriculum addressed to ATMs in Colombia. By doing so, the researcher can compare the information from different actors' viewpoints and draw some possible conclusions that prove a problem's existence.

Ethical Considerations

Participants were informed in writing (surveys) and verbally stated (interviews) that the data collected would be used for research purposes only and that their answers would be anonymous. All participants voluntarily accepted being involved in this investigation.

Chapter 4. Results

In this section, the results of the data collected will be presented. The data was gathered through semi-structured interviews, surveys, and the analysis of language curriculums of different aviation schools in Colombia. This section aims to identify which factors indicate the possible need for adjusting or standardizing an English curriculum for AMTs in Colombia.

Questionnaire

The first instrument for collecting data was a questionnaire from students and aviation professionals. In terms of language skills usage in class, they highlighted all language skills, and the most frequent English skills reported were technical vocabulary and reading. Furthermore, most students mentioned that they love and feel passionate about aviation to become an AMT. They also reported that fluency in English to interpret manuals could help them perform effectively in future workplaces by understanding manuals, teamwork, responsibility, and handling tools. Similarly, they reported that English is the universal language of aviation and plays a crucial role in their future workplace since it helps them to understand manuals. Besides, they enjoy learning technical vocabulary in their classes and interacting with manuals. Lastly, they would not change anything in their aviation English classes, but the method and hourly intensity could be modified.

The professionals' results show that most work in Colombian cities such as Barranquilla and Bogotá. The latter is considered one of the most important places for aviation since most airline companies operate there. Also, this city has many companies that offer minor and major repairs for aircraft fleets. Furthermore, most of them reported that the English language is always used at their workplaces, and reading technical vocabulary and writing were the skills that they used the most. In addition, professionals use listening and speaking skills while interacting with

international crew members and reading maintenance tasks. On the other hand, reading skills are used to understand manual instructions, and writing skills are used to elicit and answer reports. Lastly, professionals have experienced problems with using the English language to keep a conversation, some unknown words, and during the interpretation of the manuals.

Furthermore, teachers' results show that some obtained support from aviation vocational institutions related to ESP methodology but not precisely in the aviation field. In addition, most of them had to ask for an understanding of aviation-related topics to adjust the language content. On the other hand, they mainly emphasize reading and writing skills in their classes, and other skills were also used, but less frequently.

Regarding materials used in the classroom, all teachers acknowledged creating their materials using other aviation instruction books, a book titled *English for Aircraft*, and aircraft maintenance manuals approved by the FAA. Regarding whether there was an English curriculum for AMTs, some admitted that there was not one at their institutions, while others said they had access to what the institution offered. Finally, educators said their teaching material is sufficient to help aviation students perform better. At the same time, most thought the hourly intensity should be raised.

Student Open-Ended Responses

The students answered some open-ended questions. The first question, which explored the inclination of the students to become aviation technicians, revealed that 70% are interested in becoming an AMT because they “feel passionate” about it, and 16.7% like “to interact with mechanical components.” The other responses also showed a minimum percentage of 1.7% to different trends, such as: having a decent job, having a better future, and contributing to aviation security, to name a few. The second question, which inquired into the skills that an AMT needs

to perform at their future workplace effectively and in which situations they have used them, revealed that 33.3% consider “fluency in English to interpret manuals” and 11.7% “understanding manuals” as the needed skills to perform effectively at their future workplace. Some others but not less important was “teamwork,” “responsibility,” and handling tools.

In addition, 21.7% of the students considered that “learning technical vocabulary” is what they like the most in their English aviation classes. With the same percentage, they acknowledged that “dynamic classes” attract them in class. Finally, 50% of the students considered that nothing should be changed in their classes. However, 21.7% of the students recognized that the methodology might be changed. Additionally, 11.7% of the students consider the course's hourly intensity not enough to learn in English aviation classes.

In general, the results of this questionnaire revealed that most participants acknowledged they had chosen to become an aviation technician because they feel passionate about the aviation field. They also highlighted the importance of being fluent in English to comprehend aviation maintenance manuals. Besides, they also mentioned that learning aviation vocabulary is what they like the most in their classes. Furthermore, many students reported that they would not change anything in their classes except to increase the number of hours dedicated to English aviation subjects.

Professional Open-Ended Responses

The instrument applied to collect data from aviation technicians was a questionnaire. The questionnaire results of professionals' questionnaire demonstrate similar results as those of students. This survey revealed that all skills were highlighted. Moreover, the most frequent skills were reading at 66.2%, technical vocabulary at 59.2%, and writing at 56.3%. However, it is important to highlight that listening and speaking were used less frequently, as shown in Table 4.

Table 4***Professional Responses to Survey Questions***

	6	5	4	3	2	1	Total
How often do you use the following English skills during your workday?							
Listening	16.9	15.5	19.7	29.6	14.1	4.2	100.0
Speaking	9.9	9.9	25.4	32.4	15.5	7.0	100.0
Reading	66.2	15.5	12.7	4.2	1.4	--	100.0
Writing	56.3	21.1	9.9	8.5	2.8	1.4	100.0
General Vocabulary	32.4	22.5	25.4	14.1	4.2	1.4	100.0
Technical Vocabulary	59.2	31.0	2.8	5.6	1.4	--	100.0
Grammar	35.2	29.6	23.9	4.2	7.1	--	100.0

Note. The results are presented in percentages ($n=71$). The scale was presented in a Likert scale with the following: 6, Always; 5, Almost always; 4, Frequently; 3, Occasionally; 2, Almost never; 1, Never.

Additional survey results revealed that 50.7% of the AMTs always use English at their workplace. Regarding the situations in which the English language is used, 22.5% of the AMTs acknowledged that listening skills are used when communicating with “international crew members” and 16.9% when reading maintenance tasks. For speaking skills, 21.1% of the AMTs reported that “receiving international crews” is a typical situation but not less important; 15.5% of the AMTs stated that it is used very little. For reading skills, 70.4% of the AMTs recognized that “understanding manuals” and 11.3% “reading reports” are the situations they use most. For writing skills, 59.2% of the AMTs reported that “answering reports” and 7.0% “writing reports” are the situations where they use this skill.

Furthermore, the results of the open-ended questions show that some AMTs have experienced problems with using the English language. 7.0% of the AMTs reported that “keep a conversation” and 5.6% “some unknown words” are the main English language issues they face

at their workplaces. However, it is significant to highlight other English language problems reported, such as interpretation of the manuals, idioms, answering reports, grammar points, technical terminology, and general English.

Semi-Structured Interview

The semi-structured interview (SSI) with teachers aimed to identify their profiles and strategies as they teach English to ATMs' Some questions are like the ones in the questionnaire; however, they may vary according to the participants' answers. The teachers' responses were labeled T1 to T5 to maintain anonymity.

As mentioned previously, the first part of the SSI regarded teachers' demographic and academic backgrounds in language teaching, specifically in the aviation field. The second part of the interview sought clarification of various aspects of the classroom environment. Questions 6 and 7 asked the teachers to discuss their preparation to teach ESP and their actual aviation knowledge. Most teachers reported working with the help of aviation institutions and instructors with vast experience in the field. However, one reported not receiving any specific preparation to teach aviation English, unlike another with vast previous experience in the field.

T1, for example, mentions, "I have done...as we call it at SENA, technological dissemination events, that are training for a maximum of two days in teaching English for specific purposes." T2 claims, "the preparation that I have received to teach English for specific content in the institution is obvious; we have had access to all current aviation manuals, a communication with the FAA so that they also assist us with the knowledge and presence in the different courses and processes of the institution to have a greater focus or knowledge of what is done in the classrooms and what are the visions that are wanted."

Regarding aviation-related knowledge, T4 mentions,

Well, there was a preparation before starting to work. I was with ... my instructors before starting to work there, who provided me with texts and gave me talks. We went to the hangar, and they showed me an operational plane and the subcomponents: I had the opportunity to learn this in practice then over time, I learned it, always supported by teachers who had more experience than myself and they knew more about the field because they have worked all their lives as technicians.”

Furthermore, T1 adds to the conversation:

During the seven years of experience in the program, through interaction with instructors, trainees, and companies in the aeronautical sector, I have acquired knowledge and skills that allow me to work as an aeronautical English instructor. Although, I do not know anyone who offers training to a general English teacher who teaches specific content.”

The answers provided above show that some English teachers had the opportunity to interact with aviation personnel to gain experience and get familiar with the aviation field, as well as access to additional documentation, such as manuals which are essential resources to perform maintenance tasks. In addition, they have had some preparation to teach ESP but not any specific one related to the aviation field.

Questions 8 and 9 asked the teachers how frequently they emphasize English language skills in their classes and the materials they use to teach English to aviation technician trainees. All teachers mainly emphasized reading with 16%, writing with 15%, and technical vocabulary with 15%. However, it is important to highlight that grammar, general vocabulary, speaking, and listening was also used but with less frequency.

Most teachers emphasized reading skills since aviation maintenance manuals are a resource that aviation technicians must deal with. Writing skills are used to write reports and technical vocabulary to understand different topics. T1, for example, mentions, “Reading, writing, technical vocabulary and grammar since the orientation of the SENA course is towards the interpretation of a technical text and the writing of maintenance task reports.”

Furthermore, T3 mentions, “we emphasize reading in the interpretation of the manual so that the student can identify symbols, interpret texts, interpret data, understand prepositions, diagram analysis, identify and give arguments. Then we normally emphasize the competencies that the RAC specifies for the aviation technician.” In addition, T5 mentions,

As for reading, let us say that it is like the fundamental thing in the class since the technical manual is the bible for us, also sometimes the others, so sometimes we also use troubleshooting to familiarize ourselves with it. However, it is almost always the technical manual AMM (Aircraft Maintenance Manual). As for writing, yes, in-class writing, reading, and vocabulary are always treated as stronger because they must write reports.

Regarding materials, all teachers mentioned using aviation maintenance manuals authorized by the Federal Aviation Administration (FAA), designing their materials, using some other aviation training books, and the book *English for Aircraft*.

Questions 10 and 11 asked the teachers about the description of a typical English class for aviation technicians and if the institution had a pre-established English curriculum. Teachers described the development of the class differently, but some used a lead-in stage to contextualize students through new vocabulary and reading comprehension activities. T2, for instance, mentions,

“We start with learning some technical vocabulary and move on to reading comprehension to internalize the vocabulary we have seen. We can also carry out a playful-didactic activity to internalize what has been read and the vocabulary learned to use in the specific context.”

In addition, T4 mentions, “Well, the first day we read, there was an introduction, a presentation, everything that was the initial vocabulary, what was going to be worked on, the grammatical part.” Moreover, most teachers mentioned that they had a pre-established curriculum for aviation students. However, some reported that they do not have a curriculum for aviation students they use for all the programs. T3 mentions, “Yes, the curriculum designed by the institution for each teacher is simply reviewed by civil aviation.” T5 reported, “No, it is just that this question is very difficult because let us say that they establish something, but not that specific, so I would say no. They give us a guide but not the specific activity that should be done”.

Question 13 is linked with question 12 for teachers who answered “no.” It asked how they teach aviation students English. Two teachers out of five reported that their vocational institutions do not have a pre-established curriculum. Both teachers inquire about what students need to fulfill their academic needs. T1 reported that:

No, the criterion I use is taken from what I researched myself and what I received at the university regarding teaching a second language, an international language. As I said a while ago, I am eclectic from the communicative approach. I use the translation approach because the subject lends itself to that, and I use a little bit of everything. So, it is a personal criterion but not arbitrary or based on what I know about pedagogy as far as my level of training allows me.

Finally, questions 14 and 15 asked the teachers if the content they teach suits aviation students to perform better at their workplaces and what they would change to the curriculum they use to teach aviation technical English. All teachers consider that their classes are suitable for AMT trainees. However, some reported that the hourly intensity is not enough to teach the subject. T4, for instance, mentions, "Yes, well, I consider that everything that is learned and taught is adequate." Furthermore, T2 says, "of course, I think that everything we teach is to make everyone better at their job." In terms of changes to the curriculum, T1 remarks, "Well, the hourly intensity, if I had that power of decision, we would not meet for two hours a week but rather daily sessions from Monday to Friday, and I would work more on speaking and listening skills." In addition, T3 mentions "more time."

To sum up, most of the teachers who were interviewed claimed that they have prepared to teach aviation English to AMTs differently with the help of qualified aviation technicians and aviation instructors but only one of them reported having experience in the field. Moreover, most teachers emphasized reading, writing, and technical vocabulary in their teaching process. Teachers described their classes differently, but some used different stages, such as presentation, practice, and consolidation, and others went right into the technical aviation content. Regarding the existing English curriculum addressed to AMTs, some acknowledged that there was no curriculum at their institutions; others stated that they have what the institution provides. Finally, teachers reported that their teaching content is adequate for aviation students to perform better at their workplace, and most of them considered that the hourly intensity should be increased.

Comparison Matrix

The matrix describes features of some national aviation school English programs. The Aerocivil organization has certified at least 70 aviation schools in different cities in Colombia

(UAEAC, 2018). Many of them do not offer programs to prepare AMTs trainees in their academic portfolio as was validated on their official web pages. In this case study, 13 aviation schools were examined. As mentioned in Chapter 3, the matrix includes items such as the institution name, the city in which they are located, the program duration, the duration of the English component, the content focus of each level, and the duration of each English level, and the total number of hours dedicated to English. The matrix also contains variables regarding particulars of English programs, such as the current English level of students, output levels, the methodology of the English components, the evaluation frameworks, and CEFR evidence. Figure 6 depicts the information compiled from the institutions' websites.

Regarding the duration of the English component, the institutions reported in varying ways. Two aviation vocational institutions (INEC and Indoamericana) provide four semesters of English and carry out one content level per semester. Protécnica and Academia Antioqueña demonstrated three semesters (periods) for this component, and both institutions demonstrated one content level per timeframe. The remaining institutions did not provide a timeframe for the English component. Most institutions provide a minimum of two levels of English, and some require 4 or 5 levels. The timeframes for the English courses ranged from 40 hours per level to 300 hours. Many also did not mention the exact hours of their courses. The result is interesting when considering the total number of hours of English language exposure, and the AMTS receive ranges from 160 to 300 hours.

Regarding the content of the courses, most schools demonstrated varying types. For example, the aviation schools Protécnica and Academia de Aviación Antioqueña (AAA) have content levels (Aeronautic Technical English I, II, III) in common. Likewise, Instituto de Estudios Técnicos Aeronauticos, Escuela de Aviación Civil Colombiana, and Escuela

Aeronáutica de Colombia show the same content levels (Aeronautic Technical English I, II, II, IV). Additionally, SENA, Instituto Colombiano Aeronáutico, and Instituto Educativo Aeronáutico de Colombia share similar content levels (Aeronautic Technical English I, II), while Escuela de Aviación INEC (Basic English, Aeronautical Technical English I, II, III, and IV) and la Academia de Pilotaje de Aviones y Helicópteros (Basic English I, II, Aeronautical Technical English I, II, III, and IV) show distinct levels of content compared to the other aviation schools that include basic English.

Regarding the particulars of English programs (e.g., output level or CEFR evidence), none of the programs mentioned any determining factors. The matrix analysis shows the discrepancy in language exposure between the different aviation school programs in Colombia. It demonstrates no clarity regarding how the English language is taught and presented to AMTs at the institution.

Figure 6

Matrix of English Language Programs for AMTs.

Institution	City	Program duration	Duration of the English component (total)	Content/focus of each level	Duration of each level	Total hours of English	Current English levels	Output level	English component methodology	Evaluation framework	CEFR evidence
INEC	Pereira, Palmira, Rionegro	4 cycles (4 semesters)	4 semesters	1- Basic English 2- Aeronautical Technical English II 3- Aeronautical Technical English III 4- Aeronautical Technical English IV	1 semester	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Protecnic	Bogotá	2 years and six months	3 semesters	1- English I 2- English II 3- English III	3 semesters	300 hours	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Protecnic	Barranquilla	2 years and six months	3 semesters	1- English I 2- English II 3- English III	3 semesters	300 hours	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Indoamericana	Bogota	5 levels plus diploma	4 semesters (each level)	1- Aeronautical Technical English I 2- Aeronautical Technical English II 3- Aeronautical Technical English III 4- Aeronautical Technical English IV	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Industrial and Aviation Center (SENA)	Barranquilla	36 months, 18 months theory, 18 months practice	Not mentioned	Inglés I / Inglés II	180 hours (Produce written text and oral production English)	360 hours	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Industrial and Aviation Center (SENA)	Medellin-Rionegro	36 months, 18 months theory, 18 months practice	Not mentioned	Inglés I / Inglés II	Not mentioned	360 hours	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Academia Antioqueña de Aviación (AAA)	Medellin	Not mentioned	Periodo I, II, III	1- Aeronautical Technical English I 2- Aeronautical Technical English II 3- Aeronautical Technical English III	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
ACAH-EL (Academia de Pilotaje de Aeronaves y Helicópteros))	Bogota	Not mentioned	Not mentioned	Basic English I Basic English II English II English III English III	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Instituto de Estudios Tecnicos Aeronauticos (IETA)	Bogotá	Not mentioned	Not mentioned	Inglés I,II,III,IV	48 hours per module / Total :192	192 hours	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Instituto Colombiano Aeronautico	Bogotá	Not mentioned	Not mentioned	Inglés tecnico I, Inglés tecnico II	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Escuela de Aviación Civil Colombiana	Barrancabermeja	5 niveles	Not mentioned	Inglés I,II,III,IV	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Escuela Aeronautica de Colombia	Bogotá	5 niveles	Not mentioned	Inglés I,II,III,IV	40 horas por nivel / Total: 160 horas	160 hours	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned
Instituto Educativo Aeronautico de Colombia (IAEROCOL)	Bogotá	4 semestres	Not mentioned	Inglés tecnico I y II (primer - tercer semestre)	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned

Triangulation

To provide credibility to the findings reported, triangulation of the data obtained from student and professional surveys, teacher interviews, and a program analysis comparison matrix is necessary. Three themes emerged from processing the information, and the majority are

related to characteristics of the English aviation curriculum: duration of the courses, language content addressed in the classroom and the use of English professionally.

The aviation programs' analysis showed different time frames and levels to be taught in different semesters during the academic year. Likewise, language teachers and students reported in the interviews and questionnaires that it was necessary to adjust the number of hours because it was not sufficient to achieve the goals set by the programs.

In connection with language content addressed in the classroom, some similarities and differences were also evidenced. Language teachers, students, and professionals agreed with using all language skills, respectively, and they also highlighted that reading is the most used English skill in their scenarios. Additionally, language teachers and professionals coincided with the usage of writing skills while students mentioned technical vocabulary. Finally, some language teachers also expressed not having a pre-established curriculum in their institutions and their lack of preparation to teach English for specific purposes.

Additionally, professionals said that. Regarding the situations in which they used English at their workplaces, they mentioned that the English language is always used in workplaces. They particularly highlighted the importance of listening and speaking with international crew members, reading reports, understanding manuals, and answering reports were the most common responses. Finally, they mentioned they were having problems at their workplaces keeping a conversation.

To sum up, the timeframe and the content addressed in the classroom demonstrate apparent differences, indicating a necessity for an intervention in the curriculum. In addition, reading and writing English skills are highly used in the classroom, and it is possible that other skills (listening and speaking) are being neglected: Aviation schools should incorporate them

into their curriculum as well. Thus, there is an apparent gap between what is being taught and what is needed, both technically and conversationally.

Chapter 5. Discussion

This chapter aims to answer the research questions established to conduct this research work by analyzing the results obtained from the data collected. As stated, this study attempts to analyze which factors indicate the possible need for adjusting or standardizing English language learning for AMTs in Colombia.

Perspectives of English Programs for AMTs

The first sub-question considers the different actors' perspectives on English language programs for AMTs and whether these perceptions suggest a need to adjust or standardize an English curriculum. The significant findings in this study were the information provided by students, teachers, and professionals.

On the one hand, students consider that the central role of English in their career is understanding maintenance manuals since they believe English is the language of aviation. Concerning language skills usage in class, they reported that the most frequent English skills were technical vocabulary and reading. Not less importantly, learning technical vocabulary is what they like the most in their English classes.

Conversely, language teachers mainly emphasized reading, writing, and technical vocabulary. This concurs with what some authors have mentioned about the usage of the reading skill, the most important for aviation maintenance personnel (Niamsuwan, 2017; Terenzi, 2014; Terenzi & Augusto-Navarro, 2018), and is used in class to offset Drury et al.'s findings that Colombian AMTs experience problems were interpreting manuals (2005). However, a disparity exists regarding which skills should be emphasized in classrooms since writing is considered the second most crucial skill that AMTs need at their workplaces (Trenzi, 2014).

Additionally, students considered that the methodology might be improved, indicating that teachers do not have a practical roadmap to achieve the language learning outcomes proposed to the group of AMTs students. This methodological limitation could be solved by reflecting on the contextual needs and selecting more responsive teaching approaches coinciding with part of a series of steps framed within an all-inclusive curriculum development process (Richards, 2001).

Selecting a teaching approach as a curricular element is essential because it will prioritize teaching certain aspects of language, skills, and competencies. Similar to what Christison and Murray (2014) mentioned that some teaching approaches and curricular arrangements would prioritize teaching grammatical features, while others focus on the language of the subject matter. These AMT students could benefit significantly from an approach centered around the language demands they need to embrace to perform maintenance tasks effectively at their future workplace.

An alternative to aligning the curriculum elements with maintenance aviation scenarios is done through an (EOP) framework. It is based on developing two important analyses: Organizational Need Assessment (ONA) and Instructional Need Assessment (INA). This process customizes a high-quality English curriculum (Lomperis, 2020) within the specific characteristics of the aviation context. It is essential to help improve students' writing skills, professional use, confidence, learning outcomes, and language learning to communicate more effectively in work-related settings proving the effectiveness of implementing an EOP approach (Kim, 2008; Xie, 2016). In the case of the aviation schools in Colombia, there is no evidence of any study reporting any customization formula.

Professionals reported that English is always used at their workplaces, and reading and technical vocabulary were the skills that they used the most. This previous finding corroborates Niamsuwan's (2017) information, which states that reading is the most important English skill when professionals perform maintenance tasks. However, technical vocabulary should not be ignored. Improving reading skills also plays a crucial role in aviation in Colombia (Drury et al., 2005); nevertheless, other English language skills need review considering the scenarios in which the AMTs are involved.

Additionally, professionals reported the need for listening skills while interacting with international crew members and reading maintenance tasks coinciding with Pawinee (2018), who mentions listening skills as the most relevant language ability for professionals to develop successfully. Similarly, AMTs use the ability to speak when they receive international crew members, understand manual instructions, and use writing skills to elicit and answer reports.

Lastly, professionals have experienced problems with using the English language to keep a conversation, some unknown words, and during the interpretation of the manuals. Improving productive skills (e.g., speaking), like Xie (2016), is critical to improving workplace communication development through EOP courses. Notably, speaking and listening are relevant skills that cannot be ignored, considering their importance in dealing with communicative scenarios with international crews. Finally, these skills can also help AMTs grow professionally, having better opportunities to take courses abroad and get promotions.

Analysis of AMT English Language Programs

The second sub-question regarded English language programs for AMTs and if there are any indications for adjusting or standardizing an English curriculum. The matrix analysis showed marked differences among the aviation programs regarding timeframes and knowledge of

language levels. These variations have significant implications in language teaching since some language teachers and students also perceive that the number of hours is insufficient to achieve the course aims. In contrast, some language teachers do not know what the student's language level will be at the end of the courses, as it is not explicitly mentioned in the curricular documents.

Traditionally, in the ELT context, language institutes or schools offer students courses with a similar number of hours depending on the level students are intended to achieve. Even more, students take placement tests that determine the sequence of courses to guarantee the achievement of the language learning outcomes. The Common European Framework (CEFR) suggests the number of hours necessary per each level (Council of Europe, 2018). This timeframe and language levels can be used as a reference point to be included in the language curricular documents for aviation technicians. However, this action is challenging since aviation maintenance manuals contain about 100 chapters and roughly 34,000 pages (Terenzi, 2021), indicating the importance of future adjustments because language aviation programs may require more or less time depending on the specific needs. More proof of the need for these adjustments is evidenced by the language teachers who reported that they did not have an established curriculum provided by the vocational institution.

Furthermore, it is believed that aviation vocational institutions must follow the guidelines proposed by the Aerocivil (RAC 147). However, the entity does not suggest any aviation-specific content or the number of hours teaching English to AMT students. In terms of general language qualifications, AMTs trainees must demonstrate good knowledge of reading and interpretation of the English language. There are no clear criteria to define the number of English

levels or hours for each level, which shows an apparent disconnection between what to teach and the time that should be devoted to carrying out the courses of English for AMTs.

Chapter 6. Conclusions

The current chapter contains the conclusions reached after developing this case study to explore existing factors for adjusting or standardizing an English curriculum addressed to AMTs in Colombia. It also presents some limitations and suggestions for future research.

The findings of this study answered the main research question and contributed with essential data that serves as a point of departure to explore possibilities for how English for AMTs should be taught and learned by customizing curriculum. Such a shift would positively impact the aviation field. In addition, it could help mitigate potential language errors (i.e., understanding maintenance tasks, reporting discrepancies, and communicating) that might trigger an incident or accident. Such a change can also reduce the time-consumption phenomenon when an AMT performs maintenance tasks that demand a certain degree of effectiveness.

Moreover, inconsistencies in the number of hours and content devoted to teaching English to AMTs students were evidenced in the information collected in a matrix about aviation programs of different vocational schools in Colombia. Students and language teachers considered that hourly intensity was not enough to teach English aviation classes according to the questionnaires they answered. Thus, the time frame and gradation content need to be adjusted, contributing to better English curriculum development for AMTs students.

Regarding teaching English skills, Chapter 65 of the RAC says applicants must know the Spanish language in terms of linguistic competence and technical English knowledge to process an AMT license. The latter requirement does not provide a specific linguistic range to teach the different English language skills in an aviation class. In addition, in chapter 147, aviation schools, in their approved MIP, have to establish a method to demonstrate that students have a

good knowledge of reading and interpreting the English language. The linguistic guideline only proposes using reading skills, which restricts the use of other English language skills. Therefore, this case study provided timely and relevant information suggesting the consideration of a customized and standardized AMT English curriculum.

Implications for Teaching

The findings of this case study pointed out the importance of customizing the English curriculum for AMT students. The research results should be presented and channeled through the aviation authority in Colombia (Aerocivil) to help establish new linguistic guidelines for all aviation schools that offer maintenance programs. Another implication is related to the necessity of working on students' productive skills (speaking) by the teachers in order to promote better communication in English. Therefore, language teachers for AMTs should plan their classes to address receptive and productive skills.

Limitations of the study

This study was conducted since the beginning of the global pandemic. Those circumstances could have influenced certain aspects of the data collection process, especially in the lack of access to other curricular documents of different aviation programs. Another limitation was the data collected from language teachers, students, and professionals because these are the perspectives of these individuals and cannot be generalized.

Suggestions for Further Research

Bearing in mind the findings of this research, professionals, and teachers in the Colombian AMT field should continue investigating ways to customize the English language curriculum. Document analyses of different curriculums are suggested. Also, further study of developing an ONA and INA in collaboration with the people involved in the aviation field.

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Appendices

Appendix A: Questionnaire for Students

Estimado encuestado:

Este cuestionario tiene como objetivo investigar los desafíos que enfrentan los estudiantes cuando aprenden inglés. Sus respuestas son muy apreciadas. Tenga en cuenta que al responder a este cuestionario, autoriza el uso de la información recopilada. La información se utilizará de forma confidencial únicamente con fines de investigación.

1. Cuál es tu edad
 - a. 16 años a 20 años
 - b. 21 años a 25 años
 - c. 26 años a 30 años
 - d. mayores de 31 años
2. Cuál es tu género
 - a. masculino
 - b. femenino
3. Porque quieres ser técnico de aviación
4. Describe brevemente las habilidades que necesites para desempeñarte
5. Qué rol tiene el inglés para desempeñarse efectivamente en tu futuro lugar de trabajo
6. Qué te gusta de tus clases de inglés de aviación
7. Qué cambiarías de tus clases de inglés de aviación

Appendix B: Semi-Structured Interview for Language Teachers

This questionnaire investigates teachers' challenges when teaching English for Specific Purposes (ESP) at a vocational institution. Your responses are highly appreciated. Please note that by responding to this questionnaire, you authorize the use of the information collected, and information will be used confidentially for research purposes only.

1. What is your gender?
 - a. Male
 - b. Female

2. What is your level of schooling?

3. In which aviation institute did you currently serve?

4. How long have you worked as an English teacher in the aeronautical technician program?
 - a. 1 to 3 years
 - b. 3 to 6 years
 - c. 5 years
 - d. 7 to 10 years
 - e. 11 to 20 years
 - f. More than 20 years

5. What is your level of English?

Skills				
Nivel	<i>Reading</i>	<i>Writing</i>	<i>Speaking</i>	<i>Listening</i>
<i>C2</i>				
<i>C1</i>				

<i>B2</i>				
<i>B1</i>				
<i>A2</i>				
<i>A1</i>				
<i>No se</i>				

6. What preparation have you received to teach English for specific content in your institution? (Explain briefly)

7. Do you have enough aviation-related knowledge to teach English to aviation technicians?

a. Yes

b. No

Explain your answer:

8. How often (6, Always; 5, Almost always; 4, Frequently; 3, Sometimes; 2, Rarely; 1, Never) do you emphasize the following English language skills in your classes? Briefly explain why?

	<i>6</i>	<i>5</i>	<i>4</i>	<i>3</i>	<i>2</i>	<i>1</i>
Skills						
Listening						
Speaking						

Reading						
Writing						
General vocabulary						
Technical vocabulary						
Grammar						

9. What materials do you use to teach the English class to aviation technicians?

10. Describe a typical aviation English class for technicians.

11. Is your English curriculum pre-established by your institution?

a. Yes

b. No

12. If your answer is Yes to the previous question, what curriculum are you using.

13. If your answer is No to the previous question, what is the basis for teaching English to aviation technicians.

14. Do you consider that what you teach aviation technicians is appropriate for them to perform better in their workplace?

a. Yes

b. No

Why?

15. What would you change to the curriculum you use to teach English to aviation technicians?

Appendix C: Questionnaire for Professionals

1. En qué ciudad labora actualmente.
2. Cuántos años lleva trabajando en el campo aeronáutico como técnico de aviación.
 - a. 11 a 20 años
 - b. Más de 20 años
 - c. 3 a 6 años
 - d. 7 a 10 años
 - e. 1 a 3 años
3. Con qué regularidad usa el idioma inglés en su lugar de trabajo
 - a. Siempre
 - b. Con frecuencia
 - c. Casi siempre
 - d. En ocasiones
4. Teniendo en cuenta la pregunta No.3, explique brevemente en que situaciones usa la habilidad de la escucha.
5. Con qué frecuencia utilizas las siguientes habilidades durante tu desempeño laboral.
 - a. Siempre
 - b. Casi siempre
 - c. Con frecuencia
 - d. En ocasiones
 - f. Casi nunca
 - g. Nunca

6. Teniendo en cuenta la pregunta No.3, explique brevemente en qué situaciones usa la habilidad del habla.
7. Teniendo en cuenta la pregunta No.3, explique brevemente en qué situaciones usa la habilidad de la lectura.
8. Teniendo en cuenta la pregunta No.3, explique brevemente en qué situaciones usa la habilidad de la escritura.
9. Ha experimentado problemas con el uso del idioma del inglés en su lugar de trabajo