

The Proceedings of the International Civil Aviation English Association (2019) Conference

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Presenter Information

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EXPLORING THE AVIATION ENGLISH TRAINING NEEDS OF:

*Ab-initio Pilots and Air Traffic
Controllers, and Aircraft
Maintenance Personnel*

The Proceedings of the International Civil Aviation
English Association (2019) Conference

Hosted by All Nippon Airways (ANA)

Compiled by Embry-Riddle Aeronautical University



Jennifer Roberts (ed.)

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Preface

Hosted by All Nippon Airways (ANA) in Chiba, Tokyo, Japan, the 2019 International Civil Aviation English Association (ICAEA)¹ annual conference focused on exploring the aviation English training needs of ab-initio pilots and air traffic controllers, as well as aircraft maintenance personnel.

Globally, much of the demand for new pilots and air traffic controllers is located in areas of world for which English is not a first or national language. Exploring this resulting need to train non-native English speaking personnel was a primary focus of the 2019 ICAEA conference, including consideration of the language proficiency required for success in initial training, test design and implementation, instructional techniques, and the actual language used by this target population.

Further, although the International Civil Aviation Organization (ICAO) Language Proficiency Requirements (LPRs) do not directly apply to maintenance personnel, the widespread use of English in the international aviation maintenance industry necessitates language-training solutions. For the first time, the ICAEA conference included a specific track for presenters to share their knowledge and experience related to training aircraft maintenance personnel which, until now, has been an underrepresented and underdeveloped area of aviation English.

The conference featured plenary presentations, Q&A panels, and practical workshops. More than 100 participants from over 35 countries attended ICAEA's first event in Asia in seven years. Attendees included representatives from airlines, flight training organizations (FTOs), air navigation service providers (ANSPs), civil aviation authorities (CAAs), universities, and training and testing providers from all over the world.

These proceedings feature six articles written by seven of the presenters, summarizing their practical experiences and research findings which were shared at the conference. This publication is recommended to anyone interested in aeronautical communication. The accompanying presentation materials, as well as shorter summaries of other presentations and workshops, can be found on Embry-Riddle Aeronautical University's Scholarly Commons page².

¹ The International Civil Aviation English Association (ICAEA) is a non-profit, non-partisan association that exists to:

- facilitate exchanges between people and organisations involved in the use of English in aviation,
- raise awareness of language proficiency and its effect on aviation safety, service quality and industry efficiency,
- develop expertise about the use, training and testing of English in all aviation professions,
- promote the sharing of expertise and cooperation between professions, industry and training organisations.

To learn more about ICAEA, visit <https://www.icaea.aero/>.

² Embry-Riddle's Scholarly Commons page for ICAEA 2019: <https://commons.erau.edu/icaea-workshop/2019/>

Romeo, Tango, Foxtrot: A Task-Based Approach to Meeting the Diverse Training Needs of Pilot and Air Traffic Control Trainees

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Abstract

The needs of language learners can vary widely. In our case, cultural factors of pilot trainees in Japan, and language requirements for simulator training for air traffic controllers in the UAE underpin our course design. Yet, the approach we take to meeting these needs is similar and based on task-based language teaching. This paper summarises our conference presentation and outlines why this task-based approach is an effective tool in teaching aviation phraseology or radiotelephony (RTF) to our students. It examines the structure of a task-based lesson, the cognitive processes the method addresses and task sequencing. Justification for teaching RTF as a separate subject to maximise learning is established in two parts: by examining simulator training from a cognitive load perspective; and a brief look at the effect of workload on language production. Finally, we answer the criticism that RTF should be the domain of air traffic control and pilot instructors only.

Introduction

We believe that effective learning is achieved in classrooms where trainees are engaged and interested. To achieve this, instructors need to be creative with their lesson planning and design instruction that is student-centred. In other words, the trainee does most of the work while the instructor is a facilitator to their learning. Like many language instructors, we shy away from power point presentations which deliver material to a passive audience of learners

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⁴ Michael Kelly entered Japan Airlines as an aviation English instructor for the Flight Crew Training Department in June, 1987. In 2006, he was assigned as a committee member to assist in developing the testing and evaluation system for the ICAO English Language Proficiency Test in Japan. Since September, 2010, Mr. Kelly has been teaching in the Flight Operations program at Oberlin University in Tokyo, Japan. He is a licensed FAA / JCAB private pilot and is designated by the Radio Institute of Japan to teach the Radio Aeronautical Operator course for foreign pilots.

whose only job is to listen. While this aversion is the norm for language instruction, it is, unfortunately, not always the norm for aviation training. However, many of the techniques used by language instructors could be employed in all aviation classrooms.

We had the privilege of presenting our ideas at the 2019 International Civil Aviation English Association (ICAEA) Conference in Tokyo. At the conference, Michael presented activities he uses to encourage pilot trainees to speak up. Jenny then presented a simplified excerpt from a task-based language learning unit designed to teach air traffic controllers the mechanics of ICAO mandated phraseology. The presentation concluded with an activity from Michael which looked at how he uses radios to mimic what trainees will do on the job. While the needs of our students differ (culture vs a progression to simulator training), the techniques for training we advocate are similar.

This paper begins with a discussion of the task-based techniques Michael uses with his pilot trainees which help to overcome aspects of Japanese culture that would impede their success as pilots. He also briefly discusses how this relates to the ICAO language proficiency requirements. Then, Jenny outlines the task-based language lesson used for air traffic control trainees presented at the conference and the theoretical underpinnings of the techniques used. The air traffic control training precedes simulator training and a justification is given for teaching aviation phraseology before this training begins to clarify why we think this language should be explicitly taught.

In our presentation, we focused on the importance of teaching the ICAO mandated language pilots and air traffic controllers use to communicate. It is referred to in this paper as radiotelephony (RTF) or aviation phraseology. At the conference, it was suggested that aviation English teachers should not teach this language as it should be the domain of air traffic control and pilot instructors only. The final part of this paper is a response to that criticism.

Teaching RTF to Pilots

The J. F. Oberlin University (JFOU) Flight Operations program at Oberlin University in Tokyo, Japan is a four-year program designed for students who want to pursue a career as a commercial airline pilot. The first three semesters (1 ½ years) are spent in Japan to prepare for flight training at our designated training center in the United States. Most students are Japanese and have just recently graduated from high school. All students are non-native English speakers, have no aviation training and are required to have a minimum TOEIC score of 650 to continue on to the flight training stage of our program.

Ab-initio Aviation English Training

In developing an effective pilot aviation English training program, it is difficult to balance the aviation English training needs with the time constraints imposed on the training program. The aviation English courses that have been developed in the JFOU program are task-oriented and content-based to allow students to focus primarily on the English skills required for flight training. The basic areas of aviation English study can be divided into ground operations, flight operations and technical operations and include practical topics such as chart reading, flight planning and weather briefing.

Another important area of the aviation English program is the RTF communication skills course. RTF communication should be the centerpiece of any ab-initio aviation English program because it is the communication between the pilot and the controller that requires the highest level of accuracy and proficiency.

Cultural Characteristics and RTF Communication

Cultural differences also pose problems in introducing aviation English to ab-initio students. In my experience, there are certain Japanese cultural characteristics that fly in the face of being a good pilot. For example, a professional pilot is expected to speak up, ask

questions, check and confirm information that is unclear and challenge authority when needed. At the start of my course, students initially will not speak up in class. A question will not be answered unless a name is attached to it and even then, the answer is usually just a one-word response. Not only do students lack the confidence to speak English, but they are doing exactly what their culture has taught them to do and that is sit quietly and listen to the teacher. Therefore, the initial task is to get the students to break out of their cultural shell and begin acting like pilot trainees.

Workshop Activities

The activities I covered in the presentation were based on the RTF training I do with my pilot students. They are numbered activity 1 and 3 because our presentation consisted of workshop activity 1, then Jenny's lesson on RTF basics and finally, activity 3 which requires students to put the language they've learned into practice. We cherry-picked a selection of activities to demonstrate task-based activities which can be used with students and finished with the radio practice which is fun for the students, but is also an excellent way to assimilate a series of lessons in aviation phraseology.

Workshop activity 1 (ATIS).

One of the first task-oriented / content-based activities that I use to help my students "speak up" and practise the pilot communication skills mentioned above ("speak-up", "exchange information" and "check & confirm uncertain information") is to copy and readout the Automatic Terminal Information Service (ATIS) bulletin. ATIS is a weather service that is broadcast on the radio for pilots. It is usually less than one minute long and contains information about the airport, weather, runways and notices to airmen. The format is very easy to learn and students learn it quickly. In this exercise, students listen and copy the ATIS. The instructor will then prompt the students to read back the information. For example:

TEACHER: Wind
STUDENTS: 1-8-0 at 1-2 knots
TEACHER: Visibility
STUDENTS: 1-0 miles

Students quickly gain confidence and can soon copy and readback the information when requested by the teacher. Interaction and fluency are soon developed while vocabulary, comprehension and pronunciation can be checked and corrected when needed. Students can also be prompted to challenge authority by having the teacher give incorrect information. For example, saying that the wind is 4-8-0 at 1-0 knots. In this way students are challenged to speak up and confirm the incorrect information from the speaker. After some practice, mistakes can be made less obvious to further challenge and encourage students to continuously monitor information and speak up when there is any doubt or confusion.

Workshop activity 3 (RTF radio work).

RTF radio work is another excellent task-oriented, content-based activity that helps Japanese students overcome their cultural differences and develop the type of pilot skills required for effective communication. In these exercises, students are taught to role-play actual RTF communication. Step by step (see below for how some of these steps can be covered), they learn the ground procedure, departure procedures and arrival procedures at their training airport. Students begin to understand the importance of timely and accurate responses to ensure a smooth interaction between the pilot and the controller. Under guidance of the aviation English teacher, the students' fluency, comprehension, pronunciation and especially interaction begin to improve. When ready, RTF role-play can begin with students sent off to different rooms with radio transmitters to act as pilots. Other students act as controllers while others track the airplanes' movements on a whiteboard. With practice, students can quickly begin to simulate transmissions that are smooth, accurate and timely. Interactions become more and more automated to the point where students begin to question incorrect or uncertain

information, for example, if a pilot is given a take-off clearance when another aircraft is still on the runway. With this radio exercise, students learn to make accurate, timely responses and have the confidence to speak up when something is not clear.

Teaching RTF to Air Traffic Controllers

The conference presentation was taken from a unit designed for trainee air traffic controllers (ATCO's) at a small tertiary training institution in the United Arab Emirates. The students the material is designed for, first complete basic training which qualifies them to work in control towers at local aerodromes (airports), however at this stage they will not talk to pilots. In the workplace, students learn on-the-job about their airfield, the aircraft in it and will have limited duties coordinating with other aerodromes. Eventually, they return to the training centre to study in the simulator to learn to talk to pilots and manage air traffic. This is the first step towards becoming licensed ATCO's. This is also the point at which we introduce them to RTF. After this training, they return to their workplace for on-the-job training which must be completed to the required standard to gain an air traffic control licence.

The unit was originally designed in response to the fact that, in spite of international recognition that correct RTF and phraseology is essential to the safety of the aviation sector, and the complexity of its structure, RTF is rarely taught explicitly and students acquire it on-the-job and in the simulator through trial and error. Aviation phraseology is a technical language with its own set of rules that is different from the language patterns characteristic of spoken English (Campbell-Laird, 2004, 2006; Howard, 2008; Intemann, 2008; Lopez, Condamines, & Josselin-Leray, 2013; Lopez, Condamines, Josselin-Leray, O'Donoghue, & Salmon, 2013). As a consequence, it can take a few extra seconds to process what is heard and respond appropriately, although fluent use can be achieved through practice (Campbell-Laird, 2006).

To address this gap, I designed material to explicitly introduce students to the basic language required for ATC communications. It covers the aviation alphabet; numbers; the structure of an ATC conversation; read-backs; identification of the speakers; and vocabulary for simple, often-used airfield manoeuvres such as giving permission for aircraft to land and take-off. Subject matter experts were consulted throughout the development to ensure the language covered is correct. The material is based on task-based language teaching methods and the conference presentation was a simplified excerpt from the original material.

The conference presentation looked at the structure of an ATC conversation; read-backs; identification of the speakers and some simple vocabulary. It also outlined the stages of a task-based lesson. The original video was replaced with a simpler one in order to showcase more of the task-based teaching method. The presentation covered pre-task activities, the task and focus on form (i.e. grammar and language structure). These are a simplified version of the same stages as those covered in lesson 1 of the original material.

The pre-task activities used at the conference covered four stages as follows:

- Stage 1 – prime for prediction (questions were asked to revise, and get participants thinking about vocabulary which would be used later in the lesson including identifying an aircraft heading, and parts of an aerodrome);
- Stage 2 – prediction task (participants were given an aerodrome map and asked to answer the question, ‘where will the aircraft go?’. They were shown some of the video, but it was silent);
- Stage 3 – preparing to report (participants were asked to write down where they thought the aircraft was going and what they thought the pilots were saying. They were encouraged to discuss this with one or two others at their table);
- Stage 4 – report (participants were asked for their answers to stage 3).

Once the participants had been prepared for the task through these pre-task activities, the task (stage 5 of the lesson) was conducted. This time trainees watched the video again to see if their predictions about where the aircraft would go and the language used were correct. Once

complete, they discussed if their predictions were correct, and were asked to complete a number of questions related to the video. Again, participants were encouraged to work with others at their table and discuss their answers. Questions were asked about the language used:

- What does Deer Valley Ground mean? Deer Valley Tower?
- What is Cessna 75600?

Questions were also asked about the context of the video:

- What taxiway did they use?
- What runway?
- How many controllers were there?

Stage 6 of the lesson asked participants to think about the form of the language. They were given a cut up version of the conversation and asked to re-create it. The conversation was divided into the conversations between the ground controller and pilot; and between the tower controller and pilot. Different coloured paper was used for each speaker to help participants achieve the task (participants were encouraged to identify who each of the speakers were before re-creating the conversation). Once participants identified who was speaking, they then needed to look at the structure of each turn as well as the structure of the conversation in order to determine the correct answer. Once complete, they could check with nearby groups and finally checked their answers by watching the video again.

In the original material, completion of lesson one requires trainees to practice the aviation alphabet and numbers through a series of speaking activities and games. This was not covered at the conference due to time constraints, however slides for this are included in the power point attached to this paper. The next section outlines the theoretical underpinnings for the task-based language teaching approach used for the original material.

Theoretical Justifications

The original unit is comprised of two lessons (four hours training in total) each centred around a video. The first lesson is a video of aircraft taking off from an aerodrome and the second one is of aircraft landing at the same aerodrome. The videos were made in the simulator to give a realistic context to the audio conversation between an ATCO and a pilot. Videos are used to give the audio a 'here and now' focus and therefore simplify students' ability to understand the meaning of what they are hearing (Robinson, 2011, 2015) without reducing the complexity of the input. If students had to rely on an audio input only, it would be more difficult to interpret the meaning of what they hear because each scenario involves more than just landing or departing aircraft i.e. in the first video, an aircraft moves itself into 2nd place in line to take off when it should be 3rd; and in the second video, incorrect RTF by the ATCO results in an incoming aircraft having to go around.

The lesson structure used is provided by D. Willis and Willis (2007) for a task-based lesson. Both lessons begin with a task to prime for prediction, a prediction task, preparation to report and report before they watch the video to interpret its meaning. This is to engage the learners and ensure a real-world focus when they watch the video i.e. students are curious to find out if their ideas or predictions are correct (D. Willis & Willis, 2007; J. Willis, 2009). A vocabulary input is also included at the beginning of lesson 1 to highlight some of the words students will hear and to help ensure they understand what they are watching. These words should be revision from their previous training.

The video task is essentially an input task in that much of the language and the structure of the conversation is provided through listening (and watching) without requiring students to produce the language (Shintani, 2012). At the end of lesson 1, students are required to produce numbers and aviation alphabet and in lesson 2 they produce and practice a conversation including phrases for take-off, landing and weather; but not the more complex language

required to understand each scenario. The focus on form tasks are designed to enable students to notice the peculiarities of the RTF language used. Students are asked questions about how they know if a pilot or an ATCO is speaking, how they know if a pilot has understood an instruction or how an ATCO might identify themselves the first time they speak to a pilot. These questions are designed to focus the students post-task on the forms so that their ‘concern for form is heightened to... avoid error... and to push [learners] to notice something’ (Skehan, 2013, p. 14). This is done because accuracy is an essential component of RTF. This point is further made in the second lesson where the use of incorrect RTF results in a go around. Students must know why RTF is important if they are to practice the language until it is accurate and fluent.

The output required of students is significantly simpler than what is included in the videos. The required output is of items in RTF that students will use for almost every interaction they have throughout their working lives. It makes sense to drill and practice these language items first and gradually build on them to include more complex features of the RTF language for increasingly complex situations (including those encountered in the videos used for these tasks). In spite of the relative simplicity of the final task in lesson 2 (giving permission for a series of aircraft to take-off), students will need to think about the language structure, individual phrases, turn-taking, call signs, sequence of words, pronunciation and aerodrome layout to complete the task. They will also have noticed that RTF is grammatically different to English e.g. an ATCO or pilot says ‘cleared for take-off’ not: ‘you are...’ or ‘I am...’ cleared for take-off. Essentially, the unit sequences the tasks in order of increasing cognitive complexity to ‘promote rethinking for speaking, interlanguage development and automatic performance’ (Romanko & Nakatsugawa, 2010, p. 437) and to ‘gradually approximate the complexity of targeted real world task performances’ (Robinson, 2011, p. 8). Drilling is also used to promote fluency and automatic performance.

Further, students are asked why questions e.g. why does the ATCO ask an aircraft in lesson 1 to vacate the runway? The answer to this question is not given in the video and requires students to make inferences about the ATCO's reason for doing what he/she does. This is what Robinson (2011) refers to as intentional reasoning. These why questions increase the complexity of the task and should promote longer term retention of learning (Robinson, 2011). This complexity is achieved in the input tasks, but the output is closer to the SSARC model (Simplify-Stabilise, Automate, Restructure-Complexify) i.e. the output from both lessons is significantly simpler than the input (simplify-stabilise), work is done to automate through drilling, pair practice and games, then restructured and complexified resulting in pushed output (to ultimately engage students in an ATCO/pilot conversation which is simple in terms of phraseology but requires all the elements of an RTF exchange mentioned above) (Reed, 2005; Robinson, 2015; Romanko & Nakatsugawa, 2010). Finally, students are given opportunities to plan their output at various stages in the lesson as this generally results in better overall performance (Foster & Skehan, 1999; Skehan, 2003).

The unit in its entirety satisfies the requirements of task-based language teaching as laid out by Ellis (2009). These are that: 1. The primary focus should be on meaning (students must identify what they are seeing and hearing); 2. There should be some kind of gap (e.g. students must say why the ATCO directs an aircraft to leave the runway); 3. Learners should rely on their own resources (the activities in this unit are designed to be student-centred and students must complete their tasks with minimal input from the teacher); and 4. The outcome is to direct aircraft to land i.e. it is not a language outcome. In addition, the fact that learners rely on their own resources gives opportunities for them to help each other and to re-construct and prompt one another to complete the task (Foster & Ohta, 2005) e.g. when students must re-construct the conversation in lesson 1 using a series of cards which include the phrases used by the ATCO and pilot.

Cognitive Load Theory, Workload and Simulator Training

As previously discussed, our trainees will progress from language training to simulator training which is an essential part of pilot and ATCO training. Air traffic control students learn how to manage traffic (aircraft) on the ground and in the air in a simulator. This requires them to communicate with pilots at the same time as they make decisions about traffic movement. Pilots learn to fly in a simulator, and must also communicate with controllers from the cockpit. This section uses air traffic control training as an example of how cognitive load theory can be applied to show that training in aviation phraseology and RTF as outlined above is beneficial to trainees.

Cognitive load theory is a relatively complex theory which can be “used to investigate several instructional techniques. The theory suggests that instructional techniques that require students to engage in activities that are not directed at schema acquisition and automation, frequently assume a processing capacity greater than our limits and so are likely to be defective” (Sweller, 1994, p. 299). That is, when students learn new information, they use what is known as working memory which says that a person can process 5 to 9 pieces of new information at a time (Thurman, 1993). If the process of learning is successful, then with practice, this new information enters the long-term memory and becomes automatic (Sweller, 1994, 2016; Thurman, 1993). Automatisation means the student no longer needs to think about how to complete the task and they can do it without conscious effort, that is, without engaging their working memory (Sweller, 1994, 2016; Thurman, 1993). Since this is the case, working memory can be devoted to processing other information or decisions. However, if instruction is given too quickly or overloads the working memory, then it may take longer to learn and therefore, difficulty in a simulated task should only be increased when the current task is “well on its way to being automatised” (Thurman, 1993, p. 84). Since learning requires the use of working memory, it is important to structure it in such a way that working memory is not

overloaded.

Another aspect of cognitive load theory is that the aim is to learn (and automatise) schema which is essentially a body of knowledge. Schema are made up of elements and depending on the complexity of the schema, these elements may interact and therefore need to be learned together or if interactivity is low, can be learned separately (Sweller, 1994, 2016). The implication of this, for instruction, is that tasks must be broken down as much as possible and each part taught separately; and that automaticity must be achieved before the next skill is learned.

Cognitive load theory can be applied to air traffic control (ATC) training. A simulator is used to replicate the workplace of an air traffic controller and students are taught to direct traffic. In terms of schema, there are two overarching schemata to be learned – air traffic management i.e. the decisions about what aircraft will do e.g. when will they be allowed to land or take-off? Which runway will be used? What taxiways will be used? What heading will aircraft fly on departure? Even for routine tasks an air traffic controller must have a 4 dimensional “view” of the location of traffic in the present and make predictions about traffic movements in the future; and respond to that “picture” with appropriate decisions. The second overarching schema is aviation English which can be further divided into phraseology and plain English. Currently, two of these schemata (ATC and phraseology) are learned simultaneously in the simulator. According to cognitive load theory, this is likely to cause an ‘attentional split’ (Sweller, 1994, 2016) between making good ATC decisions and using the correct language to direct aircraft to carry out those decisions. That is, learners will direct their limited attentional capacity (limited because of working memory) to one or other of these schemata and the result is likely to be that learning is slowed or does not occur (Sweller, 1994, 2016; Thurman, 1993).

In fact, for second language learners especially, phraseology or RTF is a complex schema which could be learned separately. As previously stated, RTF is not a natural language

and has its own abbreviations, syntax and lexicon (Campbell-Laird, 2006; Intemann, 2008; Rees, 2013) which take time to learn and automatise. This suggests that the concurrent teaching of air traffic control tasks and phraseology is likely to overload the working memory and slow down the learning process – especially for second language learners.

This is supported by research which shows that workload affects trainees’ ability to produce language and this effect is more pronounced for NNES according to ability (Declerck & Kormos, 2015; Farris, Trofimovich, Segalowitz, & Gatbonton, 2008). This research lends weight to the benefit of automatizing language for the simulator prior to training to carry out pilot or air traffic control tasks. In addition, the research shows that trainees’ ability to simultaneously manage workload and communication is significantly affected by language level (Declerck & Kormos, 2015; Farris et al., 2008). Language proficiency has been discussed at length elsewhere, but there are obvious implications from these findings for recruitment or provision of general language training to a level advanced enough that automatization of language for the simulator is beneficial. As Farris et al. (2008, p. 407) state “low-proficiency speakers ... appear to have greater difficulty than high-proficiency speakers in using their [NNES] perception and production skills in an efficient, automatic manner”. Essentially this research appears to support the tenets of cognitive load theory and it also recommends that tasks should be sequenced from simple to complex to reduce the cognitive load for the learner (Farris et al., 2008). For our pilot and ATCO trainees, the implication is that they must have a good level of general English before any of the techniques for learning RTF discussed here are useful.

Criticisms

Finally, during the conference, we were asked if it is appropriate for English teachers to teach RTF and aviation phraseology to pilot and air traffic control trainees. This is a question that was raised a number of times. We believe that English language teachers should be

involved with this training with the caveat that they work closely with subject matter experts to ensure that the language taught is correct and to provide trainees with appropriate context and tasks for that language. The combination of subject matter experts and English language teachers is a good one because trainees benefit from student-centred language training using such techniques as the task-based language teaching (TBLT) outlined in this paper, which keeps them engaged and maximises learning. They are also taught language which is accurate and mandatory for successful communication in the aviation field through the knowledge and expertise of a pilot or air traffic control instructor. We do not advocate that aviation English instructors teach RTF in isolation without the input of experts.

Conclusion

The learning needs of our students differ. In the case of the Japanese pilot students, cultural factors can interfere with good (professional) pilot characteristics such as timely responses, speaking up, asking questions and challenging authority. Conversely, the air traffic control students require language preparation prior to simulator training in air traffic control tasks. In spite of these vastly different needs, we find that task-based language teaching (TBLT) is a useful way to meet those needs. Our presentation covered a number of tasks we use in the classroom including ATIS, conversations between pilots and air traffic controllers over the radio, and a taxi-takeoff sequence to get students using aviation phraseology.

TBLT works because it is based on real-world tasks that students are likely to encounter, addresses gaps in their learning, requires trainees to rely on their own resources and results in a non-language outcome, (though, in the case of RTF, requires accurate output). Learning is enhanced by these factors, but trainees are also required to notice how the language is constructed and plan their answers, which further benefits their learning. In addition, tasks are sequenced from simple tasks to more complex to aid learning and to build automaticity of language in a step by step fashion. For the Japanese students, tasks are sequenced from ground-

oriented tasks to flight communication as this seems to be the most logical for student understanding.

In many ways, the sequencing process used to teach language is similar to that used in the simulator, but tasks there are sequenced according to difficulty of air traffic control decisions. Language is not considered in this sequencing. Therefore, two different schemata are taught in the simulator and this can cause ‘attentional split’ if neither of these schemata is automatised. We advocate the use of TBLT to automatise the language for the simulator and reduce the cognitive load for students trying to learn air traffic control or piloting tasks and decision-making.

This paper briefly discussed the interaction between workload, language level and language output in which low level students struggle to produce language. This reinforces the language proficiency requirements discussed elsewhere and suggests that these students require a certain general English level before any of the training discussed here is effective. For aviation phraseology, instructors can monitor trainees for such factors as fluency, comprehension, pronunciation and interaction as is done with the Japanese pilots while they practise communication with air traffic control on the radio during ‘ground operations’ or ‘flying’.

Finally, the real strength of this approach is the combination of subject matter expert (SME) knowledge and language or education instructor expertise to create a product which enhances student learning. We believe that this combination results in more effective language training and better outcomes in the simulator and during flight training.

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Aviation English Training for Native English Speakers: Challenges and Suggestions

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Abstract

While non-native English Speakers (NNES) are trained in aviation communication and they must attain a certain English proficiency level before being awarded an aeronautical licence, native English speakers (NES) are not in practice subject to the same requirements. This paper discusses some of the issues posed by NES not following the standard aviation phraseology and examines the English Language Proficiency and radiotelephony requirements for NES in English speaking countries. The recommendations of ICAO (2010) concerning the responsibilities of NES are rarely implemented. Practical suggestions for the training of NES were made by participants of the 2018 ICAEA workshop and are augmented with suggestions coming from flight training experience. The main recommendation is for mandatory training and testing of aviation phraseology and communication procedures for NES pilots and Air Traffic Controllers. Training should include language awareness and testing should include understanding of NNES transmissions and production of transmissions intelligible by NNES.

Introduction

This paper discusses an issue in aviation communication which arose from research combining linguistics and aeronautical experience. The starting point was the question of what makes Aviation English a code distinct from general English. Beyond the practical issue of identifying what makes it difficult for student pilots when they learn radio communication, is the question of how language background, pilot training and contextual factors affect the ability of pilots to follow the mandated phraseology. Communication difficulties or even

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communication breakdowns are known to occur whether the pilots or ATCs are native or non-native speakers of English but the onus is more often placed on the non-native English speakers (NNES) to attain English proficiency than on native English speakers (NES) to demonstrate adequate aviation communication competence. When we are presented with figures predicting growing numbers of NNES in aviation over the next 20 or 30 years,⁶ the obvious conclusions are that more teaching of Aviation English for NNES is needed and that this teaching must include inter-cultural communication training. But what about the NES who will be making a smaller proportion of the aviation world? What training do they need? The reality is that NNES already speak more than one language and actually already know how to do inter-cultural communication, but that most NES are monolinguals. Is the request that NNES undergo inter-cultural communication training a way of suggesting they should learn to communicate with NES? Maybe NES should learn to communicate with NNES.

The workshop at the 2018 ICAEA conference where participants discussed the question “What should we teach Native English Speakers?” produced detailed answers and recommendations about the issue of inadequate communication from NES (Estival, 2018). This led to an examination of the English Language Proficiency and radiotelephony requirements for NES in English speaking countries, which confirmed the lack of rigorous testing for NES that had been suggested by anecdotal evidence.

The Problem

Most studies of difficulties in aviation communication focus either on the supposed danger posed by NNES or on the interaction between communication and other human factors (fatigue, workload, noise, etc.). However, there is enough evidence that NES pilots and ATCs contribute to communication problems by not following the ICAO phraseology or, more

⁶ <https://www.boeing.com/commercial/market/pilot-technician-outlook/>

worryingly, procedures. In addition to evidence from the literature (Kim & Elder, 2009; Kim, 2012; Bieswanger, 2013; Borowska, 2017; Clark, 2017), there is evidence from government or regulator reports (e.g., EUROCONTROL, 2006a; EUROCONTROL, 2006b), from the ICAO recommendations (ICAO, 2010) and more recently from the answers to the questionnaire from the ICAEA 2018 workshop (Estival, 2018).

In her study of air-ground communication in South Korea, Kim (2012) was able to show that communication breakdowns are often caused by NES not adhering to standard aeronautical communication conventions, rather than by NNEs' lack of language proficiency. Bieswanger (2013, p. 22) stressed that "an increased language awareness of native speakers of English is a prerequisite for effective and efficient communications, as is the implementation of proficiency standards for non-native speakers" but that in "many countries of the inner circle of Englishes, the effective use of English in aviation contexts is taken for granted." Borowska (2017, p. 177) points out that "native speakers of English still tend to use the colloquial meaning of terms in their language production, thus causing problems for non-native English personnel". In CAP 1375, her report for the UK aviation regulator CAA, Clark (2017) identified as issues with NES pilots and ATC "Deviation from standard phraseology" and "Not adhering to ICAO number pronunciation". From these observations and her detailed investigation, Clark (2017, p. 32) made the following recommendations:

- Native English speakers should think of English in the flight deck or over the radio as not English as they know it, but instead as a different 'language'.
- On-going language awareness training should be implemented.
- Language awareness training should emphasise the elimination of local slang and non-standard phraseology.
- Language awareness training should incorporate awareness of non-native English listeners in training.

The recommendations in (Clark, 2017) augment and emphasize those made by ICAO in Doc 9835 (ICAO, 2010). Indeed, as pointed out by Estival (2018), “ICAO has long identified as a potential problem for aviation communication the fact that, given the use of English as the international language of aviation, Native English Speakers not only have a perceived advantage over speakers from other linguistic backgrounds but may also have a different approach to aeronautical communication, taking it as licence to use conversational English instead when it is not appropriate.” Before going into the details of the ICAO recommendations and guidelines for NES (see also Bieswanger (2013) and Borowska (2017)) the next section provides a few examples of communication problems solely due to non-standard usage by NES.

Anecdotal Evidence

The following three examples were observed during General Aviation (GA) operations in Australia.⁷ In those instances, NES cause communication problems – and potentially delays or even incidents – by not using standard phraseology.

In example (1), observed by the author (the instructor in the right-hand seat) in January 2018, the aircraft ABC was on a Private Pilot Licence training navigation flight from Camden (NSW, Australia) to Canberra (ACT, Australia). The summer heat was causing rough thermals and turbulence and the student pilot found it difficult to maintain the assigned altitude. Canberra is Class C airspace, with procedures which student pilots find daunting and with ATC who can be intimidating. On that day however ATC sounded friendly. She only hinted at the altitude problem by asking whether the pilot had the correct altimeter setting. Nevertheless, that confused the student who was already overloaded trying to aviate and navigate, let alone communicate. ATC could not understand his answers when he used “*Yes*” and “*Affirmative*”

⁷ The pilots and ATCs in examples (1), (2) and (3) were all NES, except for the instructor on board ABC (the author) in (1). The aircraft call signs have been de-identified and the problematic transmissions are given in bold.

instead of the expected “*Affirm*”, so the instructor had to take over and make the required transmission.

(1) Aircraft ABC, on a navigation training flight to Canberra

ATC: *ABC, squawk 0435. Remain outside controlled airspace. Maintain 5500.*

Student: *Squawk 0435. Outside controlled airspace. Maintain 5500. ABC.*

ATC: *ABC. Identified. Direct to the field. Maintain 5500.*

Do you have information Charlie? QNH 1013.

[Student to instructor: “*What was that?*”]

[Instructor to student: “*Tell her we do have the QNH. You need to maintain 5500.*”]

Student: *Yes, we have the QNH.*

ATC: *Say again, ABC.*

[Instructor to student: “*AFFIRM, you should say AFFIRM.*”]

Student: *Affirmative.*

ATC: *(Pause) ABC, say again. I didn’t quite get that last transmission?*

Instructor: *Affirm, QNH 1013. ABC.*

(Observed, January 2018)

The flight could then proceed to Canberra, where the student was given a refresher about phraseology.⁸

Example (2) was provided by a student during a lecture at the School of Aviation at the University of New South Wales. Now an airline pilot, he had been on an IFR training flight from the Gold Coast (QLD, Australia) to Sydney (NSW, Australia) when he misunderstood the ATC instruction from Brisbane Approach “*Best rate to 80*” as “*Best rate 280*”. This is a classic problem: the preposition “*to*” should not be used with numbers because it is confusable

⁸ Although US pilots are often heard to use “*Affirmative*”, its confusability with “*Negative*” makes it unsuitable and potentially (as here) unintelligible.

with “two” (Cushing, 1994). Acceptable phraseology from ATC would have been “*Best rate to Flight level 80*”. Although the pilot was not completely certain (hence the pause), he did not question the clearance and Brisbane Approach did not correct his readback. Brisbane Centre then questioned his altitude and amended the clearance to a more practical level.

(2) Aircraft XYZ, on an IFR flight from the Gold Coast to Sydney

Pilot: *XYZ. Passing 1500. Climbing 6000.*

Brisbane Approach: *XYZ. Identified. Cancel speed. Best rate to 80.*

Pilot: **(Pause)** *Flight level 280. Cancel speed. XYZ.*

[... changed frequencies, now on Brisbane Centre]

Pilot: *XYZ. Climbing Flight level 280.*

Brisbane Centre: *XYZ. Confirm level.*

Pilot: *280.*

Brisbane Centre: *Climb amended 180.*

(p.c. March 2018, transcribed as given by the pilot of XYZ)

The flight continued uneventfully but the pilot received a “Please explain” phone call from Airservices on the ground.

Example (3) was observed by the author while waiting in the runup bay at Bankstown (NSW, Australia) with a NNES student in the left-hand seat. ATC repeatedly corrected the NES pilot of aircraft ABC, who sounded inexperienced and was not producing the expected readback “*Holding Point Alpha 8, 29R*”. However, ATC did so using slang (“*Close but no cigar*”) that was not understood by the author’s student. When the NES pilot of another aircraft, who sounded more experienced and was apparently known to ATC, used nonstandard expressions (“*She seems to be right now*”), not only was there no rebuke from ATC, but ATC used an even more nonstandard expression (“*OK, so you’re happy to roll the dice and have a go?*”). The last transmission from the second pilot, “*We’ll roll the dice and have a go*”, was

actually treated by ATC as a request for taxi clearance and aircraft XYZ proceeded to taxi to the holding point.

(3) Aircraft ABC and XYZ in the runup bay at Bankstown

[Pilot 1 in aircraft ABC requests taxi clearance from Bankstown Ground]

ATC: *Holding Point Alpha 8, 29R, ABC.*

Pilot 1: *Cleared 29, ABC.*

ATC: *Close but no cigar, ABC.*

Pilot 1: *Cleared 29R*

ATC: *No sir, it's 'Holding Point A8, 29R'. You must repeat all the instructions.*

Pilot 1: *Alpha 8, ABC.*

ATC: *Now this is how problems happen. Once again you must repeat all of the instructions. Holding Point Alpha 8, 29R.*

Pilot 1: *Holding Point Alpha 8, 29R, ABC.*

[A few seconds later, aircraft XYZ is in the runup bay, same ATC]

Pilot 2: *Bankstown Ground, We've solved the problem with the magnetos.*

Cancel previous request.

ATC: *XYZ, there is a car with maintenance on its way. You don't need it anymore?*

Pilot 2: *No, she seems to be right now.*

ATC: *OK, so you're happy to roll the dice and have a go?*

Pilot 2: *We'll roll the dice and have a go.*

(Observed, Dec. 2015)

Although there were no adverse consequences from these non-standard transmissions, not every pilot on the ground could be expected to anticipate the movements of aircraft XYZ in those circumstances.

ICAO Recommendations

Doc 9835 (ICAO, 2010) discusses the potential contribution of NES to communication problems due to their knowledge of, and reliance on, general English. It provides specific guidelines for NES and recommends that they take particular care when communicating with NNES. As shown below,⁹ ICAO (2010) recommends: (a) that NES production must be intelligible; (b) that NES must be aware of potential difficulties for NNES; and (c) that they acquire strategies to improve cross-cultural communications. In order to achieve (c), Doc 9835 specifically advises against the use of idioms;¹⁰ it stresses that NES share the responsibility with NNES and gives detailed instructions about rate of speech in (d) and accent in (e).

(a) Production must be intelligible

“... users with high proficiency must *accommodate their use of language* so as to remain intelligible and *supportive to less proficient* users.” [3.3.3]

“...Proficient speakers shall use a dialect or accent which is *intelligible to the aeronautical community.*” [4.5.3]

(b) Awareness of potential difficulties for NNES

“... native speech should not be privileged in a global context.” [4.5.10]

“... the burden for improved communications should not be seen as falling solely on non-native speakers.” [5.3.2.1]

⁹ The numbers in square brackets refer to the paragraph numbering of Doc 9835. Bold is added for emphasis.

¹⁰ Although the scale for vocabulary to obtain ELP Level 6 requires that “Vocabulary is idiomatic”. Thanks to Maria Treadaway (p.c.) for pointing out this clear contradiction between policy and operationalisation.

“... Native speakers of English, in particular, have an **ethical obligation** to *increase their linguistic awareness* and to take special care in the delivery of messages.”

[5.3.1.3]

(c) Strategies to improve cross-cultural communications

“b) native and other expert users of English can acquire *strategies to improve cross-cultural communications*;

c) native and other expert users of English can *refrain from the use of idioms, colloquialisms and other jargon* in radiotelephony communications and *can modulate their rate of delivery*; and

d) **native speakers are under the same obligation as non-native speakers to ensure that their variety of English is comprehensible to the international aviation community.**” [5.3.1.4]

(d) Intonation and rate of speech

“In this context, native speakers aware of the challenges faced by speakers of English as a foreign language (EFL) can take greater care in their speech. Native and highly proficient speakers can, for example, focus on *keeping their intonation neutral and calm*, admittedly difficult at busy control areas, but a good strategy to calm the language anxiety of an EFL speaker. They can take particular care to be explicit, rather than indirect, in their communications and train themselves away from the use of jargon, slang and idiomatic expressions. They can ask for readbacks and confirmation that their messages have been understood. They can also attend more carefully to readbacks in cross-cultural communication situations, *taking greater care to avoid the pitfalls of expectancy*, where a pilot or controller expecting a given result unconsciously affects the outcome. Additionally, a slower rate of delivery seems to make speech more

comprehensible; therefore, taking care to *moderate speech rate* is a common-sense approach to improving communications.” [5.3.3.2]

(e) Accent

“While accent can sometimes be difficult to control, speakers can control intelligibility by *moderating the rate of speech, limiting the number of pieces of information per utterance, and providing clear breaks between words and phrases.*” [5.3.3.7]

In this respect, we also know that Aviation English is far from being identical to the language variety NES use spontaneously (Estival, Farris, & Molesworth, 2016; Borowska, 2017). Recent research presented at the 2018 ICAEA conference shows that on the prosodic level, i.e. intonation, Aviation English is closer to other languages than to the English used by US radio announcers (Trippe & Baese-Berk, 2019), making it even more imperative for NES to take care about their pronunciation and intonation during radio communications.

Finally, ICAO (2010 [5.3.2.2]) advises NES that “While communication errors will probably never completely go away, disciplined use of ICAO standardized phraseology, compliance with the ICAO language proficiency requirements, alert awareness of the potential pitfalls of language, and an **understanding of the difficulties faced by non-native English speakers** will enable pilots and controllers to more readily recognize communication errors and work around such errors.”

The question then arises whether any notice is taken of these recommendation in the training of NES in English-speaking countries. Anecdotally, we can already say that in Australia, where NES are supposed to be tested for comprehension of other English accents, even senior flight instructors are rarely aware of these recommendations and that awareness of the speaker’s own linguistics characteristics is not emphasized. In the USA, as confirmed by Certified Flight Instructors (p.c.), there is no training or testing of NES pilots for English

Language Proficiency (ELP), in spite of the recent FAA circular which “clarifies the FAA English standard” (Federal Aviation Administration, 2017).

ICAEA 2018 Workshop

As reported in (Estival, 2018), the questionnaire asked workshop participants about their experience regarding communication between NES and NNES. The answers provided further examples of miscommunications caused by NES using nonstandard phraseology as in (4) or slang as in (5).¹¹

(4) Non-standard phraseology

“follow the greens”

“twelve ninety five”

(5) Use of slang

“kill the rabbit”

Interestingly, while these instances illustrate that colourful language is usually not helpful in aviation, an example of successful communication between NNES and NES – given in answer to Question 2 (see Appendix 1) – was due to the ability of the NNES to innovate. The NNES ATC was able to invent a phrase (*“the earth going up and down”*) to refer to an earthquake when they did not know the English word. On the other hand, success for NES in communication with NNES was attributed to their following standard radiotelephony phraseology and procedures.

¹¹ The answers to the ICAEA 2018 Workshop questionnaire are summarized in Appendix 1, and available in full at: <https://docs.google.com/document/d/1cTWn0IyJ0LJpMdeSzCBRUjOFOuBGyNfbEqrDaqLPCWM>.

Meanwhile, the answers to the question whether NES are taught to deal with NNES (Question 3.a) confirmed that there is no, or only minimal, teaching to the ICAO guidelines for NES. It is worth mentioning that, since the 2018 ICAEA Workshop, no one from Australia, Canada, New Zealand, the UK or the USA reported that NES student pilots are taught to be understandable by NNES. The answers to the questions of how and where NES are taught how to deal with NNES (Question 3.b-d), demonstrate not only the lack of such training, but the perception of the need to provide explicit instruction to NES.

“How *ARE* native English speakers certified under the LPR requirements?”

That was the question sent in an email a few weeks before the ICAEA 2019 Conference by Rachelle Udell, who asked “Do they have to pass the same language tests as multilingual, foreign-language speakers? Are they given de facto Level 6 proficiency?” and pointed out that the language in Doc. 9835 is “contradictory in that regard.” Coincidentally in another email, Tyrone Bishop, a researcher from the UK who is also a private pilot, recounted that: “Last year, I was revalidating my licence and one of the CFIs told me “don’t worry about the English thing, that’s nothing!” [...] He said that it was up to him if I have Level 6 or not and he made a summary judgement on the spot that I didn’t need a test.”¹²

This is more or less the situation in most English-speaking countries: most NES will receive an ELP Level 6 and, although some are tested as to whether they can understand speakers of other English varieties, they are never required to be intelligible by NNES.

Regulations in English-Speaking Countries

Australia. The Australian regulator (CASA) requires the General English Language Proficiency (GELP) for solo flight, and an Aeronautical Radio Operator Certificate (AROC) and Level 4 ELP for a Recreational Pilot Licence (RPL) and above.

¹² Rachell Udell and Tyrone Bishop have both kindly agreed to be cited here.

CASA had produced an excellent set of guidelines (the ‘Blue Book’) aimed at pilots as to what is expected for ELP Level 6 Proficiency, including making themselves understandable and understanding other accents.¹³ CASA recently produced a new version of the Safety Behaviours for Pilots which contains some advice on making oneself intelligible.¹⁴ The Australian ELP Level 6 test (which is only available to approved language assessors) includes short clips of radio communications with both NES and NNES pilots and ATCs. It is up to the assessor how to use these and it seems that some assessors do not even use them.

Canada. The Canadian regulator (TCCA) requires a Canadian Radiotelephone Operator Certificate (Aeronautical) for PPL, but there is no mention of training for phraseology.¹⁵ TCAA also requires evidence of English or French proficiency for the delivery of a licence, and stresses that native speakers may not be able to be granted Level 6.¹⁶

It is important to remember that not all native speakers will receive a level 6 on the pronunciation score, nor would all non-native speakers who speak with an accent be prohibited from receiving a level 6. That is, native English speakers may receive a score lower than level 6 if their regional dialect is not readily understood by those outside of that particular region. Conversely, speakers whose speech patterns clearly identify them as “non-native” speakers (having an accent) may demonstrate Expert Level 6 proficiency, as long as they are almost always easy to understand by proficient listeners. The applicant for a flight crew permit, licence or rating must be sufficiently competent in one of the official languages [English or French] to be able to read the examination questions and to write the answers without assistance.

¹³ Unfortunately, the ‘Blue Book’ is no longer available in print but a revised electronic edition is being prepared.

¹⁴ <https://www.casa.gov.au/safety-management/publication/safety-behaviours-human-factors-pilots-2nd-edition>

¹⁵ <http://www.tc.gc.ca/en/services/aviation/reference-centre/advisory-circulars/ac-401-009.html>

¹⁶ <https://laws-lois.justice.gc.ca/eng/regulations/SOR-96-433/FullText.html#s-401.01>

New Zealand. The NZ regulator (CAA) requires a Flight Radio Telephone Operator (FRTO) rating for PPL, and evidence of English language Proficiency (Level 4) before solo flight. For the English Language Proficiency, the requirements for Level 6 provide that:

Formal evaluation is not required for applicants who demonstrate expert language proficiency, e.g. native and very proficient non-native speakers with a dialect or accent intelligible to the international aeronautical community.¹⁷

The guidelines for Level 6 proficiency accessed in May 2019¹⁸ were more specific about what NES or ‘near-native’ must demonstrate but did not require them to understand NNES. The new requirements seem to be similar to those of Australia and now contain questions which “may be from people in different parts of the world”.

UK. In the UK, the regulator (UKCAA) requires all pilots and ATCs to obtain a Flight Radio Telephony Operator Licence (FRTOL) and an English Language Proficiency (ELP) endorsement. The guidelines for the ELP refer to the EU directive FCL.055 and give specific instructions that the applicants must demonstrate “proficiency both in the use of phraseologies and plain language” and the ability to “use a dialect or accent which is intelligible to the aeronautical community”.¹⁹ Assessors are not expected to assess all NES as Level 6.²⁰

Examiners should treat speakers who use English as their first-language as 'probable expert users'. However, examiners should be aware that 'first-language English speaker' does not necessarily mean 'Expert Level 6' user.

Speakers who use English as their first-language may lack the vocabulary to discuss certain themes or may speak with a regional accent that is an impediment to intelligibility for those from outside that region. They may fail to use appropriate

¹⁷ <https://www.caa.govt.nz/assets/legacy/ICAO/Annex-1.pdf>

¹⁸ https://www.caa.govt.nz/assets/legacy/Advisory_Circulars/AC065_1.pdf, accessed May 2019; now replaced by a link to ASPEQ, the ELP testing organisation.

¹⁹ https://eur-lex.europa.eu/legal_content/EN/TXT/PDF/?uri=CELEX:32011R1178&from=EN

²⁰ <https://www.caa.co.uk/Commercial-industry/Pilot-licences/Applications/Language-Proficiency/>

language or may not interact effectively; consequently should not be assessed as Expert Level 6.

Speakers who use English as their first-language who fail to demonstrate proficiency in all aspects of the Level 6 descriptors in the ICAO Rating Scale should not be assessed as Expert Level 6.

Nevertheless, as shown by T. Bishop's email (see above), proficiency is not stringently tested, nor does it include understanding NNES or being understood by NNES.

USA. No radio operator licence is required to operate inside the US.²¹ The US regulator (FAA) only requires demonstration of English proficiency for pilots whose native language is not English (Federal Aviation Administration, 2017).

As recounted by a Certified Flight Instructor (p.c.): "My experience [...] was that only NNESs received training in AE. Their courses were voluntary (though recommended) and taught by volunteers who knew nothing about aviation."

Summary

A Radio Telephony licence is required in all countries, except the USA. ELP Level 4 is required for NNES pilots and ATCs in all countries, with some form of testing. ELP Level 6 is granted to NES with some form of testing in all countries, except the USA. The ELP Level 6 testing for NES in the other English-speaking countries can be very informal. The UK, Australia, and more recently New Zealand, make some attempt at testing the ability of NES to understand NNEs but this is not strictly enforced. As shown in the summary of the requirements for language and radiotelephony proficiency given in *Table 1*, no English-speaking country tests the intelligibility of NES by NNES.

²¹ <http://www.faa-aircraft-certification.com/radio-station-license.html>

Country	Radiotelephony licence	ELP test for NNES	ELP test for NES	Understanding of NNES	Intelligibility by NNES
USA	NO	YES	NO	NO	NO
Australia	Yes, for RPL	YES	YES	To some extent	NO
Canada	Yes, for PPL	YES (English or French)	YES (English or French)	NO	NO
New Zealand	Yes, for PPL	YES	YES	To some extent	NO
UK	Yes, for PPL	YES	YES	To some extent	NO

Table 1. Radiotelephony and language proficiency requirements in English-speaking countries

Solutions and Way Forward

The recommendations from the ICAEA 2018 Workshop confirm and reinforce those made by ICAO (2010) and Clark (2017) among others. The main one is that the recommendations in Doc 9835 should be made mandatory. NES should be taught Standard Phraseology and should be tested regularly for proper use of the phraseology and appropriate plain English. Radio communication training for NES as well as for NNES would benefit from case studies and role-playing and should include language awareness. Although there is consensus about these recommendations from the NNES countries and from participants to the ICAEA 2018 Workshop, it is clear that not all NES agree and there is still a strong feeling of resistance to the idea of testing NES and of requiring NES to understand and be understandable by NNES.

From the literature cited (e.g. Kim and Elder (2009); Kim (2012); Bieswanger (2013); Clark (2017)), the answers to the ICAEA 2019 Workshop questionnaire, and personal experience, we can summarize the obstacles and issues regarding the training and testing of NES in being rooted in preconceptions about aviation communication and about the pre-eminence of English. This often leads to disregard or ignorance of the phraseology and a certain feeling of superiority of NES over NNES, which can sometimes even manifest as hostility towards foreigners (i.e., NNES). The problem can be very acute in GA, where pilots with the ‘wrong attitude’ (so-called ‘cowboys’) or pilots who only fly locally may not be aware of, or do not care about, the wider world. It is more disturbing when this attitude manifests itself in the professional aviation world, as evidenced by the many reported examples of incidents at JFK (Bieswanger, 2013).

Until the recommendations in Doc 9835 are made mandatory and all English-speaking countries require NES to undergo training and regular testing in phraseology, as well as proving they can understand, and be understandable by, NNES, the onus will fall on individual flight training organisations to ensure competency and proficiency from their NES students. In that respect, experience has shown that the best way to ensure good communication is to start very early in the training (i.e. ab initio for pilots) and try to instil a sense of professionalism (what pilots call “learn the lingo”). Instructors can point out examples where a wrong word or misuse of phraseology may cause a safety issue or a delay, as in examples (1) and (3) above. There will still remain the need to educate the old generation of local pilots, including instructors, and ATCs. Finally, language assessors and training organisations must be made aware that the assessment of someone at ELP Level 6 does not guarantee the correct use of aviation phraseology and radio procedures.

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Appendix 1

Answers to the ICAEA 2018 Workshop Questionnaire (Estival, 2018).

A total of 15 questionnaires were returned, each filled out during the workshop by a group of 3 to 5 participants. The numbers in square brackets refer to the number of responses received for a particular question, or to the number of times a particular answer was given.

Q1. What do you think are the most important requirements for NES regarding communication between NES and NNES in the aviation context? [15]

Strategies for accommodation [8], e.g. simplification [14], speech rate [11], accent [6], paraphrase [3], cross-cultural strategies [3]	44
Awareness of the need to adapt in the international environment	10
Stick to the Standards, Procedures and to Standard Phraseology	7
Attitude: professionalism and patience	4
Training of instructors; Testing; Reviews	4

Q2. Examples of NES interacting with NNES: failures [14]

Lack of training in phraseology for NES, deviations from standard phraseology (e.g. “follow the greens”; “twelve ninety five”)	6
Use of slang/jargon/colloquialisms/idioms (e.g. “kill the rabbit”)	5
Attitude: lack of sympathy, lack of patience, culture of superiority towards EL2, non-supportive behaviour, arrogance	4
No exposure to different cultures, lack of awareness of cultural issues	2
Non-compliance with standards, non-compliance with rules	2
NES speech too fast	2
Too much information in the same message (more than 3 pieces); sometimes irrelevant information	1
Rote learning/checklists	1

Q2. Examples of NES interacting with NNES: successes [2]

Standard RT + Confirm, Clarify, Check	1
Innovative creation in unusual situation: “the earth going up and down” to express “earthquake”	1

Q3. Teaching NES to the ICAO guidelines [10]

a) Are they taught? [10]

No	9
Yes	0
Sometimes	1

b) Which ones? (e.g. being intelligible, being aware of difficulties for EL2) [2]

Given scripts of previous situation. Being aware of difficulties	1
not taught routinely	1

c) Where are they taught, and by whom? [5]

They should be taught by instructors that are prepared for that and aware of its importance (most likely NNS, experienced pilots or instructors)	1
in cockpit	1
App being developed Beta stage software for self-study (Ohio University) – PlaneEnglish	1
English Language Specialist (Case Study, Test, Role Play)	1
not happening yet	1

d) How are they taught? (e.g. explicitly, by example, by correction, by rule) [2]

Explicitly. Role Play	1
maybe... CAP-413 for British radiotelephony is an example to teach British pilots & ATCOs to stick to standards	1

Q4. How should the ICAO guidelines for NES be taught? [11]

1. Standard Phraseology classes for NES, which should include: teaching accommodation skills by analysing samples of real life R/T communications, with breakdowns, with NES and NNES.	1
2, NES could be exposed to a variety of accents and there could be some tasks in which they had to understand and role play interactions with NNES.	1
3. They should be taught how to be aware, communication strategies.	1
4. Case studies	1
5. Native English speakers could start to learn other languages so they better understand the challenges	1
6. Listen to themselves	1
7. Clean up speech (Hesitations)	1
8. Teach on the ground first (vocabulary), then intersperse with flight training	1
9. Phraseology should be re-tested: Level 4 every 3 years Level 6 every 6 years	1
10. Textbooks based on ICAO for Pilots and ATCs	1
11. For ATC: classroom theory; online qualification	1
12. Phraseology refresher course	1
13. Phraseology testing as part of ground school	1
14. Workshop to raise awareness on limiting NES use of idiomatic and figurative in plain language interaction.	1
15. Simulator: Competency checks should involve a language element	1

16. CRM/TRM should include language as an element of training	1
17. For written manuals: expose authors to learning situation of readers/ mechanics	1
18. When doing line checks pilots should be evaluated. ICAO requirements should be added to line check	1
19. Built into training - initial and recurrent	1
20. Video, on line learning	1
21. Role-playing and open-ended scenarios	1
22. NES should be held accountable	1
23. Regulation	1
24. Initial training + recurrent training	1
25. Part of checklist on which you are assessed.	1
26. Case studies of risky situations	1
27. Role-play: on a sim position Switch pilot-controller Pilot-controller synergy training	1
28. Impossible to enforce unless it is regulated → All aviation authorities must impose RT training (refresher) and testing	1
29. It should be a requirement	1
30. Something like a short course like Dangerous Goods or Aviation Safety. Once per 2 years.	1

Q5. Should there be other requirements for NES? [5]

1. NES shouldn't be automatically rated level 6 but they should undergo testing in Aviation English and Standard Phraseology, in which they would have to prove their ability to apply accommodation skills. If there are reports for communication problems, they should be re-tested.	1
2. It should be included in the testing policy (NES should be tested).	1
3. Training could also be a requirement (mandatory training)	1
4. Should be tested (S.P. for NES)	1
5. Incorporated as other task?	1
6. Level 6 never gets retesting. Recommend recurrent testing for level 6.	1
7. If the ones in 9835 now were adhered to, probably no need for more!	1
8. And these requirements should appear in the documents that pilots/controller read: - Manual of RTF (Doc 9432, 2007) (ICAO, 2007) - FAA Pilot/Controller Glossary AIM (FAA, 2018) - Doc 4444 (ICAO, 2016b) - Annex 10, vol II (ICAO, 2016a)	1

How Simulation Enhances Communication in Ab-Initio Air Traffic Controller Training

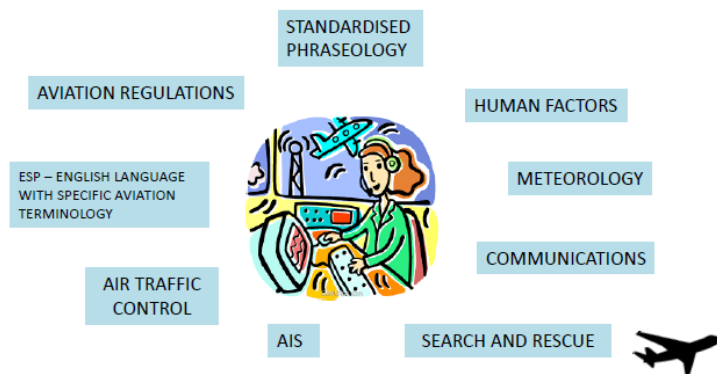
ALICIA E. GUANA²²

CIPE (Centro de Instrucción, Perfeccionamiento y Experimentación) ANAC (National Civil Aviation Administration) Buenos Aires, Argentina.
aeguana@hotmail.com

Training air traffic controllers is not an easy task. To be trained as an air traffic controller, is much more difficult. I have been involved in air traffic controllers' initial training since 1998, and as an On- the-Job-Training Instructor, had the chance to assess different teaching techniques in order to help students achieve their goal: their license.

Simulation proved to be the most powerful tool to help air traffic controllers to be professional, and to understand, not only how air traffic control works in real life, but also to be aware of the impact of the communication skills needed.

Air traffic controllers' curriculum



When a brand new controller is trained, he/she has to learn everything related to aviation, most of the things they see are new, different and hard to understand. Luckily, technology has become extremely helpful and allows us to

watch different 3D videos or listening to real time radio frequency transmissions. Subjects like meteorology, altimetry, air traffic control separations or navigational aids, seem too different to be placed together.

²² Air Traffic Controller ACC EZE. ATS Instructor - OJT at EANA S.E. Test Developer/ Rater/ Interlocutor at ANAC CIPE for the English Language Proficiency Test for ATCOs. Participant in the development and implementation of ICAO AELTS.

It is through simulation that all this conceptual knowledge is integrated and meaningful learning occurs. Simulation is the technique through which students can experience and develop situational awareness.

Since 1998, at CIPE, we work with air traffic control scenarios, simulating non-routine situations to help students to get a complete view of routine and non-routine situations, integrating the subjects learnt. Simulation helps students to connect acquired knowledge in different subjects.

There are different ways of simulating scenarios; when the class is big, a circle disposition like in the picture could be useful. In such round classroom layout, everyone will be



CIPE – 1998 Standardised physiology seminar

able to participate, and after the problematic situation is exposed by the “pilot” (a student designated by the teacher), they, in turns, will participate until the situation is worked out.



Model used in CIPE C. Rivadavia for training Brand new ATCOs

Another possibility is setting a simulation scenario. This implies a space that emulates an aerodrome or an area control centre working position. This might include a model with a runway and planes on a platform or flying (for the tower), flight strips and aeronautical charts (for en-route controllers).

This type of exercise stimulates students positively. They are fully engaged in their learning. This kind of instructional approach helps the brain to organize information and relate it to topics studied, and allows them to carry out hands-on tasks, helping them to realize where each piece of the puzzle is assembled. Teaching young adults, as ATC students usually are, could be challenging. For students, it is also highly demanding to imagine real traffic situations, when they have never stepped into a control tower or an ACC before.

We have found simulating real life situations to be one of the most effective instructional techniques. Following Edgard Dale's theories in his Cone of Learning, we tend to remember 90 % of what we SAY and DO, and when simulating real experiences, they DO separate aircraft and COMMUNICATE in English.



How to Plan a Simulation

A simulation will be more effective if planning involves all the disciplines taught in the syllabus. It could be designed as the final integration exercise of the course or as a subject in itself.

Step 1: Clearly define your objective

Once the air traffic service unit where the simulation will take place is set, define the learning objective in terms of norms, expected performance and given context.

Step 2: Focus on the norms

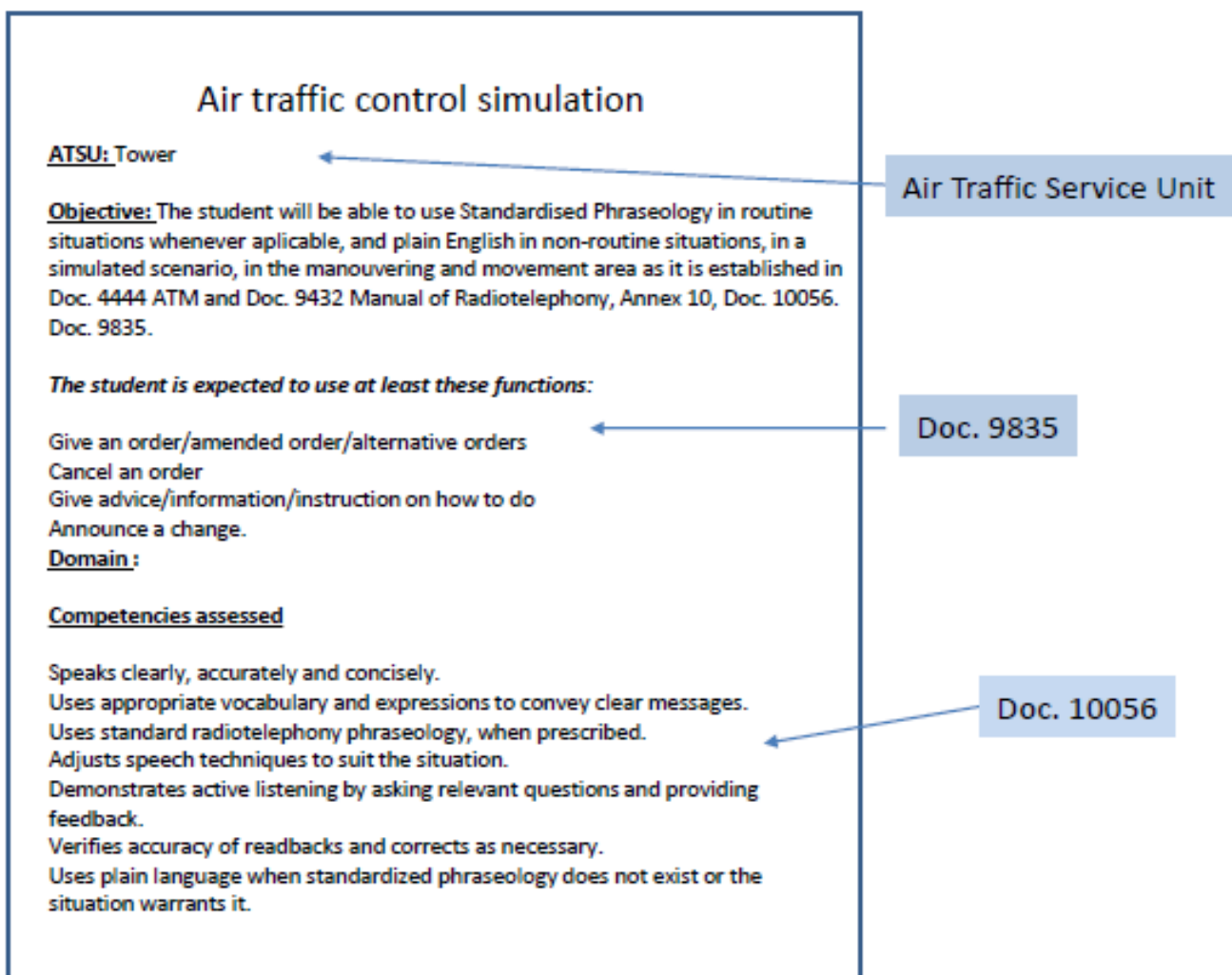
In order to frame the learning objective, and the simulation itself, look for the documents and/or regulations that rule the expected performance.

Step 3: Focus on functions

After defining the learning objective, decide which language functions²³ the student is expected to use.

Step 4: Focus on competencies

Define which competencies will be assessed during the simulation. For this, Document 10056 will be used.



²³ *Communicative Language Functions, Events, Domains, and Tasks associated with Aviation.* (2010)
Document 9835: Appendix B- Language of Aeronautical Radiotelephony Communications

Meteorological Information:

Metar 130/10 6000 HZ 15/13 Q1001

Aircraft involved:

Callsign	Dep. ad.	Dest.	First comm.	Altitude
CXMAS	SUMU	Your airport	5 NM SE	2000
PTMET	Your airport	SAAR	Gate N° 6	FL100
ARG1758	Your airport	SARI	Gate N° 3	FL350

At the beginning of the exercise PTMET calls tower and request departure clearance to SAAR. The Student is expected to give Air traffic control clearance, pilot readbacks with one mistake. The student should correct readback.

Later, ARG1758 calls. Request ATC to SARI. Both aircraft call ready to taxi, The student is expected to provide taxi clearances and information about the traffic maneuvering in the platform.

CXMAS Calls 5 miles southeast of the airport for landing. Meteorological information should be provided, and landing instructions, including traffic circuit vocabulary and departing traffic information. Simulation goes on until both aircraft have departed and CXMAS has landed.

Step 5: Prepare the set of materials

Following with the planning of the exercise, detailed information needed for the simulation should be set, as meteorological information, METARs and TAFs, runway in use, information about the traffic involved: callsign, departure aerodrome and destination, reporting positions, altitude and any other information needed to make the situation more real.

After that, a short description of the exercise could be written in order to guide the instructor leading the exercise. A map can also be included, showing the positions of the aircraft at the beginning of the exercise, scripts with examples of the dialogues that should be role-played by pilots, and any other material considered relevant for the development of the simulation.

Additional information:

Runway 11/29

METAR 140/10 6000 BR BKN025 15/13 Q1001



Step 6: Implement the simulation

After setting the scenario, and with all the materials required ready, distribute roles as convenient depending on your classroom context. The ideal situation would be two air traffic controllers every five pilots during the first stages of instruction. Playing the role of pilots will help them practice standardized phraseology and gain confidence.

In order to make the exercise more cognitive demanding, the number of flights could be increased as well as the level of difficulty of the non-routine situations (according to Doc. 10056).

Step 7: Assess students' performance

Last, but not least, the assessment form. There is not a universal one, a good approach would be to prepare an assessment form including the observable behaviors corresponding to each competence; some competencies could take more than one observable behavior. Document 10056 could be very useful at this stage.

Here there is an example of an assessment form:

Date:/...../.....			
Name: Surname:			
Sector: TWR / APP / AREA (EN ROUTE) / AREA (TMA) Stage : 1 / 2 / 3			
	<i>Observable behavior</i>	S	NS
PC4.1	Selects communication mode that takes into account the requirements of the situation, including speed, accuracy and level of detail of the comm.		
PC4.2	Speaks clearly, accurately and concisely		
PC4.3	Uses appropriate vocabulary and expressions to convey clear messages.		
PC4.4	Uses standard radiotelephony phraseology, when prescribed.		
PC4.5	Adjusts speech techniques to suit the situation.		
PC4.6	Demonstrates active listening by asking relevant questions and providing feedback.		
PC4.7	Verifies accuracy of readbacks and corrects as necessary.		

PC means performance criteria

Conclusions

- Simulation is a powerful tool that allows students to experience and solve "hands-on-tasks."
- Meaningful learning may take longer than rote memorization, but the knowledge acquired is more permanent and may be transferred to future professional situations.
- Simulation and OJT helps ab initio air traffic controllers to understand where each piece of the puzzle assembles.
- Simulation makes collecting students' performance evidence easier than other techniques.
- According to Edgar Dale's pyramid, doing things is one of the best ways to achieve long-term knowledge (learn by doing).
- Assessment criteria becomes clearer for students' management of their own learning
- Assessment techniques foster more effective competence-based learning
- We focus on Competencies (Observable behaviors)

References

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Appendix 1

AIR TRAFFIC CONTROL SIMULATION

ATSU: Tower – Phase 1

Objective: The student will be able to use Standardized Phraseology in routine situations whenever applicable and plain English in non-routine situations, in a simulated scenario, in the maneuvering and movement area as it is established in Doc. 4444 ATM and Doc. 9432 Manual of Radiotelephony, Annex 10, Doc. 10056. Doc. 9835.

The student is expected to use at least these functions:

- Give an order/amended order/alternative orders
- Cancel an order
- Give advice/information/instruction on how to do
- Announce a change.

Domain:

- Air traffic rules, speed, distance/range, position.
- Traffic information. Procedures.
- Ground movements and services.
- ATIS, METAR information.

Competencies assessed

- Speaks clearly, accurately and concisely.
- Uses appropriate vocabulary and expressions to convey clear messages.
- Uses standard radiotelephony phraseology, when prescribed.
- Adjusts speech techniques to suit the situation.
- Demonstrates active listening by asking relevant questions and providing feedback.
- Verifies accuracy of readbacks and corrects as necessary.
- Uses plain language when standardized phraseology does not exist or the situation warrants it.

Appendix 2

Meteorological Information:

Metar 130/10 6000 HZ 15/13 Q1001

Wind one-three-zero degrees, one-zero knots. Visibility six kilometres. Haze. Temperature one-five, dewpoint one-three. QNH one-zero-zero-one.

Aircraft involved:

Callsign	Dep. ad.	Dest.	First comm.	Altitude
CXMAS	SUMU	Your airport	5 NM SE	2000
PTMET	Your airport	SAAR	Gate N° 6	FL100
ARG1758	Your airport	SARI	Gate N° 3	FL350

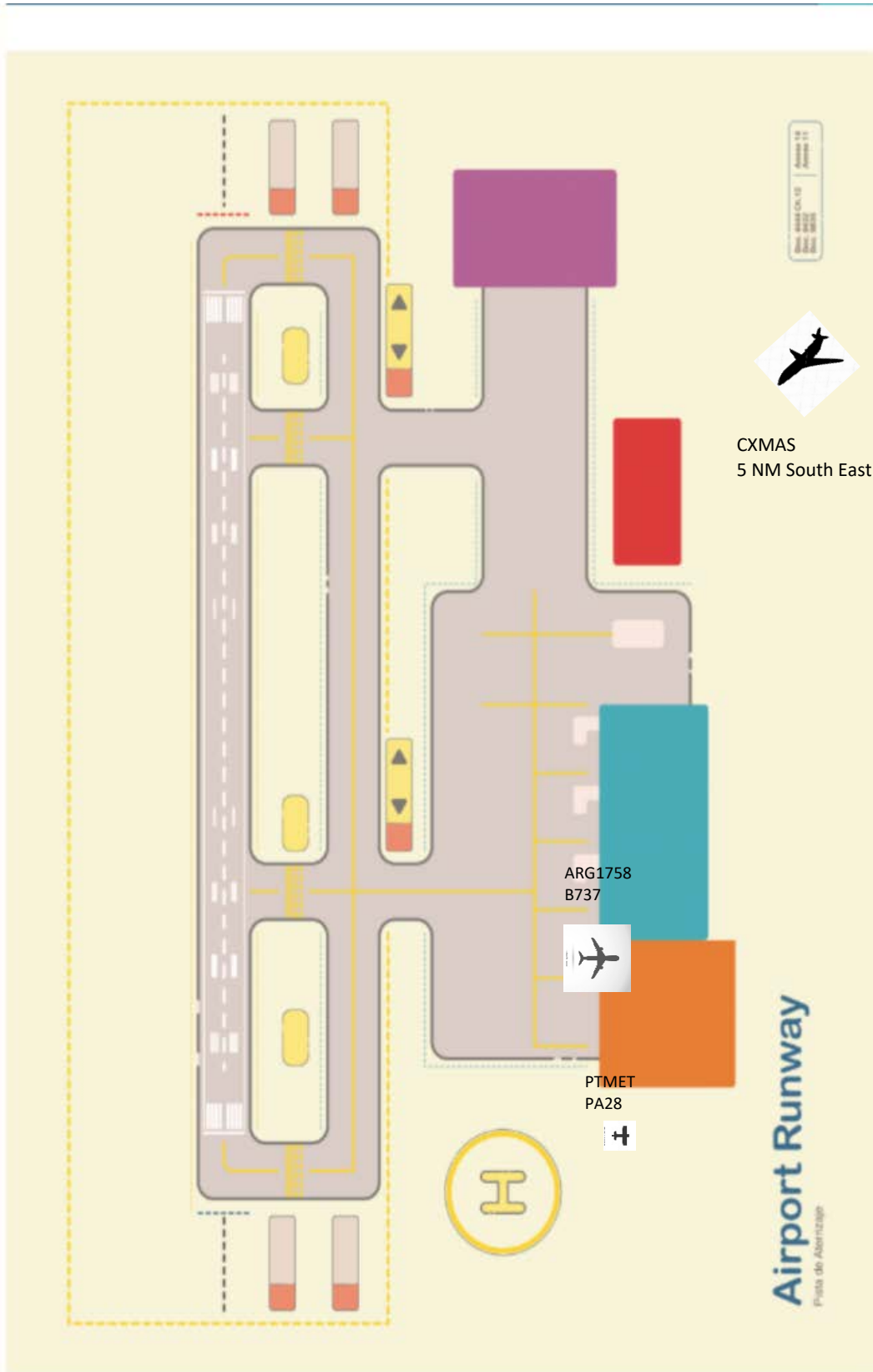
At the beginning of the exercise, PTMET calls tower and request departure clearance to SAAR. The Student is expected to give Air traffic control clearance, pilot readbacks with one mistake. The student should correct readback.

Later, ARG1758 calls. Request ATC to SARI. Both aircraft call ready to taxi, The student is expected to provide taxi clearances and information about the traffic maneuvering in the platform.

CXMAS Calls 5 miles southeast of the airport for landing. Meteorological information should be provided, and landing instructions, including traffic circuit vocabulary and departing traffic information.

Simulation goes on until both aircraft have departed and CXMAS has landed.

Appendix 3



Appendix 4

Examples of dialogues:

CXMAS: EZEIZA TOWER, This is CXMAS, 5 miles south, for landing.

ATCO: CXMAS, EZEIZA TOWER, Roger, wind 130, 10 knots, visibility 6 kilometres, HAZE, temperature 15, dewpoint 13, QNH 1001.

CXMAS: *(reads back information)*

ATCO: CXMAS, Readback correct. Descend to 3000 ft Join downwind for runway 11, report downwind.

ARG1758: EZEIZA TOWER, ARG1758 Gate number 3 request departure information and ATC clearance to Iguazú.

ATCO: ARG1758 roger. Are you ready to copy?

ARG1758: Ready to copy, ARG1758.

ATCO: ARG1758, Cleared to Iguazú, via flight planned route,

*Understanding and Adapting English Training Needs for Maintenance Personnel –
Findings and Achievements in Argentina*

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Abstract

This paper is part of ICAEA 2019 Conference Proceedings. It is based on Session 4 Workshop H which dealt with the experience of English language training needs and accomplishments for Aircraft Maintenance Technicians in Argentina. The objective of this article is to describe and address how the training center began with its original planning and how it evolved based on aircraft technicians' language training needs after a thorough research by surveying association members and other professionals, and by analyzing and assessing our own implemented Aviation/Technical English training programs and their outcomes. It intends to bring some light based on my current center experience and an 8-year reflective work into understanding technicians' language competency needs and adapting training programs to their challenging schedules, fatigue due to workload and learning styles.

How It All Began

It is interesting to notice how no matter what our initial plans or intentions might be, this so-called “airplane life” can take us into very different paths and directions diverting us from our original destination. That is how my training program for technicians was born and designed at CIPTA. It all began as a project of opening an ICAO's LPR's Testing Center at the Technicians Association (APTA) in Buenos Aires when many of APTA's members started to approach me with intentions of sitting for such test. Needless to say, such exam was not intended to our aircraft technicians, but to pilots and air traffic controllers instead. Nonetheless,

²⁴ Claudia has a bachelor's degree in Education Management, a Diploma of Teacher of English as a Foreign Language. She is a former Flight attendant and has been certified by IATA as CTP as well (Certified Training Professional). She also got certified as ICAO LPR's Rater and Interlocutor. She has designed and delivered ESL/ ESP courses and has been a consultant for different training institutions and organizations in Uruguay, USA and Argentina. Currently, she is the head coordinator at CIPTA and TEA Center Administrator, she is also a University Professor at the University of Buenos Aires.

technicians kept on coming to our Association asking for a test or training program that would be suitable for them. Even though ANAC (Local Aviation Authority in Argentina) does not require aircraft technicians to be assessed in their English language proficiency in order to obtain their license, a big percentage feel they should be, since English is such an important tool to them when reading manuals, understating and/or following daily job procedures.

Consequently, despite moving forward with the testing center initial idea, technicians' requests were acknowledged, and my research and action plan began in order to design a suitable English training program to meet their language needs.

It was clear to technicians at our Association and to me that "Precise Communication at the right place and the right time is a guarantee for success." That is how they conveyed this idea in our initial talks when they told me they knew or were aware of many technical words in English by seeing them on a daily basis or from their former training as licensed technicians, but they just did not know or understand how to put them together and how to achieve "precise interpretation or communication." This key component turned out to be a good starting point for my research. I realized communication effectiveness it is not just about what to say, but how to say it in the right place at the right time. Furthermore, it goes beyond simply second language learning or training: somehow, it appears to be more connected to language acquisition and cross-cultural interference and decoding as well.

Analyzing Data Collected

As part of the main assessment of Aviation Maintenance Technicians' language training needs, a survey of a hundred participant-sample was distributed initially among APTA members and their colleague-contacts. It was conducted online through SurveyMonkey in Buenos Aires only. In addition, later in the article, other satisfaction surveys results, which had been provided by former and current APTA technical students, will be shared in order to gain

some insights about their experiences and perspectives during and after CIPTA's English Training Courses for Aircraft Technicians.

In the initial phase, technicians were asked to answer the following questions:

1. What's your role in aviation?
2. What's your age group?
3. How many years of experience in aviation do you have?
4. What's your current level of English?
5. In which area of Maintenance do you work?
6. Which are your English communication needs at work, exactly?
7. In which situations does English play a critical role in safety at work?
8. Do you feel qualified to read and understand a Manual and/or write a report?
9. What should English training be like for Maintenance Technicians?
10. Are you currently studying English? How often?

Out of all technicians interviewed, we found some interesting facts such as: 13% are in a Chief/Supervisor position, 74% work on the line service, 45% of them are currently studying English an average of 3 hours per week.

In addition to the data above, off the record, they said that none of them have Aviation or Technical English Training during their yearly compulsory recurrent trainings. Therefore, none of the major airlines in Argentina provide planned nor mandatory training in this matter, which pushes technicians to maintain or improve their English language proficiency voluntarily out of the industry and/or without any sponsorship whatsoever. All the technicians who study

English in Buenos Aires do so privately funded or with a discount or partial scholarship given to association members, like many students in our center.

Another interesting fact regarding age groups is that almost 29% of the technicians interviewed have a 20-year or longer experience in aviation, almost 24% have an 11-15-year experience, 19% have a 16-20-year experience, other 19% have 1-5 years' experience, while the remaining 9,5% have about 6-10 years of experience. Even though the results were varied, there is a clear tendency to see well-experienced technicians, (around 75% of them) working actively in Buenos Aires.

When they were asked about their opinion on their current English level, almost 43% considered themselves to be intermediates, while the remaining 57% was equally divided between those who considered themselves beginners and advanced users of the English language.

When crisscrossing age groups and levels of English, it was found that within the 18-35-year-old-age group almost 60% of them were self-perceived as advanced users of the English Language, while the other 40% in that group was equally split between beginner and intermediate users. While in the 36-55 year-old-age group there were more intermediates (about 60%), about 30% at a beginner level and only 10% who felt were advanced users. Finally, in the 55+ year-old-group it was surprising to see equally split a 50% who considered themselves beginners and the other 50% advanced.

Out of experience, when enrolling and placing technicians in our courses, the above data could be called to question since we noticed by our student body that most of the experienced and actively working technicians showed an A1/ A2 CEF level of English. We have even noticed that our ab-initio young technicians even come with an A0 at times. The number of technicians coming to our center showing an intermediate level of English is quite

limited and many of those with a higher level coincidentally perform other roles in aviation, such as flight instructor, private pilot or aircraft dispatcher. That is, they perform roles for which they are required to have a higher level in their use of English as part of their license or as a hiring requirement.

Regarding what they felt were their English language needs for their role, 70% considered “reading manuals” their most necessary activity, while a little over 20% mentioned “writing reports”, and the percentage remaining mentioned “oral communication” with other crew members and with the tower. When considering the use of English as critical to safety, 50% mentioned “reading and interpreting manuals” again, 30% said “troubleshooting/testing”, while other 10% mentioned “communication with tower” and a last 10% mentioned “other situations” without specifying.

When asked how qualified or competent to understand manuals and or write reports, about 60% said they did, 20% did not, and the remaining 20% could only do it with assistance.

Based on these results, my experience in English language teaching, and in Aviation, along with my very own technician husband’s input, I could come up with an initial English training course aimed at technicians at CIPTA in 2012. The initial course worked quite well the first year. After being evaluated by our trainers and students through trial and error in our classrooms, it later developed in follow up level courses for different level technicians with several variations and adaptations throughout the years including courses for Aircraft Dispatchers’ as well.

Nowadays, our program is presented to technicians in the following way:

- Step 1: Diagnosis - Placement test to determine technicians’ level of English and most adequate training

- Step 2: Course selection from our offer:
 1. English Essentials for Maintenance Technicians - Technical English textbook and a selection of realia/ authentic material (A2).
 2. English Fundamentals for Maintenance Technicians - Aviation English Selection & Technical English Textbook (A2+B1).
 3. Extended English for Maintenance Technicians - General English and Authentic Material Selection & Technical English selection (B2 & up).
 4. English for Technicians Dispatchers' Version - Aviation English Selection & Technical English Textbook (A2-B1+).

In case of low-level students, General English Intro level courses are offered and in case of over-level students, tailored workshops are offered, so that they can work on a specific language skill for instance or in overall language maintenance.

Regarding methodology and delivery, each course lasts a semester, and technicians have flexible schedule options, they can either book a fixed timetable for a course or if they have rotating shifts, they can book their classes monthly in their days or shift off. The purpose is that they complete a minimum of 3 hours of class per week no matter which day or time. Classes are delivered live at the center or online through Skype, they can choose either type or combined them if appropriated for them.

In addition, a “Free pass” alternative is available to them in which they can attend any class/ course within their English level. They only book classes monthly as they can or wish. This option has allowed many technicians maintain their contact with language by giving them enough flexibility as to match their difficult or rotating shifts.

Periodical reviews and revisions are part of the spiral learning process encouraged and a final progress check is also delivered for the technicians to see their accomplishments at the end of each course upon receiving a certificate of completion.

This flexibility that is featured in our trainings is also connected to understanding and noticing fatigue in our aircraft technicians, most of it derived from the rotating shifts and workload, being the night shift particularly tiring, which creates a challenge in having early classes and in keeping students' attention and participation active. I have included techniques and share mitigation strategies in my instructors' trainings so that they can share them in class with our technicians. It is important to raise awareness on fatigue and its impact in language learning, and how it affects their attention span, short and long term memory and how they can try to mitigate these negative effects. (IATA, 2014)

In addition to the design of the courses, there have always been some constant questions going around at our center: How can we prepare for eventual ICAO LPR's? Will they ever be tested? Will English Language Requirements be a part of the non-native speakers' technicians' license? With all these in mind, we strive to provide them with a kind of training that gives them language tools and skills in order to face some identified needs or situations by technicians. Nonetheless, it would be enriching and enlightening to have a document from ICAO or local aviation authorities with guidelines regarding maintenance technician's English language training and testing.

As part of our own center assessment, we regularly conduct a satisfaction survey to find out more about whether our program is meeting their needs or if it needs adjustments at the end of each course. The following is a sample of a general survey conducted with our former and current students at the beginning of this year.

The questions former and current students answered to are:

- What's your role in aviation?
- What's your age group?
- How many years of experience in aviation do you have?
- What's your current level of English?
- In which area of Maintenance do you work?
- Which and how many courses have you taken at CIPTA - APTA?
- Which were the strengths of your course/s?
- Which were the weaknesses of your course/s?
- Have you found useful what you have learned at CIPTA- APTA? What and How?
- What would the ideal English training be like for Maintenance Technicians? What type of classes/courses?

The data collected showed that almost 86% of our students are within the range of 18 to 45 year old group, being equally divided in three sectors of 18-25 years old, 26-35 years old, and 36-45 years old respectively, and only about 14% are in the range of 46- 55+ years old.

Regarding their job experience in Aviation, almost 43% have between 1 to 5-year experience, almost 43 % between 6-15-year experience and about 14% have 16-20 years in the job.

In reference to their current level of English, almost 43% of them consider themselves as intermediate language users, almost 36% think they are advanced and around 21% think of themselves as beginners. If compared to how those technicians who did not take our courses felt about their level of English, the figures from our former students are more encouraging and

we can assess by our own assessment at the end of each course that they actually improve their level after studying in our program.

When asked what they considered were our courses strengths, some of them mentioned:

- Innovation – how pedagogical training is.
- All training is in English.
- Aviation English Content (hard to find in Argentina).
- Flexible schedule, affordable tuition fees, instructors' rotation (different trainers).
- Spoken language and grammar reviews.
- Excellent: teaching, materials, studying and learning environment.
- Handling of technical vocabulary fluency.
- Instructors' academic level, didactics, flexible schedule.
- Multiplicity of tasks: listening practice, games, grammar, instructors' commitment.

When asked what they considered were our courses weaknesses. some of them mentioned:

- 46% of them said "None".
- The course is not long enough.
- There is a lack of afternoon availability.
- Manuals and notes.
- Lack of authentic materials, more use of Manuals.
- Little grammar.
- Lack of continuity and fluency (due to personal Student reasons).
- Geographical distance to center.
- Grammar.

What we have noticed is that the course content in terms of language skills or the materials used is always an issue for debate since there are many personal perceptions involved. Some

of our technicians consider our language and material selection a strength, while others do not, and they want this aspect to be improved. Therefore, we have been working on balancing out both the use of textbooks and authentic material, and we are constantly looking for including varied didactics in the classroom in order to contemplate all learning styles and intelligences.

Besides, technicians were asked in which way our courses had been useful for them, they responded:

- I got a better understanding of the areas where I were assigned to.
- Understanding manuals without using a translator.
- The course worked well, according to the level of English required at work.
- Useful for interpreting manuals and when travelling on duty.
- Effective and important in my learning. The course gave me continuity in the use of the language.
- Got better reading comprehension.
- It helped me interact confidently with my colleagues and interpret manuals better.
- It was very useful for my daily life and for travelling too.
- It helped me a lot in many aspects.
- It made it easier to understand and read manuals.
- Do not know.

In terms of which could possibly be the ideal training for aircraft technicians, they responded:

- 31% - training should be practical and in groups.
- 15% - should be as is at CIPTA (our center), it is a good option.
- Other 15% - do not know.
- Other 15% - courses should have more and varied materials.
- 8% - training should be compulsory.

- Other 8% - training should have more grammar.
- And the last 8% - training must be face to face.

Conclusion

Considering our data collected in addition to the assessment of what has been analyzed based on our classes, courses and experiences at CIPTA throughout these past 8 years in Buenos Aires, I can conclude that there are certain highlights to be considered when thinking of designing and delivering Aviation/ Technical English Training for Maintenance Technicians.

For instance: 1. **flexibility**, which has proven to be one of the most effective components due to the nature of technicians' rotative and overloaded work schedule, especially for those working on the line. Flexibility in different aspects such as course schedule options, delivery options (face2face, online, blended, group, individual, and the like), instructors (different trainers/styles) offers them the chance to com study English and to improve or maintain their current level. 2. **Adequate content/ level selection**. I have noticed that many times realia or authentic material exceed the possibilities of technicians learning and understanding due to their low English level. Therefore, the adaptation of certain materials becomes necessary or the use technical/aviation textbooks with a simplified approach for those initial levels in order to scaffold them into comprehending real work-like material in follow up or higher-level courses. Additionally, the course contents should contain progress checks which serve the purpose of self-assessment in order to recognize need improvement areas with the adequate feedback. These are used not only as a learning aid and, but also as a teaching tool. In this way, the testing process is assumed naturally by technicians and it is considered ultimately as a learning instance as well. 3. **Variety**: in terms of sources, methodology, use of technology, learning by projects. As to prevent instructors' pedagogical automatization, a concept developed by Lewin (2017), in which it is necessary to approach the class and training

with a variety of resources and methods which will keep classes innovating and up to date in order to encourage students' interest and motivation in learning. Furthermore, variety in the class delivery enhances and considers multiple intelligences and learning styles (Gardner, 1983) which enables different technicians learning modalities making their experiences in training meaningful and adequate to their own needs. 4. Last, but not least, **Excellent instructors**. Even though, it may sound as cliché excellent trainers DO make a difference. It is essential to have committed, well-trained and motivated instructors because it truly shows in the training outcome. Good trainers have good classroom management, know how to identify each technicians' needs and to help them accordingly and they know how to keep technicians' interest and motivation in learning the language, trainers are genuine facilitators. It is important to point out that it is a great challenge, at least in Argentina, to find well qualified English teachers with experience or specialization in the subject matter of Aviation. It is worth considering investing in aviation training when coming across good language teachers. Let us keep in mind that even though having a good trainer is expensive, having a bad trainer turns out to be way more expensive and it can cause problems which will undermine all of the efforts in designing an adequate training program and center.

Finally, as it happens in education and aviation, in the end it is all a matter of trial and error, careful observation, active listening and having situational awareness. These tools will provide us with the possibility of analyzing and reflecting constantly about what is working at our training programs and what is not in order to make the necessary adjustments to meet aviation specialists training demands and needs efficiently.

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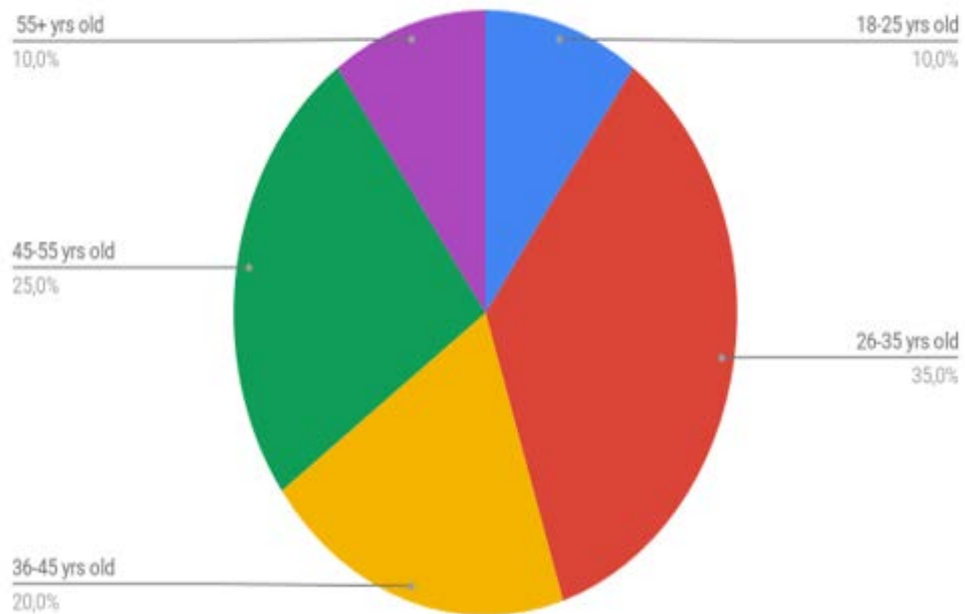
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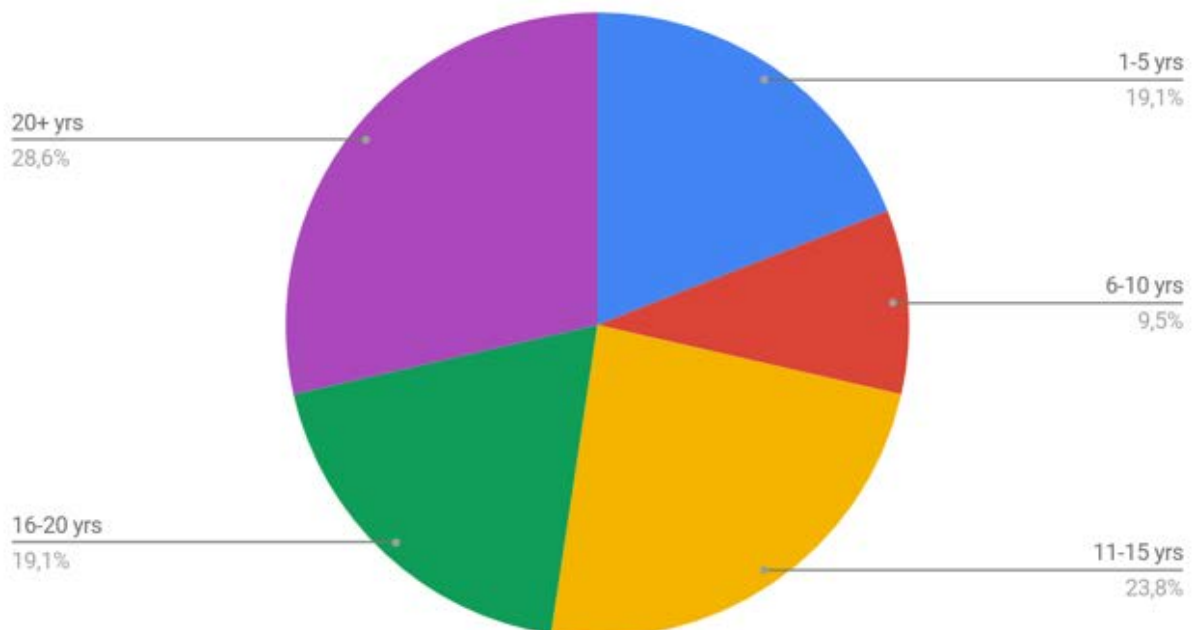
Appendix 1

General Aircraft Technicians' survey results

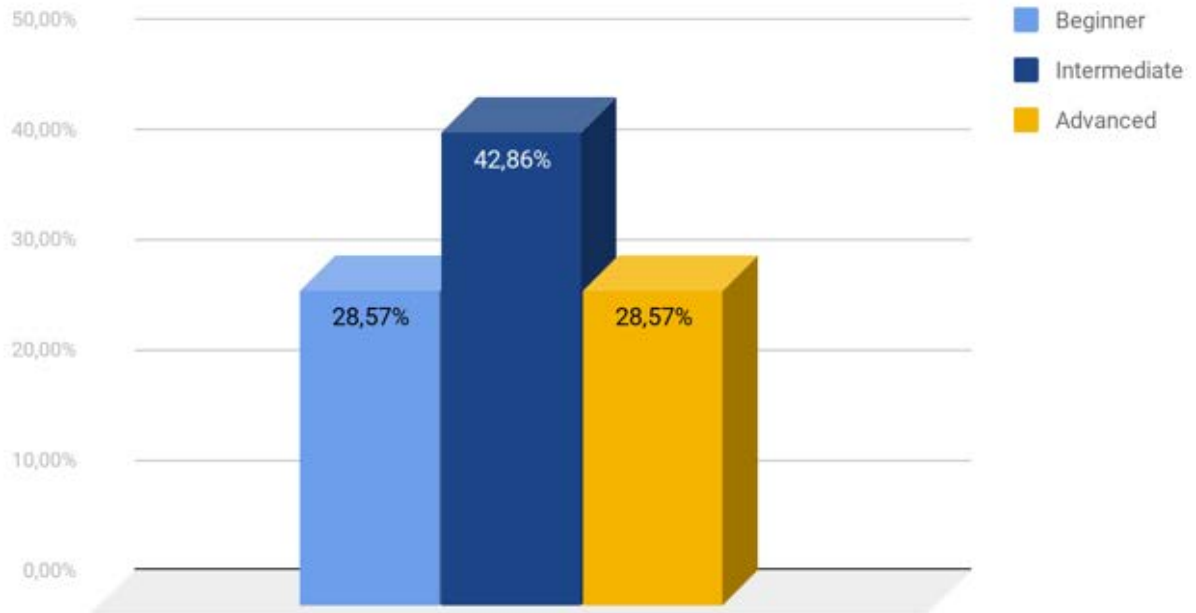
Age Group



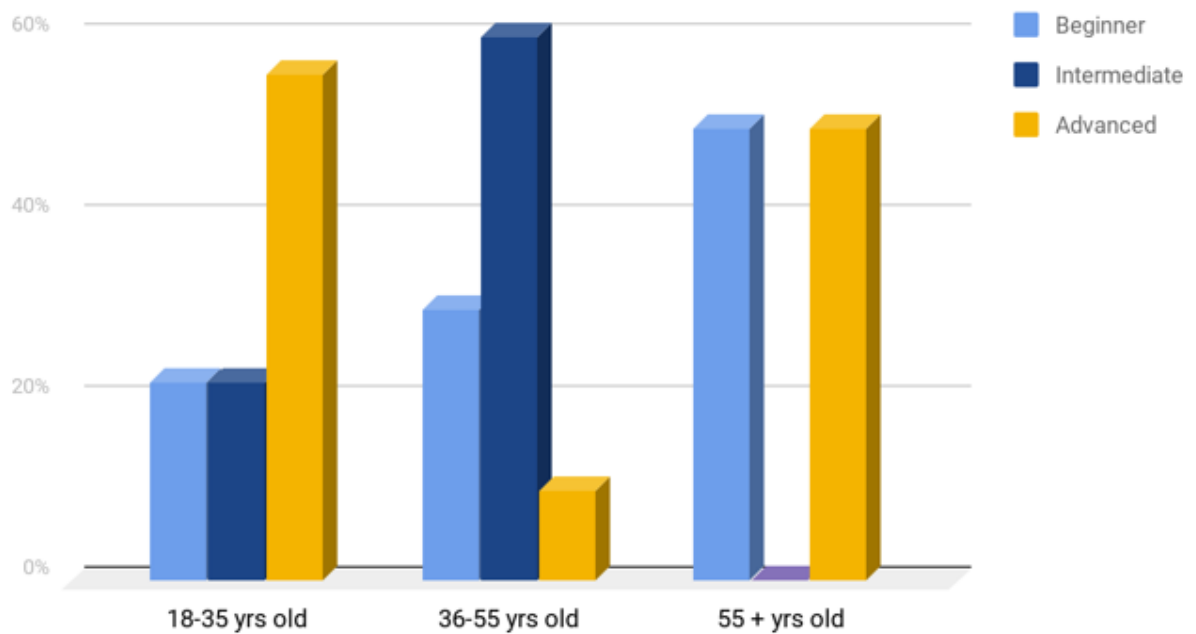
Work Experience



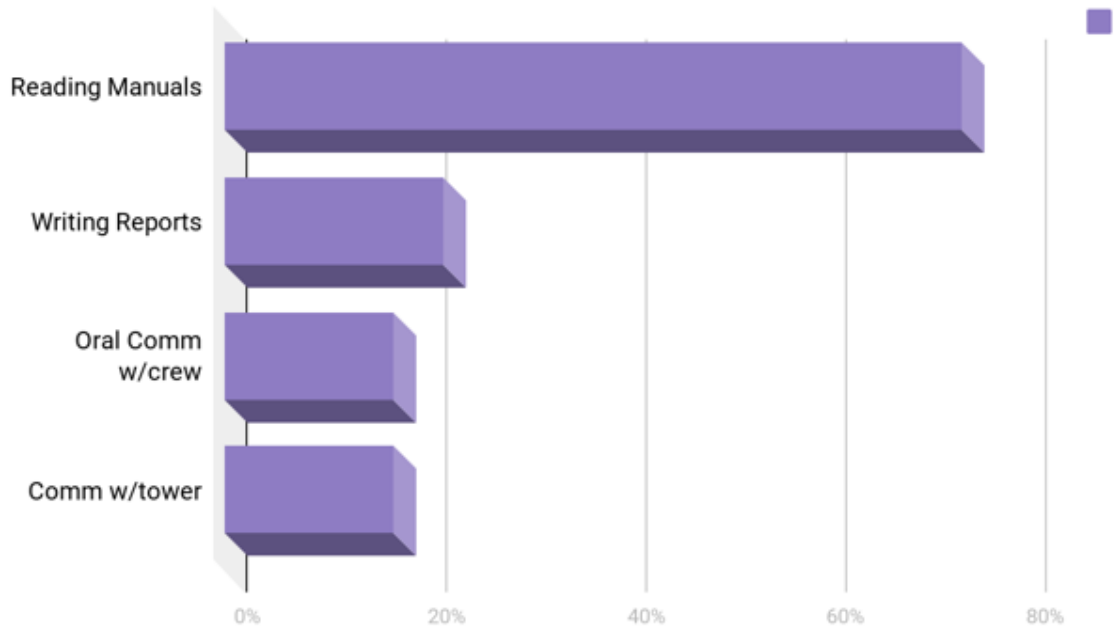
Current English Level



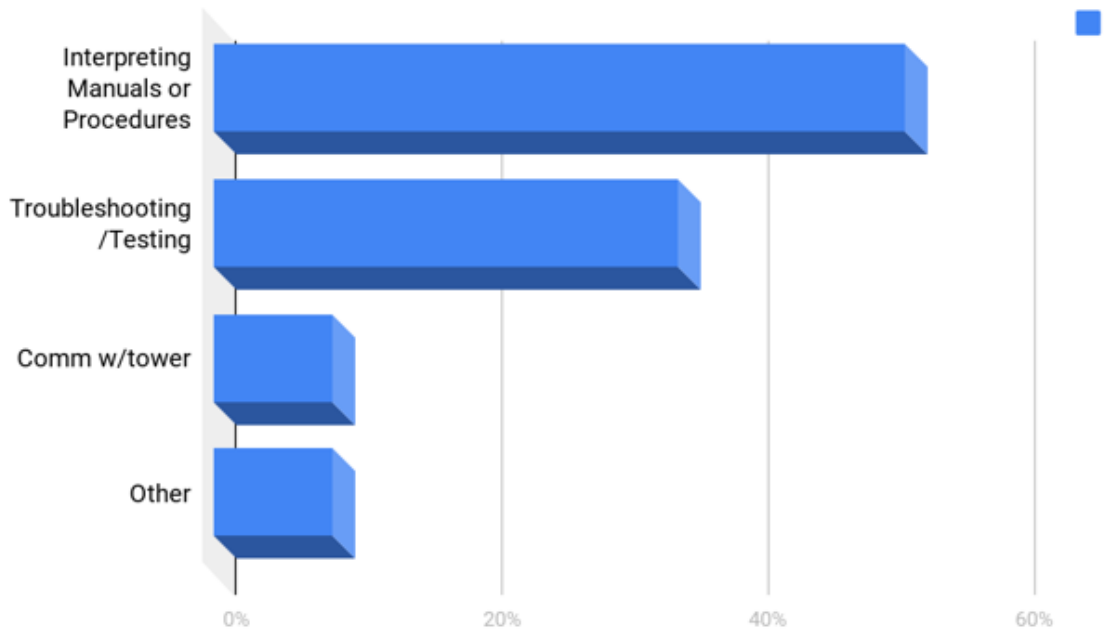
English Level by Age Group



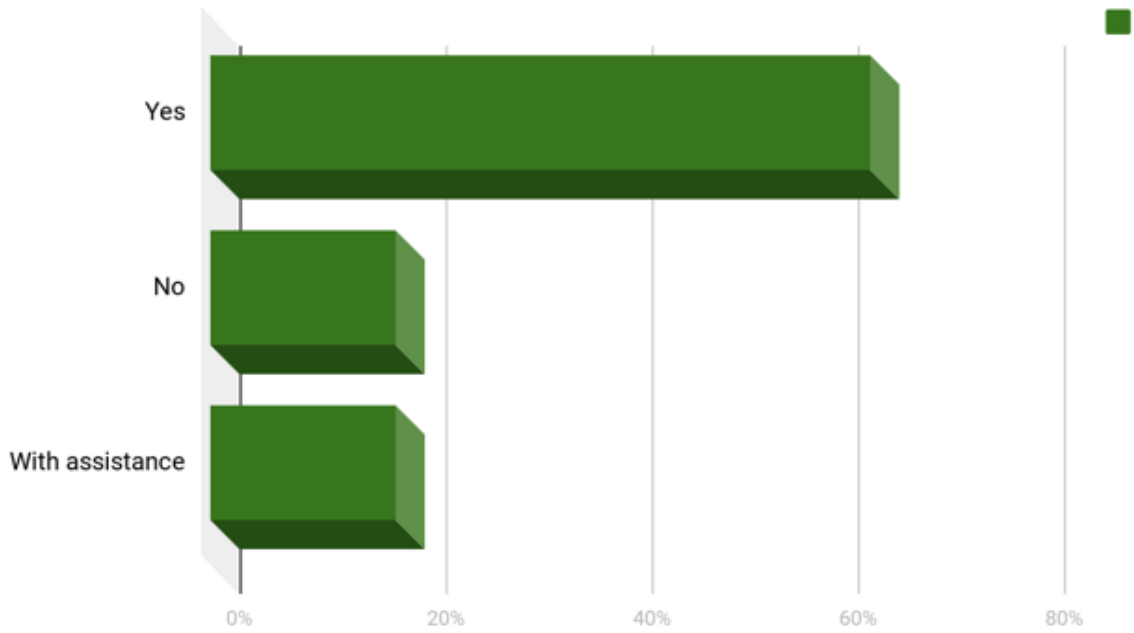
English Language Needs



Critical Use of English for Safety

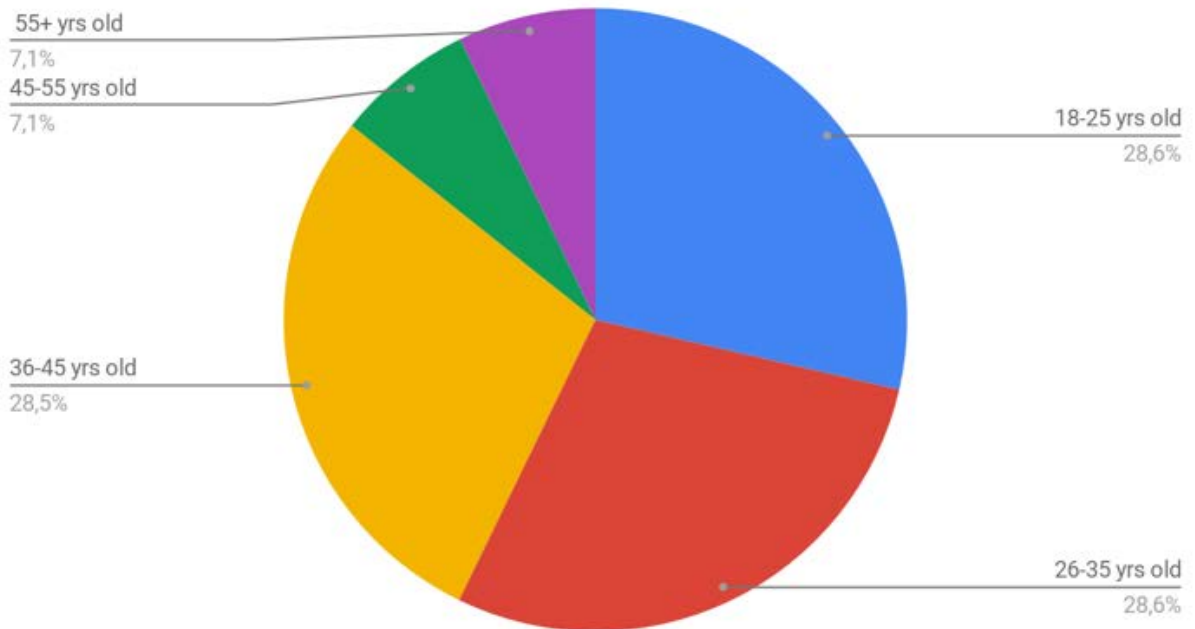


Feels qualified to understand Manuals and/or write Reports

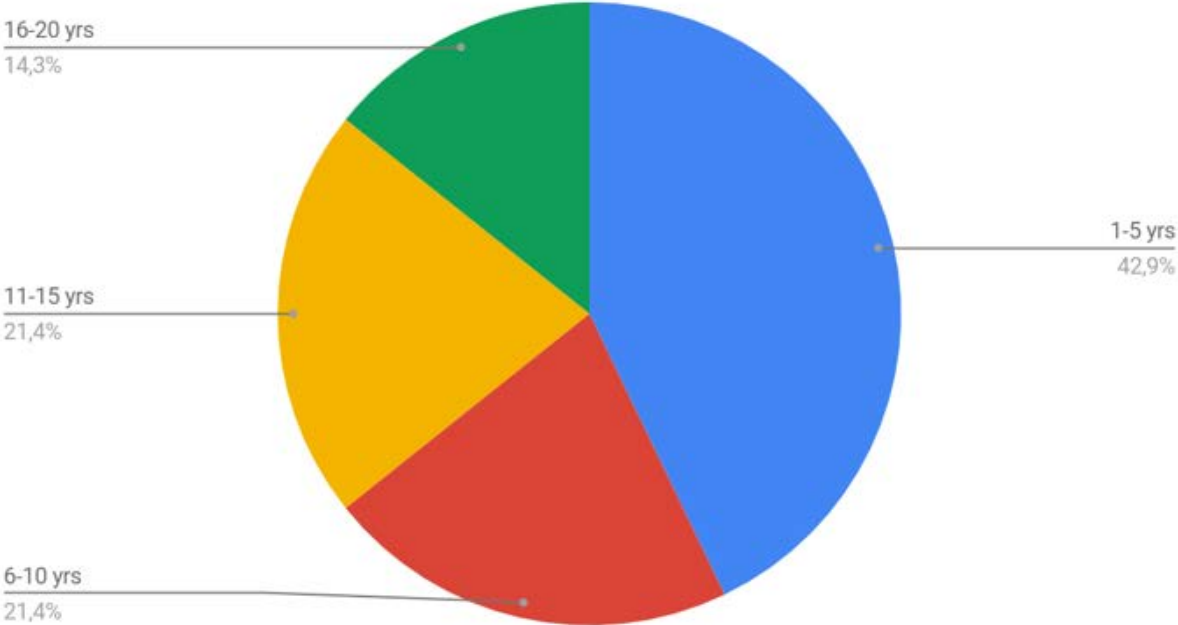


Former and current Aircraft Technician- Students at CIPTA Survey

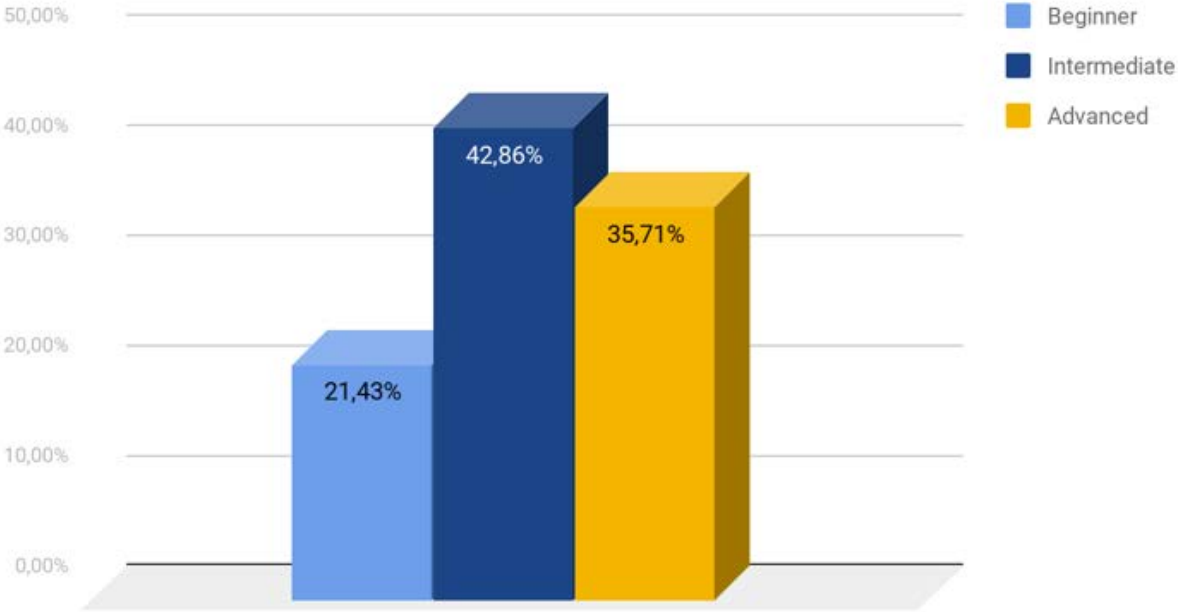
Age Group

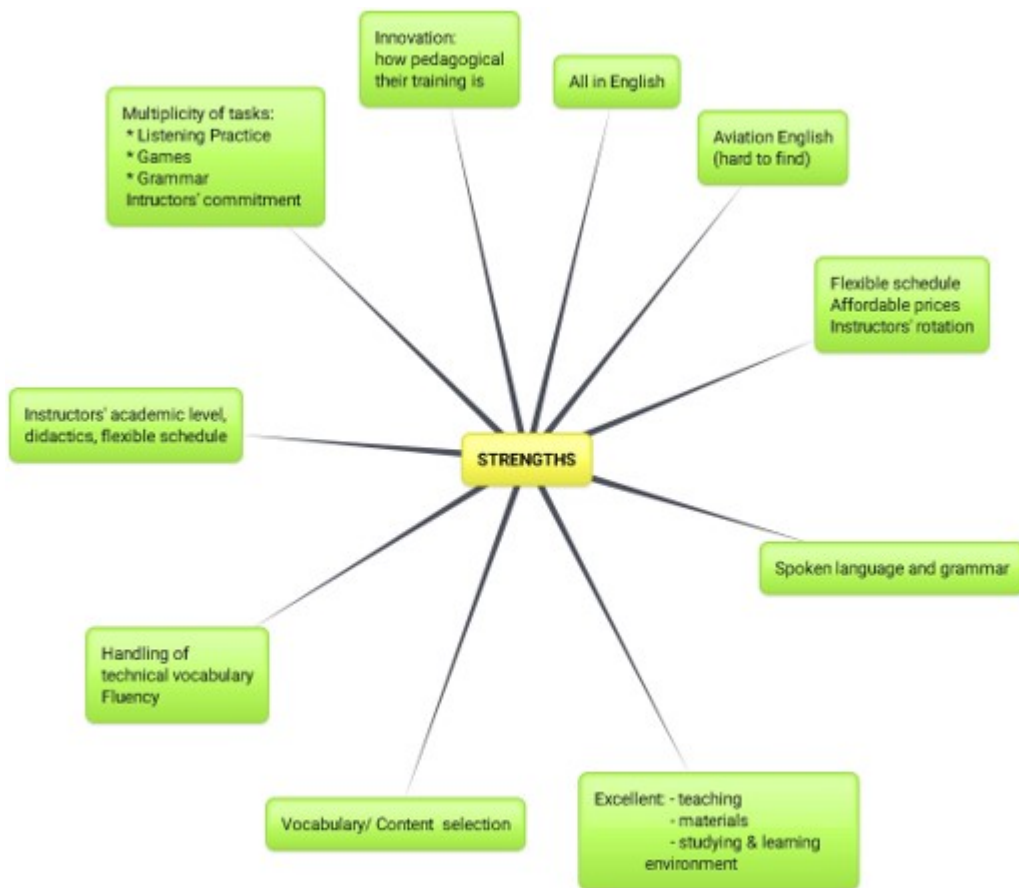


Work Experience

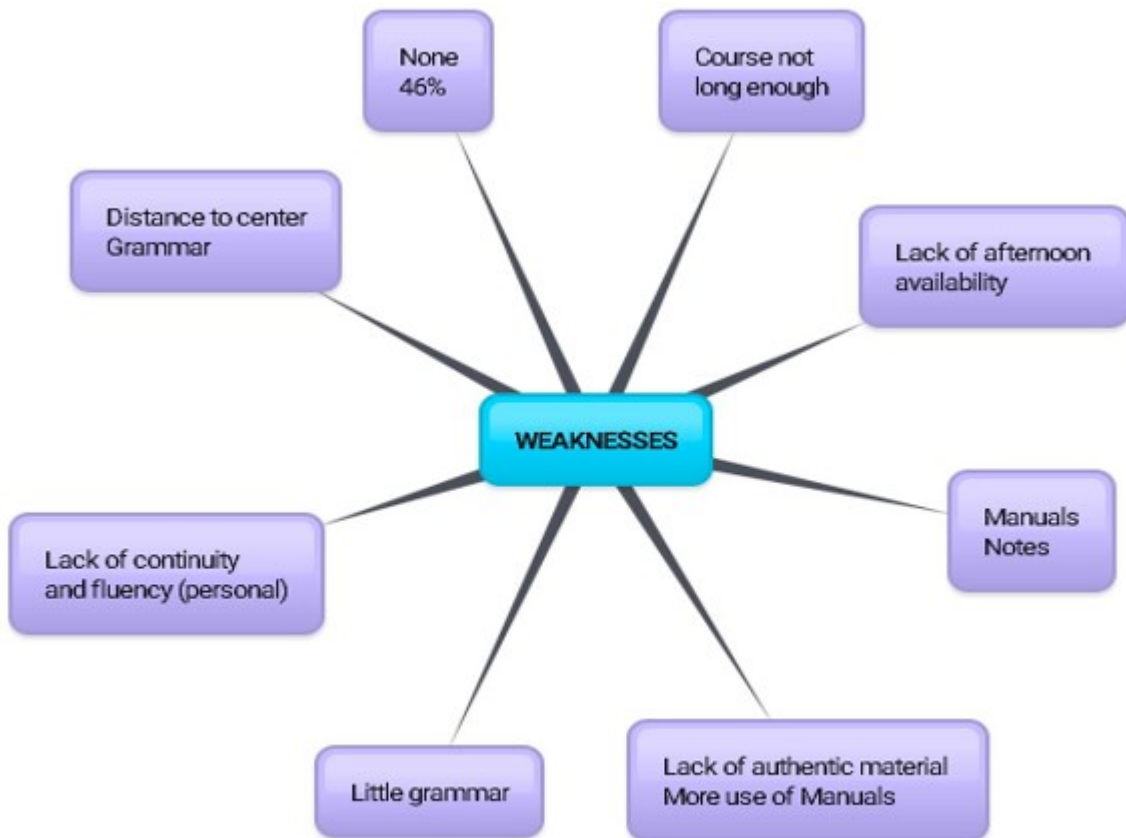


Current English Level

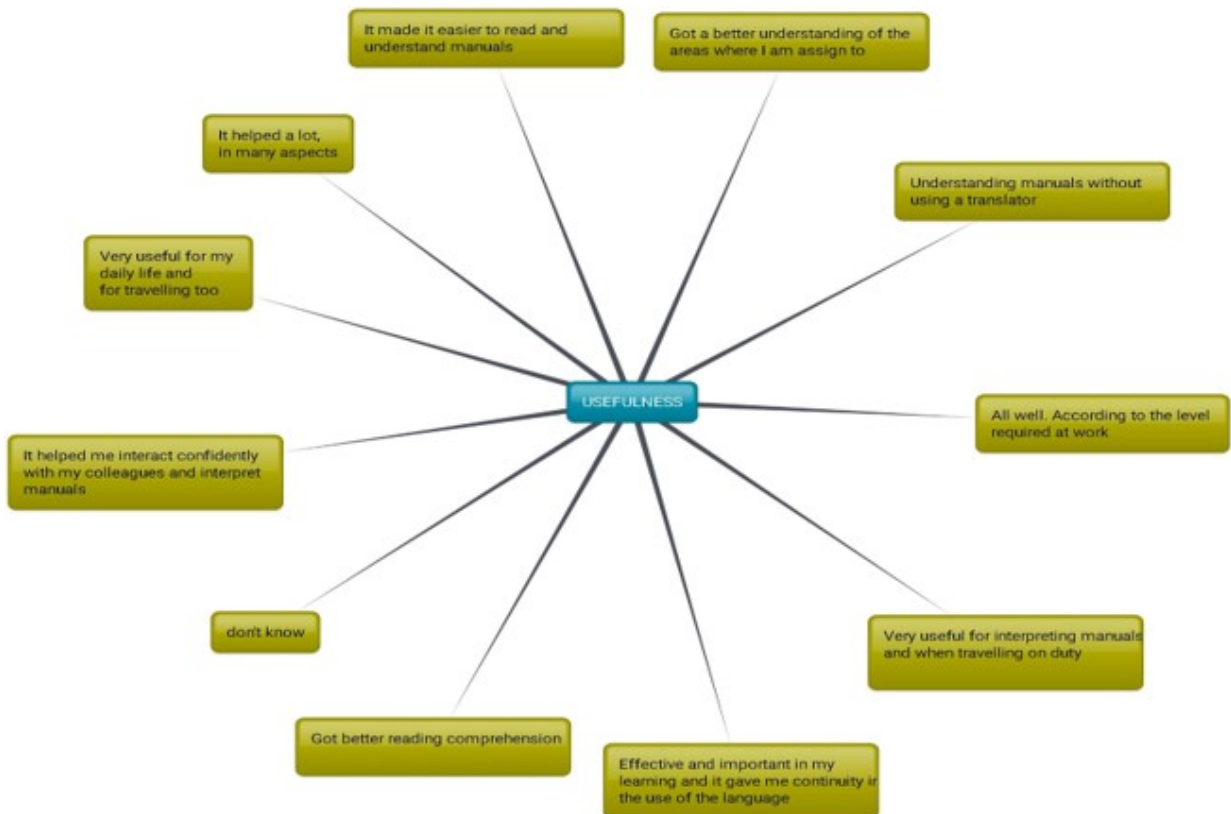




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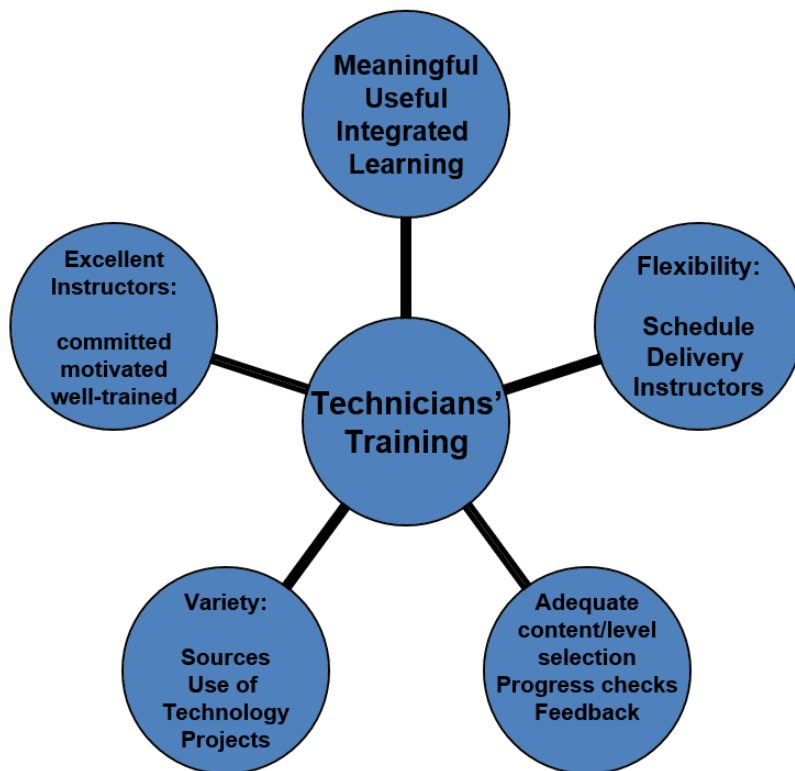
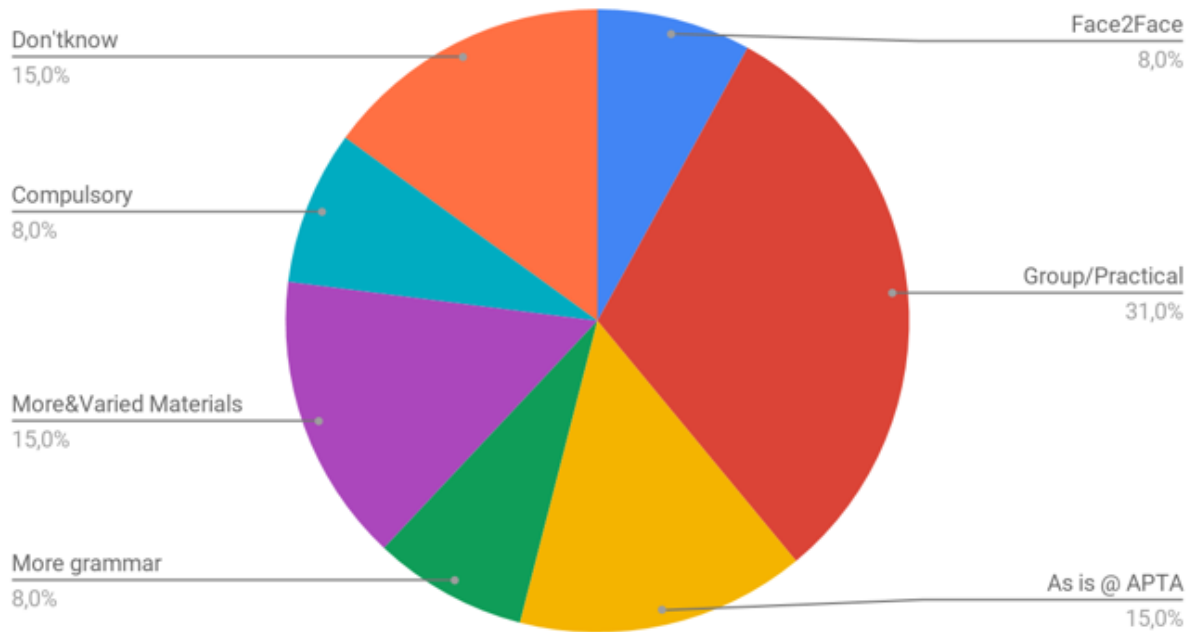


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Ideal Training Courses according to Maintenance Technicians



From a Language-Only approach to a Broader View of Communicative Competence for Intercultural Communications in Aviation

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Abstract

During the last 10 years of the ICAO Language Proficiency Requirements (LPRs) we have seen a focus on the training and assessment of pilots and controllers, mainly regarding their language proficiency. However, as aviation has grown in complexity and aeronautical communications have turned into a globalized and intercultural enterprise, training these professionals for effective communication requires a more comprehensive approach. Aiming to explore the real-world communication needs and the several competencies required by this multicultural workplace, a study was conducted (Monteiro, 2019) giving voice to aviation stakeholders from diverse ‘linguaculture’²⁶ backgrounds. This paper reports on results from the second phase of this study. First, drawing on a review of theoretical and empirical research on Aviation English, English as a Lingua Franca, Intercultural Awareness, and Interactional Competence, models of language use accounting for the aviation workplace were developed. Then, a preliminary matrix, specifying what is relevant to the context of radiotelephony (RT) communications was generated and validated by 128 aviation stakeholders. Participants’ comments on authentic RT scenarios were categorized according to what they perceived as necessary to improve the effectiveness of communication in terms of awareness, knowledge, skills and attitudes, and then organized along with the four inter-related domains: Aviation English, English as a Lingua Franca, Intercultural Awareness and Interactional Competence. Findings disclose what aviation stakeholders found as most relevant for successful RT communications and confirm the narrow view of proficiency defined by the current ICAO LPRs.

Keywords: aviation radiotelephony communication; multicultural workplace interactions; Language for Specific Purposes testing; matrix of construct specification; intercultural awareness.

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²⁶ The expression *linguaculture* was first used by Jenkins (2006), in her definition of English as a lingua franca (ELF), but Baker (2009) reinforces the relevance of the term “to highlight the language-culture connection and the importance of different languages and cultures in communication” (p. 569).

Introduction

In 2019, the International Civil Aviation English Association (ICAEA) Conference was hosted by Air Nippon Airways (ANA) in Chiba, Tokyo - Japan. The conference addressed the theme “Exploring the Aviation English training needs of: Ab-initio Pilots and Air Traffic Controllers, and Aircraft Maintenance Personnel”. Participants from a variety of cultural backgrounds had the opportunity to know more about what different countries have been doing regarding language and communication training, as well as to discuss related topics and engage in practical workshop activities. These topics were organized in five different sections:

- 1) Training the next generation of pilots and controllers for effective and efficient communication;
- 2) Guidelines and experiences in providing training for ab-initio pilots and controllers;
- 3) Equipping ab-initio pilots and controllers with language skills for operational training;
- 4) The language and communication training needs of aircraft maintenance personnel; and
- 5) Recommendations for the development and implementation of training.

Aiming to contribute to the discussions related to the conference theme, to address communication issues that arise from the growth of aviation, with its new dynamics, complexity and intercultural nature, and to reflect on ways to align training and testing practices with the real-world communication needs of pilots and air traffic controllers (ATCOs), both ab-initio and experienced professionals, I prepared and delivered Workshop L, in Session 5 of the conference.

Workshop L had two main objectives. First, to present results from a research study that explored the communicative needs and the several competencies required by the multicultural context of international radiotelephony, giving voice to aviation stakeholders from diverse

linguistic and cultural backgrounds. This is, in fact, an English for Specific Purposes (ESP) perspective on construct definition, which values the voice of domain experts to determine what really matters for successful communication in a specific context. This study is part of a larger multiphase mixed methods study that addresses the construct of pilots and ATCOs' international radiotelephony (RT) communications and its operationalization in test design (Monteiro, 2019). Second, the workshop had the objective of engaging workshop participants in discussions based on research findings, in relation to the dimensions of awareness, knowledge, skills and attitudes and across the domains of Aviation English, English as a Lingua Franca, Intercultural Awareness, and Interactional Competence.

The present paper aims to summarize the research study presented in the first part of Workshop L, including results on what aviation stakeholders found as most relevant for successful RT communications, and to present workshop participants' suggestions on how to apply these research findings to the development and implementation of training activities for pilots and ATCOs.

Background to the Study

The constant growth of aviation in a global scale has brought challenges to safe operations and communications. On top of that, the growing number of professionals from different 'linguaculture' backgrounds has shown the need to expand notions of English language proficiency, based on native speaker norms, to incorporate more updated theoretical understandings of language use, as these change over time (Shohamy, 2017). In addition, as international radiotelephony exemplifies a specialized and professional multicultural context of language use, pilots and ATCOs need to be aware of the multiple factors that impact communications and to acquire a range of knowledge, skills and attitudes in order to communicate effectively and efficiently.

Effective communication and collaboration are essential in the multicultural, complex and dynamic context of international aeronautical communications, in which pilots and ATCOs use aviation English (AE) to interact over the radio. However, in this specific context of language use, participants have distinct levels of language proficiency and potentially conflicting perspectives, values, beliefs, and attitudes. They operate in busy airports and airspaces that demand expeditious communications without the benefit of visual cues, which puts increased reliance on clear, concise and unambiguous speech. Moreover, the separation of speakers in space, and the resulting absence of common points of reference, means that much more information needs to be exchanged in order to establish common ground, although at times the acoustic conditions under which communication takes place are poor. Aeronautical RT communications are also highly context-dependent since they rely on a great deal of specific technical knowledge related to aviation themes or topics such as aircraft, navigation, air traffic control procedures, and equipment (ICAO, 2010).

It is important to stress that tensions and friction occur in the aviation workplace, which although not envisioned by the policy-maker, is part of the lived experience of professionals communicating via radiotelephony, even between speakers of English as a first language (L1). As a result, non-compliance with existing standards coupled with language and cultural issues can lead to misunderstandings, compromising safety.

After more than 10 years of the Language Proficiency Requirements (LPRs) for pilots, ATCOs and aeronautical station operators required to communicate over the radio, some questions still remain: Does the ICAO testing policy²⁷ address all the multiple factors that affect communication in this occupational domain? Is the testing policy aligned with current theories of language use brought up by the changing global roles of English and the growth of aviation

²⁷ The ICAO testing policy was introduced by Amendment 164 to the Standards and Recommended Practices (SARPs) in Annex 1 to the Convention on International Civil Aviation. It includes the ICAO Rating Scale and the Holistic Descriptors (ICAO, 2004).

worldwide? Research in the field of pilot-ATCO communication suggests that crucial features of the aviation RT-specific construct, that is, what needs to be measured in a language proficiency test for this occupational context, may be absent in the assessment of these professionals (e.g. Douglas, 2014; Kim, 2012, 2018; Monteiro, 2017). The fact that the construct of international RT communication might be underrepresented in the ICAO testing policy, may also lead to questions regarding the validity of inferences drawn from current testing practices (Messick, 1996). As a result, Kim and Elder (2015) remind us that “questions of justice may arise when the construct espoused by a particular policy, and reflected in tests used to implement this policy, fails to reflect the real-life situation or to accord with the views of relevant stakeholders” (p. 2).

Since the adoption of the LPRs, different tests for aviation personnel have been developed in order to implement those requirements and comply with the assessment criteria designed by ICAO (ICAO, 2010). However, lack of standardization is still prevalent in this language for specific purpose (LSP) testing field, mainly due to different interpretations of the ICAO guidance material and the absence of a clearer definition of the construct to be measured. Besides that, the assessment criteria still place a great emphasis on native speakers (NSs) norms and on linguistic-oriented components, which do not take into consideration what domain experts value for effective communication in this occupational context (Elder, McNamara, Kim, Pill & Sato, 2017; Harding & McNamara, 2017; Kim, 2018; Kim & Elder, 2015).

Responding to these needs, the research questions (RQ) that guided this phase of the study were:

- RQ 1: What theoretical models of language use would account for the communicative needs of pilots’ and ATCOs’ occupational domain?
- RQ 2: How can this construct be articulated and specified from the models to a framework which informs test development?

- RQ 3: What components of the construct are validated by key aviation stakeholders?

Overarching framework

The overarching framework that informed this phase of the study is based on Fulcher and Davidson's (2007, 2009) representation of the test development process. The authors' use of architecture as a metaphor for test development proves to be helpful in identifying the layers and sub-layers of architectural documentation that articulate design decisions. Three main layers or levels of design, which move from the general to the specific, are identified in terms of test purposes and contexts of test use: models, frameworks and test specifications. *Models*, as Fulcher and Davidson (2009) define the first layer, provide "a theoretical overview of what we understand by what it means to know and use a language" (p. 126). The second layer, *Frameworks*, "lays out the constructs to be tested, selected from models, because they are shown to be relevant to the specific context in question, and useful in the decisions that need to be made" (p. 127). Finally, the third layer includes *Test Specifications*, "where we find the detail that is specific to a particular test for use in the context specified in the [construct] framework" (p. 128).

It is important to note that the mandate (regulations, testing policy) is generally the starting point of a test development process, a process which is also subject to iterative feedback for test revision and improvements (Davidson & Lynch, 2002). As *Figure 1* shows, the entire process is situated within a social and policy context, with consequences to all stakeholders involved. McNamara (2007) explains that an awareness of tests as "site[s] of social recognition and control" (p. 135) appears as a way to understand the values implicit in test constructs. Thus, including key aviation actors in the entire process seems crucial in the development of a test to identify professionals who are competent to communicate effectively in routine and non-routine situations within the context of multicultural RT communications.

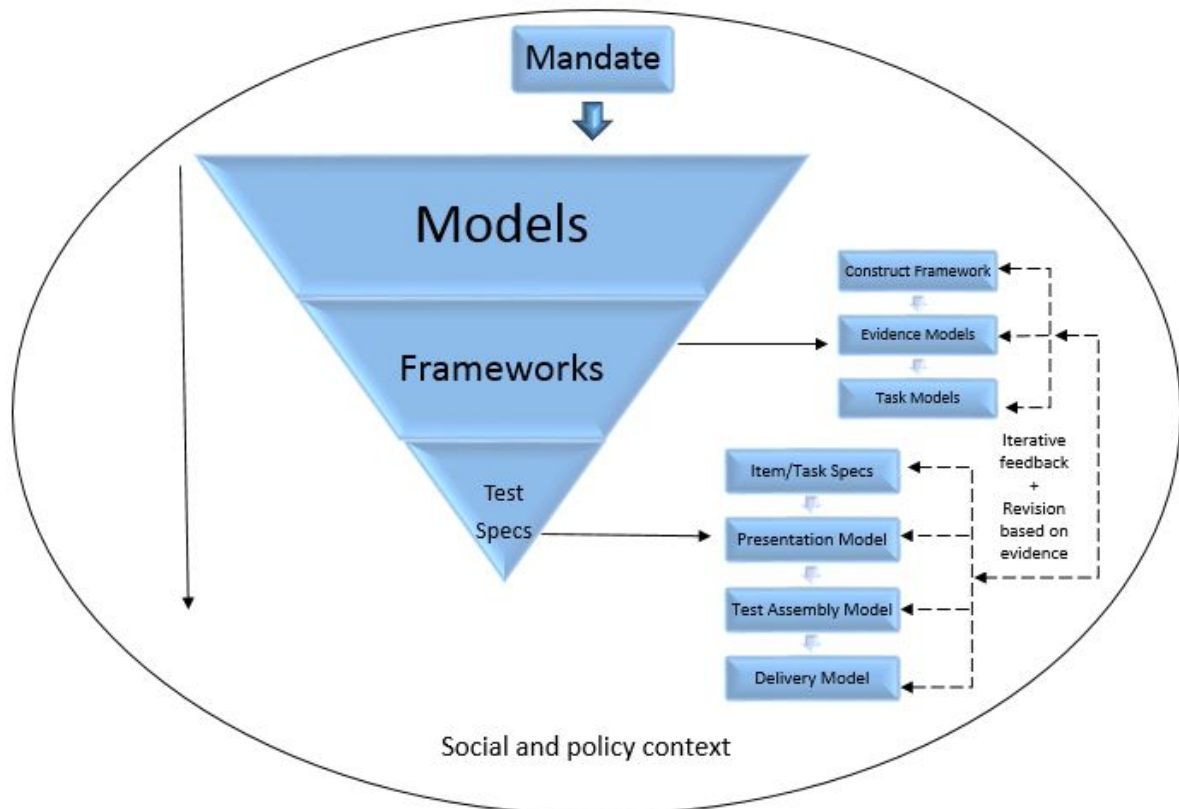


Figure 1. The test development process including layers and sub-layers of architecture documentation (adapted by Monteiro from Fulcher and Davidson, 2007, 2009)

Method

In terms of methodology and design, this qualitative study was organized in four sequential steps. The focus of the presentation was on Step 4, the validation of the matrix of construct specification, but an overview of Steps 1 to 3 is provided below.

Step 1: A systematic review of theoretical and empirical research

Step 1 consisted of a theoretical and empirical review and synthesis of the literature regarding three domains that are of relevance to RT communication within the context of aviation workplace, namely, English as a Lingua Franca (ELF), intercultural awareness/competence (ICA) and interactional competence (IC). The interfaces of Aviation

English and intercultural communications highlighted in Phase 1 of the larger multiphase mixed methods study (see Monteiro, 2018, 2019) and confirmed by the taxonomy of intercultural factors suggested points of contact with these other disciplines and served as a basis to guide the selection of studies to be included as part of the systematic review of theoretical and empirical research. First, I selected conceptual papers from each domain and then studies at the interface with Aviation English (AE). Some of these studies are organized in *Figure 2*.



Figure 2. Summary of studies included in the review of theoretical and empirical research

Step 2: Models of language use

All the readings considered in Step 1 made it possible to build different representations of the specific occupational context of international communications between pilots and ATCOs. Relevant features of each domain (AE, ELF, ICA and IC) that apply to the context of RT communications, and/or that could somehow have an impact on their outcomes, were

carefully chosen according to their importance to the context and suitability to build theoretical models. The criteria that guided the design of the models are based on comprehensiveness, interpretability and usefulness to support test development. As a result, these representations or models convey: (a) what is required for effective communication in the intercultural and highly specific context of RT – Model of the discursive space; (b) what affects the interaction between pilots and ATCOs in terms of fixed cultural frames of reference and emergent features – Model of the communicative demands of the RT occupational context; and (c) what needs to be included in a test to identify if a pilot or ATCO is ready to communicate successfully in intercultural RT communications – Model of the AE, ELF, ICA and IC overlap. In response to RQ 1, the three proposed models account for a wider range of competencies related to the communicative needs of pilots and ATCOs' occupational domain (see slides 8, 9, and 10 of the Workshop Presentation, in Additional Files; for a detailed explanation of the models, see Monteiro, 2019).

Step 3: Frameworks – Matrix development

In order to move from these models to the specification of a framework that maps the constructs considered to be relevant to the target language use (TLU) domain of pilot and ATCO interactions, the structure of the matrix was defined, specifically in what relates to the four key domains to be included, i.e., AE, ELF, ICA, and IC. Added to that, the aspects that would constitute the dimensions of interest, also drawn from the proposed models, were defined, namely the dimensions of awareness, attitudes, knowledge, and skills. Second, a synthetic organization (Li & Wang, 2018) of recurring themes and patterns emerging from the studies was conducted, followed by a categorization of components of the construct, i.e., relevant features of the RT context that pilots and ATCOs should be aware of, know, use appropriately, and display as attitude for successful intercultural encounters over the radio.

Finally, these components were organized according to their best fit to each domain and dimension intersection, generating the preliminary matrix of construct specification.

Although the components of the construct that populated the preliminary matrix were drawn from the models of language use and from theoretical and empirical studies addressing the communicative needs of pilots and ATCOs, it was necessary, as well, to give voice to domain experts in order to confirm such components as relevant to the specific context of RT communications. Thus, an initial group of stakeholders (e.g., language testers, English as a Second Language (ESL) teachers) contributed to the specification of the matrix. Their perceptions of what components should be included in the construct framework are highlighted in Appendix A: in bold, the ones that were already part of the draft matrix, and as underlined text, new components suggested by language testers and ESL teachers. In response to RQ 2, this preliminary matrix constitutes the specification of the construct from the *models* to a *framework*, aiming to inform test development.

Step 4: Frameworks – Matrix validation

An ESP perspective on construct definition takes into account the TLU's 'indigenous' assessment criteria (Douglas & Myers, 2000; Elder & McNamara, 2016; Elder et al., 2017; Fox & Artemeva, 2017; Jacoby & McNamara, 1999; Knoch 2014; Pill, 2016). Within international RT communication, these criteria should inform evaluation of the language proficiency requirements applied to this professional/workplace context. Jacoby & McNamara (1999) note the importance of "an insider's view" and point out that such a view is essential in identifying (and addressing) ". . . the complex issues involved in communicating competently" (p. 214) in a TLU domain.

Therefore, in Step 4 I moved to the validation of the matrix of construct specification with aviation stakeholders, aiming to elicit their perceptions of the communicative needs of pilots and ATCOs in the multicultural context of international radiotelephony and also to have

an idea of how important each construct component is, which is of crucial importance to LSP test design. Table 1 provides details of Step 4, including participants, instruments, procedures and analysis.

Table 1. Method used in the matrix validation (Step 4)

	Participants	Instruments	Procedures	Analysis
Step 4	128 aviation stakeholders: ➤ 20 NSs + 108 NNSs of English ➤ 52 males + 76 females ➤ 22 pilots 21 ATCOs 36 AE teachers 36 AE examiners 6 AE researchers 6 regulators 1 AE curriculum developer	Focus group discussions triggered by a scenario of authentic international RT communication and a set of six questions	Intra-group discussions – 26 groups: ➤ 13 multilingual ➤ 13 monolingual (audio-recorded and transcribed) Inter-group discussions (audio-recorded and transcribed)	<i>Nvivo</i> software 1st cycle: Provisional Coding (dimensions of AW, K, S, AT) Inter-coder reliability 2nd cycle: Provisional Coding (construct components)

Results and discussion

Coding of data yielded during the focus group discussions suggests the extent to which participants of the 26 groups accounted for the importance of aspects related to the four dimensions and also the four domains of interest. This information is crucial to inform test development. As it indicates the degree of importance or the weight of each cell in the matrix, it ultimately guides the test developer in the test assembly model to produce test forms, in such a way as to consider the “mix of items or tasks on the test that must be included in order to represent the domain adequately” (Fulcher & Davidson, 2007, p. 67). In terms of number of coding references, Table 2 provides the weighting of construct components based on these numbers.

Table 2. Weighting of construct components based on coding references

	AW	K	S	AT	Total
AE	189	160	165	552	1066
ELF	82	14	105	178	379
ICA	143	37	26	159	365
IC	9	14	123	30	176
Total	423 ^a	225 ^a	419 ^a	919 ^a	1986 ^a

Note: ^a Overlap counted.

As can be noted, the total number of coding references for each domain is included in the last column of Table 2 and decreases as it moves down from AE to IC. Regarding the four dimensions, one interesting finding is the greater number of references for the dimension of attitude (AT). While some authors consider awareness as being at the core of all four dimensions (e.g. Fantini, 2000), attitude may also be understood as putting one's awareness, skills and knowledge into practice.

In contrast to the previous discussion centered in the number of total coding references for each component of the construct, it is also important to note the number of focus groups in which a certain component was mentioned. This information gives us another perspective on the importance of such a component based on its spread across all groups. A list of the 26 construct components that were mentioned by the highest number of focus groups was organized in a table, applying a specific color to each of the four domains for ease of contrast and comparison: green for AE, blue for ELF, orange for ICA and pink for IC (see Table 2, slide 16 of the Workshop Presentation, in Additional Files). The table highlights the top ones in green, related to the domain of Aviation English: background knowledge, professional tone and attitude, compliance with rules and procedures, which are all related to the specific purpose language ability of this professional domain.

The process of coding during the Second Cycle disclosed that most components of the construct in the preliminary matrix were confirmed by aviation stakeholders, i.e., appeared in their discussions of the RT scenarios, and are highlighted in yellow in Table 3. Some

components not included in the preliminary matrix emerged during participants' discussions and are highlighted in blue. Based on the number of coding references, the four most relevant components of each cell of the matrix were identified and included in the final matrix.

Table 3. Final matrix of construct specification

Construct definition within the aviation radiotelephony domain				
	Awareness	Knowledge	Skills	Attitudes
Aviation English	<ul style="list-style-type: none"> - situational awareness (67) - group identities and authority gradients in aviation^c (50) - rules of use that characterize the domain^a (27) - threats presented by cross-cultural communications (19) 	<ul style="list-style-type: none"> - background knowledge (rules and procedures) (78) - standard phraseology (36) - plain English for the specific purpose of aeronautical RT communications (26) - communication as a Human Factor^b (6) 	<ul style="list-style-type: none"> - Crew Resource Management (CRM) (55) - language proficiency (ability to use the language) (45) - communicate effectively in routine and in highly unpredictable situations (39) - conflict management (12) 	<ul style="list-style-type: none"> - professional tone and attitude (195) - compliance with prescribed rules and procedures (e.g. use of phraseology, read back/hear back) (193) - assertiveness (87) - clarity, conciseness and correctness (37)
English as a lingua franca	<ul style="list-style-type: none"> - challenges faced by speakers of EFL and interlocutors' possible linguistic difficulties (34) - difficulty presented by the use of jargon, idioms, slang and colloquialisms (17) - the need to speak English as a lingua franca^d (17) - different varieties of English and speech communities (9) 	<ul style="list-style-type: none"> - nuances of the language (5) - language as a social practice (4) - one's own communicative style and the problems it could pose to ELF interactions (3) - characteristics of one's L1 phonology that may influence English pronunciation (2) 	<ul style="list-style-type: none"> - adjust and align to different communicative systems (new patters of phonology, syntax, discourse styles) (23) - eliminate ambiguous expressions and sentence patterns (21) - adapt linguistic forms to the communicative needs at hand (20) - self-repair, rephrase, paraphrase, and clarify (13) 	<ul style="list-style-type: none"> - patience (68) - collaborative behavior (45) - avoidance of any kind of superiority of one variety over another (39) - tolerance (12) - openness and humility to negotiate differences (12)
Intercultural Awareness/ Competence	<ul style="list-style-type: none"> - how the cultural background of participants can impact the complex and dialogic nature of their communications (58) - power distance (27) - gender expectations (17) - face concern (12) 	<ul style="list-style-type: none"> - what is involved in intercultural interaction (11) - potential threats posed by intercultural communications (11) - different cultural frames of reference (communication style, conflict management, face-work strategies, etc) (10) - how social groups and identities function (3) 	<ul style="list-style-type: none"> - move beyond cultural stereotypes and generalizations (11) - engage with and negotiate sociocultural differences (5) - engage with politeness conventions (5) - accommodate to difference and to multilingual aspects of intercultural communication (4) 	<ul style="list-style-type: none"> - politeness (90) - willingness to cooperate (25) - respect (20) - readiness to suspend disbelief about other cultures and belief about one's own (9) - willingness to relativize one's own values, beliefs, behaviors (9)
Interactional Competence	<ul style="list-style-type: none"> - shared responsibility for successful communication (5) - discourse as co-constructed among participants (3) - communication as 'a two-way negotiative effort' (1) 	<ul style="list-style-type: none"> - register specific to the practice (10) - an appropriate participation framework (3) - the processes we go through to solve communication issues (1) 	<ul style="list-style-type: none"> - deal adequately with apparent misunderstandings, by checking, confirming and clarifying (44) - use of communicative/interactional skills (36) - accommodate to the constraints of the context and perceived ability of the hearer (20) - declare non-understanding (9) 	<ul style="list-style-type: none"> - avoidance of intimidation and threatening behavior (10) - cooperation (9) - tolerance (6) - flexibility (4)

Note: ^aIn yellow, components of the construct confirmed by aviation stakeholders.

^bIn bold, components of the construct confirmed by language testers/EFL teachers.

^cIn blue, additional components of the construct suggested by aviation stakeholders.

^dAs underlined text, additional components of the construct suggested by language testers/EFL teachers.

Selected quotes from participants' comments provide a sense of the kind of statements that were made in support of particular construct components. Due to limitations of space, only a few are provided in this paper, but more examples can be found in Monteiro (2019).

Regarding the domain of AE, specifically in terms of attitudes, *compliance with prescribed rules and procedures* (e.g., *use of phraseology, read back/hear back, etc.*) was a recurring topic and deemed crucial also, or mainly, for native speakers of English: “Yes, I think what you said is ok, because they speak the same language, they are both native speakers, so I think they didn't care about the regulations, I don't know....phraseology” (M – FG 11 of 26 Scenario 1²⁸).

Within the domain of ELF, being aware of *the challenges faced by speakers of ELF* was considered important for effective communications, as cited by one of the participants:

Yes, they take for granted and they have, they need to have this awareness, that it's not just... they have to be involved in the whole process. They have to be involved not only in speaking, but also in receiving and understanding and trying to accommodate the necessity of specific communication that is being held in the ATCO-pilot situation. They need to know that on the other side they have a non-native speaker. They need to be aware that they can't just throw out their speech... (M – FG 23 of 26 Scenario 3)

In order to participate in international RT communications, it is essential to know *what is involved in intercultural interaction*, a construct component within the domain of ICA, and participants discussed issues related to the several layers of culture that affect the way an individual communicates, including gender expectations and professional culture, related to the concept of communities of practice : “There may be gender issues, male and female, and much

²⁸ Participants' comments are identified by the number of focus group and scenario analyzed, with an “M” or “F” indicating whether it was said by a male or female.

more likely a tribal issue, ATC tribal needs versus the pilot's community needs...some big issues there” (M – FG 1 of 26 Scenario 1).

Within the domain of IC, the need to *accommodate to the constraints of the context and perceived ability of the hearer* was also highlighted as a central skill in the international RT context, as the following example illustrates: “The end of the story was that we realized there was lack of accommodation on both parts, because the ATCO, who was the native speaker, could have accommodated, the pilot did not try to use any strategy to clarify or try to negotiate, because he could not understand, perhaps” (FG 14 of 26 Scenario 4).

Some components in the draft matrix were not mentioned in the focus group discussions or did not receive a lot of comments. Therefore, they do not appear in the final matrix. For example: i) AE: knowledge of “*language functions used in RT*”; ii) ELF: knowledge of “*different pragmatic norms for different contexts*”; iii) ICA: knowledge of “*causes and processes of misunderstandings between members of different cultures*”; and iv) IC: skills to “*build a sphere of ‘inter-subjectivity’ through collaborative efforts*”. However, they are also relevant for successful international RT communications. This may suggest that a greater awareness still needs to be achieved among those involved in RT communications.

Workshop Activities

As stated at the beginning of this paper, apart from presenting results from a research study on the development and validation of a construct framework to inform test development in the context of intercultural RT communications, the workshop also had the objective to create opportunities for discussions on how to apply the research findings to the development and implementation of training activities for pilots and ATCOs.

Participants

Two sessions of Workshop L were conducted during the conference. In the first, 24 participants engaged in the practical activities, whereas 22 participated in the second session.

A mix of language background was noted in the groups as well as a variety of professional expertise, including pilots, ATCOs, AE teachers, AE examiners, regulators, Human Factors specialists and researchers.

Materials

In each session, workshop participants were divided into four groups and each group received:

- a coloured handout including one domain of the matrix of construct specification (either AE, ELF, ICA or IC), with enough space to write suggestions and comments related to the four dimensions, i.e., awareness, knowledge, skills, and attitudes (see an example for the domain of AE in Appendix B);
- a white handout containing relevant definitions and a list of references that appeared during the workshop presentation (Appendix C).

Procedures

Workshop participants were organized in four groups and asked to read the extract of the matrix they received. Group 1 received the matrix related to Aviation English; Group 2, the matrix related to English as a Lingua Franca; Group 3, the one related to Intercultural Awareness/Competence; and Group 4 received the matrix related to Interactional Competence. The activity consisted of selecting at least one construct component from each cell of the matrix and discuss possible training activities directed at: i) raising awareness; ii) imparting knowledge; iii) developing skills; and iv) improving attitudes.

Contributions From Workshop Participants

Workshop participants' suggestions of training activities for pilots and ATCOs were organized into four distinct tables (see Tables 4, 5, 6, and 7), according to the specific domain of the matrix and the construct components selected by each group.

Table 4. Suggestions for training activities in the domain of Aviation English

Construct definition within the aviation radiotelephony domain				
	Awareness	Knowledge	Skills	Attitudes
Aviation English	<ul style="list-style-type: none"> - situational awareness (67) - group identities and authority gradients in aviation (50) - rules of use that characterize the domain (27) - threats presented by cross-cultural communications (19) 	<ul style="list-style-type: none"> - background knowledge (rules and procedures) (78) - standard phraseology (36) - plain English for the specific purpose of aeronautical RT communications (26) - communication as a Human Factor (6) 	<ul style="list-style-type: none"> - Crew Resource Management (CRM) (55) - language proficiency (ability to use the language) (45) - communicate effectively in routine and in unpredictable situations (39) - conflict management (12) 	<ul style="list-style-type: none"> - professional tone and attitude (195) - compliance with prescribed rules and procedures (e.g. use of phraseology, readback/hearback) (193) - assertiveness (87) - clarity, conciseness and correctness (37)
Group 1	<u>Threats presented by cross-cultural communications:</u> <ul style="list-style-type: none"> - Research and present case studies relating to language-related crashes 	<u>Standard phraseology:</u> <ul style="list-style-type: none"> - Video watching of real RT communications - Listen once without script, discuss, then listen again with transcriptions - Discuss what should have been said in standard phraseology (where appropriate), and how to improve it - Role-play with improved script 	<u>Communicate effectively in routine and in unpredictable situations:</u> <ul style="list-style-type: none"> - Establish the importance of keeping calm for effective RT communications - Role-play with vague details of a scenario to explain over RT communication, within a short time limit 	
Group 2	<u>Situational awareness:</u> <ul style="list-style-type: none"> - Listening activity: put a storyline in order 	<u>Communication as a Human Factor:</u> <ul style="list-style-type: none"> - The ability to clarify and correct even if you are L1 speaker, and understand when you have made a mistake 	<u>Communicate effectively in routine and in unpredictable situations:</u> <ul style="list-style-type: none"> - Lower level speakers: paraphrasing an emergency situation 	<u>Clarity, conciseness and correctness:</u> <ul style="list-style-type: none"> - Listening activity: the difference between standard phraseology and plain language, and which is most important

Table 5. Suggestions for training activities in the domain of English as a Lingua Franca

Construct definition within the aviation radiotelephony domain				
	Awareness	Knowledge	Skills	Attitudes
English as a lingua franca	<ul style="list-style-type: none"> - challenges faced by speakers of EFL and interlocutors' possible linguistic difficulties (34) - difficulty presented by the use of jargon, idioms, slang and colloquialisms (17) - the need to speak English as a lingua franca (17) - different varieties of English and speech communities (9) 	<ul style="list-style-type: none"> - nuances of the language (5) - language as a social practice (4) - one's own communicative style and the problems it could pose to ELF interactions (3) - characteristics of one's L1 phonology that may influence English pronunciation (2) 	<ul style="list-style-type: none"> - adjust and align to different communicative systems (new patterns of phonology, syntax, discourse styles) (23) - eliminate ambiguous expressions and sentence patterns (21) - adapt linguistic forms to the communicative needs at hand (20) - self-repair, rephrase, paraphrase, and clarify (13) 	<ul style="list-style-type: none"> - patience (68) - collaborative behavior (45) - avoid any kind of superiority of one variety over another (39) - tolerance (12) - openness and humility to negotiate differences (12)
Group 1		<p><u>Nuances of the language:</u></p> <ul style="list-style-type: none"> - Practical language – ellipsis (warmer: play short extract) - Going/around/cards – group matching (literal vs. metaphor/nuanced) - Listening for nuance (or reading) – discuss, complete worksheet with literal vs. metaphor <p><u>Language as a social practice:</u></p> <ul style="list-style-type: none"> - Captain talking to a colleague on diversion: <ol style="list-style-type: none"> a) Then has to come out and talk to passengers. Class as group of passengers – diffuse anger/anxiety (elicit from speakers; functional language; multi-cultural passengers on long haul; Monty Python video) b) Handling unruly passenger – class exercise role-play; then groups to discuss <p><u>One's own communicative style and the problems it could pose to ELF interactions:</u></p>		

		- Various YouTube videos (JFK, etc.): role-plays; honorifics (exercise)		
Group 2	<u>Difficulty presented by the use of jargon, idioms, slang and colloquialisms:</u> <ul style="list-style-type: none"> - Expose students to live RT communications (different nationalities and accents) - Use different vocabulary (idioms, slangs, etc) from different countries (*depending on the type of students in class) 		<u>Self-repair, rephrase, paraphrase, and clarify:</u> <ul style="list-style-type: none"> - Speaking activity – describe a routine scenario with an unexpected event - Role-play – reporting to supervisor - Picture description or listening to RT recordings and students paraphrase and clarify what they heard. 	<u>Collaborative behavior:</u> <ul style="list-style-type: none"> - Group activity – two groups of students are given instructions and the group has to work together to follow through and comply - Reverse role-play – pilots play the role of ATCOs and vice-versa - Intercultural exchange activity

Table 6. Suggestions of training activities in the domain of Intercultural Awareness/Competence

Construct definition within the aviation radiotelephony domain				
	Awareness	Knowledge	Skills	Attitudes
Intercultural Awareness/Competence	<ul style="list-style-type: none"> - how the cultural background of participants can impact the complex and dialogic nature of their communications (58) - power distance (27) - gender expectations (17) - face concern (12) 	<ul style="list-style-type: none"> - what is involved in intercultural interaction (11) - potential threats posed by intercultural communications (11) - different cultural frames of reference (communication style, conflict management, face-work strategies, etc) (10) - how social groups and identities function (3) 	<ul style="list-style-type: none"> - move beyond cultural stereotypes and generalizations (11) - engage with and negotiate sociocultural differences (5) - engage with politeness conventions (5) - accommodate to difference and to multilingual aspects of intercultural communication (4) 	<ul style="list-style-type: none"> - politeness (90) - willingness to cooperate (25) - respect (20) - readiness to suspend disbelief about other cultures and belief about one's own (9) - willingness to relativize one's own values, beliefs, behaviors (9)
Group 1				<p><u>Politeness:</u></p> <ul style="list-style-type: none"> - Conveying emotions through tone of voice (using a barrier between interlocutors) - Practice language strategies to handle different emotions <p><u>Respect:</u></p> <ul style="list-style-type: none"> - CRM training: switch roles within the aircraft <p><u>Willingness to relativize one's own values, beliefs, behaviors:</u></p> <ul style="list-style-type: none"> - Information gap – introduce an incident; predict what was said between crew members and over the radio
Group 2			<p><u>Accommodate to difference and to multilingual aspects of intercultural communication:</u></p> <ul style="list-style-type: none"> - Communication vs. cultural background – focus on something in common (e.g., procedures) and share - Lecture discussion - Simulation 	<p><u>Willingness to cooperate:</u></p> <ul style="list-style-type: none"> - Learn about each other's jobs followed by a discussion - Phraseology is politeness?

Table 7. Suggestions of training activities in the domain of Interactional Competence

Construct definition within the aviation radiotelephony domain				
	Awareness	Knowledge	Skills	Attitudes
Interactional Competence	<ul style="list-style-type: none"> - shared responsibility for successful communication (5) - discourse as co-constructed among participants (3) - communication as ‘a two-way negotiative effort’ (1) 	<ul style="list-style-type: none"> - register specific to the practice (10) - an appropriate participation framework (3) - the processes we go through to solve communication issues (1) 	<ul style="list-style-type: none"> - deal adequately with apparent misunderstandings, by checking, confirming and clarifying (44) - communicative/interactional skills (36) - accommodate to the constraints of the context and perceived ability of the hearer (20) - declare non-understanding (9) 	<ul style="list-style-type: none"> - avoid intimidating/threatening (10) - cooperation (9) - tolerance (6) - flexibility (4)
Group 1	<p><u>Shared responsibility for successful communication:</u></p> <ul style="list-style-type: none"> - Authentic recordings with miscommunication – identify it - Videos – NSs-NSs miscommunication - Situational awareness - Forum for ATCOs and pilots (e.g., Singapore) 	<p><u>The processes we go through to solve communication issues:</u></p> <ul style="list-style-type: none"> - Brainstorm techniques to say you don’t understand - Apply strategies - Rephrasing/using synonyms - Repairing miscommunications - Clarifying (paraphrasing) 		<p><u>Tolerance:</u></p> <ul style="list-style-type: none"> - Be respectful of others’ experiences <p><u>Flexibility:</u></p> <ul style="list-style-type: none"> - Ask for feedback along the way – how the exercises in a textbook can be applied to students’ particular contexts (airport, ground, tower, etc.)
Group 2	<p><u>Discourse as co-constructed among participants:</u></p> <ul style="list-style-type: none"> - Show real examples of RT communication - Case studies - Simulate scenarios - Role-plays 	<p><u>Register specific to the practice:</u></p> <ul style="list-style-type: none"> - Understanding RT phraseology, applying the correct usage of ICAO phraseology and adapting to the local environment 		

The proposed tasks represent brainstormed ideas, which can be expanded, modified, or incorporated into training materials based on specific training objectives, having the target audience in mind. A number of the proposed activities involve the use of authentic RT material to trigger discussions, simulations, recognition of communication clashes and how to improve the outcomes of interactions between pilots and ATCOs from different cultural backgrounds. Role-play tasks (and also reverse role-plays, where pilots exchange roles with ATCOs) were repeatedly suggested as a way to practice the use of interactional skills, strategies to solve communication issues, to accommodate to difference and show professional attitudes, to name a few.

This type of activity can be used either in teacher training courses, by engaging teachers in discussions on how to address specific construct components in the development of training materials, or in test development, by engaging test task designers in discussions on how to operationalize the components of the construct as test tasks.

Conclusion

Findings from the study revealed that some construct components overlap across the domains and dimensions, but more critically, a problem with one of them can be, many times, exacerbated by other issues specified in different cells of the matrix. This not only confirms the complexity of professional communication in a multicultural context, but also reinforces the narrow view of proficiency defined by the current ICAO LPRs, that is, the current language proficiency testing underrepresents the international RT communication construct. These results are substantiated by some scholars in the fields of LSP testing, intercultural communication and, more specifically, by other researchers investigating the domain of Aviation English. For example, Douglas (2000) argues that “when test content is highly specialized, and is based on complex concepts which are familiar to only a limited group of

language users, good language proficiency alone will no longer be sufficient for effective performance” (p. 34). Consonant with that, Kim (2012) states that “linguistically oriented criteria alone cannot capture the key aspects of communication in this professional setting” (p. 229) and adds that “the co-constructed nature of interactional competence is not at all reflected in the traditional linguistic-based ICAO rating scale. Interaction in the setting of air traffic control demands not just good language skills but also sufficient professional knowledge” (Kim, 2018, p. 420). What these quotes have in common is that they underscore the need to move from a language-only approach to a broader view of communicative competence in the occupational context of international radiotelephony. On top of that, when emphasizing the growing role of English as a lingua franca, Snow (2018) argues that “building effective intercultural communication skills is at least as important as building linguistic accuracy, if not more so” (p. 69).

In sum, study results signpost what is required for effective communication in the professional, specialized and multicultural context of aviation international radiotelephony: specific purpose language ability and background knowledge (AE), the need to speak English as a lingua franca and to adjust to the communicative needs at hand (ELF), to accommodate and negotiate sociocultural differences (ICA), and to solve misunderstandings between members of different cultures, while at the same time sharing responsibility for successful communication (IC). The development of this wider range of competencies applies to both first language (L1) speakers of English and those who speak English as a second (L2) or additional language. Consequently, exempting native speakers of English from being tested in their specific purpose language ability to communicate in international radiotelephony seems to go against the safety requirements of aviation.

Finally, in order to address the training needs of the next generation of pilots and ATCOs we need teachers that are mindful of the multiple factors that impact multicultural RT

communications in aviation. The workshop activities proved useful to raise workshop participants' awareness of what is relevant for communicative success in relation to the four domains of interest, i.e., AE, ELF, ICA and IC, across the dimensions of awareness, knowledge, skills and attitudes. Working collaboratively, participants engaged in discussions on how to apply these research findings to the development of practical training activities, which may support teachers in implementing what was proposed according to their students' needs.

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Appendix A – Preliminary matrix of construct specification

Construct definition within the aviation radiotelephony domain				
	Awareness	Knowledge	Skills	Attitudes
Aviation English	<ul style="list-style-type: none"> - rules of use that characterize the domain - safety-critical requirements for intelligibility^a, directness, appropriacy, non-ambiguity and concision - threats presented by cross-cultural communications - impact of communication on safety and efficiency - social and occupational context in which AE is used 	<ul style="list-style-type: none"> - standard phraseology - plain English for the specific purpose of aeronautical RT communications - syntactic structures and language functions used in RT - aviation lexicon - aviation phonetic alphabet and pronunciation of numbers - prosodic features of RT - background knowledge 	<ul style="list-style-type: none"> - apply speech transmitting techniques - use the linguistic features of AE meaningfully - communicate effectively in routine and in highly unpredictable situations - use strategic skills to deal with aviation personnel with different levels of expertise 	<ul style="list-style-type: none"> - compliance with prescribed rules and procedures (e.g. use of phraseology, read back/hear back) - discipline - professional tone and attitude - clarity, conciseness and correctness
English as a lingua franca	<ul style="list-style-type: none"> - different varieties of English and speech communities - challenges faced by speakers of EFL and interlocutors' possible linguistic difficulties - difficulty presented by the use of jargon, idioms, slang and colloquialisms - <u>the need to speak English as a lingua franca^b</u> - <u>language use and language processing</u> 	<ul style="list-style-type: none"> - language as a social practice - different pragmatic norms for different contexts - one's own communicative style and the problems it could pose to ELF interactions - characteristics of one's L1 phonology that may influence English pronunciation - <u>exposure to different international accents</u> 	<ul style="list-style-type: none"> - mediate and negotiate meaning - accommodate different accents and dialects - adapt linguistic forms to the communicative needs at hand - adjust and align to different communicative systems (new patterns of phonology, syntax, discourse styles) - self-repair, rephrase, <u>paraphrase</u>, and clarify - notice and repair breakdowns in communication - preempt misunderstanding - ascertain and deploy appropriate pragmatics 	<ul style="list-style-type: none"> - collaborative behavior - patience - tolerance - flexibility - openness and humility to negotiate differences - <u>avoidance of any kind of superiority of one variety over another</u>

			<ul style="list-style-type: none"> - <u>eliminate ambiguous expressions and sentence patterns</u> - <u>adapt speed and rate of speech</u> - <u>use auditory skills to perceive a wide variety of Englishes</u> 	
Intercultural Awareness/ Competence	<ul style="list-style-type: none"> - culture as having <i>a priori</i> elements (ethnic or cultural marking in communicative behavior) and emergent features (co-constructed in the moment of interaction) - impact of the cultural background of participants on the complex and dialogic nature of their communications - individuals with multiple membership in various cultural groups - importance of being a multilingual communicator - critical cultural awareness - <u>tone as a potential cause of cultural misinterpretation</u> 	<ul style="list-style-type: none"> - theories of cross-cultural communication - how social groups and identities function - different cultural frames of reference (communication style, conflict management, face-work strategies, etc) - what is involved in intercultural interaction - causes and processes of misunderstanding between members of different cultures - <u>potential threats posed by intercultural communications</u> 	<ul style="list-style-type: none"> - adjust (cultural) ways of speaking - apply and refine one's own cultural schemata - engage with and negotiate sociocultural differences - accommodate to difference and to multilingual aspects of intercultural communication - engage with politeness conventions - act as mediator between people of different cultural origins - analyze, interpret, and relate - acquire new knowledge of cultural practices and operate it in interaction - move beyond cultural stereotypes and generalizations 	<ul style="list-style-type: none"> -willingness to cooperate - respect - flexibility - openness - curiosity - readiness to suspend disbelief about other cultures and belief about one's own - willingness to relativize one's own values, beliefs, behaviors
Interactional Competence	<ul style="list-style-type: none"> - shared responsibility for successful communication - communication as 'a two-way negotiative effort' - discourse as co-constructed among participants 	<ul style="list-style-type: none"> - rhetorical scripts - register specific to the practice - patterns of turn-taking - topical organization - an appropriate participation framework - signaling of boundaries between practices - the processes we go through to solve communication issues 	<ul style="list-style-type: none"> - build a 'sphere of inter-subjectivity' through collaborative efforts - accommodate to the constraints of the context and perceived ability of the hearer - eliminate idioms, cultural references and syntactic complexity from speech - deal adequately with apparent misunderstandings, by checking, confirming and clarifying 	<ul style="list-style-type: none"> - cooperation - openness - flexibility - tolerance

			-attenuate unintelligible features of one's own speech	
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Note. ^a In **bold**, components of the construct confirmed by language testers/ESL teachers.

^bAs underlined text, additional components of the construct suggested by language testers/ESL teachers.

Appendix B – Workshop handout

ICAEA International Conference – Chiba, Tokyo/Japan – May 8-10, 2019

“Exploring the Aviation English training needs of ab-initio pilots and air traffic controllers, and aircraft maintenance personnel”

Workshop Title: From a language-only approach to a broader view of communicative competence for intercultural communications in aviation

Presenter: Ana Lúcia Tavares Monteiro

Organization: Carleton University (Canada) and ANAC (Brazil)

- a) Please write the number of participants in your group according to their roles. If anyone has overlapping roles, include him/her in the option that best represents his/her main activity:
() pilots () ATCOs () aviation English teachers () aviation English examiners/test developers
() researchers () regulators () Human Factors specialists () other: _____
- b) Please write the number of participants in your group according to their language background:
() English as L1 () English as L2/foreign language
- c) Do you consent to use your notes anonymously for research purposes? () Yes () No

Workshop activity: Applying research findings to the development and implementation of training

In groups, consider one domain of the matrix and discuss:

What practical activities would you suggest to:

- Raise **awareness**?
- Impart **knowledge**?
- Develop **skills**?
- Improve **attitudes**?

Choose at least one component from each cell of the matrix to brainstorm possible activities.

Turn the page and fill in the blank spaces of the table with your suggestions. Choose one member of your group to present your ideas. Please, return one completed table from your group to the presenter/researcher.

Thank you for your participation!!
If you have any further comment, do not hesitate to contact me at
anatavareshmonteiro@email.carleton.ca
ana.monteiro.icaea@gmail.com

Construct definition within the aviation radiotelephony domain

	Awareness	Knowledge	Skills	Attitudes
Aviation English	<ul style="list-style-type: none"> - situational awareness (67) - group identities and authority gradients in aviation (50) - rules of use that characterize the domain (27) - threats presented by cross-cultural communications (19) 	<ul style="list-style-type: none"> - background knowledge (rules and procedures) (78) - standard phraseology (36) - plain English for the specific purpose of aeronautical RT communications (26) - communication as a Human Factor(6) 	<ul style="list-style-type: none"> - Crew Resource Management (CRM) (55) - language proficiency (ability to use the language) (45) - communicate effectively in routine and in unpredictable situations (39) - conflict management (12) 	<ul style="list-style-type: none"> - professional tone and attitude (195) - compliance with prescribed rules and procedures (e.g. use of phraseology, readback/hearback) (193) - assertiveness (87) - clarity, conciseness and correctness (37)
1				
2				

Appendix C – Workshop handout: Definitions and references

ICAEA International Conference – Chiba, Tokyo/Japan – May 8-10, 2019

“Exploring the Aviation English training needs of ab-initio pilots and air traffic controllers, and aircraft maintenance personnel”

Workshop Title: From a language-only approach to a broader view of communicative competence for intercultural communications in aviation

Presenter: Ana Lúcia Tavares Monteiro

Organization: Carleton University (Canada) and ANAC (Brazil)

Definitions:

English as a Lingua Franca (ELF) – “an additionally acquired language system which serves as a common means of communication for speakers of different first languages” (Jenkins, Cogo & Dewey, 2011, p. 283).

Intercultural communicative competence (ICC) – “someone with Intercultural *Communicative* Competence is able to interact with people from another country or culture in a foreign language. They are able to negotiate a mode of communication and interaction which is satisfactory to themselves and the other and they are able to act as mediator between people of different cultural origins” (Byram, 1997, p. 71).

Intercultural awareness (ICA) – “a conscious understanding of the role culturally based forms, practices and frames of reference can have in intercultural communication, and an ability to put these conceptions into practice in a flexible and context specific manner in real time communications” (Baker, 2011, p. 202).

Intercultural communication: A discourse approach – “Each of us is simultaneously a member of many different discourse systems. We are members of a particular corporate group, a particular professional or occupational group, a generation, a gender, a region, and an ethnicity. As a result, virtually all professional communication is communication across some lines which divide us into different discourse groups or systems of discourse” (Scollon & Scollon, 2001, p. 3).

Interculturality - “a phenomenon that is not only interactionally and socially constructed in the course of communication but also relies on relatively definable cultural models and norms that represent the speech communities to which the interlocutors belong” (Kesckes, 2014, p. 14).

Culture is “neither relatively static nor ever-changing, but both” (Kesckes, 2014, p. 4). He argues that culture has a priori elements (ethnic or cultural marking in communicative behavior) and emergent features (co-constructed in the moment of interaction), which should be combined to approach culture in a dialectical and dynamic way (p. 5).

Interactional competence (IC) – Kramsch (1986) states that “successful interactions presupposes not only a shared knowledge of the world, the reference to a common external context of communication, but also the construction of a shared internal context or ‘sphere of inter-subjectivity’ that is built through the collaborative efforts of the interactional partners” (p. 367).

In addition, Roever and Kasper (2018) state that “in any activity, at any moment, participants calibrate interactional methods and resources to the interactional goals and circumstances at hand. Their IC allows them to deploy these methods for local, context sensitive and practice specific use (Young & Miller, 2004) and the achievement of mutual understanding” (p. 334).

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Perspectives and Implications of Language Issues of Non-Native Speakers: A More Specialized Analysis of Ab-Initio Pilots Learner Language

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Abstract

The significant increase in the demand of pilots estimated for the upcoming years brings along several challenges in effective language training, especially in what it involves non-native speakers of English. The issuance of operational level 4 should closely observe the mastering of basic ICAO skills, namely vocabulary, structure and pronunciation, which should not be underrated or disregarded upon more pragmatic skills. The article addresses the most common language problems concerning structure and pronunciation extracted from a list based on ab-initio pilots' oral production in order to promote reflection and discussion about perspectives and implications of these specific issues in aviation safety. It aims to offer data with reference to some specific language problems that should be addressed when designing curriculum, most specially, to the non-native English-speaking ab-initio pilots, as well as to promote a reflection on the impact that these issues might take within a framework of analysis that proposes language as a (human) factor in aviation safety.

Introduction

The 2019 ICAEA Conference held in Tokyo aimed at exploring the Aviation English (AE) training needs of ab-initio pilots, air traffic controllers and aviation personnel, considering the industry growth and the increasing need of non-native speaking professionals. One of the sessions promoted the theme “Equipping ab-initio pilots and controllers with language skills for operational training” and, in this direction, I had the opportunity to deliver a workshop entitled “Perspectives from Language Issues of Non-Native English Speakers: A More Specialized Analysis of Ab-initio Pilots Learner Language”, which is the baseline to this

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article.

Doc 9835 (ICAO, 2004) features a pyramid with six skills that should guide the teaching, learning and assessment of the use of the English language in aviation.

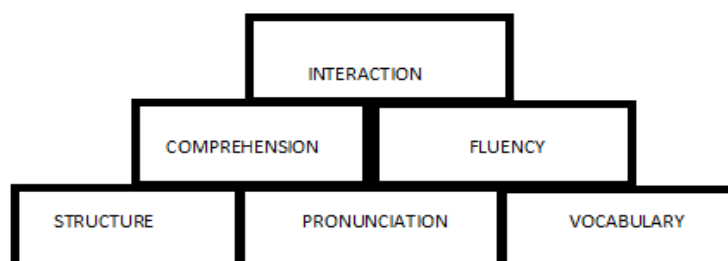


Figure 1. A pyramid structure of language proficiency

Structure, pronunciation and vocabulary are placed at the bottom because they are the basic elements of language that need to be mastered for someone to develop comprehension and fluency skills. Interaction is at the top – it is the actual result of the operation of all the other skills put together when aviation professionals engage in conversation (Pacheco, 2019).

If we understand competence as the knowledge that speakers have of their language and performance as their linguistic behaviour (Chomsky, 1965; Widdowson, 1996), we could say that the bottom skills reflect competence and the top skills could be associated to language performance. As there seems to be a consensus that Aviation English has an emphasis on content, not form (that is, it is essentially about the linguistic interaction of aviation personnel), there is a tendency to focus on the top skills both in teaching and assessment. However, the skills are featured in a pyramid, and as such, it should be understood that the bottom skills – structure, vocabulary and pronunciation, could not be taken for granted due to the fact that interaction will only be successful if the basic language elements are well developed.

This poses a challenge to professionals who are supposed to teach and assess the language used in aviation: Exactly to what extent should norms of English language grammar, vocabulary and pronunciation be taught and/or assessed? If we conceive AE within the

framework of English as a Lingua Franca (EFL) (Jenkins, 2006; Mackenzie, 2014; Estiva, Farris, & Molesworth, 2016), there is an agreement that “understanding each other” is our target despite minor structure or pronunciation issues. Yet, how can we reach an agreement as to what exactly should be taught or assessed that could have a significant impact on safety?

Given the growing necessity of non-native English-speaking pilots in the aviation market, prospected by Boeing (2019)³⁰ to reach 804.000 pilots by 2018, the need for specialized language training requires a more attentive look at the language acquisition process and at the elementary language problems of those subjects.

Learner Language is a powerful source of information (Swan & Smith, 2001). Ellis and Barkhuizen (2005) state that the oral and written production of learners should be the primary data for the study of L2 acquisition and that competence can only be examined by performance. Corpora are formally organized data sets that can allow the analysis of learner language and, in the view of Sylviane Granger (2002, 2010) are “a yardstick to measure the distance between learner performance and target language”, who also adds that research with learner corpora makes it possible “to outline learner needs, teaching objectives and teachability, and what you are going to select or ignore”.

Pacheco (2010) outlines the developmental stages of the acquisition of grammatical morphemes of English as a Second Language. She conducted a study based on BELC-Brazilian English Learner Corpus, a data base with more than 103.000 words that she organized from written texts produced by Brazilian learners of English as a foreign language from eight different levels of proficiency.

Based on these views and mostly on the belief that teachers must always be focusing on their students’ problems in order to have better tools to help them, the Aviation English Learner Corpus (AELC) is being elaborated, based on the language production of ab-initio

³⁰ <https://www.boeing.com/commercial/market/pilot-technician-outlook/>

pilots in the Aeronautical Science Program.

The original intention was to record all the students' production and organize it in a way to allow further contextual analysis. However, due to research constraints such as financial support, lack of personnel and time, the learner information is currently limited to lists which were built from the “debriefings” of oral presentations.³¹

Students in the Aeronautical Science Program offered by the Pontifical Catholic University of Rio Grande do Sul have to take four Aviation English courses - namely *Inglês Aplicado à Aviação* I, II, III and IV, which start from the intermediate level of proficiency in order to reach the advanced level until the end of the program. Throughout three years, students have the chance to build and improve their language skills along with their aeronautical knowledge. In order to be approved in the language courses, students must go through two oral tests every term, that range from oral presentations about academic articles, airports, airlines and accidents/incidents caused by miscommunication to mock interviews. Students are usually very attentive to their grades and want a punctual feedback after their performance. This is why a “debriefing sheet” was created – so that they can have access to the most observations or suggestions on language issues that can be improved.

Data

Data were gathered until December 2018 from a total of 781 debriefing sheets, which were organized in four lists – one for each course, displaying errors³² regarding STRUCTURE, PRONUNCIATION and VOCABULARY domains. An example of a list is featured below:

³¹ Data were collected and analyzed only by Prof. Aline Pacheco.

³² We understand “errors” as forms that are not considered commonly standardized in the English Language.

N	Structure	Type	N	Pronunciation	Type	N	Vocabulary	Type	Line
3	<i>builded</i>	InfIOR	4	<i>Put</i> /ʌ/	uS		<i>simplificate</i>		1
	<i>It was necessary put</i>	InfTO	4	<i>Construction</i> /u/	uS		<i>evolutioning</i>		2
	<i>Allow the water increase</i>	InfTO	17	<i>World/word/</i>	LS		<i>Parents (relatives)</i>		3
	<i>Ground level don't change</i>	InfI3rd	3	<i>Region</i> /redzən/	eS		<i>The fly had to continue</i>		4
5	<i>The both</i>	EWArt		<i>Consumption</i> /u/	uS		<i>Are considered</i>		5
4	<i>Depend of</i>	WWP		<i>Growing</i> /a/	oS		<i>comparation</i>		6
	<i>You need construction</i>	WWN	14	<i>Largest/largest/</i>	gS		<i>The flies that were chosen</i>		7

Table 1. List 1 – Aviation English I excerpt

The analysis conducted with all the data available proposed 56 types of errors pertaining to structure and 26 to pronunciation. Vocabulary errors have not been analyzed due to time constraints.³³ The following table shows the total number of occurrences distributed by levels.

	AE I	AEII	AEIII	AEIV	TOTAL
STRUCT.	471	292	708	485	1956
PRONUNC.	317	144	263	51	775
Total of Debriefings	258	142	254	127	781

Table 2. Total Occurrences and Levels

We aim at 400 debriefings for each level, so that we can also have the chance to expand the scope to the analysis of the developmental stages of acquisition, for example. As prospective research projects, we plan on conducting (i) comparative studies with professional Brazilian pilots or (ii) pilots who are speakers of other L1s and comparative studies with data from CORPAC (Corpus of Pilot and ATC Communications).³⁴

The information supporting this study has been gathered along three years (2016-2018) and, as previously noted, is part of the assessment in regular academic courses. Performing

³³ Yet, a preliminary outlook showed they account for few occurrences compared to the other two categories and seem to be related to transfer from Brazilian Portuguese.

³⁴ This is a corpus I have been elaborating since 2016 at PUCRS with João Cavallet, based on transcriptions of real emergency situations from a publicly available source called VASAVIATION.

these tests, the repetition of the same kinds of language problems has always been intriguing – students in the same level tend to make similar errors or to have similar issues, but within an English for Specific Purpose framework, it may be more clearly observed. This is particularly one of the main motivations for the study: If we have a more specific picture of students' language needs, we are better prepared to deal with them, mostly concerning curriculum design.

Issues regarding structure totaled 1976 and were labeled according to 56 types. They ranged from Inflection problems – lack of inflection or inflection overuse, to lack of words like prepositions, articles, among others. After calculating the total occurrences for each type and level, the ten most frequent errors were selected:

Order	Code	AEI	AEII	AEIII	AEIV	Total
1	Infl3rd- Inflection 3rd person	73	32	55	105	265
2	InflPa - Inflection Past Simple	16	25	160	42	243
3	PIOu - Plural Overuse	45	32	47	21	145
4	InflBE - Inflection Verb TO BE	37	24	53	26	140
5	InflOu3 – Inflection Overuse 3rd p	42	24	26	28	120
6	WWPn – Wrong Word Pronoun	46	23	20	27	116
7	WWP – Wrong Word Preposition	16	7	23	18	64
8	InflOuPa – InFlection Overuse Past	14	15	31	2	62
9	WWN – Wrong Word Noun	3	6	30	21	60
10	WWArt – Wrong Word Article	11	14	18	6	49
	Total					1264
56	Total of Occurrences	381+90 =471	246+46 =292	638+71 =708	445+40 =485	1956
	Total of Debriefings	258	142	254	127	781

Table 3. Ten most frequent Structure errors distributed in levels of proficiency in the Aeronautical Science program

A surprising fact was that they accounted for 64,62% of the total number of structural errors – the other 35,42% related to 46 types of problems. Although we predicted students would feature similar language problems, we did not expect such conciseness. The following pie chart offers a better image of this outcome.

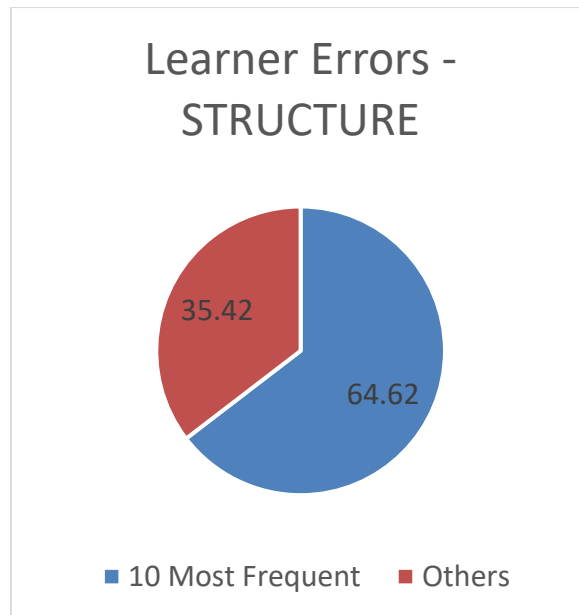


Chart 1. Distribution of Structure Errors

In the following graph, it is possible to see the types of errors distributed according to the percentage of occurrences.

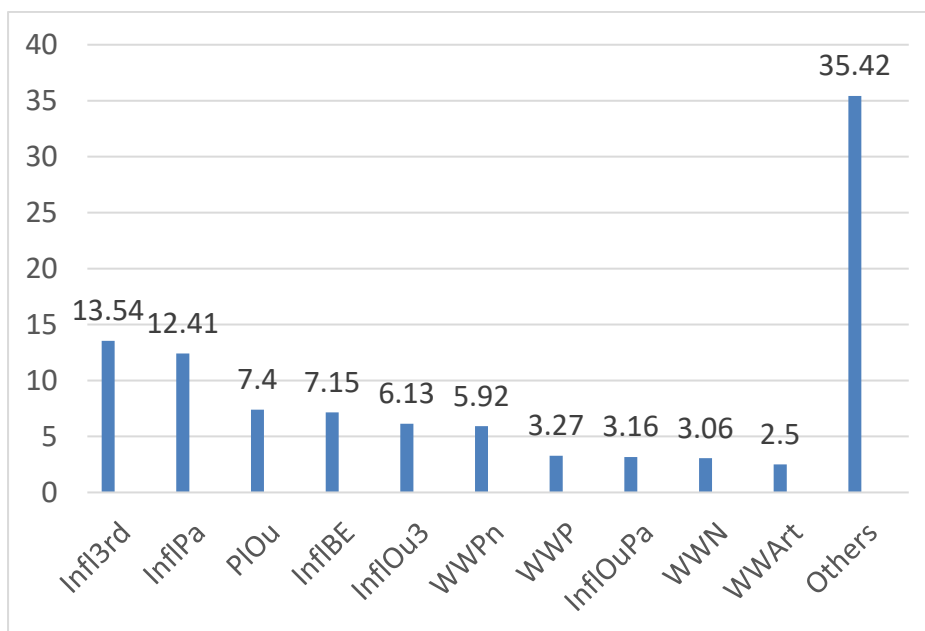


Chart 2. Percentage of Structure Errors

As for pronunciation, data point to the same direction: 26 types of errors were identified, the five most frequent were selected and they accounted for 62,32% of the occurrences, leaving the other 21 types to account for 37,67%, as shown below:

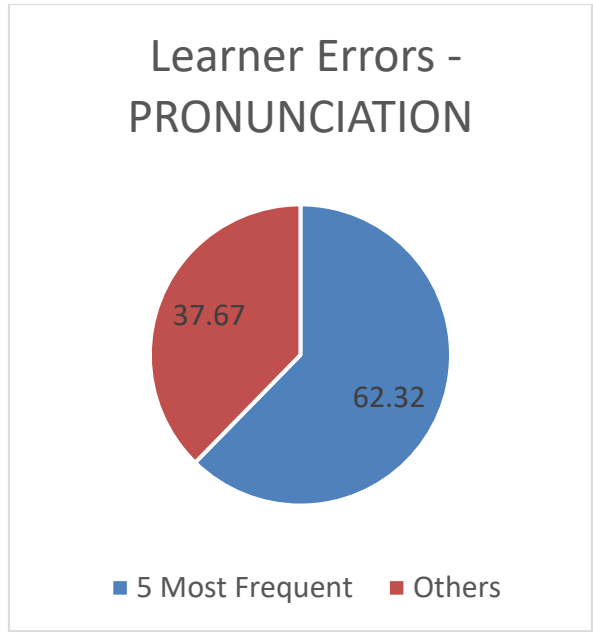


Chart 3. Distribution of Pronunciation Errors

The following images offer a better picture of the specific pronunciation issues marked by students:

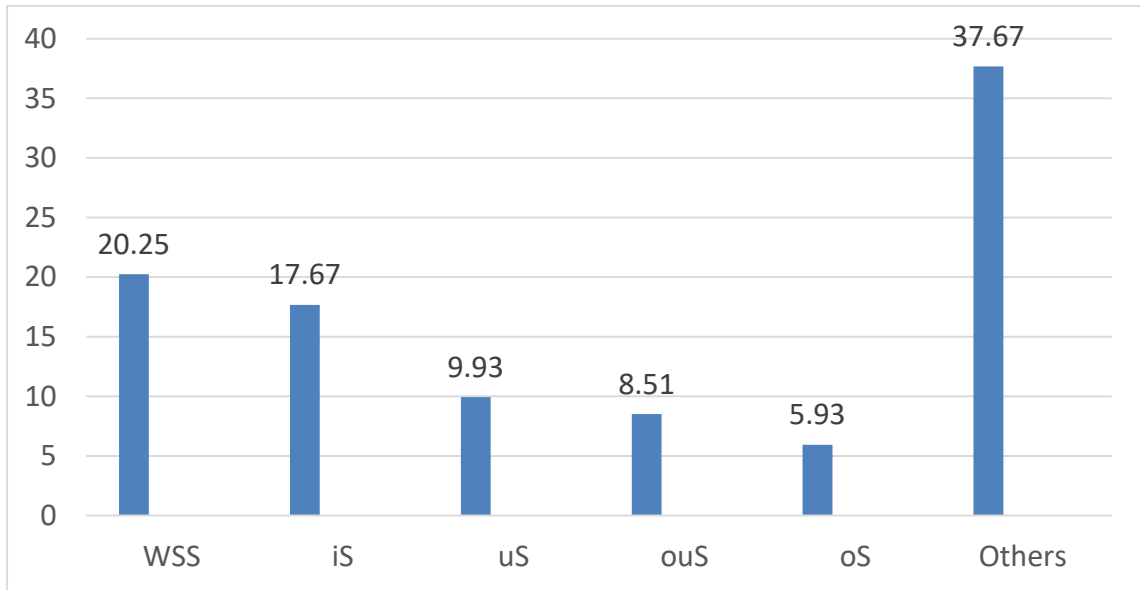


Chart 4. Percentage of Pronunciation Errors

Order	TYPE	AEI	AEII	AEIII	AEIV	Total
1	WSS Wrong Stressed Syllable	71 22.39%	25 17.36%	48 18.25%	13 25.49%	157 20.25%
2	iS I sound	37 11.67%	32 22.22%	58 22.05%	10 19.60%	137 17.67%
3	uS U sound	30 9.46%	12 8.33%	32 12.16%	3 5.88%	77 9.93%
4	ouS ou Sound	19 5.99%	23 15.97%	19 7.22%	5 9.80%	66 8.51%
5	oS O Sound	29 9.14%	7 4.86%	7 2.66%	3 5.88%	46 5.93%
	TOTAL	186 58.67%	99 68.75%	164 62.35%	34 66.66%	483 62.32%
	Others	131 41.32%	45 31.25%	99 37.64%	17 33.33%	292 37.67%
	Total of Occurrences	317	144	263	51	775
	Total of Debriefings	258	142	254	127	781

Table 4. Percentage of Pronunciation Errors distributed by levels

Perspectives

Data gathered from the debriefings confirmed that student-pilots in the Aeronautical Science Program tend to present quite similar language issues, surpassing expectations, which is very positive when envisioning better teaching practices and curriculum design. Notwithstanding, it poses another challenge: How significant are those language issues to aviation safety? In other words, to what extent would these structure and pronunciation problems be considered a potential threat if/when committed in a risky aeronautical communication scenario?

If we, professionals involved in the Aviation English context, could reach a finer agreement on those forms, we would have more effective tools to better guide pilots, whether in teaching or assessment.

The idea was proposed as a discussion in two workshop sessions and participants were tagged according to their professional performance (pilot, ATC, teacher/trainer, rater, other) and required to answer the following question in various moments - individually, in groups with their peers, in mixed groups and, at last, individually again:

“How would you rate the following errors? ³⁵

VS – Very significant

S – Significant

NS – Not significant”

More specifically, the question addressed how potentially threatening the following language issues are to cause breakdown in a problematic communication scenario in aviation – the exchange between Native (NES) and Non-native English speakers (NNES) or NNES and NNES. For instance, a Brazilian pilot flying for a Chinese Airline over Russian airspace, sharing the cockpit with a French pilot – what is the impact of linguistic noises? ³⁶

Below, we present two tables with the most frequent errors and examples extracted from the lists, which were the support for the discussions.

<i>Error Type - STRUCTURE</i>	<i>Examples</i>
1. INFL3p (Inflection 3rd person)	“The airport have...” “ where the procedure occur” “ when the light touch the ground “ “GRU airport know that” “The airport no have limits”
2. INFLPA (Inflection Past Simple)	“The pilot decides for...” “The company not participated” “He take the control” “We have to enter a holding pattern” “The airport not opened...”
3. PlOu (Plural Overuse)	“feets” “ a lot of mens and womens” “17 millions peoples” “aircrafts” “some informations”
4. InflBE (Inflection BE)	“These programs is” “They was the first company” “How people is affected” “ Some hubs which is far” “Operations was interrupted”
5. InflOu3rd (Inflection Overuse 3rdp)	“They goes” “They doesn’t operate” “Problems occurs because...” “All the airlines that appears..” “They has the number”
6. WWPn (Wrong Word Pronoun)	“His operations are...” (the company’s) “Your routes could be...”(the company’s) “He collided with the mountain “(the plane)

³⁵ A worksheet was provided and is made available in the Appendix of this article.

³⁶ “noise”: anything that interferes with communication, eg., mispronunciation, syntactic misconstructions, wrong word choice.

	“Qantas bought ... planes for her...” “Airports who have...”
7. WWP (Wrong Word Preposition)	“for save the company” “in the runway” “In this day” “Instead to say” “To be on Ryanair”
8. InflOuPa (Inflection Overuse Past)	“It started to came down” “The tower did not understood” “We could heard” “...Didn’t found more...” “He started to took off”
9. WWN (Wrong Word Noun)	“Everyone can be more safety” “I will flight/I didn’t flight a lot” “ I choice for this” “The company must management” “It’s very danger if you”
10. WWArt (Wrong Word Article)	“The Fraport...” “A alternate” “the both aircraft” “The Ryanair airlines/The Air China” “A airlines/A Airbus”

Table 5. Examples of the Ten Most frequent Structure Errors

<i>Error Type- PRONUNCIATION</i>	<i>Examples</i>
1. WWS (Wrong Stressed Syllable)	Deve’lop(ed) Ins’t rument Ma’nage Pa’ssengers ‘control Moni’toring
2. iSound ³⁷	S <u>i</u> nce /aɪ/ C <u>r</u> isis /ɪ/ F <u>i</u> nancial /ɪ/ E <u>n</u> gines /aɪ/ I <u>L</u> S /ɪ/
3. uSound	P <u>u</u> t /ʌ/ P <u>u</u> sh /ʌ/ In <u>str</u> ucted /ʊ/ Occ <u>ur</u> red /ɪʊ/ U <u>rg</u> ent /ɪʊ/
4. ouSound	S <u>ou</u> th /oo/ R <u>ou</u> tes /oo/ C <u>ou</u> ntry /aʊ/ S <u>ou</u> rce /ʌ/ M <u>ou</u> ntains /oo/
5. oSound	L <u>o</u> wer /aʊ/ O <u>th</u> er /oo/ C <u>o</u> st /oo/ A <u>ll</u> ow /oo/ A <u>bo</u> ve /oo/

Table 6. Examples of the Ten Most frequent Pronunciation Errors

³⁷ It is important to remark that what is meant by “sound” as in “iSound” is all phonetic manifestations of the letter “I”.

Participants got really engaged into the discussion, which was the goal of the workshop and very fruitful in the sense of promoting reflection from different perspectives. Some aspects can be highlighted:

- When in “Peer groups”, attendees apparently followed a similar line of reasoning. Yet, when in “mixed groups”, discussions were more intense and collaborative, which, on several occasions, caused individuals to change their minds on the significance of the error.
- teachers/trainers seemed to find certain errors more threatening than pilots or ATCOs.
- The lack of context in some cases made it harder to analyze the error.³⁸
- Attendees seemed to be familiar with most errors regarding structure, but not so much with the ones about pronunciation. This fact poses another challenge to be pursued in research: How similar can aviation English learners from different L1s/nationalities be? Do they tend to have similar problems or errors could mostly be attributed to first language interference?

Although all the attendees were truly involved in the discussions, most participants did not manage to answer the worksheet appropriately, which compromised an accurate number to be considered as the results. The answers that reflect the group discussions are also incomplete, and not all participants returned the worksheet.³⁹

However, we decided to include in this article the numbers that we have in order to provide the reader with some views of different aviation professionals on the subject.

³⁸ Error analysis is much easier when tied to a detailed context. However, since aviation communication is a high stakes environment and not all the threatening scenarios can be predictable, we decided to propose a kind of analysis in which attendees would be free to think about a suitable scenario.

³⁹ The original intention of the workshop was fully attained - to have the participants discuss their different perspectives. It was not originally intended as a formal study with results – e.g. participants have not been requested to fill out a consent form.

STRUC.	INDIVIDUAL ANSWERS																	
	TEACHER (14)			PILOT (3)			ATCO (4)			RATER (2)			OTHER (4)			NOT SPECIFIED (7)		
	VS	S	NS	VS	S	NS	VS	S	NS	VS	S	NS	VS	S	NS	VS	S	NS
Infl3rdp	0	1	13	0	0	3	0	0	4	0	0	2	0	0	4	0	2	5
InflPa	2	8	4	1	0	2	3	0	1	0	1	1	0	3	1	5	2	0
PIOu	1	6	7	0	0	3	0	0	4	0	1	1	0	0	4	1	1	5
InflBe	0	6	8	0	0	3	0	2	3	1	0	1	1	1	2	0	4	3
InflOu3	2	4	8	0	1	2	1	2	1	1	0	1	0	2	2	0	6	1
WWPr	5	6	3	1	1	1	1	1	2	0	2	0	3	1	0	3	2	2
WWP	5	3	5	0	2	1	1	1	2	0	2	0	1	1	2	4	2	1
InflOuPa	2	3	8	0	0	3	2	0	2	0	0	2	1	2	1	2	1	5
WWN	6	7	0	0	1	2	1	3	0	0	1	1	2	2	0	3	3	1
WWArt	1	5	7	0	0	3	0	2	2	0	0	2	0	3	1	2	0	5

Table 7. Individual Ratings regarding Structure (Preliminary Results)

PRON.	INDIVIDUAL ANSWERS																	
	TEACHER (10)			PILOT (3)			ATCO (4)			RATER (2)			OTHER (5)			NOT SPECIFIED (5)		
	VS	S	NS	VS	S	NS	VS	S	NS	VS	S	NS	VS	S	NS	VS	S	NS
Wrong Stressed Syllable	5	3	2	1	0	2	2	0	2	1	0	1	1	3	1	3	1	1
iS	4	6	0	1	0	2	2	2	0	1	1	0	1	3	0	2	2	1
uS	1	7	2	0	1	2	2	2	0	1	1	0	1	1	1	2	2	1
ouS	3	6	1	0	1	2	2	1	1	1	1	0	1	1	2	1	3	1
oS	2	6	1	1	0	2	2	2	0	1	1	0	1	3	0	2	2	1

Table 8. Individual Ratings regarding Pronunciation (Preliminary Results)

The above results are clearly not conclusive, especially due to the very few responses registered. Nevertheless, it is possible to remark that:

- Pronunciation problems seem to have been considered more threatening than structure problems overall;
- Teachers, as the majority of the participants who registered the results (and likely the majority to attend the workshops) tend to consider the language issues more significantly threatening than pilots (and other professionals);
- Regarding “Structure”, InflPa (Inflection Past Simple) and WWPr (Wrong Word Pronoun) seem to have been considered more threatening by all professionals compared to the other errors.

- As for Pronunciation, WWS (Wrong Stressed Syllable) seems to have been analyzed consensually as a problem.

As we can see, there is still a lot to be done. The original objective of the workshop was attained, and it opened an array of possibilities in order to deepen specific information about the judgement on the relevance of language issues.

Implications

Mathews suggests a pyramid for where “research” is placed at the bottom as a base for all kinds of actions towards the use of language for aviation safety (Pacheco, 2019). In order to have a clearer picture of what to research, she also offers a taxonomy that outstands language as a factor in the investigation of accidents or incidents.

Language is a fundamental component of communication and, as such, is intrinsically associated to human factors, defined in DOC 9683 as *“an understanding of the predictable human capabilities and limitations and the application of this understanding are the primary concerns of Human Factors.”* (p. 1-1-2)

The below image depicts, in a simple way, language as a factor in communication.

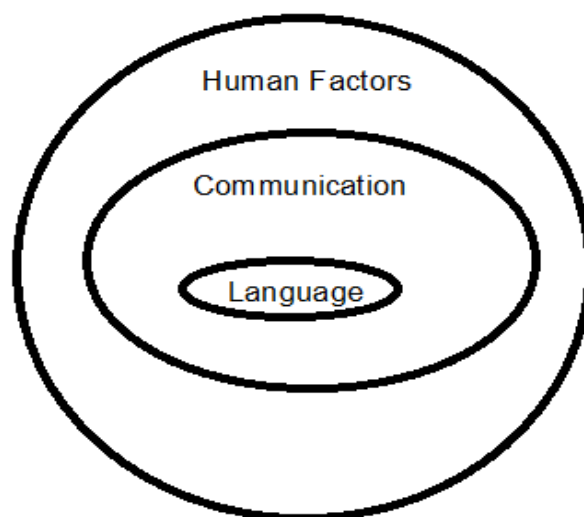


Figure 2. Language as a Human factor (the author)

Historically, it has been comprehended by the term “communications”, which

undermines its potential (Mathews, Pacheco, & Albritton, 2019).

The idea is to reinforce the impact of specific language issues in communications. Language is taken for granted and underrated given the growing demand of pilots and aviation professionals in general.

If we could improve the scope of specific language problems and how they might affect aviation safety, we would have better tools to design curriculum and deal with the core problems that might cause miscommunication.

Hence, “Language as a Human Factor in Aviation”, or LHUFT, is a perspective of analysis and also a Research Center at Embry-Riddle Aeronautical University, which “aims to support improved aviation safety through better understanding of the issues around language and culture in flight safety.”⁴⁰ This study is intrinsically associated with this proposal as it offers data supported by academic research that can be used for curriculum design.

It is not an easy task to rate uncontextualized language occurrences, especially in such a constrained language environment as aviation. The context of the utterance allows for a much broader analysis in what it offers precious information for a more pragmatic account.

However, if we think about the need for research that approaches specific language problems featuring structure and pronunciation having in mind accident or incident analysis, we see that having particular language issues can be a contribution to curriculum design. In other words, if we think about the implications that certain errors may have in aviation safety, we realize that we lack studies both about accident or incident investigation and about the impact that certain language problems may have in these events.

Let us take the example of a sentence from the Avianca 052 episode. The co-pilot said, “*We run out of fuel*”, and the structural error due to the lack of tense markers clearly contributed to the tragic outcome of the event. We understand that he was trying to mean “we are running

⁴⁰ <https://commons.erau.edu/db-lhuft/>

out of fuel” but did not manage to inflect it appropriately. As is, the sentence does not communicate much if we understand that Present Simple is used to express routine situations. One can say that it would only be correct in a context in which the pilots might want to express that running out of fuel is something usual, which is not supposed to be frequent in aviation. So, context is indeed relevant to a broader analysis, but specific language errors cannot be disregarded even if they do not have a context in the moment of the analysis because they are still errors, and as such, can be interpreted erroneously in a scenario that we would never set up before.

Tenerife, the most classical example of how language issues can ultimately trigger a tragedy, is also an illustration of this point. The sentence “*at takeoff*”, if analyzed in isolation, can only mean “at takeoff point”, as understood by the controller. Even aware that contextual clues are essential for successful communication, we understand that they do not dismiss the need to train aviation professionals as best as we can in order to avoid possible communication breakdowns.

That is, aviation people make use of a lot of communication strategies in order to attain mutual understanding even with structural and pronunciation problems considering the diversity of speakers’ language background. Aviation English is used as a Lingua Franca by native and non-native speakers of English. Yet, aviation safety can be harmed if sentences are context-dependent in the sense that we must always rely on the context to understand tense marks - we cannot assume that errors will always be understood and clarified by contextual clues.

The point here is not to enforce aviation English lessons that focus on grammar rules and strict pronunciation practices, but not to disregard basic English language features regarding structure and pronunciation that ensure mutual understanding because learners seem to master the routine of aviation communications and are under the pressure of having hold an

ICAO language proficiency operational Level 4. The ICAO skills are displayed in a pyramid and, because of that, the bottom skills must support the top ones.

Through the framework of Jeremy Mell’s adaptation of the Swiss Cheese Model - as below, we should not allow certain language problems to be ‘a hole in the cheese’.

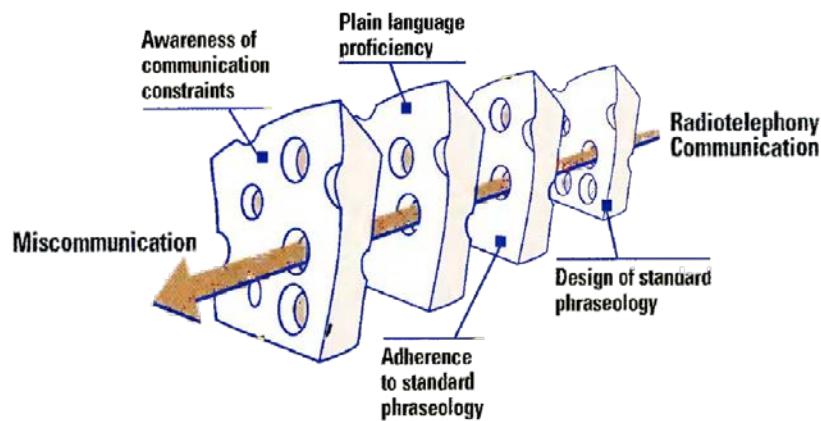


Figure 3. Adaptation of the Reason Model (Mell, 2004)

As well noted by Monteiro (2012), awareness is crucial as an impediment of a communication breakdown, and as pointed by Mell, as a final “layer” that should be accounted for. However, insofar as possible, language standardization should be encouraged not only in what refers to phraseology, but also in those plain language standardized aspects that need to be accounted for in order to mitigate communication breakdowns.

Conclusion

Teaching Aviation English is challenging in a lot of aspects, but one of the most complex things is to attain a balance in what is relevant to be taught and redundantly practiced. Given the growing demand for pilots and the need to have them all “operational”, the whole industry tends to focus on more pragmatic language aspects, disregarding, at times, issues that may not seem priority, but might cause communication problems. In this study, tense markers showed to be an issue for student-pilots as well as impactful to aviation safety as featured in Avianca 052. Research is one of the best tools to deal with it, as it allows for data and

discussion. It is still constrained by several hurdles, though. We intend to promote further studies that can offer a better view on the relevance of certain errors regarding structure and pronunciation, also considering the upcoming challenges in communication technologies that include text communications.

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Appendix 1

Worksheet

ICAEA Conference – TOKYO, 2019 Session 3 - WORKSHOP D - Aline Pacheco, Pontifical Catholic University of RS, Brazil
Perspectives from language issues of non-native English speakers: a more specialized analysis of ab-initio pilots learner language

WORKSHEET

1. Are you a ... ? ()teacher/trainer ()pilot ()ATCO ()Rater ()other
 How would you rate the following “errors” as threats to communication in aviation?

VS – Very Significant S – Significant NS – Not Significant

• **STRUCTURE:**

Error Type	Part I: Peers			Part II: Mixed			8.Final Answer
	2.YOU	3.GROUP	4.YOU	5.YOU	6.GROUP	7.YOU	
INFL3p (Inflection 3rd person)							
INFLPA (Inflection Past Simple)							
PIOu (Plural Overuse)							
InflBE (Inflection BE)							
InflOu3rd (Inflection Overuse 3rdp)							
WWPr (Wrong Word Pronoun)							
WWP (Wrong Word Preposition)							
InflOuPa (Inflection Overuse Past)							
WWN (Wrong Word Noun)							
WWArt (Wrong Word Article)							

• **PRONUNCIATION**

Error Type	Part I: Peers			Part II: Mixed			8.Final Answer
	2.YOU	3.GROUP	4.YOU	5.YOU	6.GROUP	7.YOU	
WWS: Wrong Stressed Syllable							
iSound							
uSound							
ouSound							
oSound							