

Advancement in Pedagogical Foundations:
Developing Language Proficiency for Student Success

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Abstract

Interruptions in flight training and a corresponding increase in costs appear to be prevalent among universities with aviation training programs. Students in these programs have to manage both demanding academics and flight training. Additionally, international students, for whom English is not their primary language, have the added disadvantage of learning complex aviation concepts in English. In order to maximize retention in collegiate flight programs, an experimental aviation English course has been designed to help frontload aviation vocabulary and take a proactive approach to teaching language skills that are essential in flight training. This as a case study model includes the learning goals and objectives for this course. The primary intent is to develop an applied knowledge of international radiotelephony alphabet and numerals, basic flight fundamentals and maneuvers, airport operations, national airspace operations, and emergency procedures as a means to developing English language proficiency. Students will know how to comprehend basic air traffic controller (ATC)-pilot transmissions, basic runway navigational directions given by ATC, and communicate effectively with clear, understandable speech, and at an appropriate tempo. Other important goals and objectives for this course include students understanding the role of ATC and the importance of clear communication by conducting an interview and providing a written summary of the interview. Furthermore, students will learn the value in safety by recognizing situational awareness through the means of analyzing both fatal and non-fatal incidents, why these incidents occurred and how they could have been avoided.

Background

Aviation

Aviation industry professionals are continuously seeking new and innovative ways to improve safety among pilots. Human factors, more specifically communication, has been a primary topic of discussion for over 20 years in the International Civil Aviation Organization. In 1998, ICAO diligently began taking steps toward establishing language proficiency requirements (LPRs). In 2004, ICAO published the first edition of Document 9835 (ICAO, 2010), which offers a brief, yet comprehensive, overview of language acquisition by identifying and defining essential concepts in the field of language teaching for members of the aviation field who are unfamiliar with or have no previous experience in the language acquisition field. Additionally, ICAO acknowledged that while language-learning schools have strict mandates, guidelines and regulations, aviation English training schools are not monitored and regulated through an accreditation process for their language teaching. To circumvent potential setbacks and keep safety in the forefront, ICAO published Circular 323 (ICAO, 2009), a guideline for aviation English training design,

delivery, trainer profiles and trainer training. One essential component identified in both publications is that aviation English trainers must first have a background in language teaching and second a willingness to learn and be exposed to the technical foundations of aviation (ICAO, 2009). Soon after Circular 323 was established, ICAO published their second edition of Document 9835. This document mandates that each state's civil aviation authority implement and enforce the LPRs. In our case, the Federal Aviation Administration published an advisory circular (60-28A) in 2013 that very briefly outlines the requirements for ensuring aviators meet basic English LPRs before being issued an Airmen Certificate under part 61, 63, or 65. What brought these publications into motion? Three accidents, over 800 peoples' lives lost; all with one common factor - insufficient English language proficiency (ICAO, 2010).

Language

The adage, “aviate, navigate, communicate” is well known in the aviation industry. The term ‘communicate’ is a fundamental component in the popular saying and holds a tremendous amount of weight. In order to communicate, one needs language. According to Mathews (2012), language is complex and is often a subtle, yet significant factor in some aviation accidents. ICAO identifies what language is not. It is not a set of grammar rules, vocabulary, or simple pronunciation of sounds. Language is a set of complex interactions with a number of skills and abilities that work together to enable communication (ICAO, 2010). To develop a language, there are two processes, language learning and language acquisition. Language learning is a conscious process that involves learning language forms, whereas language acquisition is an unconscious method of learning, much like an infant learning a language. While language learning has its advantages, learners will lack the ability to improve in spontaneous situations. Emery (2016) notes in his article, featured in *Changing Perspectives on Aviation English Training*, emergencies depend on a wider range of proficiency. This is why ICAO promotes a student-centered learning approach, in that activities are planned to engage all learners' styles and students given ample time to be immersed in language learning activities. Just as identifying language as a factor in aviation accidents is difficult, so is learning or acquiring a language. Students come to flight programs at various levels of proficiency. Acknowledging these differences and setting realistic expectations is essential when designing an aviation English program.

Statement of the Challenge

Prior studies indicate that student flight-training delays and corresponding increased costs are widespread among universities with aviation programs (Bryan and Thuemmel, 1996). Identification of students prior to failure in professional flight courses was conceived from an eighteen-month study of training trends in the Embry-Riddle Aeronautical University, Prescott, Arizona Department of Aeronautical Science. Through this study of flight training trends and assessment of how the College of Aviation could better assist students in ensuring the success of the flight training requirements, it was realized that, in order to maximize student retention, students at risk must be identified early, prior to training failure or financial distress. In evaluating this data it became apparent that international students, for whom English was not their primary language, had some difficulty mastering aviation concepts and communication while completing their initial phase of flight training.

Innovative Approach

To address this problem, an aviation English course was developed to assist non-native English speakers in mastering aviation-specific content and communications. The learning goals and objectives for this course are to have good knowledge of international radiotelephony alphabet and numerals, basic flight

fundamentals and maneuvers, airport operations, national airspace operations, and emergency procedures. Students learn how to comprehend basic air traffic controller (ATC)-pilot transmissions, basic runway navigational directions given by ATC, and communicate effectively with clear, understandable speech, and at an appropriate tempo. Other important goals and objectives for this course include students understanding the role of ATC and the importance of clear communication by conducting an interview and providing a written summary of the interview. Students learn the value in safety by recognizing situational awareness through the means of analyzing both fatal and non-fatal incidents, why these incidents occurred and how they could have been avoided. This course follows the three models of pedagogy all of which are supported and encouraged by ICAO in Circular 323 and Document 9835.

Model 1: Content-Based Instruction

The first is a Content-Based Instructional (CBI) model, which allows for students to make strong connections to academic content while learning and mastering the language skills necessary to be successful in their flight training (Stoller, 2008). According to Stoller (2002), in CBI the focus of content objectives and language objectives can shift along a continuum to meet the needs of the students. Stoller also asserts in her plenary address at the TESOL conference (2002) that, as content is learned, students will then improve their language skills. For this course, a great portion of the class is structured on content rich objectives and discussions, which are centered on topics that the students are learning concurrently in their Private Pilot Ground School (AS 121) course. The students' Private Ground School course provides the fundamental aviation knowledge and technical foundation they will need in their foundational aeronautical coursework. As a complementary course, it provides additional language support through the use of content with the use of cooperative learning strategies, such as jigsaw reading, that promote student-to-student interaction (Johnson, 1998). Jigsaw reading is a strategy where students are put into small groups and then assigned a short reading. They then become "experts" of their content and teach their section to the other members of the class. Materials used for this portion of the course include but are not limited to the Pilots Handbook of Aeronautical Knowledge, Airport Facility Directory, the Aeronautical Information Manual, and other relevant industry approved publications.

Model 2: Language Acquisition Strategies

The second pedagogy model is English for Specific Purposes (ESP), which incorporates language acquisition strategies through the use of special topics, such as aviation (Master, 1997). The focus on this portion of the course is primarily on language objectives rather than content objectives. Language forms and grammatical structures that are relevant to the field of aviation are explicitly taught, and as a result communicative skills are strengthened (Hutchinson, 1987). Students are provided additional vocabulary and language support in areas, such as phraseology and pronunciation, so that students can master critical concepts and better prepare students for their initial phases of flight training. Pronunciation is a key aspect of this course and will facilitate the students in understanding, being understood, and building self-confidence in a communicative environment (Goodwin, 2001). The goal is for students to obtain functional intelligibility where errors do not interfere with the message and are not distracting; native-like fluency is not a goal for this course. Along with pronunciation and speaking fluency, listening comprehension is another key aspect of this course. Listening skills are supported through the use of authentic discourse in both routine and non-routine aviation situations. Both bottom-up and top-down processing strategies are used to support student learning. Richard and Burns define bottom-up processing as sounds, words, and phrases, whereas top-down processing is focused on meaning (2011). An example of top-down approach would be to provide students with an authentic audio transmission, such as a pilot

communicating with ATC, and allow students to listen for meaning. After students had several attempts to listen to the audio transmission, students are then supplied with a written script to deconstruct the transmission on a word level, a bottom-up approach. In an airplane, there are no scripts for pilots to use, but by providing structured practice within the classroom, students are given the confidence they need to apply their skills in flight. In teaching skill-related content, a gradual release model is used, which is a form of scaffolded instruction (Pearson & Gallagher, 1983). In this type of model there is a release of responsibility from teacher to student; in other words, it transfers learning from a teacher-centered focus to a student-centered focus (see Figure 1).

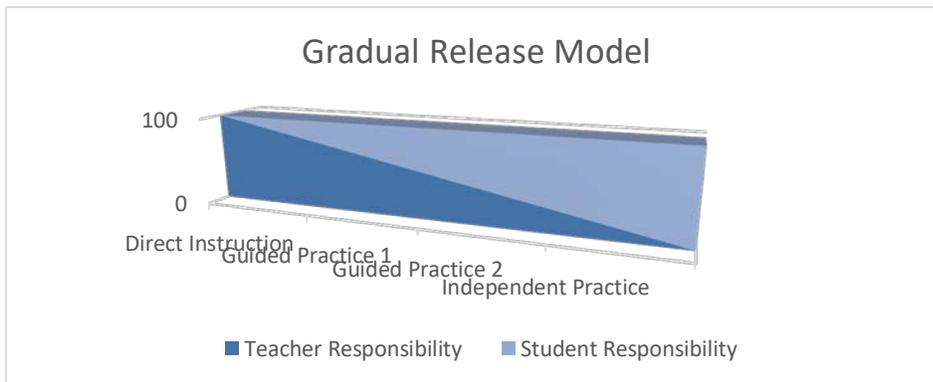


Figure 1

Model 3: Computer-Assisted Language Learning

The final model is the use of Computer-assisted Language Learning (CALL) where instruction is aided by digital learnings strategies, such as classroom capture technology, to improve and build language skills (Hubbard, 2009). Egbert (2005) asserts that CALL is focused on language development, not technology. In other words, technology is used as a learning tool. For the use of this course, a classroom capture technology is used to record lectures in the Private Pilot Ground School course. Students work at different paces, so by capturing vital lectures students are able to review and watch portions of the lecture multiple times. As a result, student anxiety level will more than likely decrease and result in increased learning (Egbert, 2005). Other technology, such as *TCS Learning System*™ (TCS), a guided simulation program, and content specific videos created by Embry-Riddle Aeronautical University are used to help support student learning.

Benefits and Lessons Learned

Each semester students enter into aviation English with varying language proficiency levels, as well as a wide range of aviation knowledge. For this reason, keeping a certain amount of fluidity within the areas of content is essential. In the fall semester, for instance, students needed additional support in learning the E6B, an aviation flight calculator. They felt they were struggling more so than their native English speaking classmates in ground school. In order to meet their learning needs, the weather unit, which they felt confident in, was shortened so that class time could be utilized. A gradual release model of instruction was used in teaching the E6B. This was found to be an exceptionally useful strategy in teaching second language learners and students are encouraged throughout the course to self-reflect on their learning and offer areas in which they feel they need additional support.

Challenges

An unexpected challenge in designing this course was trying to frontload, or pre-teach, vocabulary before students were taught the same topics in ground school. Frontloading is found to be far more beneficial than re-teaching strategies. Typically this is done in a single lesson or unit, but this strategy is used to frontload content across multiple courses. The idea is to familiarize students with essential vocabulary within the aviation English class before learning about those concepts in the ground school course. The pace of the ground school course is extremely fast due to the large amount of content that needs to be taught and thus poses a difficulty in structuring the content in the aviation English course. Postponing ground school instruction is not always a viable option for students, especially those who have stronger language proficiency skills. Fortunately, students with stronger language proficiency skills are able to adapt with ease. Students with weaker language proficiency skills need more support. Our next steps will be to further consider how students with lower language proficiency skills can continue to be supported throughout their flight training.

Successes

A variety of methods were used to gather data on the effectiveness and success of the aviation English course, such as instructor observations, end of course evaluations, class assessment data, and a follow-up survey via a web-based survey collector. Overall, as noted the support that students received through their ground school training was highly successful. Students felt comfortable to request specific content to review, ask questions via our classroom “parking lot” and frequent the instructor’s office hours for additional support. Often students would communicate their successes in exams or flights to the instructor and felt they were successful because of the support they received. Another success was the activities and methods of teaching that were used in designing this course. Students noted in a voluntary follow-up survey that the learning activities they preferred the most were classroom discussions, guest speakers, field trips to the local ATC tower and flight line, as well as using computer technologies to support learning. Lecture style instruction was favored less. Of the 18 students that were invited to partake in a voluntary follow-up survey, 15 respondents completed the survey. All 15 indicated that they would recommend this course to a friend. All of those flying (14) noted that the course supported them in their flight training. Due to the course’s overall success and benefits gained for our international non-native English-speaking students, this course is in the process of becoming a permanent course within the Aeronautical Science program.

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