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Safety in Focus: Analyzing Aviation English Competency Among Ab-Initio Pilots

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The proficiency in Aviation English among ab-initio pilots raises significant concerns within the aviation industry, prompting the need for thorough research to explore the root causes, issues, and consequences. This investigation specifically concentrates on the competence of ab-initio pilots in Aviation English within a Turkish foundation university, utilizing a mixed-methods sequential explanatory design. The results obtained from the modified 'Competency in Aviation English' questionnaire, encompassing responses from 90 student pilots, along with focus group interviews involving 45 participants, highlight notable apprehensions, particularly in speaking and listening skills. The study aims to evaluate the competency of ab-initio pilots in Aviation English and shed light on existing issues by identifying root causes and their extensive impacts. Participants underscore challenges in maintaining fluent speech during emergency situations, comprehending diverse accents, and managing workload and noise. Root causes encompass language proficiency, cultural factors, fear of making mistakes, teaching styles, and a lack of practice materials. Adverse consequences involve stress, compromised flight performance, and safety concerns. The study advocates for tailored pedagogical approaches, proposing enhancements in proficiency exams, customized programs for ab-initio pilots' better integration of flight and language training. In addition, realistic fluency goals, stress management, and technology integration are crucial for effective training.

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Introduction

Safety, as defined by Aurino (2000), is primarily a mindset, with attitudes serving as its foundation despite the supportive role of formal structures and protocols. From a corporate perspective, safety is defined by the absence of accidents. The primary responsibility of safety management is accident prevention since accidents not only cause financial losses but also damage the company's reputation. To achieve this objective, safety measures are implemented to prevent accidents, including safety equipment, devices, and various behavioral activities (Li & Guldenmund, 2018). Managing safety effectively involves a comprehensive effort, requiring organizations to define safety requirements and establish a solid framework (Strutt et al., 2006). However, despite these efforts, tragic accidents persist in the aviation industry, often attributed to miscommunication.

Communication between pilots and air traffic controllers is a cornerstone of aviation safety, as highlighted by Kanki and Palmer (1993). The consensus among industry professionals, as articulated by Wulle and Zerr (1997), is that effective communication is just as crucial as technical proficiency for flight safety. Yet, communication errors remain a significant threat to aviation safety, influenced by factors such as language proficiency and adherence to standard phraseology, as observed by Molesworth and Estival (2015). Miscommunication has been a critical factor in over 2,000 aviation-related accidents that resulted in fatalities, particularly since the mid-1970s (Alharasees et al., 2023).

Examining 508 case studies from the National Transportation Safety Board's database on airplane crashes, it was revealed that 49 accidents were partially linked to various forms of miscommunication. This implies that around 10% of commercial aviation incidents involve critical miscommunication, significantly influencing the outcome of accidents (Hillis, 2019). Generally, pilots and ATCOs find it difficult to maintain efficient radiotelephonic communication, especially when they are not native English speakers. There are instances when radio communications between aircraft operators are not successfully completed, which could lead to dangerous circumstances(Alharasees et al., 2023). In noisy, high-pressure situations, non-native English-speaking pilots may struggle with language issues despite using standard terminology and having strong language skills. Additionally, varying accents can cause air traffic controllers to misinterpret pilots' readbacks or requests, and pilots might mishear controllers' instructions (Estival & Molesworth, 2012). In his study focusing on the obstacles non-native English speakers experience in aviation, Strugis (2018) found that non-native pilots face significant challenges in comprehending aviation content in English, particularly in mastering vocabulary and aviation acronyms, overcoming accent-related difficulties, and achieving fluency and comprehension for proper phraseology and radio communication. Similarly, Tiewtrakul and Fletcher (2010) investigated how 'non-native English' influences communication in pilot–air traffic control interactions. Their research focused on recordings from the approach phase at Bangkok International Airport. The findings indicate that communication errors, particularly those involving misunderstandings by pilots, are notably more frequent when both the pilot and the controller are non-native English speakers, especially when the messages are complex or involve numerical information.

Accidents in aviation history also demonstrate the vital importance of English proficiency for non-native pilots. For instance, in 1996, a mid-air collision in India resulted in 349 deaths when

the Russian-speaking crew of the Kazakh Ilyushin misinterpreted instructions from an Indian air traffic controller due to poor English skills (Tajima, 2004). Similarly, in 1993, a commercial aircraft in China crashed during its final approach, killing 12 people because the pilot did not understand the English warning "pull up." (Wald, 1996). These tragic accidents highlight significant gaps in English proficiency among non-native pilots and display the critical role of English proficiency in aviation safety.

While some research has been conducted on various aspects of Aviation English (Cushing, 1997; Alderson, 2009; Cookson, 2009; Estival & Molesworth, 2012; Aiguo, 2008; Roberts & Orr, 2020; Kay, 2019; Bieswanger et al., 2020), there remains a notable gap concerning a specific examination of ab-initio pilots' competency in Aviation English and its implications for safety.

Roberts and Orr (2020) and Bieswanger et al. (2020) have contributed valuable insights into language education for ab-initio flight training. Additionally, Treadaway's study (2021) focuses on developing a reliable diagnostic language assessment for ab-initio pilots prior to their flight programs. In Turkey, there is one important study (Demirdoken,2019) that examines the needs of Aviation English learners at the tertiary level and another one (Dinçer & Demirdöken,2023) that focuses ab initio pilots' perspectives on the integration of simulation in Aviation English course. Nevertheless, there is no study specifically analyzing the competency of ab initio pilots in Aviation English, the issues they have, and the causes and consequences of the potential problems from a safety-centric point of view in literature. Considering the scarcity of studies focusing on ab-initio pilots, this research is significant since it is the first study to pave the way for understanding ab-initio pilots' perceptions about their competency in Aviation English, issues they have, and additionally, the causes and effects of these potential issues.

Accordingly, the primary aim of this research was to evaluate the proficiency of ab-initio pilots in Aviation English at a Turkish foundation university. This study sought to shed light on existing issues, identify root causes, and understand their extensive impacts. Secondly, it aimed to facilitate better learning programs, curriculum enhancements, and instructional approaches in training institutions to address communication-related issues more effectively. In line with these aims, the researchers investigated the following research questions to provide relevant answers.

Q1. What are the perceptions of ab-initio pilots at a foundation university in Turkey towards their competency in Aviation English?

Q2. What are the issues ab-initio pilots at a foundation university in Turkey have in Aviation English?

Q3. What do the ab-initio pilots at a foundation university in Turkey think about the causes and effects of the issues they have in Aviation English?

Literature Review: Competencies Required in Aviation English

Acquiring effective communication skills in a second language requires a comprehensive understanding of linguistic, sociolinguistic, and socio-cultural aspects (Saleh, 2013). In the aviation industry, safety is critical, and proficient communication can prevent disasters. In a study, Sexton and Helmreich (2000) found that over 70% of reports submitted to the Aviation Safety

Reporting System revealed major failures in interpersonal communication. Therefore, mastering Aviation English and navigational communication complexities is essential. In this context, three important competencies emerge: linguistic competence, communicative competence, and interactional competence.

Linguistic competence pertains to the innate ability of native speakers to construct "well-formed sentences" (Thornbury, 2006, p. 37). While crucial, linguistic competence alone does not ensure effective communication but sets the stage for standardizing communication protocols and fostering interoperability in the international aviation context. Engaging and active grammar instruction during ab-initio training can boost learners' motivation and language acquisition progress (Yoon et al., 2004). A strong grasp of grammar contributes to oral proficiency and speaking skills (Tuan, 2017; Wahyuni et al., 2015). Nevertheless, to ensure effective communication within specific contexts, grammar instruction must be supplemented with communicative competence to enable learners (Hymes, 1972; Canale & Swain, 1980).

Communicative competence is the ability to effectively convey messages and understand others within specific contexts, which involves real-world application and appropriate language usage beyond merely accurate grammar (Hymes, 1972). Canale and Swain (1980) expanded on this concept, highlighting grammatical, sociolinguistic, and strategic competencies essential for communication. Various instructional approaches, such as role-play, drama activities, task-based learning, and group work, have been shown to effectively enhance communicative competence among learners. The ICAO Manual (2010) stresses the importance of communicative competence in aviation, emphasizing the need for pilots and controllers to understand communication concepts for safe operations. Ultimately, developing strong communicative competence is crucial for ab-initio pilots to ensure effective communication in high-stakes aviation situations.

Interactional competence is the ability to collaboratively share communication responsibilities among all participants, adapt to various situations, and utilize diverse communicative resources effectively (Kim & Elder, 2009). Unlike communicative competence, which emphasizes individual speakers' abilities within a social setting, interactional competence focuses on collaborative efforts involving all participants. It also emphasizes the ability to infer each other's thoughts and intentions, extending beyond verbal communication to encompass written, digital, and non-verbal exchanges. Interactional competence can also be viewed as being engaged in social interactions and professional pursuits, emphasizing the strategic use of language resources, including aviation phraseology (Douglas, 2000). Studies by Kecskes et al. (2017) and Park (2017) highlight the importance of equipping learners with interactional competence from the outset of language learning, incorporating nonverbal communication elements, and providing ample opportunities for authentic practice. Xiao (2016) emphasizes the need for targeted instruction in interactional competence specific to the target language, which could prove useful in preparing learners for real-world language use scenarios during training.

The focal point is that combining linguistic, communicative, and interactional competencies in ab-initio training is important since they all prepare student pilots to confidently communicate in real-world aviation scenarios.

Methodology

A mixed-methods sequential explanatory design was employed to investigate the research question in this study. This approach combines both quantitative and qualitative methodologies, as it is widely acknowledged that the integration of these two approaches offers a more comprehensive understanding of research problems compared to using either approach alone (Creswell & Plano, 2007).

Data Collection and Analysis

In this research, two methods were utilized for data collection: a questionnaire assessing competency in Aviation English and semi-structured focus group interviews. To gather quantitative data, a Competency in Aviation English questionnaire based on Demirdöken's (2019) work was adapted and administered to participants. This questionnaire was the main instrument for data collection. It consisted of 18 items to assess learners' perceptions of their proficiency in Aviation English. Participants were asked to indicate their level of agreement using a 5-point Likert scale. The questionnaire was administered through Google Forms and reached 110 students online. In total, 90 students completed the survey. The quantitative data analysis for this study was conducted using Minitab 17. Initially, demographic and educational characteristics among participants were examined. Following this, an in-depth analysis was carried out on the data collected from the second part of the questionnaire, which specifically focused on learners' perceptions of their competency in Aviation English. This analysis included measures such as means, standard deviations, and percentages. Furthermore, a two-sample t-test was applied to differentiate between the responses of students whose English language proficiency was below the B2 level (the prerequisite for commencing undergraduate studies) and those who indicated proficiency at the B2 level or higher before undertaking the Aviation English course. The purpose of this statistical test was to determine whether there were any significant differences in perceptions of Aviation English competency between these two distinct groups.

Additionally, semi-structured individual interviews were conducted to gather qualitative insights. The focus group discussions were conducted online through Zoom meetings. With the aim of encouraging active participation in a comfortable environment, the learners were divided into nine separate groups, each consisting of five students. Each focus group meeting lasted approximately 25 minutes. The focus group discussions underwent complete transcription prior to entering the analysis phase. These transcripts were meticulously examined to explore keywords and identify recurring themes, aiming to reveal valuable insights into the perspectives and views of the participating students.

Respondents of the Study

Table 1.
Demographic Information Related to the Participants in the Study

	Variables	N	%
Age	19	2	2.2%
	20	10	11.1%
	21	21	23.3%
	22	27	30%
	23	20	22.2%
	24	7	7.8%
	25	2	2.2%
	26	1	1.1%
Nationality	Turkish	82	91.11%
	Azerbaijani	3	3.33%
	Spanish	1	1.11%
	Turkish-British	1	1.11%
	Uzbek	1	1.11%
	Pakistani	1	1.11%
	Egyptian	1	1.11%
Gender	Male	73	81.1%
	Female	17	18.9%
Flight Hours	10-60	39	43.33%
	60-110	25	27.28%
	110-160	9	10%
	160-210	2	2.22%
	210 and above	15	16.67%
License Type	Currently in the process of obtaining PPL	1	1.1%
	PPL	46	51.1%
	Holding a PPL and recently completed ATPL theoretical courses	29	32.2%
	ATPL	14	15.6%
Learning Experience	1-3 years	7	7.8%
	3-6 years	21	23.3%
	6-10 years	26	28.9%
	More than ten years	36	40%
Learning Circumstances	I have learned English in a language school in Turkey.	25	28.1%
	I have learned English as part of compulsory education.	50	56.2%
	I have learned English abroad.	11	12.4%
	I have learned English with a tutor.	3	3.4%

Note: N: Number of responses, %: Percentage of responses

As presented in the table, the age range varied, with the largest group falling between 21 and 22 years old, each comprising 23.3% of the sample. Most of the participants were Turkish (91.11%), with smaller percentages from various other nationalities. Gender distribution was predominantly male (81.1%). Flight hour experience ranged widely, with 43.33% reporting 10-60 hours and 51.1% holding a Private Pilot License. In terms of their English language learning experience, 40% had over ten years, while 56.2% learned English as part of compulsory education, and 28.1% learned it in a Turkish language school.

Findings and Discussion

Discussion of Findings Regarding Research Question 1

The first research question was designed to explore how ab-initio pilots at a foundation university in Turkey perceive their competence in Aviation English. To gain meaningful insights into this research question, the data collected from participants via a questionnaire was subjected to statistical analysis using Minitab software version 17.

Table 2.
Participants' Own Perceptions of their English Language Proficiency Level Prior to taking Aviation English Courses

	Variables	N	%
Speaking	A1 Beginner	0	0.00%
	A2 Elementary	7	7.78%
	B1 Intermediate	39	43.33%
	B2 Upper-Intermediate	27	30.00%
	C1 Advanced	16	17.78%
	C2 Proficient	1	1.11%
Listening	A1 Beginner	1	1.11%
	A2 Elementary	1	1.11%
	B1 Intermediate	37	41.11%
	B2 Upper-Intermediate	32	35.56%
	C1 Advanced	19	21.11%
	C2 Proficient	0	0.00%
Reading	A1 Beginner	0	0.00%
	A2 Elementary	4	4.44%
	B1 Intermediate	31	34.44%
	B2 Upper-Intermediate	35	38.89%
	C1 Advanced	19	21.11%
	C2 Proficient	1	1.11%
Writing	A1 Beginner	1	1.11%
	A2 Elementary	3	3.33%
	B1 Intermediate	37	41.11%
	B2 Upper-Intermediate	38	42.22%
	C1 Advanced	11	12.22%
	C2 Proficient	0	0.00%

Note: N: Number of responses, %: Percentage of responses

As shown in the table, a significant finding emerges regarding students' perceived proficiency levels in speaking and listening skills, which are highly crucial in Aviation English. Data reveals that 43.33% of participants assessed their speaking proficiency at the B1 level, with 7.78% at the A2 level before undertaking Aviation English courses. Similarly, a majority (41.11%) rated their listening skills at the B1 level, while only 2.2% rated them at A1 or A2 levels. These findings suggest potential gaps in linguistic competence, indicating that a notable portion of participants may not meet the necessary language proficiency standards for effective communication in aviation.

This finding aligns with feedback from focus groups, where many students, despite undergoing preparatory programs, felt they had not reached the B2 level, a prerequisite for

undergraduate studies. Addressing this issue involves two critical considerations. Firstly, the institutional proficiency exam, while evaluating reading, writing, and listening, lacks a direct assessment of speaking skills. Incorporating a section focusing on speaking skills can provide a more comprehensive evaluation of students' proficiency levels. Secondly, although the exam aligns with Common European Framework levels, ensuring the curriculum and materials effectively establish a solid foundation for B2 level proficiency across all four skills is crucial.

Table 3.
Participants' Personal Thoughts on the Most Difficult Skill to Develop in English

	Variables	N	%
Skills	Listening	12	13.3%
	Speaking	43	47.8%
	Reading	5	5.6%
	Writing	30	33.3 %

Note: N: Number of responses, %: Percentage of responses

According to the data in Table 3, the majority of students (47.8%, n=43) identified speaking as their biggest challenge. Writing was noted as the primary difficulty by 33.3% of students (n=30), while 13.3% (n=12) found listening to be the most challenging skill. Only a small percentage (5.6%, n=5) viewed reading as the toughest skill to develop in English.

Considering the widely recognized difficulty of speaking in a foreign language and the time required for speaking proficiency to develop (Luama, 2004), it is not surprising that most learners (51.11%) perceived their speaking skills to be below B2 level. The second most prevalent challenge reported was writing, noted by 33.3% of students (n=30). As outlined by Dastgeer and Afzal (2015), students predominantly acquire English language skills in academic settings, often relying heavily on memorization and reproducing learned information during exams rather than practical application. Notably, the Aviation English program lacks emphasis on writing skills, compounding the challenge. Interestingly, only 13.3% (n=12) of participants identified listening as their most difficult skill, despite 42.21% rating their listening skills below B2. Focus group discussions revealed a perception among learners that listening skills improve through practice and experience, making it more manageable compared to speaking and writing. These insights underscore the complexities of linguistic competence, with speaking identified as particularly challenging and raising concerns about communicative competence. A T-test was performed to determine whether there existed a statistically significant distinction between the group who rated their speaking and listening skills below B2 and the group who rated these skills as B2 and above in the questionnaire. The outcomes of the test are outlined below.

Table 4.
Speaking Comparison of The Groups

	Students at B2 level and above (*n*=44)		Students below B2 (n=46)			
	M	*SD*	*M*	*SD*	*t*	*p*
Scores	4.128	0.731	3.594	0.702	3.53	0.001

Note: M: Mean, SD: Standard Deviation, t: T-Value, p: P-Value

Based on the table's analysis, the initial group comprising students at the B2 level and beyond consisted of 44 participants, with a mean of 4.128 and a standard deviation of 0.731. Conversely, the second group, consisting of students below B2, comprised 46 participants, with a mean of 3.594 and a standard deviation of 0.702. The two-sample t-test revealed a t-value of 3.53 and a p-value of 0.001.

Table 5.
Listening Comparison of the Groups

	Students at B2 level and above (*n=51*)		Students below B2 (n=39)			
	M	*SD*	*M*	*SD*	*t*	*p*
Scores	4.066	0.727	3.580	0.724	3.15	0.002

Note: M: Mean, SD: Standard Deviation, t: T-value, p: P-value

The same methodology was employed to evaluate participants' listening skills based on their self-reported levels. As indicated in the table, the initial group consisted of 51 participants reporting B2 level listening skills and above, with a mean of 4.066 and a standard deviation of 0.727. Conversely, the second group comprised 39 participants reporting listening skills below B2, with a mean of 3.580 and a standard deviation of 0.724. The two-sample t-test conducted for the listening skills produced a t-value of 3.15 and a p-value of 0.002.

Table 6.
Listening and Speaking Comparison of the Groups

Metric	**Value**
Regression Slope Speaking	0.010214218327170364
Regression Intercept Speaking	3.917429622907424
Regression Slope Listening	0.013325037168858371
Regression Intercept Listening	3.6949081188808672
Correlation Speaking	-0.026043866854448317
Correlation Listening	-0.09771011811935984
Covariance Speaking	-0.014220636839558601
Covariance Listening	-0.05264720079091682
Variance Speaking Above B2	0.5667468558984529
Variance Speaking Below B2	0.5024230982851549
Variance Listening Above B2	0.5113232424846037
Variance Listening Below B2	0.5422599346901111

Table 6 shows key metrics such as regression, correlation, covariance, and variance derived from the data analysis. For speaking proficiency above the B2 level, the regression slope is 0.010214, and the intercept is 3.917430. For listening proficiency, the regression slope is 0.013325, and the intercept is 3.694908. The correlation coefficient between students above and below the B2 level is -0.026044, showing a very weak negative relationship. For listening proficiency, the correlation coefficient is -0.097710, which also shows a very weak negative relationship. For speaking proficiency, the covariance between students' scores above and below the B2 level is -0.014221. For listening proficiency, the covariance is -0.052647. For speaking proficiency, the variance score above the B2 level is 0.566747, and for scores below the B2 level

is 0.502423. For listening proficiency, the variance above the B2 level is 0.511323, and below the B2 level is 0.542260.

In brief, the analysis of both skills reveals a notable contrast, suggesting a statistically significant difference between the groups. These findings also emphasize the importance of language proficiency in skills development. Students with higher proficiency levels demonstrate greater competence in both areas, highlighting the need for interventions to support students with lower proficiency levels.

Table 7.
Frequencies of Participants' Responses, Mean Score, and Standard Deviation of Items in the Questionnaire

Item	1	2	3	4	5	Mean	Standard Deviation	N
1. I can speak Aviation English fluently.	1	5	25	46	13	3.72	0.816	90
2. I can pronounce Aviation English terms correctly.	0	0	18	54	18	4.00	0.632	90
3. My Aviation English accent is intelligible to other aviators.	0	9	16	44	21	3.85	0.888	90
4. I can have good control of sentence patterns in Aviation English.	0	3	27	51	9	3.73	0.679	90
5. My knowledge of Aviation English terms is enough to understand audio files related to Aviation English.	0	4	22	56	8	3.76	0.667	90
6. My knowledge of Aviation English terms is enough to express myself to other aviators.	0	3	17	52	18	3.94	0.720	90
7. My knowledge of Aviation English terms is enough to explain an emergency situation.	0	3	28	41	18	3.82	0.782	90
8. I can communicate with other aviators effectively.	0	4	16	52	18	3.93	0.742	90
9. I can maintain fluent speech even in emergency situations.	0	12	45	27	6	3.30	0.781	90
10. I am a fluent English speaker in terms of aviation.	0	8	29	42	11	3.62	0.810	90
11. I can respond to the questions of other aviators appropriately.	0	4	20	52	14	3.84	0.728	90
12. I can maintain effective communication when I speak Aviation English.	0	3	24	50	13	3.81	0.713	90
13. I can easily understand a speech related to aviation.	0	3	20	48	19	3.92	0.748	90
14. I can ask for clarification when I do not understand other	0	1	9	48	32	4.23	0.667	90

people in terms of Aviation English.								
15. I can easily inform other aviators on a topic related to aviation.	0	2	25	47	16	3.85	0.723	90
16. My knowledge of Aviation English terms is enough to explain a problem.	0	4	20	52	14	3.84	0.728	90
17. I can ask for confirmation when a misunderstanding occurs.	0	0	6	30	54	4.26	0.573	90
18. I can express myself in black and white easily.	0	4	19	47	20	3.92	0.777	90

Note: 1: Strongly Disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree, 5: Strongly Agree, N: number of responses.

The respondents' perceptions of their competencies in Aviation English offer valuable insights into their strengths and areas for improvement. Notably, Item 17, concerning the ability to ask for confirmation during misunderstandings, received the highest mean score of 4.26. A significant majority, 30 individuals (33.33%), agreed, and 54 individuals (60.00%) strongly agreed with this statement, indicating a strong inclination among learners to address misunderstandings proactively. Similarly, Item 14, focusing on asking for clarification when encountering difficulties, received a high mean score of 4.23. Here, 48 participants (53.33%) agreed, and 32 participants (35.56%) strongly agreed, reaffirming learners' confidence in resolving issues through effective communication.

These findings are supported by feedback from focus group meetings, where participants emphasized the importance of effective communication and their readiness to seek clarification. As highlighted by Uplinger (1997), the absence of non-verbal cues in pilot-air traffic controller communication underscores the necessity of clarification techniques for effective communication. These results suggest that current training methods have equipped learners with essential coping strategies aligned with the demands of Aviation English, demonstrating a strong inclination toward interactional competence.

However, concerning fluency in emergency situations, the data presents a different picture. Item 9, regarding the ability to maintain fluent speech during emergencies, received the lowest mean score of 3.3. While 12 participants (13.33%) expressed disagreement, and 45 participants (50.00%) remained neutral, indicating a lower perceived ability among participants in maintaining fluency during critical moments. Focus group interviews further revealed concerns among participants regarding fluency, particularly when communicating with non-Turkish people, highlighting potential challenges in interactional competence during emergencies.

Similarly, Item 10, addressing proficiency as a fluent English speaker in aviation, received a mean score of 3.62, with diverse opinions among participants. While many agreed or strongly agreed, 8 participants (8.89%) disagreed, and 29 participants (32.22%) remained neutral. Focus group discussions revealed difficulties in maintaining fluency during Aviation English lessons, especially in activities such as describing pictures or participating in group discussions.

Discussion of Findings Regarding Research Question 2

The second research inquiry aimed to identify challenges faced by ab-initio pilots in Aviation English through a series of focus group interviews with 45 students.

Table 8.
Issues

Issue	Percentage of Participants Affected
Rate of Speech	66.67%
Fluency	71.11% (lesson fluency)
	86.67% (emergency scenarios)
Regional Accents	86.67%
Lack of Knowledge	22.2%

As presented in the table, the initial concern raised by participants pertained to the rate of speech. Among the 30 participants (66.67%), a predominant issue was encountered with the pace of speech, particularly during the initial phase of flight training. Participants expressed difficulty in comprehending transmissions due to the rapid delivery of a substantial amount of information. Despite ICAO's (2010) recommendation for a steady speech rate not exceeding 100 words per minute in radio communication, this challenge persists. Sayer (2013) suggests that miscommunication arises not from the absence of distinct breaks between words but from insufficient time allotted to recipients for processing and comprehending information. Therefore, in ab-initio pilot training, Air Traffic Controllers (ATCs) must exercise caution in allowing inexperienced pilot trainees adequate time to grasp information.

The second issue discussed was fluency. Participants reported fluency-related challenges in various contexts. A majority (71.11%) expressed concerns about sustaining fluent speech in Aviation English lessons, particularly during activities such as describing pictures, summarizing topics through self-recordings, and engaging in group discussions. This finding suggests that students may require more time to digest new input and more opportunities for practice before reaching the production stage. Additionally, participants may prioritize accuracy over fluency in these activities, hindering their speech flow. Concerning emergency scenarios, 86.67% of participants indicated potential challenges in sustaining fluent speech, particularly when communicating with non-Turkish people. As stress and time pressure in emergencies can negatively impact fluency and communication performance, there is a dire need for accurate and reliable assessment of communicative competence to meet language standards for student pilots.

The third issue raised was regional accents. Although accent was not a concern when communicating with Turkish ATCs, 86.67% of participants found transmission recordings with various regional accents difficult to understand in the Aviation English course. However, this challenge aided in improving their listening skills through extensive practice. Lightfoot (1982) noted that accents impact transmissions due to pronunciation variations across languages,

influencing non-native English speakers' speech. Challenges in pilot-ATC transmissions escalate when both parties are non-native English speakers, substantially reducing comprehension when attempting to understand unfamiliar accents. Therefore, it is crucial to help students gain awareness of regional accents, study their common phonological features, and dedicate ample time to practice both inside and outside the classroom.

The final issue discussed was the lack of knowledge and experience. 22.2% of participants reported challenges in busier airfields due to only having basic knowledge of radio communication, leading to confusion and stress when encountering unfamiliar ATC phrases. Comprehensive training under supervision is essential in aviation (Wilpert & Thoralf, 2013). Ab-initio pilots should be equipped with necessary phrases, terminologies, and alternatives during theoretical training, followed by ample opportunities for practice through role plays and simulation exercises.

Discussion of Findings Regarding Research Question 3

The primary aim of the third research question was to investigate the root causes and resultant effects of challenges encountered by ab-initio pilots in mastering Aviation English. In the table below, the causes and effects are summarized with their percentages.

Table 9**.**
Causes and Effects

Causes	**Percentage**	**Effects**	**Percentage**
Language proficiency	66.67%	Stress	86.67%
Cultural factors	13.33%	Impact on flight performance	26.67%
Stress and fear of making mistakes	60.00%	Safety concerns	71.11%
Issues with teaching style	31.11%		
Lack of practice materials	22.22%		
Multitasking and workload	68.89%		
Noise	24.44%		

Causes

When participants were asked about the root causes behind their issues, they identified seven main factors: language proficiency, cultural influences, stress and fear of errors, teaching style, lack of practice materials, multitasking and workload, and noise.

The key discovery concerning language proficiency reveals that 66.67% of students acknowledged that language-related challenges impact their performance in Aviation English class, including activities like short presentations, discussions, self-recording, and ATC

transmissions. Furthermore, the t-test results demonstrated a significant statistical contrast between students who assessed their speaking and listening skills below B2 level and those who rated them at B2 or above. These findings underscore two pivotal points that warrant attention. Firstly, it is imperative to reconsider the language proficiency criteria for undergraduate program admission. Rather than relying solely on institutional proficiency exams, which fail to evaluate speaking skills, institutions should mandate high scores on standardized exams. Research by Dusenbury and Bjerke (2013) indicates a positive correlation between higher English proficiency scores on standardized exams and student success in flight school, suggesting improved performance on oral exams and reduced training hours required.

Secondly, there is a need to reassess the design and content of preparatory programs. A study by Nishikawa and Nawata (2019) revealed that only 20% of ab initio flight students at a Japanese institution found intensive academic English preparation classes generally beneficial for flight training skills. These programs, focusing primarily on writing instruction, do not adequately prepare students for the linguistic demands of flight training, crucial for ab initio pilots. Hence, there is an urgent necessity to develop programs tailored specifically to address the language requirements of ab initio flight training.

Although these participants noted that language-related issues affected their in-class performance, they added that these challenges did not hinder their flight performance due to the straightforward nature of standard phraseology. However, when asked about the potential impact of their language background and linguistic issues during flight training in a different country with native English instructors and ATCs, 51.11% anticipated difficulties.

13.33% of participants mentioned cultural influences on their language learning and practice, highlighting the need for increased exposure to the target language through technology integration, cultural awareness components, and peer support groups.

Stress and fear of mistakes were cited by 60% of participants, emphasizing the importance of stress management workshops and opportunities for practical experience in simulated environments.

31.11% of participants identified issues with the teaching style, advocating for interactive learning approaches, constructive feedback, and the provision of ample practice materials outside the class.

22.22% mentioned a lack of practice materials and suggested that additional practice materials for studying radio communication outside of class would have been beneficial. They noted that this could have reduced their stress levels when encountering unfamiliar terms on the radio.

The most prevalent cause, multitasking and workload, was cited by 68.89% of participants, highlighting the need for guidance on task prioritization and realistic simulations to enhance multitasking skills.

Finally, 24.44% reported that engine noise and radio chatter negatively impacted their ability to use Aviation English, suggesting investment in quality headsets with noise-canceling features and exposure to authentic materials during training.

Effects

During the interviews, participants cited three adverse effects, with stress being the most prominent. A staggering 86.67% noted feeling stressed when unable to understand Air Traffic Control (ATC) instructions or readbacks correctly, particularly when faced with harsh criticism for mistakes. Additionally, 57.78% reported stress during Aviation English classes when grappling with practice ATC transmission recordings. Stress, a known contributor to accidents in civil aviation, particularly affects ab-initio pilots, who are more responsive to flight-related stressors compared to experienced instructors (Kilic & Ucler, 2019). Comprehension-related issues exacerbate this stress among students, necessitating targeted strategies for mitigation.

Furthermore, 26.67% mentioned that stress adversely affected their flight performance, aligning with historical records linking stress-ridden pilots to diminished performance. Instructors play a crucial role in providing support to manage stress levels, emphasizing a holistic approach to pilot training that encompasses technical skills, humanistic values, and psychological well-being.

Moreover, 71.11% expressed concerns about potential safety issues stemming from language-related challenges during international flights, particularly in emergency situations. While miscommunication is common in emergencies, the participants recognized the importance of comprehensive training strategies. These strategies should include scenario-based activities to simulate real-life emergencies and cross-cultural communication training to address diverse backgrounds and regional accents in the aviation industry.

Implications

The findings of this study not only highlight current issues, their underlying causes, and consequences but also offer valuable insights into the future trajectory of Aviation English training. As a result, there is a compelling need for deliberate actions in this specific domain. These significant implications are presented below.

Pedagogical Implications

- The institutional proficiency exam should undergo comprehensive evaluation to ensure a thorough assessment of all four language skills—listening, speaking, reading, and writing—aligned with the B2 level of the Common European Framework of Reference. Meticulous preparation for this exam is crucial.
- Rather than offering an English for Academic Purposes (EAP) program, which emphasizes academic reading, writing, and listening skills, ab-initio pilots could benefit from a program specifically tailored to the language skills needed during training.
- Collaboration between flight instructors and ground instructors teaching communication and Aviation English classes is essential to ensure alignment of content covered in both

flight training and language classes. This coordinated approach enhances learning experiences and supports practical application during flight training.

- Due to the scarcity of commercial textbooks dedicated to aviation English, a custom-designed program and materials developed in-house should prioritize learners' needs.
- Setting realistic objectives for language learning and improvement rather than prioritizing native-like fluency is crucial. Instructors can encourage learners to prioritize fluency to ensure meaningful engagement in language use (Brown, 2007) and enhance communicative competence.
- A multifaceted approach is necessary to help students develop fluency, including interactive multimedia resources, simulated scenarios, peer-to-peer communication activities, and role-plays. Additionally, tailored approaches to language training, with additional support mechanisms for weaker students, could prove beneficial in enhancing fluency levels across the board.
- Investment in high-quality headsets with noise-canceling features is essential, along with exposure to authentic materials in Aviation English classes to familiarize students with real-world conditions.
- Providing guidance on prioritizing tasks and gradually introducing and building up the complexity of tasks can assist students in managing workload. Realistic simulations can further enhance their ability to manage multiple tasks simultaneously.
- It is advisable to offer students abundant resources beyond class time to strengthen their skills through practice, thus laying a solid foundation. Extensive training materials, along with clear instructions, should be provided in accordance with ICAO guidelines.
- Since language anxiety can hinder effective communication in a second language, especially when engaging in radio communication or cockpit interactions (Sirin,2023), incorporating language anxiety awareness training and stress management workshops into the aviation program can empower learners with effective coping mechanisms under stressful conditions.
- Integration of technology, such as virtual reality simulations and online language exchange platforms, can bridge the gap in exposure to English-speaking environments. Peer support groups focusing on language practice can also be beneficial.
- Equipping ab-initio pilots with necessary phrases, terminologies, and ample opportunities for practice during theoretical training is essential. Role plays and simulation exercises can aid in practical application.
- Adopting a holistic approach to regional accents, including exploration of common phonological features and ample practice opportunities, is crucial.
- Tailored approaches to language training in mixed-ability groups, along with additional support mechanisms for weaker students, can enhance fluency.
- Ground and flight instructors should prioritize constructive feedback that fosters improvement without inducing unnecessary stress. Positive reinforcement fosters a culture that views mistakes as opportunities for growth.
- Integration of cultural awareness components into the curriculum can raise students' awareness of cultural issues.
- The absence of standardized assessment tools for non-native students poses challenges to safety. There is a clear necessity for official criteria and standardized testing methods designed specifically for admission into flight schools.

- Flight schools and universities must strictly adhere to language proficiency standards set by aviation regulatory bodies to maintain safety standards.

Limitations and Recommendations for Further Research

This study has certain limitations. First and foremost, it focuses on 90 ab-initio pilots from a university in Istanbul, Turkey, limiting its generalizability. Although this sample size is adequate for the context and Turkey, it is small compared to all ab-initio pilots in JAA Countries. Furthermore, the study leans towards qualitative methods despite a mixed approach, reducing its applicability. Also, the researcher's close relationship with participants as their Aviation English instructor may have influenced responses. Future research should involve a larger, diverse sample, employ longitudinal designs, mitigate researcher influence, explore additional variables, and encourage collaboration among Aviation English professionals in Turkey and other countries who are active in civil aviation.

Conclusion

The study revealed significant concerns that might cause safety issues, particularly in speaking and listening skills, with a substantial number of students falling below the B2 level, as presented in Table 2. Data revealed that 43.33% of participants assessed their speaking proficiency at the B1 level, with 7.78% at the A2 level before undertaking Aviation English courses. Similarly, a majority (41.11%) rated their listening skills at the B1 level, while only 2.2% rated them at A1 or A2 levels. These findings suggest potential gaps in linguistic competence, indicating that a notable portion of participants may not meet the necessary language proficiency standards for effective communication in aviation. Additionally, potential gaps in the current proficiency exam emphasized the necessity for a more comprehensive assessment of speaking skills and a reevaluation of the curriculum and materials to establish a solid foundation in all four language skills. Moreover, the majority of the participants (47.8%, n=43) identified speaking as their biggest challenge. These insights demonstrate the complexities of linguistic competence, with speaking identified as particularly challenging and raising concerns about communicative competence. The analysis of both speaking and listening skills also revealed a notable contrast, suggesting a statistically significant difference between the groups (P-value 0.001 for speaking skills and 0.002 for listening skills). On a positive note, participants demonstrated a strong inclination to proactively address misunderstandings, adhering to the requirements of effective radio communication. However, maintaining fluent speech in emergency situations received the lowest mean score, indicating a perceived challenge among participants. Fluency-related issues were reported in both aviation English lessons and radio communication. Concerns about understanding different accents, particularly in recordings, were evident. Lack of knowledge and experience posed challenges in radio communication, impacting flight performance and safety awareness. Focus group interviews supported this, revealing concerns about fluency and emphasizing the need for attention in training. Additionally, difficulties in the initial phases of flight training were noted, with those completing ATPL theoretical classes finding the issue less problematic but anticipating challenges in their professional careers. Root causes behind the reported issues included language proficiency, cultural factors, fear of mistakes, teaching style, lack of practice materials, multitasking, workload, and noise. Negative consequences of language-related issues included stress, negative effects on flight performance, and safety concerns. A significant majority of

participants reported experiencing stress when unable to understand ATC or practice recordings, and some noted a subsequent impact on their flight performance and safety awareness.

In brief, the study highlights complex challenges faced by ab-initio pilots in Aviation English training, calling for tailored approaches. Pedagogically, it suggests improvements in proficiency exams, custom programs for ab-initio pilots, and better alignment of flight and language training. Emphasis on realistic fluency goals, stress management, and technology integration is also crucial. Consequently, there is a compelling need to put deliberate actions into operation in this specific domain.

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