

Synergy of Competences in Aeronautical English Education

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Abstract. Successful communication between military pilots and air traffic controllers is vital for ensuring the safety and efficiency of aviation operations. While linguistic competence is fundamental, efficient communication in this context transcends mere language proficiency. The research study explores some contemporary under-researched theoretical and practical issues regarding the acquisition of the military aeronautical English language and establishes a strong correlation between aviation linguistic competence and interactive, cross-cultural and professional competence. This article explores the synergy of these competences and underscores the significance of integrating them in aviation English education. The synergy of competences equips pilots and controllers with the multifaceted skills necessary for ensuring the safety and success of flights in increasingly complex and globalized airspace environments.

Keywords: *aeronautical English language, aviation, competences*

I. INTRODUCTION

Military pilots and air traffic controllers (ATCs) work in multinational, multilingual and multicultural environment where most days the air-ground communication is conducted in the English language. Against this background a need exists to provide officer-cadets from the Bulgarian Air Force Academy (BAFA) with special professional language – aeronautical English. This special radiotelephony language employs standardized phraseology, developed deliberately and designed for aviators to speak briefly and clearly, together with plain English, vocabulary, grammatical structures and functions used in aviation context. Any misunderstanding during flights can cause a disaster or some kind of damage. That is why English language proficiency is a safety measure in this field and has become a compulsory element of any aviation training. Just a general understanding of the English language will not suffice in this context.

Since the early days of aviation flying qualification and experience have been measured in hours. For pilots,

professional competence is equated with flight time. Underlying assumption is that flight hours reflect quality training and correspond to a competence level. In order to complete one's pilot training and get a license, a pilot needs a certain number of flight hours (the number depends on the license – PPL, CPL, military, etc.) A pilot who has logged more hours is considered better than the one with half the flight time despite their respective experience with different aircraft types and responsibilities. However, recently the aviation industry has started to adopt new approaches and focus on competence-based training.

The concept of competence has evolved through the years. Although in the world there is no generally accepted definition or approach, there are a number of definitions emphasizing different aspects brought up by educators and linguists who have discussed competence-related issues. Noam Chomsky introduced the term competence as a key term in linguistics. Dell Hymes [1] argued that Chomsky's linguistic competence failed to explain the overall language behavior and offered the focal term "communicative competence." He highlighted the fact that the linguistic knowledge is not enough. Apart from the grammatical knowledge, one should have the ability to use this knowledge appropriately in social interactions: one should know when to talk, when not, and as to what to talk about with whom, when, where, in what manner [1]. Munby [2] went a step further and looked at the grammatical competence not as a separate element but as an element inextricably bound up with the communicative competence. Michael Canale and Merrill Swain [3] contributed to this with their communicative competence framework which distinguishes three major domains. First, an indispensable component of the communicative competence is the grammatical competence. The term usually refers to morphology and syntax, so it is slightly misleading in this context. Canale and Swain use it in a broader sense - knowledge of vocabulary, rules of grammar, semantics, and phonology. They assigned it a central role because it is essential for

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externalizing communicative intentions. Second, sociolinguistic competence – sociocultural and discourse rules, i.e. on one hand, knowledge of how to use language in different sociocultural situations, and the extent to which appropriate attitude and register are conveyed by a particular grammatical form in certain sociocultural contexts; on the other hand, skills of combining utterances and functions as regards discourse rules; the cohesion and coherence of sentences and paragraphs. Third, strategic competence – verbal and nonverbal communication strategies... that compensate for breakdowns in communication [3]. In 1983 Canale elaborated this framework further and set apart discourse competence as a separate component. Savignon [4] expanded the concept by suggesting five characteristics. Two of them are particularly relevant to the aeronautical English: “Communicative competence is a dynamic rather than static concept. It depends on the negotiation of meaning between two or more persons who share to some degree the same symbolic system” and “Communicative competence is relative and depends on the cooperation of all participants involved” [4, p.9]. While proposing their approach to language test design, development and use, Bachman and Palmer [5] formulated a “theoretical framework of communicative language ability”. This theoretical framework indicates how various components relate to each other in a complex manner. The three components - language competence, strategic competence and psychophysiological mechanisms – are interdependent. The language competence can be classified into two broad categories: organizational competence (which consists of grammatical competence and textual competence) and pragmatic competence (which consists of illocutionary competence and sociolinguistic competence). For the acquisition of knowledge and skills in using language functions, Bachman and Palmer [5] prefer to use the term functional knowledge instead of illocutionary competence.

Adopting a communicative competence framework leaves open the question as to how to describe different proficiency levels and how to harmonize them in so many different countries. In the beginning of the 21 century the European Qualification Framework (EQF) and the Common European Framework of Reference for Languages (CEFR) dealt with this issue. EQF is based on learning outcomes defined in the form of competences; the European Credit System for Vocational Education and Training (ECVET) recognizes and validates work-related skills and knowledge acquired in different countries through the creation of a set of reference levels; the CEFR gives a comprehensive description “what language learners have to learn to do in order to use a language for communication and what knowledge and skills they have to develop so as to be able to act effectively” [6, p.1]. The definition in the EQF states that “competence means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development” [7, p.6]. Responsibility and autonomy are the two notions which describe the term “competence” in the EQF. CEFR adds two further types: general competences and specific communicative language competences. General competences “are those not specific to language, but which are called upon for actions of all kinds, including language activities” [6, p.9]. The communicative language

competences are linguistic, sociolinguistic and pragmatic competences, a delineation that is clearly informed by the communicative approach. Language use and language learning develop a variety of competences in various contexts and under various conditions. The interconnection between general competences and communicative language competences is reinforced by the words, “All human competences contribute in one way or another to the language user’s ability to communicate and may be regarded as aspects of communicative competence” [6, p.101].

In 2007 Celce-Murcia suggested a comprehensive model, which shows that the various components of the communicative competence are interrelated [8, p.45].

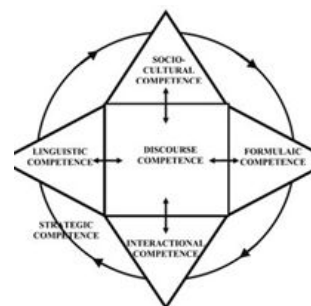


Fig.1. Celce-Murcia’s model on competences

Celce-Murcia proposes a complex and multidimensional model where the communicative competence contains linguistic competence, sociolinguistic competence, formulaic competence, and interactional competence, all of them supported by discourse competence and interrelated with the strategic competence. Celce-Murcia prefers “linguistic competence” to “grammatical competence” in order to highlight that this component comprises all the basic elements of communication: not only morphology and syntax but also lexis and phonology. The formulaic competence is the “counterbalance to linguistic competence” [8, p.47] and concerns the routine formulas and pre-fabricated chunks of language which facilitate the conversational flow. Murcia also uses the term “sociocultural competence” instead of “sociolinguistic competence.” Sociocultural competence addresses the knowledge of conversing appropriately in a particular social and cultural context, in accordance with the pragmatic factors related to variation in language use. Discourse competence refers to the ability to select, combine, and arrange words, sentences and utterances to make a coherent spoken or written text. This model places it in a central position by means of which all other competences intersect and interact with it. Celce-Murcia believes that interactional competence is one of the most useful because it ensures that all parties involved comprehend the communicative act. Strategic competence – cognitive and metacognitive strategies that allow the speaker to negotiate meaning, resolve ambiguities and compensate for deficiencies in the other competences. Celce-Murcia concludes that “the application of the model is relative rather than absolute” [8, p.55] and it has to be adapted to the needs of each group of students.

Recently some scholars [9, 10] have given empirical evidence that successful aeronautical radiotelephony

communication is dependent on more competences than the linguistic one. Communication threats related to the use of English by aircrew members and controllers range from linguistic to discursive to strategic or cultural factors. Kim and Elder [11] address this issue and claim that the communicative needs of pilots and air traffic controllers extend beyond their language proficiency, requiring negotiation, collaboration and interaction, "These participants, whatever their language background, need to be able to adapt to the situation at hand and enlist a range of communicative resources to participate in and make sense of messages delivered by speakers with differing levels of English competence in situations which may range from routine to highly unpredictable" [11, p. 14]. Emery [12] claims that background professional knowledge is inseparable from language use. While at work aircrew and air traffic controllers must rely on their knowledge, skills, and competences of all subjects they studied at school – navigation, meteorology, tactics, etc. – and apply them to the particular situation using their English language communicative competence. Moreover, it is only in the aviation English classroom that all domain-specific knowledge from all subjects comes into interplay.

III. MATERIALS AND METHODS

The key research question that this study addresses is: What competences would serve best the English language communicative needs of pilots and air traffic controllers and are validated by key stakeholders? The aim was to find out which competences officer-cadets need for effective flight training in English.

Three context-specific surveys were developed and they were quantitatively tested with 53 teachers in aviation English from 25 countries in 3 continents, 106 Bulgarian air force officers and 24 cadets from Bulgaria. The surveys were created using Google Forms and distributed via author's personal network and the social network Linked-in, a platform used for professional networking and career development. Participation in all surveys was voluntary and anonymous.

The answers of the respondents of the three surveys are valuable as they are all representative members of a group of specialists who are completely aware of the target language use (TLU) domain and the needs, wants and necessities of military air crews, as well as of the essential issues in the aviation communication. Most of the teachers and military personnel had both life and professional experience. 42.3% of the teachers were between 40 and 50 years old while 55.6% of the pilots and ATCs were 30 – 50 years old. All cadets were in the age range 20-24. 48.1% of the military personnel had more than 10 year professional experience. 77.4% of the teachers have been teaching English as a foreign language for more than 10 years. It is worth noting that 58.7% had more than 6-year experience in teaching aviation English in particular.

The population of the teachers was diverse and heterogeneous which we definitely see as an advantage because they contain variability of characteristics and provide worldwide perspectives on the researched topics. On the other hand, the pilot/ATC population was rather homogenous consisting of Bulgarian military pilots and

air traffic controllers, both newbies and experienced. This choice was deliberate due to the needs analysis and the need to generalize for the cadet population at the Bulgarian Air Force Academy. These domain experts can provide valuable information about job profiles, job-related tasks, and competences. They can bring forth insight and data that yields accurate understanding of their own occupation. The specific knowledge, skills, and attitudes as well as methods and tools required by professionals in order to fulfill their duties well can be best described by members of the profession. With this survey population, the basic requirement for diversity was fulfilled - maximum variation sampling where diverse respondents, who have different perspectives on the issue, are chosen.

Survey 1 had 31 questions; survey 2 - 24 questions; survey 3 – 15 questions. These surveys were a component of a bigger mixed-methods research study which had additional goals and research questions. That is the reason why only a couple of survey questions will be discussed in this article. Part I in all surveys collected demographic information for the respondents. The aim was to determine the profile of the participants. Part II of the surveys had 6 common questions. The competences were measured using a Likert rating scale. There is a competences grid with 19 Likert items ranging from "least important (1)" to "most important (5)". Additionally, there were a couple of open-ended questions.

IV. RESULTS AND DISCUSSION

All survey respondents were emphatic of the topic and they found the discussion about the aeronautical English timely, useful and important. The three surveys had Cronbach's alpha above 0.9, which indicates very good internal consistency of the surveys. In other words, the surveys measured what we wanted to measure.

Survey 2 investigated the necessity of pilots and ATCs to study aeronautical English. In this regard two questions were asked. One of them, question 5, asked if the English language is an integral part of the professional life of pilots and air traffic controllers (ATCs). The answers provided by the respondents confirmed unequivocally the necessity to teach aeronautical English: 96.2% replied "yes" while the rest of them "to some extent." The other one, question 6, asked: "How often do you participate in international meetings/exercises/missions where English is the common language in communication?" 35.8% replied 2-5 times a year, 26.4% replied that they do it annually; 15.1% participate between 6-10 times per year, while 16% take part in international activities more than 10 times per year. Only less than 7% have never participated. These answers revealed the necessity for the BAFA cadets to learn aeronautical English as they will use it in their future careers.

Survey respondents emphasized that communication is crucial for good teamwork and it is fundamental to flight safety. One of them explicitly mentioned that "the importance of communication for orderly and efficient job performance cannot be overemphasized." The respondents drew the attention to the various purposes of military aviation English during a typical working day at an air force base, during international training exercises, and during wartime. During combat aircrews are under an

enormous stress. When long or complex or coded instructions are given in English, pilots and controllers need proficiency in aviation English. In case of allies taken hostages or spying missions, military personnel should be armed with the communicative competence in English.

The key variables were identified and analyzed, using descriptive statistics and mean and mode. In Figure 2 below the mean, the average score, and the mode, can be seen. The mean shows us which variables were rated as more important. Although the mode is the least precise measure of a central tendency, it is necessary because it is the value which is most frequent; it shows the most commonly chosen answer in the survey. According to the findings the linguistic, interactional, intercultural and professional competences were confirmed as relevant for the design of an aeronautical English syllabus for BAFA cadets and their aviation English education.

Variable	N	Mean	Mode
Linguistic competence			
know and use correctly standard radiotelephony phraseology	183	4,75	5
know and use clear, concise and unambiguous language in aviation context	183	4,74	5
use intelligible pronunciation and intonation	182	4,53	5
be able to accommodate to various native speaker and non-native speaker accents	182	4,32	5
know and use accurate grammar	182	3,85	4
Interactional competence			
communicate successfully in routine situation	167	4,71	5
communicate successfully in unpredictable situations	166	4,72	5
cope adequately with apparent misunderstanding by checking, paraphrasing, confirming, clarifying information and repairing breakdowns	181	4,63	5
demonstrate fluency in speaking	182	4,23	5
demonstrate accuracy in speaking	181	4,30	5
Intercultural competence			
be aware that there are different cultures with different values, beliefs and behaviors	165	3,81	5
demonstrate openness and flexibility to different cultures e.g. accept their communication style or work strategy	182	3,82	5
be aware of the effects of gender on communication	164	3,38	3
be aware of the effects of losing face on communication	164	3,73	5
Professional competence			
be aware of the effects of military hierarchy and authority on communication	166	3,68	5
possess initial background professional knowledge	166	4,36	5
comply with the rules and procedures for radiotelephony communication	164	4,70	5
demonstrate a professional attitude and tone	165	4,48	5
be able to offer and accept teamwork	166	4,51	5

Figure 2. Mean and mode of competences

Pilots and ATCs, cadets and teachers consider as the most important element of their aeronautical English to learn, know and use correctly standard radiotelephony phraseology (4.75); to know and use clear, concise and unambiguous language in aviation context (4.74); and to communicate successfully in routine and non-routine situations (4.71). It is not surprising that they value highly the strict compliance with the rules and regulations of the radiotelephony communication. The lowest rated variable was being aware of the effect of gender on communication (3.38).

The surveys delineated the four core competences that are necessary for the professional careers of the officer-cadets.

Furthermore, the research study aimed to investigate the interdependence between linguistic competence and interactional competence, cultural competence and professional competence. According to the correlation analyses all correlations are statistically significant. Linguistic competence strongly correlates with interactional competence. Pearson correlation coefficient is 0.830. Another strong correlation is between linguistic competence and professional competence – 0.777. The correlation between linguistic competence and cultural competence is on medium strength 0.568.

		Interaction competence
Linguistic competence	Pearson Correlation	0,830**
	Sig. (2-tailed)	0,000
	N	160

		Cultural competence
Linguistic competence	Pearson Correlation	0,568**
	Sig. (2-tailed)	0,000
	N	158

		Professional competence
Linguistic competence	Pearson Correlation	0,777**
	Sig. (2-tailed)	0,000
	N	160

Figure 3. Correlations between competences

Linguistic competence. The English language is an indispensable part of the aviation communication in international context and this was confirmed by both the literature review of relevant sources and the empirical data from the surveys. Even in such a highly technical domain as aviation everyday English knowledge and skills are required. In Survey 2 open-ended questions respondents recognized the importance of general English as a factor for miscommunication – “lack of general English knowledge”; “low level of English proficiency” were mentioned as key issues in the breakdown of air-ground communication.

The respondents of the surveys found the standardized radiotelephony phraseology an indispensable part of the aeronautical English communicative competence. Pilots, ATCs, flight instructors, aviation English teachers emphasized and prioritized strict adherence to the phraseology. Reinforcing the correct use of standard phraseology was addressed by many respondents. Some particular examples of incorrect use of standard phraseology were provided in Survey 2 – “Stand by for take-off” or “Ready for take-off”. Lack of knowledge or

noncompliance of standard phrases was a problem commonly mentioned as a main cause for communication breakdowns. In Survey 2 a lot of respondents addressed this issue. Problems in communication are due to “different phrases used by pilots from various air force bases during identical situations”, “misleading phraseology”, “lack of standardization in the flight phraseology”. Another participant said, “in my opinion the greatest problem is that in the Bulgarian air force bases some pilots and controllers do not comply with the standard phraseology”. In some cases the problem is in the individual professional who has not learned the standard phrases and either does not use them or uses them inappropriately – “It is extremely important to speak correctly and fluently. It is also important to use the standard phraseology. Some military pilots try to be creative but when they are creative in English, they are only ridiculous” and “the mixture of Bulgarian and Western terminology may cause problems”.

The main conclusion from the surveys of the Bulgarian military pilots and air traffic controllers is that a need exists to standardize the phraseology in all Bulgarian air force bases. This goes together with implementation of the phraseology, appropriate refreshment training, and control on the correct usage of that phraseology.

The linguistic – interactional correlation is the strongest one according to the surveys. Obviously all stakeholders realize that it is not sufficient to know lexical items or grammatical structures in isolation. Some of the respondents suggest that the interactive skills are more important than the pure linguistic ones. Functions are used in spoken English interactions and they are recognized as important by most aviation English users. Communicative strategies are required between all speakers, proficient or not, native or non-native. In aviation they are particularly needed when there is congested traffic and stressful non-routine situations. The comments of the respondents support the idea that interactive factors affect pilots’ and ATCs’ discourse in different ways.

A pilot expresses his irritation at a controller who lacks communicative strategies – “After ‘say again’ the Tower repeats the instruction word by word. It is much better to paraphrase their instruction... to use easier words”. Paraphrasing is considered a function which could repair communication breakdowns and negotiate meaning. On the other hand, the above mentioned observation implies that collaborative behavior and supportiveness are directly linked to aviation safety. The concepts of team work, negotiation, collaboration in avoiding misunderstanding, adaptation to the speaking of others, flexibility, tolerance accentuate the existing connections between the pure linguistic factors and the use of interactional strategies. Here are the words of an approach controller who confirms the idea that accommodation in adapting language to that of a communication partner is extremely important because it helps to avoid misunderstanding and decreases the human error in communication – “Everybody should aim at correct, clear and unambiguous speech; everybody should monitor if their message was understood correctly by the other person. Radiotelephony communication is teamwork”. Solidarity and teamwork especially in international surrounding are key factors to safety.

The linguistic – professional correlation is a key one. Both the literature review [10, 11, 12] and the empirical study report that aspects of professional competence contribute to effective intercultural aeronautical communication. Radiotelephony context is completely different from general English context. When aviators or controllers lack professional knowledge, they will not only be ridiculed by their peers but they can also jeopardize the safety of flights. A few survey extracts clarify that “not knowing the procedures in depth”, “not knowing holding procedures or SID procedures”, as well as some other factors „...not only make aviators look preposterous but they endanger the flight”. Assisting cadets in learning the language in appropriate aviation context brings communicative success for students in their professional lives in the future.

It seems difficult for pilots/ATCs to separate language ability from background knowledge. Thus they reinforced the view that linguistic and professional competences are interrelated in aviation communication. Highlighting the relationship between linguistic and professional competence, a Bulgarian pilot flying at an US air-force base has explained the following, “...I have no problems communicating with colleagues and instructors, on the ground and in the classroom. I have 3-3-3-3 at Stanag exam and I have ECL 99 points. But I have to admit that I have difficulties with English. Mostly when I am in the air. When I expect a specific answer, I have no problem understanding it and responding accordingly. But if the situation changes and if there are many other aircraft that the controllers are talking to, it is quite difficult for me to sort out which radio message is for me and what exactly I need to do”. This pilot is confused and cannot differentiate if he lacks language competence or professional competence. Actually, often these two competences cannot be separated.

If companies and individuals aim to work effectively in aviation, then the complexities presented by differences in cultural predispositions must be understood and harnessed. The linguistic – cultural correlation is often underestimated but it is a crucial one, too. Communicating with pilots/ATCs who speak vague and ambiguous language is a threat to a successful flight. However, certain cultures are known to possess direct and objective language, and they get right to the point, whereas others not so much [13]. A lot of respondents reported instances of culturally influenced behavior that affected their work and their communications. A Survey 2 respondent wrote the following, “I can understand better a Bulgarian speaking in English rather than a foreigner speaking in English. It is important to practice English with foreigners in order to understand their way of thinking and speaking”. Teaching a foreign language is not a value-free activity and, consequently, language teachers, whether they realize it or not, are introducing certain patterns of thoughts, values and beliefs to their learners. Aeronautical English, however, is a lingua franca which means that a lot of cultures are interconnected while communicating in English. Aeronautical English is also the cultura franca and it reflects the perceptions of various nationalities, religions, ethnic groups and communities. Aeronautical English reflects diverse cultural experiences and language teaching should project them.

It is interesting to note that although intercultural competence was statistically weaker in my surveys, respondents actually shared a lot of observations connected with culture without realizing themselves that these were issues related with the intercultural competence. Here are a few examples: “some pilots explain in too many words what they want (especially Italians)” – stereotyping; “it is complicated when in one mission there are Bulgarian pilots who fly Czech airplanes and American pilots who fly F16 - mish-mash” – different cultural values and different measurement systems; “he is acting like a big boss, while actually safety comes first, not the boss” – power aspect; “civies (civilian colleagues) talk down to us but we are better in our profession” – organizational culture; “...the level of respect at civilian airports has decreased” – respect and judgmental attitude; “everyone should observe the rules of polite behavior and refrain from expressing their personal preferences” - deferential style of communication and avoiding conflict style.

No doubt literature [9, 10, 12] and the experimental study reveal that multicultural communicative competence should be included into aeronautical English trainings so that ab-initio and seasoned pilots and ATCs meet not only the sole language proficiency criterion but also the criterion for intercultural knowledge and skills which has already proved to be of vital importance in non-routine unexpected situations.

V. CONCLUSION

As global civil and military aviation have grown in complexity, effective language training of student pilots and air traffic controllers requires a more holistic approach. Air-ground radiotelephony communication is influenced by many elements most of which are interdependent. While linguistic competence is fundamental, successful communication in this context transcends mere language proficiency. Linguistic competence must be complemented by interactional skills, enabling effective negotiation of meaning and adaptation to dynamic communication contexts. Furthermore, professional competence ensures adherence to standard procedures and terminology, enhancing operational efficiency and safety. Additionally, cross-cultural competence enables individuals to navigate diverse linguistic and cultural backgrounds, fostering mutual understanding and minimizing communication barriers. The empirical study illustrated the stakeholders' perceptions of the importance of linguistic, interactive, professional, and intercultural competences to the successful aeronautical English communication and to the safety of this communication between pilots and air traffic controllers.

The main goal of this study is to help increase the professional competence of Bulgarian military pilots and air traffic controllers through the exploration of the competences required for effective communication, relying on the perceptions of a range of national and international aviation stakeholders. The relevance of the competence concept is its contribution to the syllabus design appropriate to the context of intercultural radiotelephony communications in aviation. Syllabi so far

have placed a great emphasis on linguistic components; however, this training has failed to take into consideration what domain experts value for successful communication in this professional context. Scholars nowadays recognize the interdependence between language and communication. The linguistic components of language, i.e. semantics, grammar and discourse, are interrelated with the pragmatic components i.e. the functional, sociolinguistic, and strategic. Language is used to facilitate social and professional exchanges between individuals. Language is learned by means of communication; meaning and content are of paramount importance.

Communication in a multicultural aviation context is the intersection of language, professionalism and culture. The synergy of the four competences – linguistic, interactional, professional and cross-cultural – can contribute to the on-going improvement of the aviation language proficiency training of military pilots and air traffic controllers.

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