

THE IDEAL ABILITY PROFILE OF THE STUDENT FUTURE MILITARY AIRCRAFT PILOT

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Abstract: *The objective of the research was to outline an ideal ability profile of the student future military aircraft pilot from "Henri Coandă" Air Force Academy, and comparing it with the position profile of the Air Force jet pilot, drawn off from an Indian study. The research included the assessments of abilities from 20 subjects, students at "Henri Coandă" Air Force Academy, with the specialization "Aviation pilots on aircraft with jet engines/planes", third year of study, and comparing them in terms of abilities. The theoretical concepts involved in the construction of the inventory used for the assessment of the basic abilities (AB11) are those subsumed to Fleishman's ability taxonomy (F-JAS). The results show the following hierarchy of basically skills necessary for a student future military aircraft pilot: psychomotor skills, perceptual skills, social skills, cognitive skills and physical skills. I also found relatively large differences between the ideal student profile and the position profile of the Air Force pilot made by Indian specialists. The main findings of this research may be useful to people involved in the development of the evaluation tests, in the evaluation and selection of applicants, and also to persons interested in becoming students at "Henri Coandă" Air Force Academy, by providing practical insight on abilities needed in this area.*

Keywords: *cognitive abilities, psychomotor abilities, physical abilities, perceptual abilities, social abilities*

1. THEORETICAL BACKGROUND

In 1992, Morrison and Brantner proposed a model of the factors that facilitate or inhibit learning related to taking up a new job. These factors are time on the job, inter-individual differences, job characteristics, context and environmental factors. After the relevance criterion first ranked was seniority, which explain 27% of the ease with which job tasks are learned, followed by inter-individual differences, job characteristics and environmental factors, which explained 24% of variance of the ease of job learning. Job characteristics, such as role complexity and lack of job challenge and inter-individual differences such as self-efficacy or prior similar experience was strongly associated with the learning ability of the job.

Other empirical studies have shown significant impact of inter-individual differences (skills, abilities, knowledge, personality characteristics, beliefs and attitudes) on job performance (Tett et al., 1991; Motowildo et al., 1997) and on adapting to organizational changes (eg, the acceptance of new informational technologies) (Agarwal and Prasad, 1999). The importance of inter-individual differences as a catalyst factor in job learning, professional success and adapting to organizational changes should make us lend them a greater attention in the context of staff recruitment and selection.

This study deals with such an inter-individual difference – the basic abilities – attempting to define the ideal ability profile of the student future military aircraft pilot.

Abilities represent a set of physical and mental traits, relatively stable, which allow the individual to achieve success in one or more fields (Golu, 2005). In short, abilities designate inclination, disposition, and talent.

Often the concept of "ability" is confused with the concept "skill" or "capacity". Although there is a clear link between the three, they are still different. Ability is the innate potentiality to achieve success in a particular area, being a mandatory precondition for capacity (to be able to accomplish a task), while skill is acquired competence (declarative and procedural knowledge) that leads to high levels of performance on tasks.

The individual abilities level reflects the development, structuring, integration and operation of all mental processes and functions. It is relatively stable (so it is a good predictor of future performance), but may be enhanced in some way by exercise (Neveanu, 1969). The skill level is proving to be an important resource for organizational psychology, offering the possibility to be used successfully in both recruitment actions and prediction of future performance, but also in training activities and training of employees.

Moreover, abilities play a significant role in the educational and vocational orientation service. To have a successful career in areas such as the military career it is not enough to show passion and grow interest, but also requires the presence/formation of specific abilities and skills.

After conducting several studies in the ability field, Fleishman (2000, cited in Caughron et al., 2012) offers a taxonomy of basic abilities (F-JAS - Fleishman Job Analysis Survey), which will become one of the most used nowadays. It contains five types of abilities: cognitive, psycho-motor, physical, sensorio-perceptual and social abilities. Initially the model included only the first four categories of abilities, but considering the relevance of social/interpersonal abilities in professions with an emphasis on teamwork, sales, working with the public, counseling, and so on, they were added later.

Each skill is described by three specific examples of anchors representing low, medium and high level of ability presence in subjects examined. The model was developed over several years, based on rigorous correlational and factor analysis studies on human abilities and performance in different tasks (Fleishman, 1964, 1972, 1975; Fleishman and Mumford, 1991; Theologus and Fleishman, 1973; Theologus and co., 1973, cited in Caughron et al., 2012).

F-JAS has been successfully used to analyze a wide variety of jobs and in the development of numerous ability tests for different jobs, from public sectors - military, government and private - factories and refineries, communication, electric energy, supermarkets (Fleishman and Mumford, 1988; cited in Caughron et al., 2012). Thus, it becomes a vital tool in recruitment, transfers, promotions and for identifying training needs.

Research tools based on Fleishman's Taxonomy obtained adequate reliability and validity coefficients.

Reliability coefficients obtained (between .70-.90) among different evaluators quotations reported by different studies (eg on supervisors to prison, Gebhardt, 1982; telecommunications staff, Inn, 1982; technical staff of the army, Mayers, 1981, cited in Pitariu, 2006) were fairly high. Also, Hogan (1978, cited in Pitariu, 2006) indicates the concordance between the assessments of the job holders, superiors and job analysts.

The ability instruments tested showed also a good content, external and construct validity (Messick, 1989, cited in Caughron et al., 2012). The instruments allow an exhaustive description of the abilities responsible for different performance dimensions, measure indeed the proposed ability categories and provide accurate predictions of the future job performance. Divergent and convergent validity is satisfactory – tasks of which content belong to the same 'family' have similar ability profiles. Also ability profiles describing the same job, but in different organizations, are consistent (Berndin, 1988, cited in Pitariu, 2006).

Theologus and co. (1971, cited in Pitariu, 2006) found a significant relationship between the experts abilities quotations and the factors saturation from the factor analysis of performance. The validity of the tests chosen, based on job analysis done with F-JAS has been highlighted in various employment situations (Cooper, 1983, Zedeck, 1976; cited in Pitariu, 2006).

1	The understanding of short and simple verbal messages Eg: audio informative messages	The understanding of the details and latent meanings from complex verbal messages Eg: ambiguous and technical speeches
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Fig. 1. Exemple of AB11 item

2. THE RESEARCH APPROACH

2.1. The research objective. The present study is an exploratory one aimed to obtain an ideal ability profile of the student future military aircraft pilot at the Air Force Academy "Henri Coandă", from Braşov, and comparing it with the ideal ability profile of the Air Force jet pilot drawn off from an Indian study.

Given the difficulty and complexity of piloting military aircraft requirements, it becomes vital to know the necessary skills to obtain a good performance in this area, by both those involved in the development of the evaluation tests, evaluation and selection of applicants, and by those who wish to move towards such a profession.

2.2. Participants in the study. The group of subjects consisted of 20 participants (5 girls and 15 boys), students at "Henri Coandă" Air Force Academy, from Braşov, with the specialization "Aviation pilots on aircraft with jet engines/planes" in the third year of study. They voluntarily participated in the research.

2.3. Research Methodology. The research instrument used was AB11 Inventory (job evaluation version) - an inventory of basical abilities, built by me and my colleagues from the Association of E-team Psychology, based on Fleishman's taxonomy presented above. AB11 measures five categories of basical abilities (cognitive, psychomotor, physical, perceptual and social abilities) through 73 items, with responses on a 7-point Likert scale of intensity.

The measured cognitive abilities were: oral and written language comprehension, oral and written expression, richness of imagination, originality of ideas, memorization, problem identification, mathematical reasoning, number facility, inductive and deductive reasoning, information classification, cognitive flexibility, speed of closure, flexibility of closure, spatial orientation, visualization, perceptual speed, attention focusing and attention mobility.

The psychomotor domain included: control precision of movements, coordination precision of movements, multilimb coordination, response orientation, and timing of movements, reaction time, arm-hand steadiness, manual dexterity, digital dexterity, wrist-finger speed and speed of limb movement.

The physical abilities category included: static strength, explosive strength, dynamic strength, trunk strength, extent flexibility, dynamic flexibility, gross body coordination, gross body equilibrium and stamina.

The perceptual skills assessed were: near vision, far vision, visual color discrimination, night vision, peripheral vision, depth perception, glare sensitivity, hearing sensitivity, auditory attention, sound localization, speech recognition and speech clarity.

The social/interpersonal abilities measured were kindness, behavioral flexibility, coordinationability, responsibility, assertiveness, negotiation ability, persuasiveness, sociability, social conformity, social responsiveness, self-control, social trust, developing others, obtaining information through conversation, desire for achievement, openness to experience, independence, perseverance, resistance to make premature decisions, verbal reasoning and the ability to restore one's mood.

AB11 has been also applied in other fields, showing a high internal consistency (for example, in a study involving 53 workers in construction, the instrument reported an α Cronbach coefficient of $.91 > .70$). Also, a factor analysis of the main components was performed using the responses of 251 subjects (106 students, 112 workers, 13 dentists and 20 students of the Academy of Aviation in the current study), based on the five dimensions, corresponding to the five categories of abilities underlying the instrument construction. This revealed a total explained variance of 52.929%, which represents a significant proportion of explained variance.

The data just presented indicate that we can trust AB11 Inventory as a valid and reliable instrument.

2.4. Procedure. Research approach consisted of three steps presented below.

In the first stage of the study, the 20 subjects assessed using AB11 Inventory, the necessary abilities level for the student future military aircraft pilot. Each research participant was assured anonymity and confidentiality of results.

As a second step, I analyzed the results obtained and made on this base the ideal ability profile of the student with the specialization "Aviation pilots on aircraft with jet engines/planes".

In the third stage, I compared the ability profile of the student future military aircraft pilot obtained with Air Force pilot position ability profile, drawn off from an Indian study (Awasthy and Kaur, 2009). For the last one, job requirements included 14 skills, most of it of cognitive nature: alert observation ability, spatial ability, form perception, perceptual speed, spatial learning, memorization, specialized skills, and knowledge of English, visualization, general reasoning, mechanical knowledge, eye-hand coordination, and visual discrimination.

3. RESULTS

To start I calculated α Cronbach coefficient including all items ($\alpha = 0.91$), which showed a very good internal consistency of the AB11 inventory. Forward, I checked the internal consistency of items from each category of basic abilities. Except for items in the category of physical abilities, which recorded the lowest coefficient of internal consistency ($\alpha = 0.65 < 0.70$), the other items describing cognitive abilities ($\alpha = 0.85$), perceptual abilities ($\alpha = 0.72$), psychomotor abilities ($\alpha = 0.75$) and social abilities ($\alpha = 0.79$) had adequate internal consistency coefficients.

After that, for each category of abilities it has been calculated the average, which was subsequently used to classify their importance inside the ideal ability profile of the student with the specialization "Aviation pilots on aircraft with jet engines/planes", in the military area.

Abilities necessary for a student future military aircraft pilot were ranked in the following order: psychomotor abilities ($M = 5.74$), social abilities ($M = 5.42$), perceptual abilities ($M = 5.3$), cognitive abilities ($M = 5.1$) and physical abilities ($M = 4.86$).

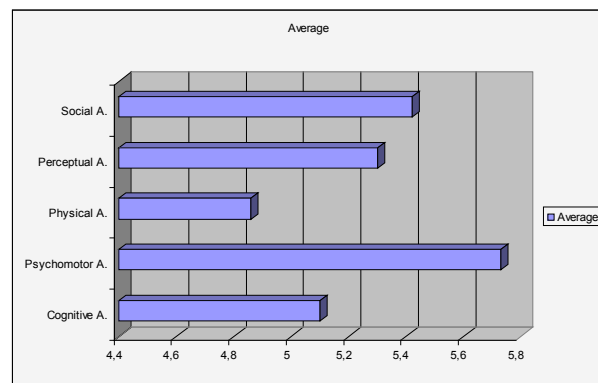


Fig 2. Ability profile of the student with the specialization "Aviation pilots on aircraft with jet engines/planes", in the military area

Highest scores in each category of abilities were recorded as follows.

Psychomotor abilities with the highest scores were: reaction time, digital dexterity, and manual dexterity, control precision of movements, limb motion control and limb movement speed.

Social abilities, who achieved the highest scores, were: autonomy, perseverance, resistance to make premature decisions, behavioral flexibility, verbal reasoning, responsibility, self-control, kindness, social responsiveness, assertiveness and desire for achievement.

In the case of perceptual abilities highest scores were recorded by: perception far, auditory attention, speech recognition, depth perception, peripheral perception, the perception of close perception and perception nighttime glare.

Inside the category of cognitive abilities the highest scores were obtained by: visualization, memory, spatial orientation, and flexibility of closure, focus, speed of perception, richness of imagination, speed of closure, attention mobility and cognitive flexibility.

The most important physical skills, depending on their score were: physical strength, extent flexibility, gross body equilibrium, gross body coordination and static force.

Compared to the ability profile for the Air Force pilot position, described in the Indian study, this ability profile includes less cognitive abilities and more psychomotor and perceptual abilities.

4. CONCLUSIONS

The current study provides a comprehensive picture of the abilities needed by a student with the specialization "Aviation pilots on aircraft with jet engines/planes" in the military area, outlining an ideal profile.

This profile was obtained using an basical ability inventory AB11 (job evaluation version), built after Fleishman's taxonomy (2000) and applied to 20 students with the specialization "Aviation pilots on aircraft with jet engines/aircraft" within "Henri Coandă" Air Force Academy, from Braşov, in the third year of study.

By relevance, the five types of basical abilities outlined the following hierarchy: psychomotor abilities, social abilities, perceptive abilities, cognitive abilities and physical abilities.

Compared to the ability profile of the Air Force pilot position, included into the Indian study, this one offers a different perspective, but a much larger and specific one, about the necessary abilities to ensure military aviation performance.

An unexpected aspect highlighted by the study is the importance given by the students to social abilities, ranked even before the perceptual, cognitive and physical abilities. This can be attributed to the novelty inclusion of this ability class in studying abilities of future military aircraft pilots, or to a desirable attitude displayed by the subjects, but it is very important to not neglect their real importance in the field of military aviation. Social abilities such as autonomy, perseverance, resistance to premature decisions, behavioral flexibility, self-control, certainly make an important contribution to performance in this area. The relationship between social abilities and performance in the military area deserves more attention from future studies.

5. THE STUDY UTILITY

Firstly, the study provides a practical perspective on the skills needed in this area, useful to people interested in becoming students at "Henri Coandă" Air Force Academy.

It also provides to current students, by presenting the job analysis conducted by 632 experienced Indian military instructors, a practical perspective on the skills really needed into military aviation domain.

Moreover, it may have implications for the improvement of the entrance examination of candidates to the Air Force Academy "Henri Coandă", from Braşov, and not least, it is informative to the interested public.

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