

EXPERIMENTAL VERIFICATION OF THE EFFECTIVENESS OF FOREIGN LANGUAGE APTITUDE ASSESSMENT METHODOLOGY OF CANDIDATES TO UKRAINIAN HIGHER MILITARY EDUCATION INSTITUTIONS OF THE MINISTRY OF DEFENCE OF UKRAINE

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Abstract

The article presents the results of an experimental verification of the effectiveness of Foreign Language Aptitude Assessment (FLAA) methodology of candidates to Ukrainian higher military education institutions (HMEI) of the Ministry of Defence of Ukraine. The hypothesis, structure, and outcomes of the experiment are formulated; the content and tasks of the ascertaining and final stages of the study are analyzed, confirming the effectiveness of the proposed methodology. The main part of the article describes the experimental procedure and its results, which involved the selection of participants from among applicants in small groups. The experimental study was conducted through a correlational comparison of the outcomes of FLAA administered on the Moodle platform using the author-developed test tasks, with expert evaluations of the candidates, as well as their academic performance based on modular assessment data. The results of the experiment confirmed that the proposed diagnostic assessment model is effective, and the methodology is characterized by high validity, reliability, and practicality: the indicators are stable over time, the level of correlation is nearly perfect, no statistically significant differences were found between mean values, and the distribution of differences does not indicate the presence of systematic error.

Key words: experimental verification, Foreign Language Aptitude Assessment model, expert evaluation, Spearman correlation, representative sample of tastes.

Introduction

According to the Strategic Defence Bulletin, the improvement of military education and personnel training is one of the priorities in the defense sector aimed at enhancing the quality of education and ensuring that training meets modern challenges, including the realities of wartime. This implies updating training programs, introducing new methodologies, and ensuring a high level of professionalism among service members, which is essential for maintaining the state's defence capability (Stratehichnyi oboronnyi biuleten Ukrainy, 2016).

At the stage of selection for admission, candidates applying to HMEI of the Ministry of Defence of Ukraine take entrance examinations, among which the FLAA of candidates to HMEI of the Ministry of Defence of Ukraine has been implemented and tested. This system is designed to diagnose and predict success in mastering foreign languages and helps to assign candidates to appropriate language groups (Bachman L., Davidson F.; Pimsleur P.).

Therefore, the hypothesis of our research assumes that the implementation of a comprehensive model of FLAA of candidates to HMEI of the Ministry of Defence of Ukraine will make it possible to determine the levels of linguistic aptitude development and predict candidates' success in mastering foreign languages.

Considering the requirement for applicants to achieve a foreign language proficiency level of at least Level – 2 (in accordance with STANAG 6001), a fast and efficient diagnostic tool is a modern, automated prognostic test — the FLAA implemented on the MOODLE platform (Metodychni rekomendatsii zi stvorennia testovykh zavdan ta testiv u systemi upravlinnia navchalnymy materialamy MOODLE, 2014).

In our previous publications, we presented the scientific justification of the FLAA methodology of applicants to HMEI of the Ministry of Defence of Ukraine, developed at the methodological level (based on systemic, synergetic, subject-activity, and andragogical approaches), the theoretical level (scientific substantiation of the features, goals, objectives, content, principles, and stages of linguistic aptitude diagnostics), and the practical level (development of the methodology — a system of methods, techniques, test tasks, forms, tools, and the sequence of their application) (Rafalska M.,2025); ¹Rafalska M.,2025)].

However, the effectiveness and validity of the theoretical foundations and experimental methodology have not yet been empirically verified. Therefore, the purpose of this article is to describe the process and results of the experimental verification of the effectiveness of FLAA methodology of applicants to HMEI of the Ministry of Defence of Ukraine.

Theoretical background

In our earlier studies presented the FLAA definition and stated that the FLAA has been studied by domestic and foreign scholars, namely: linguistic intelligence (G. Gardner), structural elements and patterns of development of foreign language learning abilities (J. Carroll, C. Sepon, P. Pimsler, V. Henmon. R. Lado), testing in foreign language teaching (A. Davies, G. Henning), testing as a method of verifying professional competence (R. Lado), adaptation of the modern language aptitude test by Carroll and Sapon (J. Rysiewicz), methodological recommendations for creating test tasks and tests in the MOODLE learning management system (V. Sergienko, V. Franchuk, L. Kukhar). Our model is based on the following approaches: the subject-activity approach (A. Bruslinsky, V. Yahupov, etc.), the andragogical approach (C. Rogers, O. Lahodynskyi), and the synergetic approach (H. Haken, M. Feigenbaum, H. Honcharenko) [(Stratehichniy oboronnyi biuleten Ukrainy, 2016; Bachman L., Davidson F.; Pimsleur P.).

Results and Discussion

It should be noted that the experimental verification of this research was carried out under the conditions of a regular admission campaign, with the additional application of the FLAA methodology of applicants to HMEI of the Ministry of Defence of Ukraine, as well as under the conditions of the educational process. It is also important to emphasize that the conditions for organizing both the admission campaign and the educational process were identical; therefore, they can be considered a reliable source of measurement.

During the preparation phase of the experiment, the necessary tools for foreign language aptitude diagnostic assessment were developed and organized, including:

- human resources – participants of the diagnostic assessment (test-takers, test specialists, and technical staff);
- testing materials – a set of test tasks and supporting materials;
- physical resources – laptops, headphones, modems, copying and printing equipment, answer sheets for test-takers, questionnaires for survey participants and academic staff of the departments of foreign languages, as well as facilities for conducting and organizing the diagnostic assessment.

When forming the sample group of candidates for admission, we adhered to several requirements: availability of necessary information, equal working conditions for all candidates, and

compliance with the general principles of sampling. Test specialists who conducted the FLAA were instructed on the experimental procedure and the use of the new assessment materials.

Participants were selected and the FLAA of Applicants to HMEI of the Ministry of Defence of Ukraine was organized among candidates for admission. Each experimental group consisted of up to 20 participants. The experiment lasted for four years. During this period, after the diagnostic stage conducted on the Moodle platform, the results were evaluated by a group of experts composed of experienced academic staff (hereinafter referred to as academic and teaching personnel – ATP) in order to determine the level of linguistic aptitude development.

After one academic semester, the learning outcomes of admitted candidates to the HMEI of the Ministry of Defence of Ukraine and were studying foreign languages in different language groups were evaluated.

During the experiment, significant efforts were made to ensure gender balance and equal participation of teachers and test-takers, taking into account the instructors' teaching, methodological, and research experience.

We consider that the most objective and statistically valid way to verify the validity of the results is through correlation analysis using specific statistical measurement methods. This approach allows determining the degree of interconnection between the studied indicators, the strength and direction of their correlation, and confirming the validity and scientific soundness of the proposed foreign language aptitude diagnostic assessment method. Consequently, this enables the determination of candidates' suitability levels for learning foreign languages and their subsequent distribution into appropriate language groups.

Thus, to determine the strength and direction of the relationship between two interval variables (the results of the foreign language aptitude diagnostic assessment / expert evaluation and academic performance results), the Pearson correlation coefficient (r) was used. To test the statistical significance of the differences between our interval variables, the Student's t -test (t) was applied. This made it possible to verify the previously stated hypothesis and to compare the mean values of our samples (results) in order to determine whether they differ significantly or originate from the same general population. In addition, as an extra reliability control of the results, the Spearman rank correlation coefficient (ρ) was employed — a nonparametric statistical method used to measure the strength and direction of a monotonic relationship between two variable samples, based on their ranks rather than their actual values.

To compare the results of the FLAA, expert evaluation, and academic performance, empirical data from three sets of applicants were used.

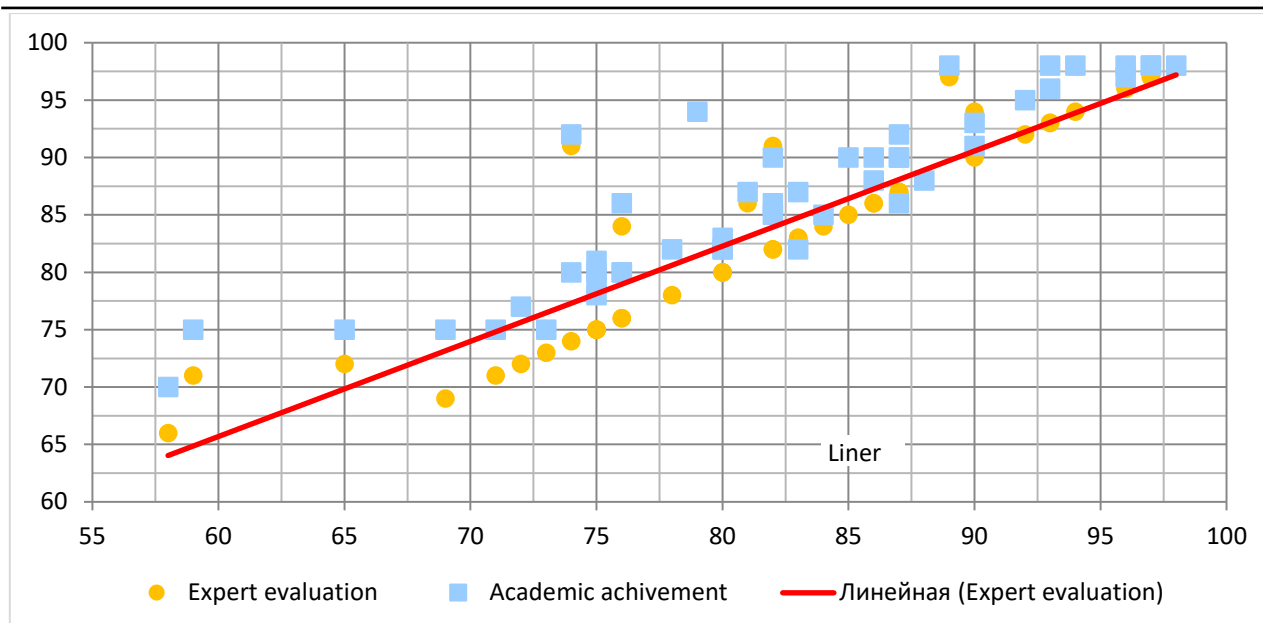
For correct comparison, the diagnostic scores were converted into percentages using the following formula:

$$D\% = \left(\frac{D}{170} \right) \times 100$$

where D – is the number of points obtained during the FLAA.

Based on the obtained data, scatter plots were constructed, one of which is presented as an example (Figure).

The scatter plot shows a strong linear dependence between the indicators: the points are arranged along an upward line, and the regression line passes slightly above the diagnostic values, illustrating a tendency toward lower expert evaluations and academic performance levels. The visual representation confirms the analytical results: the plotted points corresponding to quantitative evaluation indicators are generally located along an ascending line, which illustrates a strong positive correlation.



Picture – Comparison of the results of the FLAA, Expert Evaluation, and Academic Performance in the 2022 academic year

To verify the strength and direction of the relationship between the two sets of variables, Pearson correlation coefficients were used. In our case, the Pearson correlation coefficient (r) for different periods of the experiment is provided in our dissertation research. The results demonstrate the presence of a very close direct relationship, indicating that the higher the diagnostic assessment result, the higher the expert evaluation.

The obtained result was calculated using the following formula:

$$r = \frac{\sum[(x_i - \bar{x})(y_i - \bar{y})]}{\sqrt{(\sum(x_i - \bar{x})^2 \cdot \sum(y_i - \bar{y})^2)}}$$

where x_i, y_i – values of the variables X and Y , $\bar{x}, \bar{y}$ – their mean values.

In turn, the Spearman rank correlation coefficient (ρ) for different periods of the experiment is also presented in our dissertation research.

To ensure the objectivity and comparability of expert evaluations, detailed criteria were developed that, according to the experts, encompass the key aspects necessary for determining the level of foreign language aptitude development. These aspects include:

- foreign language proficiency (based on the results of the foreign language examination, which assesses all types of language activities — reading, speaking, writing, and listening comprehension);
- coherent speech in the Ukrainian language (dialogic and monologic speech);
- creative thinking (the ability to think critically and express thoughts creatively, as well as to produce detailed and structured narratives).

The assessment of coherent speech in Ukrainian is an integral part of the FLAA of candidates to HMEI of the Ministry of Defence of Ukraine, as it reflects the test-takers' ability to use their native language effectively for communication.

To ensure the consistency and objectivity of expert evaluation of the native language, which is an essential component of linguistic aptitude, a detailed assessment rubric was developed. This

rubric converts qualitative aspects of coherent speech into measurable indicators, allowing experts to apply a unified evaluation approach and minimize subjectivity. This directly corresponds to the requirements for assessing coherent speech in Ukrainian (Table).

Table – Criteria and Indicators for Assessing Coherent Speech in Ukrainian

Speech Aspect	Evaluation Criteria	Indicators (Examples)
Dialogue Speech	Content and Logic	Adherence to the topic of communication; logical and coherent expression of ideas; argumentation of one's position.
	Normativity of Speech	Compliance with the norms of literary language (phonetic, lexical, grammatical); absence of surzhyk and Russianisms.
	Communicative Competence	Conciseness, expressiveness, appropriateness, and inventiveness in dialogue; active listening; ability to maintain a conversation.
	Interaction and Etiquette	Polite correction of inaccurate statements; expression of personal opinion; observance of communication etiquette.
Monologue Speech	Content and Completeness	Full disclosure of the topic; clear expression of the main idea; distinction between primary and secondary information.
	Structure and Logic	Logical and sequential organization of the statement; presence of introduction, main part, and conclusion; stylistic consistency.
	Linguistic Expression	Use of linguistic means according to communicative intent; lexical and grammatical richness; adherence to literary norms.
	Creative Component	Ability to transform information (detailed, concise, selective); creation of an original text; argumentation of ideas; expressiveness of delivery.
	Reflection and Attitude	Expression of personal attitude toward the topic; understanding of the possibility of multiple interpretations of the issue.

The table above presents the detailed criteria and measurable indicators used by experts to assess coherent speech in Ukrainian within the FLAA of Applicants to HMEI of the Ministry of Defence of Ukraine.

Conclusions

Our experimental study was conducted through a correlational comparison of the results of the FLAA using specially developed test tasks on a representative sample of participants, with an independent expert evaluation of the candidates' linguistic aptitude, as well as with the assessment of academic performance of those who were admitted to HMEI of the Ministry of Defence of Ukraine, based on their module grades.

The FLAA is a vital component of the admission process to HMEI, especially for programs requiring intensive language training for prospective military specialists in Ukraine. Therefore, the obtained results indicate that the methodology for diagnosing linguistic aptitude is a valid indicator,

as it strongly correlates with both expert assessments and academic performance ($r \approx 0.96\text{--}0.98$). The high Spearman correlation coefficient ($\rho \approx 0.98$) confirms the reliability of the diagnostic tool for comparative ranking of candidates, even in the presence of differences in mean values.

Thus, the instrument accurately reflects the hierarchy of linguistic aptitude, although it requires scale calibration to eliminate systematic bias. The obtained data provide grounds to conclude that the model of the FLAA is effective, and the diagnostic methodology demonstrates high validity, practicality, and reliability: the results are stable over time, shows an almost perfect correlation, the mean values do not differ statistically, and the distribution of differences does not indicate systematic error.

Another outcome of our experimental research is the formulation of methodological recommendations for conducting the FLAA of candidates applying for HMEI of the Ministry of Defence of Ukraine.

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Competing interests

The authors declare that they have no competing interests.

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