

## COGNITIVE DEVELOPMENT OF STUDENTS IN FOREIGN LANGUAGE ACQUISITION

Natalia Saienko

National Technical University of Ukraine “Igor Sikorsky Kyiv Polytechnic Institute”, Kyiv, Ukraine  
[saenko106@gmail.com](mailto:saenko106@gmail.com)

The article highlights the necessity and possibility of students' psychological and cognitive development by means of a language education through the intensive and regular formation of linguistic abilities. The concept “ability” is analysed and defined in terms of different sciences: psychology, physiology and pedagogy. The linguistic abilities are classified as special abilities. It distinguishes them from general abilities and determines their composition. The structure of these abilities includes primarily components – memory, perception, intellection and a number of secondary qualities which are discussed in the article. Creativity is regarded as a valuable addition to any special abilities and its formation in language study is ensured by using a problem-solving method. Special attention in the article is paid to the issues of motivation and interest which are presented as the significant factors accelerating the formation of linguistic abilities. For determining the level of linguistic abilities, the article substantiates the use of diagnostic tests designed to evaluate the indicators of cognitive processes related to a speech activity. These indicators are ranked and combined into four main groups in accordance with a component composition of linguistic abilities.

**Keywords:** cognitive qualities; linguistic abilities; high technical school; integrative motivation; instrumental motivation; interest; intercultural communication; tests; speech activity.

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### Introduction

The current trends and challenges in foreign language acquisition, social order for language proficiency of future engineers, their personal academic and professional needs specify the principal aims and approaches in the educational process. According to the communicative and learner-centered approaches the learning process should be targeted on the formation of a clearly defined set of competences both language and professional ones and on the development of students' cognitive abilities and psychological qualities which underlie and optimise an intercultural communication.

Cognitive development of students is an important constituent of a complex educational multi-directed paradigm the two main cornerstones of which are training and development (Freud, 2010). Among the wide variety of cognitive characteristics of an individual, the most significant for the language acquisition process are proved to be linguistic abilities which have a branched structure, comprise various elements and possess many options.

Different aspects of the problem of cognitive abilities including linguistic abilities have been the subject of meticulous and thorough investigations in several branches of science: psychology (McGrew, 2005; Willson & Barnes, 2002), philosophy (Topping & Trickey, 2007; Stanovich & West, 2008), physiology (Marino-Brain, 2002; Casey & Tottenham, 2005), medicine (Kernan & Sabsay, 1996) cognitive linguistics (Evans & Green, 2006; Croft & Cruse, 2004), pedagogy and teaching (Nazzi & Gopnik, 2001; Moreno & Marques, 2009; Halpem, 2013; de Jong & van der Leij, 2002; Lesaux, Lipka & Siegel, 2006) etc. However, a complicated task of a comprehensive and multi-directional development of technical students' cognitive abilities by means of language education necessitates a profound analysis of linguistic abilities.

**The aim** of this paper is to define the structure of cognitive abilities which underlie and effectuate foreign language acquisition, to accentuate the factors which predetermine a successful formation of linguistic abilities and to specify the ways of their evaluation and development.

### Overview

Psychologists define “ability” as a totality of cognitive qualities and characteristics which determine the efficiency of a certain activity. In terms of physiology, a whole assortment of person's abilities and the degree of their primary level of development depend upon the type of nervous activity which is reflected in strength, balance and mobility of excitation or deceleration processes (Elbro, 1996; Freud, 2010). In psychology, abilities designate some individual psychological properties which:

- (1) distinguish people from one another;
- (2) are related to the efficiency of certain activity;
- (3) are not identical to existing skills and knowledge but can accelerate and facilitate their formation.

There exist numerous classifications of abilities and according to the most recognised one all the abilities can be united into two major groups:

- *general abilities* which ensure mastery of different types of skills and knowledge and which an individual realises in various activities. As they primarily include qualities of mind, they are often called general mental abilities though they can depend on volitional and emotional features. The whole set of general abilities is sometimes referred to as an aptitude or intellect;

- *special abilities* which are related to certain activities and can be accordingly classified. In language education, we deal with special abilities to foreign languages.

An important and valuable addition to any kind of special abilities is a set of creative abilities which form an integral part of an innovative productive professional activity. Creativity as a special ability includes various components, the most significant among them being:

- identification and vision of the problem to solve;
- enunciation and drafting of the problem;
- putting forward a hypothesis and finding ways of its verification;
- data collection and analysis; drawing the conclusions;
- searching the opportunities for using the obtained results.

In language teaching process the development of creative abilities is ensured by using different options of a problem-solving method.

**The composition of linguistic abilities** is complex and multileveled. The basic components are memory, perception and intellection which underlie various classifications of these abilities. Some scientists include also such personal qualities as emotionality, openness to interaction, will and responsibility (Liferenko, 2013, p. 41). These qualities stand in the secondary line of importance for language acquisition but they play a significant role in the realisation of an extremely consequential function – a compensatory function – in situations of an insufficient level of abilities. Some special studies in psychology stress the importance of the capacity for empathy i.e. wish and ability to identify oneself as a native speaker in a proposed communication situation. And the most important personal characteristics upon which the success of language acquisition depends greatly are the communicative abilities of students (Kabardov, 2010). The need for communication and willingness to communicate with people of other cultures promote motivation for language education.

### **Motivation and interest**

The intense and systematic development of language abilities is closely connected to the problems of motivation and interest. Numerous investigations show that in the absence of interest even high level of language abilities in most cases fail to provide purposeful results in education (Polyanskaya, 2002). For teachers of English in high technical school this implies the need to raise interest in the subject through diversification of learning content, teaching methods, training technologies and – which is most important – through integration of foreign language education and professional training of future engineers e.g. using a project method built on research in the future speciality of students etc. An interest is usually formed by two components:

- by recognised importance of language learning;
- by emotional appeal of a linguistic education to technical students.

Most scientists tend to specify three key characteristics of an interest:

- positive emotions towards the study of a foreign language;
- availability of a cognitive aspect;
- apprehensible presence of a motive that forms the very activity.

Emotional and cognitive attitude to language education affects the formation of the internal motivation which serves as the source of the individual's activity and the development of abilities including linguistic abilities. Such process requires consideration of personal characteristics and some specific features of higher nervous activity according to which there exist two main types of language acquisition:

- *intuitive and sensitive type* which makes more accessible an active productive foreign language; speaking and creative writing have a priority and are easier to master;
- *rational and logical type* which facilitates mastery of passive types of speech activity namely reading and listening.

Psychological studies present also other types of language acquisition:

- *communicative type* which is defined on the basis of physiological peculiarities in some particular differences in the level of lability of nervous processes:

- *non-communicative type* which is related to the inertia of the nervous system.

To distinguish between these two types is essential for choosing the teaching method. It should be considered for example that intensive methods especially those based on role-playing games usually demonstrate low efficiency with students of non-communicative type.

So, a significant factor in the accelerated development of abilities is believed to be an external and internal motivation. Teaching practice shows that a high level of motivation can ensure success in learning even for students with mediocre abilities. Together with such components as educational assignments, training actions, control and self-control, assessment and self-assessment motivation forms an external structure of educational process and affects students' academic behaviour which has two basic dimensions: focus and intensity. A cognitive type of academic motivation is based on students' intellectual activity and constant pursuit of knowledge. Negative motivation reveals itself in attempts to avoid low marks and censure of teacher for the failure of educational tasks. The development of cognitive abilities, positive attitude to language acquisition process and to a subject of English for Specific Purposes intensify training activity and improve its efficiency which means that motivation becomes a source of active focus of students' behaviour including educational behaviour. If the motivational determinant is insufficiently developed it fails to stimulate effective learning and causes adverse conditions for the linguistic abilities development.

In cognitive psychology the study of motivation is based on three theories: (a) the theory of incentives; (b) the hierarchy of needs theory; (c) the self-control theory. According to the hierarchy of needs theory, a system of needs has been developed in which all individual's needs are arranged in a form of a pyramid from elementary physical needs up to the need of a total self-fulfillment. For the language teaching process the important conclusion of the hierarchy of needs theory is that a student cannot be properly motivated to perform actions to satisfy the needs of a higher level until the needs of the previous level are mostly gratified. In terms of planning of educational process, it means the necessity of ranking academic aims and goals in ascending order of complexity and importance for the future professional activity of technical students.

Among the vast variety of classifications of motivation the division into two types, namely instrumental and integrative motivation (Gardner & Lambert, 1972) is of particular importance for language training of future engineers. In the aspect of the instrumental motivation, the aim of foreign language acquisition is linked with material wealth and career considerations. In contrast, the integrative motivation is formed due to the desire to bring oneself to culture and society of the target language. Experimental study of motivation is carried out mainly through written and oral questioning of students and ranking the received responses by different scales designed to determine respondents' attitude to the target language, culture and language acquisition process. According to our annual survey the vast majority of students of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" have the instrumental motivation. The fact that English is widely used as a means of intercultural professional communication of technical specialists, none of whom can rather often be a native speaker of English, has led to a significant reduction of the importance of integrative motivation. This tendency has a negative impact in certain declining of students' interest to a socio-cultural component of the language learning.

However, in accordance with the current political and economic situation in the world, a particular importance is attached to the humanisation trend of teaching foreign languages as a dialogue of different cultures considering national mentality and the necessity for mastering a system of concepts elaborated in each culture using the language of the society. The Common European Framework of References for Languages stresses that rich inheritance of different languages and cultures is a valuable common resource for mutual development. Therefore the main task of universities must be to transform such diversity from an obstacle in communication especially in professional one into a source of mutual enrichment and understanding which requires a study of national nature, specific national character, spiritual culture and outlook stereotypes of people. The development of a socio-cultural competence of future engineers in the process of learning English for Professional Purposes contributes greatly to reaching complex political objectives in the preparation of all Europeans to growing academic and professional mobility and close cooperation not only in the fields of education, culture and science but also in trade and industry. It will facilitate mutual understanding and tolerance, respect of individual and cultural differences on the background of effective international cooperation. The development of a socio-cultural competence of technical university graduates includes forming of three kinds of skills to possess and use effectively:

- (a) background knowledge of native speakers which include historical, cultural, ethnic, semiotic and other similar information;
- (b) skills and abilities of linguistic and extra-linguistic activity;

(c) facts and phenomena of national culture personifying socio-cultural peculiarities of foreign language.

A planned and regular work on the development of a socio-cultural competence of technical students on the lessons of English contributes significantly to the formation of the integrative motivation which together with other kinds of motivation and interest accelerate and facilitate the development of linguistic abilities of future engineers.

An individual approach to students as the subjects of learning process requires awareness of the existence of varying abilities and capabilities of students. This includes the organisation of the educational process on the basis of two important principles: individualization and differentiation (Saienko, 2012). Individualization is a system of measures designed to take account of individual differences within one academic group. Differentiation involves the creation of specialised groups or subgroups for consideration of certain mental characteristics.

### **The evaluation of the level of linguistic abilities**

The most effective and obviously the most convenient way to determine the level of linguistic abilities, apart from the results of a systematic study, is to use specially developed diagnostic tests. In the first half of the twentieth century when the problem of determining the level of abilities was actively studied, the diagnostic tests which were called placement tests were mostly used to distribute students into groups. As the basis of such tests, foreign researchers used verbal intelligence tests and achievement tests in the native language (Carrol & Sapon, 1959; McCarty & Kirk, 1961; Pimsler, 1966). Most tests were designed to evaluate the following indicators which were supposed to underlie the linguistic abilities:

- auditory sensitivity as an ability to distinguish between sounds and to memorise them;
- sound correlation with the corresponding symbol;
- ability to deduce grammatical rules from the proposed linguistic material;
- verbal memory.

A gradual specification of a component composition of the linguistic abilities fulfilled by the researchers of Russian psychological school (Belyaev, 1965; Novikova, 1979; Saburova, 1975; Petrova, 1973; Kalmykova, 1975; Zimnyaya, etc.) led to the improvement of diagnostic tests in the aspect of three main characteristics of any test: validity, reliability and objectivity. At present the linguistic abilities are mostly assessed by tests which evaluate principal indicators of cognitive processes related to a speech activity:

*The level of auditory differential sensitivity* can vary depending on a number of factors and circumstances:

- availability of a model of comparison for a differentiated sound in a student's memory;
- category of a differentiated unit (phoneme, word);
- degree of difficulty of a differentiation problem (to find identity or dissimilarity of the proposed units; to identify differentiated sound etc.);
- the method of material presentation (sequential or mixed).

*The volume of verbal operational memory* which is defined by the method based on the principle of varying types of operational problems:

- selection and reproduction of units according to the given grammatical characteristics;
- selection and ordering all units in a sequence which conforms to the logic of a further statement.

*The probabilistic forecasting in speech activity.* A student is supposed to give all possible options of sentence endings. Results are evaluated by two parameters:

- rapidity of production of speech hypotheses (an average number of hypotheses on a phrase);
- flexibility of mental processes which ensures speech forecasting evaluated by a quantity of hypotheses of various types.

The control of this kind allows outlining the range of students' verbal experience, their ability to use such experience in new situations of communication.

*The generalisation and identification of language patterns* which is evaluated by the correctness of translation of sentences from the native language to foreign or, in some specially developed tests, artificial language. This method makes it possible to differentiate between intuitive-practical and verbal-logical plans of forming and using of language patterns and twig the process of their formation (Saienko, 2011).

Tests results help to find effective ways of perfection of linguistic abilities to satisfy the necessity to overcome the contradiction between the current level of student' abilities, which is insufficient in most cases, and speech activity requirements.

## Conclusions

It is proved that abilities reveal themselves and are gradually developed in a certain activity. For linguistic abilities, it means the speech activity, both academic and professional. The recognition of one's own level of linguistic abilities can help students to develop them under conditions of intensification of a learning process. It imposes significant requirements on the high technical school to organise an education on the basis of individualization and charting the individual learning trajectories for all students.

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