

# Language of Science as a Means and Cognitive Resource of Educational Process

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**Abstract**—The article deals with the correlation between the phenomena of the language of science and the educational process as an integral element of the pedagogical system. The most important role of the language in the processes of knowledge and categorization of the world is shown in the article as well as the role of the term as a linguistic-cognitive operator of the three subsystems in the system of global science – knowledge, information and language. The relationship and meaningful content of the basic concepts of the language of science – “Language for special purposes (LSP)”; “English for Special Purposes (ESP)”; “English for Academic Purposes (EAP)” are analyzed. The article generalizes the existing points of view on the status and functional amplitude of the language of science as a cognitive-semiotic mediator in multi-vector processes of cognitive-creative activities of subjects of science and education

**Keywords**—*language of science, cognition, educational process, knowledge, information*

## I. INTRODUCTION

Pedagogy occupies an important place in the system of human sciences and is conceptually connected with philosophy, psychology, sociology, linguistics, anthropology, history and many other cognitive spheres. Like any scientific field, pedagogy has its own system of basic categories that form its cognitive-conceptual core. The axiomatic foundations of pedagogical science are represented by such categories as education, self-education; training; education, self-education, knowledge; pedagogical process; development; formation, skills.

In the 21st century all these categories are also objectified by means of the most important cognitive resource, the language of science, the semiotic and epistemological base of which is made up of terms of varying degrees of scientific and conceptual specialization. The term as a linguistic cognitive operator is a common element of the three relevant subsystems in the science system – knowledge, information and language. The term encodes the process of concept formation which is then decoded into a terminological definition giving grounds to single out a special function of the term as one of the priority functions – the codification (coding) function. The language of science plays a crucial role in the most important module of the pedagogical space – education [7, 8].

## II. PURPOSE OF THE STUDY

Educational process is impossible without the use of the language of science and the simultaneous enlightenment and upbringing which is also based on national traditions, customs and beliefs fixed and reflected in the national language. Of particular importance in the processes of upbringing and education is the figurative-semiotic system of influencing a person, since it is the image of one or another fragment of reality that has been set consciously and is linked in a cognitive “bundle” with others. It is the mental-psychological basis of that process which is called education.

The study of the specifics of the language of science as a semiotic means and cognitive resource of educational processes is aimed at finding out and describing the ontology, genesis, functions and correlation of such interrelated and interdependent phenomena as language and education. It is necessary to parameterize the specificity of the verbal-semiotic representation of the various epistemological modules that form modern science as a global super-sphere [9].

In the broadest sense, education is defined as a three-dimensional phenomenon: 1) as a process it is the development in educational institutions as well as a result of the self-education of a system of knowledge, skills, experience, cognitive and practical experience, value orientations and relationships; 2) education as a result is the achieved level in mastering knowledge, skills, abilities, ways of thinking and activity; 3) education as a system is a set of successive educational programs and state educational standards as well as a network of educational institutions and educational authorities that implement them.

## III. RESEARCH METHODS

The main method is the descriptive method; methods of cognitive science were also used – the method of cognitive analysis, categorization, observation, comparison, generalization, the method of conceptual and taxonomic analysis; interpretation method; functional method; cognitive modeling method; data integration method.

#### IV. FINDINGS

The beginning of the 21st century is characterized by an increased interest in the problem of the language of science in philosophy [5]. When considering the language of science as a subject of philosophical analysis, E.V. Chepkasova notes that the philosophical-logical approach implies the understanding of the language of science as a conceptual composition of science. It expresses the logical-conceptual aspect of the semantics of the language of science .... The language of science is examined from the point of view of its possibilities of clarifying the content of scientific theories, the nature and gnoseological status of the language of science as a subject of logical research, the gnoseological status of the principles and methods used in the analysis and reconstruction of the language of science are analyzed. The philosophical-linguistic approach includes a genetic consideration of the language of science, that is, an explanation of the need for the latter; the analysis of the features of the language of science, that is, how the properties, structure and functions of a natural language were transformed within the framework of the language of science; the study of the relationship of natural and artificial levels, relationship with the natural language basis, the reasons for the selection in the language of science of a special formalized language fragment; epistemological and ideological grounds of mutual influence and interpenetration of ordinary, artistic and scientific consciousness since besides the terms in the language of science there are always emotional and evaluative components [5]. The researcher shows that the philosophical and semiotic approach includes an explanation of the nature of the sign and sign activity, their epistemological and social justification; consideration of natural and artificial signs, each of which has a certain value and performs specific functions; the analysis of the relationship between the signifier and the signified within natural and artificial signs in the language of science.

From the standpoint of “intellectualization of the language” and “deformation of a unified (real) language consciousness under the influence of the scientific form of social consciousness”, the phenomenon “language of science” appears in some works primarily as a system of scientific concepts in the form in which they make up the plan content of numerous scientific terminology interacting with higher forms of theoretical thinking. Developing the semiotic aspect of this statement, we come to the necessity to distinguish between languages (conceptual schemes) of science and functional styles that have thematic, pragmatic, speech, theoretical and informational differences which express themselves in opposition to the forms and levels of social consciousness, activities, conditions of communication, forms and types of language implementation in speech, etc. The term “sublanguage” has recently been functioning in one more plane: terminologists consider it possible to raise the question of the existence within the national language of a certain number of autonomous, narrower in volume and specialized sublanguages, or languages for special purposes (LSP).

The concept of language for special purposes for Russian linguistics at the end of the twentieth century was relatively new, representing a transposition that emerged in the 1970s in the German-speaking European countries of the concept (and term) of “Language for special purposes (LSP)” (“*Lanque de Spécialité*”, “*Fach sprache*”).

Initially, the concepts of LSP and special language were isomorphic: “The language for special purposes” increasingly comes into the literature on language teaching,” said LSP theorist Ronald Mackay [11]. Gradually, the functional amplitude of the LSP increases. It is recognized as a means of implementing the functions of communication as well as communication in various spheres of human activity.

The definition of the LSP theory in foreign linguistics, as well as in Russian studies, was determined by the concept of a functional style, or register. We should distinguish between a general scientific and technical style and private scientific and technical styles differentiated according to the specifics of subject areas and language levels.

There are also polar opinions on the issues under consideration. So, R. Hartley rejects the idea of “special languages”, or special types of languages (such as “scientific German”, etc.) from the standpoint of the existence of corresponding languages: German, French, etc [6].

The analysis of sources on the problems of the language of science and international scientific communication based on English as one of the world languages allows us to conclude that there is a kind of conceptual interference and inadequacy of the content of the concepts of LSP and ESP (English for Special Purposes). Gradually in the term ESP an adjective “special” is replaced by a “specific” characterizing the specifics of the goals of students studying various English registers of science. With such an interpretation, the communicative-pragmatic aspect of scientific communication comes to the fore, in which the learner is oriented towards fulfilling a certain social role that determines the set and degree of restriction of the language tools inventory.

It is noteworthy that ESP theorists point out that it is logical to consider “language for special purposes” as a combination of a special (professionally oriented) lexicon (dictionary) and a layer of the “common core” of the language remaining constant regardless of the social / professional role of communicators of scientific communication.

In addition to those noted above, the concept of “English for Academic Purposes” is functioning actively. “English for Academic Purposes” (EAP) represents the use of English in order to master professional knowledge in a particular science. This implies an in-depth insight into the ontology of scientific prose. The language of scientific communication is considered to be an “open” system that constantly interacts with the national language: the study of the general scientific language and its mastery are conditioned by the

understanding of the national language and the peculiarities of its functioning.

The priority in the development and study of the technical subspecies of scientific prose is noted in the LSP stratum – in the “language of science and technology” “English for Science and Technology” (EST) performing a dual function and serving the purposes of scientific communication of professionals and the goals of teaching a specific scientific subject.

The conceptual space of the LSP in Russian studies reveals a certain isomorphism of the notion “special language”, but it is not adequately superimposed on the stratification grid of the generalized LSP concept. In the national conception of the LSP / language of the specialty, the communicative-philological approach prevails, putting the language of science and scientific communication in educational processes at the forefront.

The interpretation of the language of science as a cognitive resource is based on the cognitive approach to the language, in which the latter, according to W. Chafe, is the best window into knowledge, because we always use language to express it [4]. E.S. Kubryakova notes that with the development of a cognitive science, “the idea of the exceptional importance of the language for all knowledge processing processes, for its transfer from one generation to another, for growth and accumulation of experience in understanding the world, according to its description, etc., received more and more recognition” [10].

Considering the multi-stage and multi-factorial nature of the educational process when developing optimal models of educational technologies based on the language of science it is advisable to take into account the 21st century technical-computerized and high-tech realities and include the meta-language of information technologies in the system of the cognitive resource which belongs to high-ranking sublanguages and is rapidly developing. “The language of symbols is one of the most informative languages of science, various mathematical symbols play an important role in it providing not only the exact expression of scientific thought but also logical analysis and processing of information contained in scientific knowledge” [2].

Distinctive features of a scientific text as a cognitive-syntactic unit of the representation of knowledge in the educational process are the following: “terms as verbal semiotic units; cognition; logical sequence of presentation; cognitive accuracy of the information presented; persuasive argument; formal conciseness and conciseness with an underlined focus on the reader-specialist. The scientific text as a whole is characterized by the absence of modality since the authors do not verbally express their attitude to their own conclusions. Dispassion, consistency, reasoning as the most important properties of a scientific text usually leave no place for the subjective-evaluative modality, therefore in such texts the modality can be defined as zero” [2]. Verbalization of any scientific field is carried out by means

of terms of various semiotic nature; it is the term as a language representative of a scientific concept that is a semiotic marker that, as adequately as possible and within its conceptual field, explicates and nominates a scientific concept fixing its place in the cognitive system of a specific science. The cognitive-semiotic approach to the problem of the linguistic structure of science conditions the interpretation of the term as a semiotic derivative of conceptualization and categorization of the world by human consciousness and thinking. Its conceptual and logical content is a complex structure of knowledge, a terminoconcept that correlates with epistemological denotata. The cognitive function of the language of science is inextricably linked with the creative, nominative as well as with the derivational and metalanguage aspect of the widest range.

The language of science represents the following aspects of scientific knowledge in the educational process: 1) formation, structuring, differentiation and classification of sciences – the constituents of the scientific continuum; 2) formation, modeling, systematization, differentiation and classification of their logical-conceptual systems; 3) formation, genesis, parameterization, differentiation and classification of their terminological systems; 4) principles and laws of organization, mechanisms of functioning, constituent features and properties, parameterization and classification of their derivational systems. The scientific results obtained in the process of cognition — in the verbal incarnation — become adequate, they are included in structures — contexts — realities through the escalation of conversion procedures (steps): 1) from systems of sciences to systems of concepts; 2) from systems of concepts to systems of their definitions; 3) from systems of their definitions to systems of terms; 4) from systems of terms to systems of their meanings. The language of science in the semiotic “refraction” can be interpreted in this connection as “any intersubject set of symbolic means, the use of which is defined by syntactic, semantic and pragmatic rules”, and “a language sign is used in combination with other signs – members of a certain social group; language is a social system of signs that mediates the reactions of team members in relation to each other and to their environment” [12].

The multidimensionality of the classification representations of the concept of the language of science at the present stage implies the integration of the logical, cognitive, epistemological, semiotic, communicative and pragmatic aspects as priorities taking into account the features of the previous turns of the concept of the science language. With anthropocentric understanding and interpretation of the language of science as a way of being of the scientific consciousness, as the medium of the human essence, a complex of interrelationship of a different plane reflecting the role of the human (personal) factor in language is highlighted. Such an approach is most relevant in the processes of multifaceted and multi-vector educational activities.

In a pedagogical activity at all stages of the implementation of fundamental gnoseological attitudes, it is also necessary to take into account the link between mentality and language which is also manifested in the fact that “mentality can be represented as a picture of the world that an individual has sharing the peculiarities of the team to which he belongs. The mentality determines the “way of thinking” of the individual but the individual is not aware of this impact but perceives it as a given. Collective attitudes and stereotypes affect the individual giving him the opportunity and the right to position himself as a member of this society or team. Sociologists equate mentality with an absolute model of behavior, an ideal code presented in the form of a given set of settings” [3].

Term as the basic unit of the language of science and the cognitive resource of the educational process actualizes its most important function – the function of the linguo-cognitive mediator, the conceptual-verbal mediator between the global system of knowledge and the person creating, discovering and transmitting new knowledge to his successors and students.

## V. CONCLUSION

In a pedagogical studies language of science is multifaceted: it is connected with the problem of the interaction of thinking, reality and language and the way language content is incorporated into the conceptual picture of the world; with the correlation of conceptual schemes and the adequacy of the linguistic picture of the world of the social personality; with polycoordination and dynamics of relationship categories: language personality, language, speech, communication, term, language sign, word, system, function, structure, model, text, discourse, integrity, etc.; with cognitive-epistemological, derivational, semiotic, pragmatic units of measurement constituting properties and features of the scientific continuum with a general tendency towards integration, generalization of ideas about the language of science from local points of view.

According to L.Yu. Buyanova, the continuity (in historical perspective) of the cognitive processes of human consciousness determines the continuity of terminological semiosis and contributes to the further development of the entire civilizational process and the evolution of the language of science in general. All these processes are international in nature due to the historical internationalization of the semiotic foundations of world terminologies (Latin and Greek) without which both the globalization process of scientific cooperation and the development of world science as a whole would not be possible [1].

## REFERENCES

- [1] L. Buyanova, Modern concept of a term as a semiotic-cognitive operator of a scientific picture of the world [J]. *Language. Personality. Culture*, 2015, 2: 25-30.
- [2] L. Buyanova, E. Zavaley, The subject area “Informatics” as a cognitive-terminological supersphere [J]. *News of Sochi State University*, 2013, 3(26): 182-184.
- [3] L. Buyanova, E. Nachkebiya, Mentality as a linguistic category [J]. *Cultural Life of South of Russia*, 2009, 4(33): 82-86.
- [4] W.L. Chafe, Repeated verbalization as evidence for the organization of knowledge [J]. *Preprints of the plenary session papers: XIV International Congress of Linguists*, 1987: 88-110.
- [5] E. Chepkasova. The ratio of natural and artificial language systems in science [J]. *News of St. Petersburg Electrotechnical University “LETI”. Series “Humanities”*, 2003, 2: 14-16.
- [6] R. Hartley, *Implications for the Preparation of Teaching Materials* [J]. *Languages for Special Purposes*, 1969.
- [7] V. Katermina, Cultural and interpretative potential of mass-media neologisms in English discourse [J]. *Questions of Cognitive Linguistics*, 2017, Vol. 1: 84-90.
- [8] V. Katermina, Manipulative Potential of Vocatives in Pedagogical Discourse [J]. *Proceedings of the International Scientific Conference Society. Integration. Education*, 2017, Vol.1: 228-237.
- [9] V. Katermina, Political Semiotics: Lexical Innovations in Mass-Media Discourse, [J]. *Redefining Community in Intercultural Context: 7th International Conference RCIC’2018. Nation Branding, Identity and Security*, 2018, Vol. 7, 1/2018: 223-228.
- [10] E.Kubryakova, Language and knowledge: Towards the acquisition of knowledge about the language: Parts of speech from a cognitive point of view. The role of language in the knowledge of the world [M]. *Moscow: Languages of Slavic culture*, 2004.
- [11] R.Mackay, *Languages for special purposes* [J]. *Eduvec*, 1975, 3: 24-33.
- [12] Ch. Morris, *Foundations of the theory of signs* [C] // Yu.S. Stepanov (Eds). *Semiotics. Moscow: Science*, 1983: 48-61.