

# THE FORMATION OF INTERCULTURAL COMPETENCE BASED ON INFORMATION AND ANALYTICAL TECHNOLOGIES

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The choice of a profession is a crucial part of our life. It can be claimed that nowadays many new professions have appeared connected with information and data analysis. Besides, one should take into account the importance of intercultural and communicative competence (ICC) and emphasize the need to consider ICC based on the information and analytical technologies as a positive influence for the future career. The aim of this research is to investigate the cognitive and communicative process of foreign language education at the profile or specialized level of a secondary general school. In this regard we set specific tasks to determine the nomenclature of sub-competencies that are part of the ICC of specialized schools students; draw up a system of communicative tasks aiming at the formation of ICC of specialized schools students; substantiate the relevance of integrating information and analytical technologies in the formation of specialized schools students' ICC. In this paper, we demonstrate a model for the formation of intercultural and communicative competence of specialized school students based on the information and analytical technologies. All approaches, stages, and experimental techniques conducted at a specialized school in the city of Karaganda are detailed.

**Keywords:** *Intercultural competence, Communication, Specialized schools, Students, Model, STEM.*

## 1. INTRODUCTION

In the near future, significant technological changes will occur in Kazakhstan, which will require integration of the latest technical achievements such as advanced digital technologies, smart technologies, IQ, IT, big data, artificial intelligence, various methods of developing human cognitive skills, physical capabilities, an unmanned electric buses (such as an alternative mode of transport) digital twins in various spheres of life and much more. As a result, the Atlas of New Professions and Competencies of Kazakhstan, created by the Higher Technician's Certificate, has a list of professions of the future, most of which are based on the widespread use of leading information technologies and robotization [1]. For example, robotics operators, a designer of transport control interfaces, an eco-analyst, a designer of digital twins, a digital logistician, a robotics technology engineer, a big-data analyst (in the field of tourism), transport

gamifiers, etc. The Atlas also presents supra-professional competencies that help improve the efficiency of professional activity. These include systems thinking, cross-industry communication, environmental thinking, lean manufacturing, project and process management, customer focus, programming, robotics, artificial intelligence, artistic creativity, multilingualism and multiculturalism.

Here, the importance of all of the above competencies for the formation of an educated, highly moral, critically-thinking, physically and spiritually developed citizen, capable of self-development and creativity can be considered. Taking their importance into account, the authors decided to single out from the listed competencies cross-sectoral communication and, in particular, multilingualism and multiculturalism. According to the terms presented in the Atlas, multiculturalism is the preservation and development in a particular

community (state or enterprise) of the cultural characteristics of the people who live there. Multiculturalism and multilingualism in an organization or company imply not only a list of national or religious cultures but also cultures of thinking, psychotypes, communications and individual characteristics. The modern world is becoming global by leaps and bounds. Already, a company that employs specialists born or living in different parts of the world is no exception. The transformations taking place at the moment pose new and exceptional challenges. It is generally recognized that at the junction of different areas of knowledge, approaches, cultures, the most effective solutions are born. Successful and progressive teams include people with different mindsets, psychology, distribution of roles in the team. It follows that multicultural teams will be able to find effective unusual solutions and even solve problems that have not yet been resolved. This contributes to the emergence of new needs of society, where intercultural communication is a key factor for successful professional activity. This led to the idea of creating a model for the formation of intercultural and communicative competence based on the integration of information and analytical technologies among students of specialized schools in the natural and mathematical direction [2].

According to the State Program for the Development of Education for 2011-2020 [3], which provides for the creation of a system of profile education “Beyindikmektep” in the senior grades of secondary schools, lyceums, gymnasiums, in grades 10-11 profile education is implemented in two directions: social and humanitarian and natural and mathematical. Profile training is assumed as the basis for the acquisition of primary vocational, secondary vocational and higher education. The introduction of profile education in the Republic of Kazakhstan at the senior level of school requires the determination of the purposefulness and subject content of foreign language education from new methodological positions. Eventual in this regard was the development of fundamentally new approaches to the organization of teaching a professionally-oriented foreign language by the Kazakh methodological school: the subject area “foreign language” has been expanded to the level of “foreign language education” and a “cognitive-linguocultural” methodology of foreign language education has been developed, which implies the formation of intercultural and communicative competence of an individual through the co-study of language and culture.

The didactic orientation of the intercultural competence (ICC) formation process is determined by the composition of a foreign language – communicative sub-competence, interpreted as the possession of a foreign language in all aspects of speech and communicative activity; subject-content subcompetence, which is interpreted as mastering new cognitive linguocultural complexes that reflect the subject content of the source text (problem, general background information on the subject, a situation that caused discussion, proposed solutions); contextual and communicative subcompetence, considered as the ability to communicate freely on a wide range of significant problems. The criteria for the formation of intercultural and communicative competence are the following abilities: to be aware of the system of concepts and categories of the object of communication; to carry out analytical-semantic, evaluative-critical processing of the incoming information for the subsequent solution of communicative tasks; create your own polemically reasoned discourses; conduct discussion communication, interviews, conversations [4]. Research on intercultural communication competence has mainly attempted to produce models based on attitudes and skills to measure interculturally successful behaviours, such as intercultural adaptation, appropriateness, and effectiveness of the interaction.

As with the definition of intercultural communicative competence, the terminology of the ICC areas or dimensions that group attitudes and skills is also varied depending on the author and the focus of the ICC model: intercultural awareness, intercultural sensitivity, and intercultural adroitness; cognitive dimension, affective dimension, behavioural dimension; empathy, experience, motivation, positive attitude toward other cultures, and listening; and from the organisational context: effective communication skills/abilities, cultural awareness and understanding, open-mindedness and non-judgemental attitude, and personal competence and intelligence [5]. The authors believe that the intercultural and communicative competence of students in specialized schools can be successfully formed based on the information and analytical technologies. This research covers the development process of the model for the formation of intercultural and communicative competence of specialized school students based on information and analytical technologies. Development of certain abilities of the students will be criteria for determining the success of the prepared model. The predominant criteria will be the aforementioned abilities as awareness of the systems of concepts and

categories of the object of communication, the ability to conduct analytical, semantic, evaluative and critical processing of incoming information to solve communication problems, build their own polemically reasoned discourses and conduct debatable communication, interviews, and conversations.

## 2. MATERIALS AND METHODS

The leading method was started with was the modelling method. Modelling, being a research method, is often applied in the humanities. Also, modelling as a method of scientific knowledge has been known since ancient times, and gradually it began to spread to new areas of scientific knowledge. In the 20th century, the modelling method was considered already as a universal research method, and it was during this period that a unified system of concepts was developed and terminology was created. In science, there are several concepts and terms of the model, since the emphasis is on its different qualities and tasks that are solved using the model. One of them is “A model is such a material or a mentally imagined object that, in the process of research, replaces the original object so that you can get new knowledge about this original object.” [6]. Another definition: “Model is a simplified representation of a real object, process or phenomenon” [7]. Models of objects can be reduced copies of architectural structures, visual aids, etc.

S.S. Kunanbaeva defines a model as an artificial construct created to obtain or store information in the form of an image, reflecting the properties, characteristics and connections of the original object [4]. Modeling is one of the methods widely used in world methodology for its range of epistemological functions and broad focus in the organization of training, but also as a method of scientific research. Modelling, as a method of scientific knowledge, makes it possible to identify the regularity between the constituent elements of the system, followed by the synthesis and reproduction of a model of a particular educational process. The model acts as the initial stage in the design of the logical process of mastering certain competencies, which includes a theoretical and methodological basis, a system of principles, goal-setting, a content component and teaching methods, etc. The term “model” in modern science is interpreted in different ways by different authors. One of the interpretations of this term is its consideration as a system of signs describing the characteristic properties of the original – an analogue with a reflection of an abstract image [8].

Modelling, as one of the methods of scientific cognition, is considered as the main method of constructing scientific provisions and has the following characteristic features, as a functional focus on the reflection of a real object by an analogue, systemic interconnection of components, and the consistency of the cognition process. The model is considered as the main product of modelling, which is determined according to V. Kraevsky [9] as a system of interrelated elements, which in turn reunite the connections, sides and functions of the object under study. Undoubtedly, the modelling process is a creative process, since heuristic methods and forms of creating an abstraction of the educational process are applied, taking into account current trends and innovations in foreign language education. The authors believe that the creation of a model is the development of the goal of creating the design of a pedagogical system, process or situation, as well as the main ways to achieve it. The construction of methodological activity is one of the tasks of the methodology of foreign language education and has been considered by various authors for a long time. A large number of studies have been carried out by various researchers on the modelling of foreign language communicative competence, aimed at achieving a certain level of students. The typology of models also differs depending on the functional orientation and component content. V. Kraevsky considers two types of models, such as:

- an analogue of the pedagogical process, considered as a model of the projected process in the planned form;

- the interconnection of the constituent components in the pedagogical process, due to the abstraction of already existing connections [9].

M. Wartofsky [10] is not limited to the functionality of modelling and presents his vision of the application based on the nature of the displayed object and the nature of the model: didactic and research, structural and functional and signed and subject. N. Kuzmina and N. Kukharev [11] considers five main components in modelling: 1) gnostic; 2) design; 3) constructive; 4) organizational; 5) communicative.

- The gnostic component belongs to the field of knowledge of the teacher. It is not only about knowledge of one's subject, but also about knowledge of the methods of pedagogical communication, psychological characteristics of students, as well as about self-knowledge (of one's personality and activity).

– The design component includes ideas about the promising tasks of teaching and upbringing, as well as about the strategies and ways to achieve them.

– The constructive component is the features of the teacher's design of his activity and the activity of students, taking into account the near goals of teaching and upbringing (lesson, lesson, the cycle of classes).

– The communicative component is the features of the teacher's communicative activity, the specifics of his interaction with students.

– The emphasis is on the connection between communication and the effectiveness of pedagogical activities aimed at achieving didactic goals.

– The organizational component is a system of the teacher's skills to organize their activities, as well as the activity of students.

V. Ginetsinsky [12] also proposes a systemic model in which he distinguishes four functional components.

– The presentation function is to present the content of the material to the students. Allocation of this function consists of abstraction from specific forms of learning. It is focused on the very fact of the presentation of educational material.

– The incentive function is to arouse students' interest in assimilating information. Its implementation is associated with asking questions, evaluating answers.

– The corrective function is associated with the correction and comparison of the results of the activities of the students themselves.

– The diagnostic function provides feedback.

Thus, the model serves as a kind of cognitive tool: the model is the link between the researcher and the object of research, and therefore how the research is carried out. Thus, the modelling process includes the following elements: research subject, or researcher; the object of research is the original object under study, and the subject of research, which is the model. The concept of “technology” is widely used in modern teaching theory. It is customary to talk about pedagogical technologies, educational technologies, distance learning technologies, etc. M. Bershadsky [13], exploring the meaning of the term “technology” in the modern pedagogical literature, notes that this

term is often used as a tribute to fashion: any pedagogical activity is declared a technology. Besides, the author identifies three more main areas of application of this term: technology as art, classical technology (algorithmic paradigm), the technology of person-centred education (stochastic paradigm). From the point of view of this research, the most interesting is the concept defined by M. Bershadsky as “classical technology”, which is used to describe models of the educational process following the paradigm of the production technological process. The model is built on a theoretical basis and includes a student personality model with a description of the parameters to be monitored and methods for their diagnosis; a system of pedagogical influences on a student, consisting of well-known operations that implement a certain theoretical concept of learning; a system of diagnostically and operationally defined educational goals, so it could be used, but it is based on the opposite content and structure, so criterion for analyzing the disciplines of the curriculum to identify students educational resource in the development of information competence would be easier if the study concentrate on the educational potential of technical disciplines [13].

To form effectively intercultural and communicative competence, it becomes necessary to use integrated information and analytical technologies. Here it is very important to determine the role of information and analytical technologies in mastering intercultural and communicative competence by students of specialized schools. Information and analytical technologies are a set of methods for collecting and processing information that characterizes the object of managerial influence (social, political, economic and other processes), specific methods for their diagnosis, analysis and synthesis, as well as assessing the consequences of making various decision options. Information and Analytical Technologies (IAT) can be defined as a system of knowledge, methods, operations and rules that allow ensuring the greatest efficiency of a particular type of activity by attracting energy, raw materials, technical, intellectual, human, organizational, informational and other resources. The most important feature of IAT is their interdisciplinary nature, they are at the “junction” of some scientific disciplines, sometimes weakly interconnected. Among them are philosophy, sociology, logic, mathematics, economics, computer science, management science, psychology and other branches of science [14].

Presenting information fragments in a systematic form, these technologies allow collecting scattered data into a kind of “mosaic”, creating a holistic picture of what is happening and predicting the future action of various factors, structures, interest groups, etc. Information and analytical technologies are a set of techniques and procedures established in research practice and allowing them to obtain the necessary types of information. These technologies are universal, they are used both in research work focused on the creation of a scientific theory and in research carried out intending to optimize the solution of a managerial problem. One of the modelling components is the principles based on which the goals and objectives of the designed object are realized. The authors have developed the principles of a model for the formation of intercultural and communicative competencies of students of specialized schools based on the information and analytical technologies. Let's pay attention to the following principles, which the authors took as the basis for the formation of intercultural and communicative competencies.

– The principle of cognitivism, as purposefully managing the process of becoming a “subject of intercultural communication” in the formation of adequate mental constructs in the structure of the updated knowledge/consciousness of the subject of activity through the construction of visual images; reference logic-block diagrams; associations; interactivity; synthesis of verbal, sign, sound, pictorial forms of visibility; creating problem situations, etc.

– The principle of reflexivity as realizing the idea of centring education on the individual, the development of his potential capabilities and his strategy of cognition and self-development through the possibility of choosing an individual learning path and the optimal learning strategy following the level of preparedness and individual characteristics of the user; choice; nonlinear algorithm; unrepeatability of the situation; autonomy and independence of the student, realizing his own; self-control of the level of knowledge on a particular topic, etc. [15].

– The principle of problematic presupposes consistency in the construction of content, forms, methods and means of teaching and the interconnection of their structures based on the logic of the search (research) activity of students.

– The principle of interdisciplinary integration can have a comprehensive impact on the learning process (setting tasks + organizing the

process + monitoring results), which implies certain multifunctionality of this process, including such functions as developing, educating, coordinating and educational itself. It is the educational function of interdisciplinary integration that determines the formation of both an integral system of students' knowledge and their competitiveness. The main thing is that interdisciplinary integrative ties have both thematic and competence orientations, within the framework of which certain organizational and pedagogical conditions of interdisciplinary integration are implemented: the organizational forms of the educational process, their inherent pedagogical methods and techniques.

– The principles of consistency and phasing. The pedagogical process is an ordered system, planned by the teacher in advance (for an academic year, six months, a quarter), taking into account the age and psychological characteristics of children. The principle of consistency assumes the analysis of all aspects of informatization of the educational system and its inherent processes in the relationship of their internal and external conditions; informatization of all subsystems and functional links of education. The principle of phasing in the formation of competence assumes that the pedagogical process takes place in stages, from “general” to “particular”. What was learned earlier should be the basis for what is new.

– The principle of the professional orientation of education, which provides for the consideration of the future speciality and professional interests of students in language classes and other disciplines of the curriculum.

To build a model for the formation of intercultural and communicative competence based on the information and analytical technologies, it was important to determine the abilities that need to be developed in students of specialized schools. For this, the following stages were identified in the formation of intercultural and communicative competence: conceptual-reflexive, conceptual-accumulating, integrative-representative, communicative-modelling. At the conceptual – reflexive stage, there is an acquaintance with the existing linguistic forms, methods of expression depending on the conditions of the communicative act, acquaintance with the very conditions of the communicative act: the situation, the communicative goal and intentions of the speaker, the social and functional roles of communicants, the relationship between them, etc. The cognitive sub-competence formed at this stage makes it possible to determine the role and importance of the ICC and IAT, to



determine the direction of the IAS, to understand the system of concepts and categories of the object of communication. The strategic one will make it possible to set achievable goals, formulate tasks and predictive skills, compensate for the lack of knowledge of the language, speech and social experience of communication in a foreign language environment.

The conceptual and accumulating stage implies the implementation of analytical-semantic and evaluative-critical processing of the information received. It includes abductive sub-competence, which helps to analyze the existing state of a problem or phenomenon, identify phenomena that are subject to further consideration and research, analyze the information received and systematize the knowledge gained, compare facts and draw conclusions, as well as critically evaluate information. The integrative-representative one represents exercises that form the skills of a functionally adequate speech reaction following the conditions of the communicative act. Pragmatic sub-competence contributes to an objective assessment of the work done, substantiation of the legitimacy of the results, helps to reasonably prove the significance of the results obtained, to use the new knowledge gained in practice. And the communicative-modelling stage performs the choice of the desired linguistic form, the way of expression, depending on the conditions of the communicative act. Based on the integration of information and analytical technologies at 4 stages, such sub-competencies as polemic-argumentation and verification allow you to apply system thinking, determine the methods of critical assessment and self-assessment, determine ways to solve the assigned tasks, carry out analytical-semantic, evaluative-critical processing of incoming information to solve communication problems create your own polemically reasoned discourses; conduct discussion communication, interviews, conversations.

To determine the role and importance of ICC and IAT, to determine the focus of IAS (information and analytical systems) and to help to understand the system of concepts and categories of the object of communication, the authors applied the questionnaire method. The authors interviewed 63 students of the 10th grade of the natural and mathematical direction of the KSU "Gymnasium No. 3" of the city of Karaganda. The students were divided in advance into the EG (experimental group) and CG (control group).

– Do you know what ICC is and how to develop it?

Answers: yes, no, not sure.

– Do you have an idea about information and analytical technologies?

Answers: yes, no, not sure.

– Are you aware of STEM (Science, Technology, Engineering and Mathematics)?

Answers: yes, no, not sure.

– Do you want to present your projects/inventions in English freely?

Answers: yes, no, not sure.

– Do you want to communicate fluently on professional topics in English?

Answers: yes, no, not sure.

The second research method is an experimental verification of this model was carried out based on "Gymnasium No. 3" of Karaganda city among 10th-grade students of the natural and mathematical direction (sciences). The total number of lessons is 32 academic hours according to the timetable. At the planning stage, the authors identified control and experimental groups of 30-33 students each. The model was built using digital resources and implemented in experimental groups was a variable aspect of the experimental work. In the experimental groups, the training course and content were formed following the proposed model, which was represented by three stages and a set of exercises. The method of statistical calculation and mathematical forecasting was also applied (the level of formation of intercultural and communicative competence among students of specialized schools in percentage terms was calculated by the formula:

$$X = \frac{S.a.*100}{Tn}, \quad (1)$$

where: X is the level of ICC formation in%; S.a. – the number of correct answers; Tn is the number of students who took part in the test multiplied by the number of tasks).

### 3. RESULTS AND DISCUSSION

The results of the Figure 1 show that 30% of schoolchildren do not understand what intercultural-communicative competence is and how to form and develop it. Only 17% of respondents understand what it is, and 43% of students in a

specialized school found it difficult to answer the question. Here the authors do not see the problem of lack of interest in the study of languages. Learning new languages requires certain qualities and skills from student. The structure of language abilities includes the presence of visual images of memory, sense of language, rich imagination, interest in the subject, etc [11]. So, ignorance of the intercultural orientation of education ensures the speech and cultural development of the individual using a foreign language. A person could join different national cultures only when value orientations are developed and awareness of the peculiarities of his own culture is clear. When a person knows how to interact with representatives of other peoples and cultures, achieve mutual understanding, show tolerance to unusual manifestations of a different mentality and a different culture, which is necessary

for the context of globalization. L.L. Vladimirova speaks about globalization as a “global village” where space and time are abolished, and the life of each individual rushes by “at the speed of light”. Thus, L. L. Vladimirova argues that teaching foreign languages in the era of globalization has its own characteristics and problems, such as variability in the volume and material of instruction, etc. During research surveys, it was found out that students in specialized schools are well versed in information and analytical technologies, but have vague understanding of intercultural and communicative competence. According to S. G. Ter Manisova, a foreign language lesson is a crossroads of cultures, the practice of intercultural foreign world and culture [16].

1. Do you know what ICC is and how to develop it?

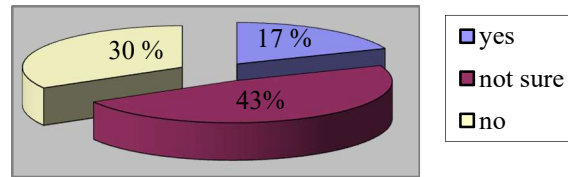


Figure 1. The results of the survey showed how students of specialized schools know what intercultural and communicative competence is and how to develop it for their future professional activities

According to the results of Figure 2, a larger percentage of students have no idea about information and analytical technologies and find it difficult to answer, since they may know information

technologies, and analytical ones are vague. And just naturally – the mathematical profile requires more analytical support.

2. Do you have an idea about information and analytical technologies?

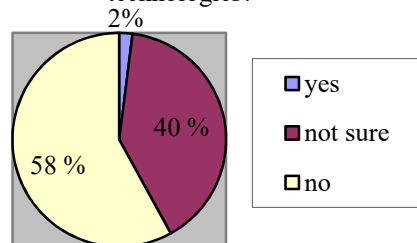


Figure 2. The results of the survey showed how students of specialized schools know what information and analytical technologies are

Currently, the fourth technological revolution is taking place in the world: the rapid

flows of information, high-tech innovations and developments are transforming all areas of our lives.

Robotics, design, programming, modelling, 3D design and much more – this is what is now of interest to modern schoolchildren around the world. To realize these interests, more complex skills and competencies are required. It is important not only to

know and be able but also to research and invent. It is necessary to simultaneously develop in such key academic areas as science, mathematics, technology and engineering, which can be combined in one word – STEM (Figure 3).

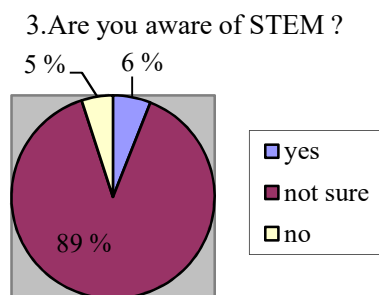


Figure 3. The responses reflected the knowledge of students of specialized schools about STEM technology

Note: STEM stands for Science, Technology, Engineering and Mathematics.

STEM is an integrated learning approach in which academic scientific and technical concepts are studied in a real-life context. The goal of this approach is to create lasting links between school, society, work and the whole world.

In Figure 4 80% of respondents are aware of their choice and intention to activate the intellectual sphere, their communicative and

educational-cognitive activities, with an emphasis on their self-determination, self-realization and the development of reflection. The remaining 20% found it difficult to answer since the main ways of self-realization have not yet been determined, which is one of the tasks of the profile school as a guide.

4. Do you want to present your projects / inventions in English freely?

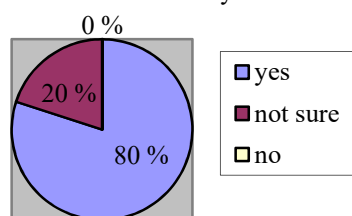


Figure 4. The results showed the students' desire to demonstrate their knowledge in their own or joint projects or inventions through the knowledge of a foreign language

According to the indicators on the principle of accounting and development of vocational guidance of the profile level (Figure 5), 90% of students imagine their opportunity for in-depth study

of a foreign language, based on their professional aspirations as the goal of their further professional study of a foreign language or as a means of integrating it with another subject area.



5. Do you want to communicate fluently on professional topics in English?

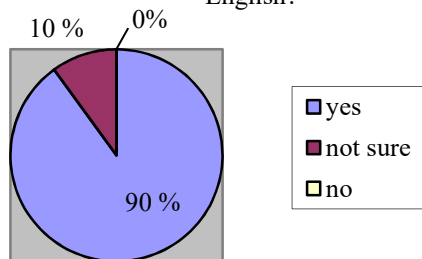


Figure 5. The survey results reflect the intention and willingness of students to communicate on professional topics in English

According to the Table 1, the authors have identified the Criteria-parameter indications according to the formed sub-competencies of the four above mentioned stages. To determine grades

accurately, levels of assessment for the ICC formation are required (Table 2).

TABLE 1: Criteria-parameter indications according to the formed sub-competencies of the four above mentioned stages

Criteria-parameter indications	Grades in points
Cognitive	10
Strategic	10
Abductive	20
Pragmatic	20
Polemic and argumentation	20
Verification	20
Total	100

TABLE 2: Levels of assessment for the ICC formation

Level	Points
Optimal	100-95
High	94-85
Middle	84-75
Minimum	74-55
Low	54-50

The order of the experimental work was carried out in this way, after the experimental work, post-experimental diagnostics of the level of development of research competence in the experimental and control groups was carried out. The results of post-experimental diagnostics were based on mathematical data processing. The dynamics of the development of intercultural and communicative competencies in the experimental and control groups differed markedly. The students of the experimental groups showed an improvement in all test parameters, while the students of the control groups did not show a significant improvement in the tested abilities. During the preparation of the material and the lessons for the experimental verification of the

effectiveness of the model, elements of STEM education were used in experimental groups (Table 3; Figure 6).

TABLE 3: Levels of ICC formation of students from the EG and CG at the beginning and the end of the experiment

Subcompetencies within the ICC						
EG	Cognitive	Strategic	Abductive	Pragmatic	Polemic-argumentation	Verification
Before	6%	10%	18%	14%	18%	15%
After	21%	41%	35%	39%	44%	38%
CG	Cognitive	Strategic	Abductive	Pragmatic	Polemic-argumentation	Verification
Before	7%	8%	18%	19%	12%	15%
After	11%	23%	29%	31%	25%	28%

TABLE 2: Levels of assessment for the ICC formation

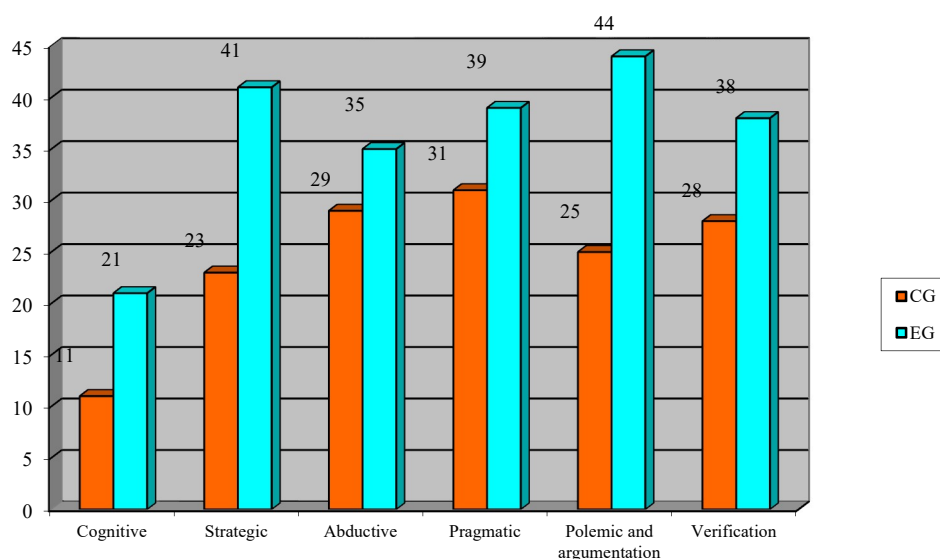


Figure 6. Correlation of the level of ICC formation in the EG and CG

Cognitive sub-competence is the ability to be aware of the system of concepts and categories of the object of communication. Strategic one is the ability to set achievable goals, formulate tasks and predictive skills, compensate for the lack of knowledge of the language, speech and social experience of communication in a foreign language environment. Abductive sub-competence means the ability to analyze the existing state of a problem or phenomenon, identify phenomena that are subject to further consideration and research, analyze the information received and systematize the knowledge gained, compare facts and draw conclusions, and critically evaluate information. Pragmatic sub-competence is the ability to evaluate the work done objectively, substantiates the legitimacy of the results, helps to reasonably prove the significance of the results obtained, to use the new knowledge gained in practice. Polemic – argumentation one is the ability to apply systemic thinking, to determine the techniques of critical assessment and self-

assessment, to determine ways of solving the assigned tasks, verification subcompetence is the ability to carry out analytical-semantic, evaluative-critical processing of incoming information to solve communicative problems; create your own polemically reasoned discourses; conduct discussion communication, interviews, conversations.

Shows a qualitative improvement in the analytical processing of information by students, a tendency to the critical assessment of information. This increased the speed of working with the text – its analysis, comparison and synthesis, developed creativity, professional activity, self-reflection and the desire for continuous development and improvement. Thus, the description of the skills acquired by students at each stage of the formation of intercultural and communicative competence can be characterized as follows: a student of the profile stage of secondary school is able to independently determine the role and importance of intercultural

and communicative competence and information and analytical technologies, determine the focus of information and analytical systems, be aware of a system of concepts and categories of the object of communication [17]. A student of the profile stage of secondary school is able to set achievable goals, formulate tasks and prognostic skills, compensate for the lack of knowledge of the language, speech and social experience of communication in a foreign language environment [18]. A student of the specialized level of secondary school is able to analyze the existing state of a problem or phenomenon, identify phenomena that are subject to further consideration and research, analyze the information received and systematize the knowledge gained, compare facts and draw conclusions, as well as critically evaluate information [19]. A student of the specialized level of secondary school is able to objectively assess the work done, substantiate the legitimacy of the results, reasonably prove the significance of the results obtained, and use the new knowledge gained in practice [20]. A student of the profile stage of secondary school is able to perform analytical-semantic and evaluative-critical processing of the information received. A student of the specialized level of secondary school is able to apply systems thinking, determine the techniques of critical assessment and self-assessment, and determine ways to solve the assigned tasks. A student of the specialized secondary school level is able to create his own polemically reasoned discourses; conduct discussion communication, interviews, conversations.

#### 4. CONCLUSIONS

We tried to determine the role and importance of the intercultural and communicative competence, information and analytical technologies and STEM, to understand the system of concepts and categories of the object of communication as a multifaceted concept that has not previously received detailed consideration in the existing literature. The authors studied and identified the abilities that form the basis of intercultural and communicative competence (the ability to carry out analytical-semantic, evaluative-critical processing of incoming information to solve communicative problems; create authors' own polemically reasoned discourses; conduct debatable communication, interviews, conversations, the ability to analyze the existing state of the problem or phenomena, determine the phenomena subject to further consideration and research, analyze the information received and systematize the knowledge gained,

compare facts and draw conclusions, as well as critically evaluate the information).

Highlighted the principles aimed at the formation of intercultural and communicative competence of students. (The principle of cognitivism, the principle of reflexivity, the principle of problematic, the principle of interdisciplinary integration, the principles of consistency and phasing, the principle of the professional orientation of education, which provides for the consideration of the future speciality and professional interests of students in the classroom in language and other disciplines of the curriculum). A model for the formation of intercultural and communicative competence of students of specialized schools has been built. A set of exercises based on the information and analytical technologies and elements of STEM education is proposed, experimental work has been carried out, showing the effectiveness of the developed model. In the course of the experimental work, it was proved that the organization of training aimed at the formation of intercultural and communicative competence of students of specialized schools based on the integration of information and analytical technologies helps to motivate students to acquire the above abilities. The authors deeply believe that this research will make a certain theoretical and practical contribution to the formation of intercultural and communicative competence of students of specialized schools in the natural and mathematical direction. The study is based on a small volume of statistical sample and an imperfect method of obtaining statistical data, the questionnaire could be replaced with something more effective, all this limits current research and gives the prospect for further study.

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