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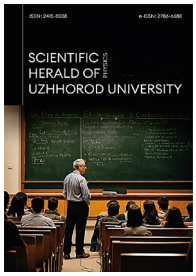

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Modelling of speech activity of a younger student as a platform for the implementation of communication technologies

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Abstract

Relevance. The research article holds relevance in educational contexts by emphasizing the importance of fostering creativity, critical thinking, and empathy among younger students through problem-solving approaches.

Purpose. The research article aims to cultivate critical thinking, self-discipline, and creativity in younger students by leveraging communication technologies and educational strategies based on B.S. Bloom's taxonomy, with a focus on enhancing speech activities and language proficiency in primary school education.

Methodology. The experiment was conducted in the conditions of a natural pedagogical process on the basis of a pilot school for the introduction of updated educational content. The experiment involved 118 third grade students. Both the control and experimental groups consisted of 59 students, with an equal number in each group.

Results. The research article demonstrates the efficacy of utilizing communication technologies for developing speech activity in younger students through various learning strategies, such as self-managed, experimental, critical, and contextual strategies. The implementation of communicative learning technologies in primary school language teaching enhances students' speech skills, fosters critical thinking, and promotes autonomous decision-making, leading to significant improvements in speech activity and overall academic performance.

Conclusions. Learning strategies in communication technologies play a decisive role in promoting the development of not only speech activity, but also all cognitive aspects of elementary school students. The functions of communication technologies contribute to the harmonious speech development of the linguistic personality, and the use of various techniques allows consolidating the acquired knowledge, skills, and abilities of primary school students.

Keywords: learning technology; student; reflection; occupation; knowledge.

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Introduction

The critical thinking of a younger student is the ability to observe their thoughts, analyse what arises in them and use various options for learning activities that affect the final result [1]. Self-discipline or the management of one's own behaviour orients the student to be able to:

- manage their emotions in favour of achieving an important goal;
- interact in the unity of thoughts, feelings and activities;
- do not respond to external stimuli;
- teach how to think about the various options available for making an independent decision;
- making a choice in favour of the most important decision [2].

To form the ability of younger students to be creative, generate ideas, originality, such strategies as a "basket" of ideas, concepts, names; "cluster" (bundle, constellation), drawing up a diagram; brainstorming; associations; "prediction tree"; "learning together" (working in pairs/groups); "cinquain" (writing a five-line verse) were used. The characteristics presented in Table 1 outline the functional aspects of communicative learning technology, which are inherently ingrained and unchangeable.

Table 1. Functions of communication technologies

Function	Competence	Competencies by B.S. Bloom	Forms and methods of implementation	Methods
Instrumental	Language	Knowledge and application	Simulated practice	Keywords
Regulatory	Cross-cultural	Assessment	Learning in collaboration	"Teacher-student"
Interactive	Communication skills	Understanding	Learning in dialogue and polylogue	"Detailed hearing"
Personal	Self-development	Assessment	An equal interlocutor	"Learning together"
Heuristic	Research	Analysis and synthesis	Form of acquired experience	"Basket"
Figurative	Creativity	Analysis and synthesis	Game training	"Cinquain", "Cluster"
Representative	Information	Knowledge and application	Public speaking	"Tree of predictions"

Based on the using of communication technologies, Table 1 displays the preferred forms and methods of instruction for enhancing the speech activity of primary school students. The methods of speech activity development that were used in the experimental work are also indicated [3]. Competencies according to B.S. Bloom [4] are the development of high forms of thinking of students through analysis, synthesis and evaluation of educational products. The B.S. Bloom [4] taxonomy is a strategy for fostering critical thinking and measuring the level of student learning.

The concept of taxonomy means the systematisation and classification of knowledge, competencies, and capabilities of students, while it should be mentioned that it is based on previous training and in the continuation of the development of more complex levels of understanding of the educational material. Here, it is possible to draw a parallel with the concept of L.S. Vygotsky [5] about the zones of actual and immediate development of the younger student. According to B.S. Bloom [4], the teacher should develop a lesson that would contribute to the achievement of the set educational objectives by students. Didactic tasks in elective classes in elementary school were implemented through a number of tasks and exercises for the enhancement of different types of verbal activities. A number of tasks provided the development of verbal activity of a younger student through comprehension, action, development of speech behaviour in real-life communication cases. To maintain the necessity for learning, theoretical materials were utilized following B.S. Bloom's taxonomy [4], which categorizes tasks into six levels: "Knowledge" (Level 1), "Understanding" (Level 2), "Application" (Level 3), "Analysis" (Level 4), "Synthesis" (Level 5), and "Evaluation" (Level 6) (refer to Figure 1).

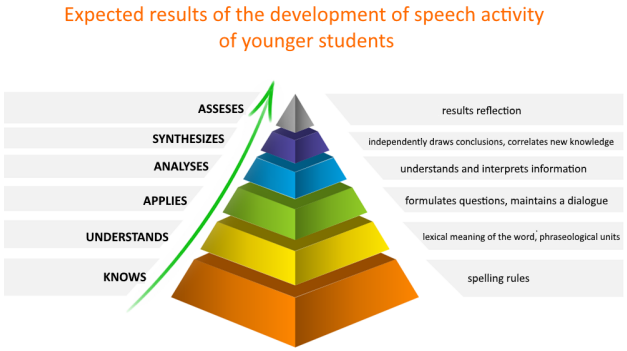

Figure 1. Hierarchy of levels of learning outcomes by B.S. Bloom

In communicative technology, the content of speech behaviour, consisting of a conscious speech situation and speech actions, is decisive. A teacher using communicative learning technologies should answer the following questions: "What experience will a student get from listening, speaking, reading and writing in my lesson?", "What communicative learning strategies will be effective in developing the speech activity of a younger student?" [6; 7]. The following characteristics represent the attainment of goals in language teaching lessons for primary school, aligned with the established educational objectives:

- development of skills and abilities to freely express their own and understand other people's thoughts in verbal and non-verbal form;
- replenishment of students' vocabulary;
- development of skills to use grammatical constructions in speech by students;

- ensuring that students learn spelling, vocabulary, grammar of the Russian language;
- development of skills to construct students' own statements and conduct an adequate assessment.

The functionality of learning based on communication technologies assumes the following areas in the activities of students:

- manifestation of students' interest in obtaining information (the student asks);
- expressing one's own thoughts, arguing one's position (confirms the thought);
- speech behaviour of students, prompting the interlocutor to act with the help of questions, controversial statements;
- evaluation, critical attitude to statements, determination of doubts, which contributes to the actualisation of grammatical norms of the language [8].

At the same time, the novelty of the speech situation is ensured – this is a new speech situation, a new interlocutor, a new topic of discussion and a way of mastering communicative competencies – the need for communication, the need to use speech, the establishment of ideas about speech behaviour.

Literature Review

At the end of each lesson, reflection exercises are presented. The success of mastering the lesson depends on the students' awareness of their activities, therefore, throughout the training, younger students performed tasks for reflection. The effectiveness of reflection in teaching consists in the use of a variety of its forms that align with the age and individual attributes of the students. It is acceptable for a younger student to "draw their mood" or briefly describe their feelings or state in writing, for example, using adjectives, which facilitates the cultivation of analytical thinking and enhances students' comprehension of the sensory aspects involved in their self-awareness of activities [9].

Through reflection, the student remembers, identifies and realises their main components of educational activity – its meaning, methods, actions and ways of solving problematic issues and the results obtained. Based on reflection, the results obtained are analysed through the eyes of the students themselves, they pass through feelings and build an internal plan for further work, correcting the trajectory of their education. Consequently, reflection is a way of self-knowledge of one's individuality through the prism of the implementation of a person's objective activity, which is characterised by uniqueness and authenticity, prevailing in a particular area of being. The concept of "reflection" has been considered since the time of ancient philosophy. According to the philosophical encyclopaedic dictionary, the Late Latin term "reflexio" has two consistent meanings: "turning back" and "reflection" and originally meant the process of a person thinking about everything that happens in their own consciousness [10].

In other words, it is a form of theoretical activity of self-knowledge, revealing to a person the content of their spiritual world. "Turning back" means returning to the past, to what has already happened, but requires reflection, hence it follows that if there is a past to turn to, then there is also the present from which this appeal follows, and the future, for the sake of which the request takes place. The origins of reflection lie in the special nature of human thinking. From a philosophical standpoint, the peculiarity of human thinking, in addition to the ability to display the objective external world, is the ability to see the universal side of reality [11]. The problem that students face in the educational process when introducing elements of reflection, according to A.V. Khutorskoy [12], is the absence of the need for awareness of their development, students do not determine the reasons for their results or problems, cannot explain the course of their educational activities. This shows the habit of explaining the teacher and reproducing the finished material; therefore, the perception of information occurs unconsciously to students, which means it is ineffective. Therefore, it is necessary to start teaching reflection from primary school age, paying attention to the result of their activities in teaching, while they must consciously understand what they are doing.

Regarding the student's conscious approach to their cognitive activity, G.E. Alimukhambetova [13] argues: "... the expansion of the student's consciousness, the transfer of their actions from unconscious to conscious is possible only with the expansion of the cognitive activity of schoolchildren according to the level of the pedagogical process. Moreover, the depth of this awareness may be different depending on what the student is aware of: concrete practical actions (what I do, for what, how, is it right) or my reflection on practical, subject-based activities (what I think, for what, how, do I think correctly; what I am doing at the same time I feel emotionally, physically)". Here, the most important thing is to identify what is common in various types of reflections as cognitive processes so that the common is necessarily realised by schoolchildren and used to regulate and manage life in general, their own development, in particular. L.R. Myltykbaeva [14] considers reflection as the ability to introspect. The author notes that "the content of introspection is self-reflection, as a research act leading to new knowledge." The integrative personal characteristic of introspection establishes its reflexive nature, fostering interconnectedness and interdependence among the processes of self-knowledge, self-development, self-construction, and self-fulfilment.

Reflection is connected with another important action – goal setting. Setting the goals of the student's education involves their implementation and subsequent reflection – awareness of ways to achieve set goals. In this context, reflection serves not only as an outcome but also as a catalyst for new educational endeavours and the establishment of fresh objectives. Reflection within the learning process involves engaging in activity-based or sensory experiences that heighten the learner's awareness of their own actions. It encompasses the examination of subject knowledge and the individual's activity, involving the study of past actions to solidify outcomes and enhance future effectiveness. The methodology of organising the student's reflection in the lesson includes the following stages: stopping the subject activity; restoring the sequence of actions performed; studying the compiled sequence of actions; formulating results; testing hypotheses in subsequent activities. K.S. Kurakbaev [11] believes that

"reflexive regulation of a person's personality is activated precisely in communicative processes (be it reflexive dialogic writing, conversation, interactive learning)". It is in the context of communication and interpersonal relations "between me and you" that another person can activate the functioning of the feedback principle in the self-consciousness of the "reflective". The expression of the face and the reaction of the interlocutor to the speaker's speech in the process of verbal communication can serve as feedback. So, the "reflexive" can control and correct the correctness of their speech and the course of their thoughts." Consequently, the process of reflection by one person of the inner world of another person through communication or communicative interaction is understood as communicative reflection.

Materials and Methods

The focus of the experimental research is the educational process within primary schools. The experimental phase of the study was carried out within the framework of a natural pedagogical setting, specifically a pilot school that implemented updated educational content. The experiment involved 118 third grade students. The control group (CG) and the experimental group (EG) included an equal number of students – 59 people. Tasks of experimental research:

- to conduct an initial assessment of the level of speech activity development in younger schoolchildren;
- to incorporate a supplementary educational resource, consisting of a collection of exercises and tasks, into the educational process. This resource aims to enhance the speech activity of younger students by utilizing communication technologies;
- to assess the efficacy of incorporating communication technologies in a range of exercises and tasks designed to enhance speech activity among younger students (Table 2).

Table 2. Technological map of experimental research

Purpose	Stages of the experiment	Main tasks and content of the work	Research methods
Determining the current level of development of students' speech activity.	Stating.	– To conduct a primary diagnosis of the development level of students' speech activity; – to form control and experimental groups.	– Observation; – to conduct a criterion-based evaluation of educational accomplishments.
Development of students' speech activity.	Formative.	– To integrate the created set of exercises and tasks in the Russian language into the educational process, serving as a supplementary educational resource for fostering promoting the advancement of speech activity in younger students by employing communicative learning technologies	– Observation; – Conducting a criterion-referenced evaluation of educational accomplishments.
Assessing the efficacy of enhancing students' speech activity through the implementation of communication technologies.	Control.	– Testing the hypothesis of the dissertation research; – statistical processing of experimental results.	– Comparative analysis and interpretation of research results; – method of mathematical statistics; – Drawing conclusions derived from the experimental findings.

The criteria system for evaluating the effectiveness of the experimental work involves assessing the utilization of a comprehensive set of exercises and tasks for enhancing all forms of speech activity of all forms in younger students within the educational process. The experiment was conducted during elective language training sessions, scheduled three times a week. An optional lesson is an extracurricular activity that is related to an academic subject and has the character of an in-depth study of it. The purpose of the elective course is to deepen and expand the knowledge previously acquired in the classroom and to assist in the assimilation of programme material. The educational objectives of the optional lesson are as follows:

- deepening and expanding the knowledge gained in the previous lesson;
- assistance in mastering the programme material;
- promoting the advancement of various forms of verbal activity, including listening, speaking, reading, and writing improving;
- expanding the students' horizons;
- development of creative opportunities;
- improving language culture;
- fostering the development of psychological attributes in a student's personality, such as activity, independence, and curiosity.

Thus, conditions were created for the development of the speech activity of the younger student at the optional language lessons. Each educational component of the optional lesson was based on a communicative approach. The training was conducted on a text-based basis. Texts containing material aimed at the development of all types of speech activity (listening, speaking, reading, writing) were used. The successful development of students' speech

activity in language lessons is associated with the introduction of communicative learning technologies that provide access to a new level of learning quality. An experimental set of exercises and tasks was created to foster the development of speech activity among primary school students. These exercises and tasks were formulated based on the principles of integration, differentiation, continuity, clarity, consistency, scientific rigor, communication, and holistic approach. Thus, the principle of differentiation of learning is conditioned upon the presence of tasks of different difficulty levels (from simple to complex) and volume (from word to text), and the principle of continuity is based on the observance of logic, sequence and step-by-step presentation of tasks to students, preserving the natural conditions of communication of all subjects of the pedagogical process [15].

Results and Discussion

In primary school language teaching, the following learning strategies are used: self-guided, experimental, critical, communicative, contextual. Communicative technologies, as the experience of testing the study of the speech activity of younger students shows, are applicable for all types of learning strategies. A self-managed strategy is implemented in the application of such methods of developing the speech activity of a younger student as "Teacher-student" (mutual verification, criterion assessment). Children exchange their notebooks and check them according to descriptors compiled by the teacher and count the points. The results of this strategy are the following parameters:

- fostering mutual trust. Students are happy to check with each other the correctness of completed tasks, exchange notebooks with confidence;
- the development of mindfulness. The ability to understand the handwriting of a student-neighbour on the desk, to find and correct an error while strictly following the instructions of the teacher when checking;
- development of spelling vigilance of students;
- the educational moment is to honestly evaluate the work of a classmate.

The experimental strategy is presented in the form of a group work "Classification", where students, for example, classify the words given on the card by signs: to determine the gender, number, case of nouns. This approach facilitates the enhancement of students' search activity, autonomy in decision-making, and the ability to generalize their knowledge. The critical strategy or the strategy of critical thinking is based on the development of operations of mental activity: analysis, synthesis, generalisation, comparison and abstraction, so for the implementation of this strategy we offer the following form of work "Writing in a circle". The class is divided into 5 groups. The children compose a letter to their teacher and pass it around in a circle. The first group makes up the beginning of the letter (introduction) of 1-2 sentences, the letter is passed to other groups, they make up the main part and at the end express their attitude in writing.

The development of communication skills and abilities, as well as the enhancement of speech activity in students, is directly linked to the implementation of communicative strategies. To implement this strategy, the form of "Detailed listening" is used – a complete understanding of the sounding speech, memorisation and comprehension of the basic facts. Children listen to audio texts about outstanding personalities. Then the students reproduce the listened texts in the form of a written presentation and answer questions. Students master the ways of listening, speaking, writing, reading and memorising basic facts using new words in questions [16; 17]. Result: determination of the level of being able to listen and present the text, development of writing, spelling, syntactic and stylistic literacy.

"Venn Diagram" and "Keywords" are a vivid demonstration of a contextual learning strategy in primary school, during which students compare texts by parameters: topic, main idea, style and type of text, difference, similarity, keywords. Text serves as a fundamental didactic and linguistic entity in shaping the linguistic personality of students. Within the methodology of teaching the Russian language, the text assumes the role of the instructional subject, functioning as a vehicle for teaching language components such as words and sentences [18-20]. The composition of texts aimed at fostering the speech activity of younger students adhered to didactic requirements, including:

- alignment with the characteristics specific to the students' age group;
- accessibility in terms of content and language, ensuring easy comprehension;
- appropriate volume, ranging from 77 to 90 words;
- engaging and appealing content to capture the interest of children;
- avoidance of uncommon or complex syntactic structures within the text.

The exercises meet the following didactic requirements:

- ensuring constant active cognitive and mental activity of students;
- compliance with a specific didactic and methodological task;
- compliance with the age characteristics of students;
- consideration of situational conditionality;
- ensuring communication to all exercises.

Under the framework of communicative strategies, exercises can be categorized into three types: grammar-oriented, text-content, and communicative. In the current phase of implementing updated educational content, the assessment of learning outcomes and personal achievements of students in key competencies is conducted using a criteria-based assessment system. This assessment system is an essential component of the educational process, encompassing the collection and analysis of information regarding students' progress at every stage of learning. It enables the determination of educational quality and its alignment with global standards. In the event of discrepancies in educational objectives, timely decisions must be made to enhance the content of education and the format of assessing learning outcomes [21-23].

Criterion assessment is understood as a systematic process involving the comparison of students' educational achievements against predetermined, collectively established criteria. These criteria are well-known to all

participants involved in the educational process and align with the goals and content of education, thereby fostering the development of educational and cognitive competence in students. Criterion assessment is conducted in accordance with curriculum content, assessment methods, and the individual psychological and pedagogical traits of students. It encompasses both formative and summative assessment, which entails comprehensive evaluation through the utilization of ongoing and final measures to gauge educational accomplishments [24; 25].

The first developments of systematic measurements of educational achievements of students belong to J.M. Rice [26], namely, test tasks aimed at determining the level of writing skills' development. Later, researcher presented to the scientific world the developed criteria for measuring reading skills in schoolchildren who had the following stages: reading syllabic, syllabic, reading with hitches, fluent and expressive. Burt and Ballard are the authors of the test of the speed of reading aloud in the first years of school education. The tests suggested by the scientists consisted of separate monosyllabic (forest) and two-syllable (fish) words, unrelated to each other [27; 28].

Burt and Ballard tested the reliability of the test by comparing it with the speed at which students read a coherent text. Experiments have shown that students who read a greater number of words in a coherent text, read a greater number in the text from individual words, and, conversely, the fewer words a student reads in a coherent text, the less he reads in the text from individual words [29; 30]. The criterion assessment system comprises two components: formative assessment and summative assessment. Formative assessment is an ongoing process conducted by the teacher, enabling continuous feedback and facilitating adjustments in the learning process. It does not involve scoring or grading. On the other hand, summative assessment takes place at the conclusion of curriculum sections and cross-cutting topics. This includes summative assessment for specific sections (SAs) and for designated academic periods such as quarters or academic years (SAq).

During the diagnostic phase of studying the advancement of verbal activity in students using communicative technologies, a criterion assessment was used to determine the initial level of speech activity skills among the students. The results of this assessment, indicating the actual developmental level, are presented in Table 3. After analysing the results of students' speech skills, control and experimental groups were identified. According to the data, it can be seen that the first two classes have higher academic performance and quality of education in the subject "Russian language– these are 3 "G" and 3 "D" classes than 3 "E" and 3 "W". Therefore, 3 "G" and 3 "E" were taken into the control group, and 3 "D" and 3 "W" were taken into the experimental group, thereby equalising the intellectual potential and the number of students so that at the beginning of the experiment there were groups equal in academic achievements.

Table 3. Results of CAs 1, CAs 2 and CAq (summative assessment for the second quarter)

	Classes											
	3 "G"			3 "D"			3 "E"			3 "W"		
	31 students			30 students			28 students			30 students		
	SAs 1	SAs 2	SAq 2	SAs 1	SAs 2	SAq 2	SAs 1	SAs 2	SAq 2	SAs 1	SAs 2	SAq 2
Academic performance	100%	100%	100%	100%	100%	100%	92,86 %	100%	100%	93,33 %	93,33 %	100%
Quality	80.65 %	93.55 %	90.32 %	90.0 %	93.33 %	90.0%	67.86 %	77.78 %	78.57 %	76.67 %	86.67 %	66.67 %
Learnability	64.39 %	90.06 %	89.16 %	70.8 %	81.33 %	79.20 %	56.14 %	64.44 %	73.43 %	57.33 %	73.33 %	61.87 %
Average score	3.97	4.71	4.68	4.17	4.47	4.40	3.68	3.96	4.21	3.73	4.20	3.87

Thus, based on the results of SAs 1, SAs 2, and SAq 2, the initial phase of the experimental work involved selecting control and experimental groups to assess the effectiveness of employing a set of promoting speech development in younger students by utilizing communicative technologies. In the formative (transformative) stage of the pedagogical experiment, the efficacy of implementing these exercises and activities in elective language classes was evaluated. The assessment of students' academic achievements was conducted using criteria-based diagnostic tools. Each summative assessment included varying numbers of tasks with specific evaluation criteria and descriptors. The tasks in the summative assessment were designed to address multiple levels, determining the development level of verbal activity types.

The results of the experimental work were generalized by analysing quantitative data from the control section (OP 2), intermediate section (OP 3), and final section (OP 4), which were collected to evaluate the effectiveness of using a set of exercises and tasks designed to foster the development of verbal activity in students by the utilization of communication technologies. Diagnostic tools used in the study included criteria-based assessment of students' academic achievements, ensuring consistent and comparable data across all types of verbal activity. The initial state of the control section and the progress achieved in the intermediate and final sections were diagnosed by comparing quantitative data between the control and experimental groups. The criterion assessment system enables a qualitative evaluation of students' results based on international standards and individual student needs, thus enhancing their interest and motivation to learn. The implementation of criterion assessment is guided by the following principles:

– the relationship between learning and assessment;

– objectivity, reliability and validity;
– clarity and accessibility.

The criterion assessment system enables the evaluation of students' educational achievements based on established criteria that align with the goals and content of education. These criteria guide the participants in the educational process towards achieving the learning objectives. Summative assessment is employed to determine the level of knowledge and skills attained by students upon completing sections of the curriculum. In the transformative experiment conducted with the experimental group, focused efforts were made to develop speech activity through the use of communicative learning technologies. A series of exercises and tasks aimed at enhancing speech activity was put into practice and evaluated in elective classes. Figures 2-4 illustrate the educational achievements of younger students, specifically their levels of proficiency in listening, speaking, reading, and writing skills, both before and after the experiment, in both the experimental and control groups. The numerical data presented in the figures represent the percentage indicators of the quality of students' knowledge and their overall academic performance. These indicators are calculated based on the percentage of positive grades obtained by students within a specific period of training.

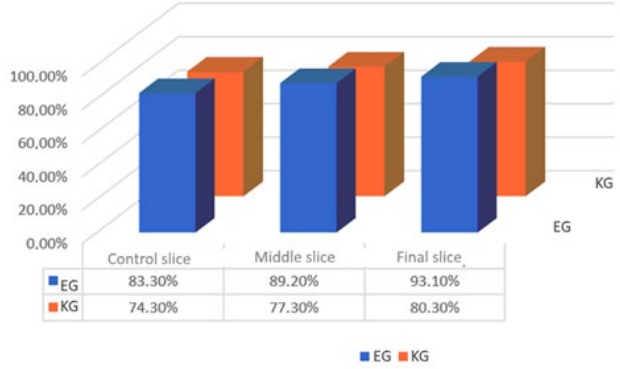

Figure 2. The progression of students' listening and speaking skills over time

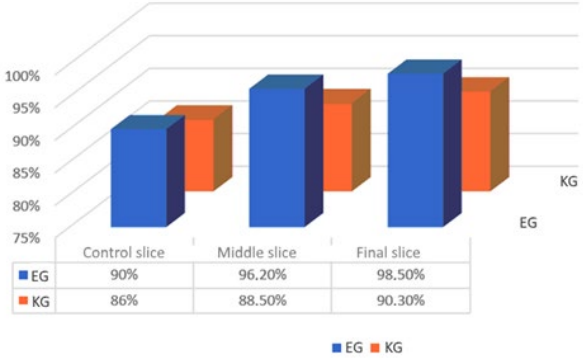

Figure 3. The progression of students' reading and writing skills over time

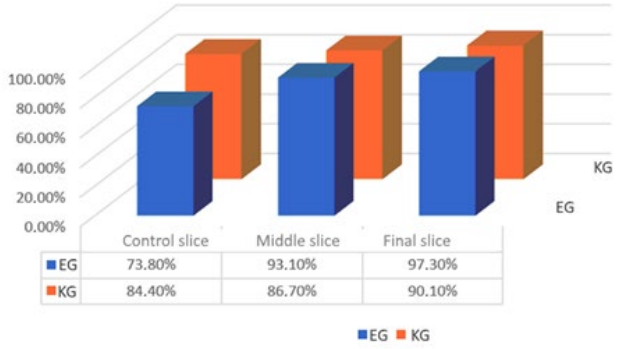

Figure 4. The progression of students' listening, speaking, reading, and writing skills over a period of time

Based on the summarized quantitative data presented in Figure 2-4, the percentage indicators of students' educational achievements reveal dynamic changes in the development of their speech activity throughout the experiment. However, for more reliable results, further data analysis using mathematical statistics is required. A comparison of the levels of development of all types of speech activity (listening, speaking, reading, and writing) in the experimental groups during the formative stage of the experiment with the indicators from the ascertaining stage suggests that the use of a set of exercises and tasks as an additional learning resource in optional classes leads to a higher level of communication skills compared to the control group. Pedagogical research involves obtaining quantitative results, but objectively and correctly collected data does not show a completed study, hence it follows that the researcher must process and interpret the results obtained. Any research begins with the formulation of an assumption that requires verification with the involvement of facts, the hypothesis must correspond to the connections of phenomena or properties in a certain set of objects. Therefore, to verify assumptions based on facts, it is necessary to measure the corresponding properties or phenomena of any process under study, in this case, it is the process of developing speech activity based on the using of instructional methods that emphasize communication and interaction in the learning process [31-34].

The research hypothesis is formulated in relation to the general population, which consists of primary school-age students following the updated curriculum. To ensure statistical reliability of the study results, specific requirements regarding sample size or volume are considered when employing methods of statistical inference. In this study, two samples are compared: a control group comprising 59 students and an experimental group also consisting of 59 students. The sample sizes for both groups are equal. By nature, the sample has uniformity, since these are students of the same age, the studied phenomena are types of speech activity, therefore, the variability of the studied phenomena will not depend on an increase or decrease in the sample size. Since the study requires repeated measurement of properties on the same sample before and after pedagogical influence and includes the same subjects, in this case the samples are dependent to the maximum extent possible. So, the purpose of any pedagogical research is the empirical confirmation or refutation of the formulated research hypothesis. In

order to establish the validity of the statements, it is important to define whether the observed differences in the rank of verbal activity development between the younger students in the experimental and control groups can be attributed to the utilization of a set of exercises and tasks aimed at enhancing speech activity by the implementation of communication technologies.

The reliability of the pedagogical research findings was evaluated utilizing statistical analysis, specifically employing the SPSS (Statistical Package for the Social Sciences), version 20.0. This computer program is specifically designed for statistical data processing in applied research within the social sciences field. The application of mathematical analysis allows for an evaluation of the phenomenon under investigation by statistically analysing the experimental results. It aims to determine whether the implementation of an additional educational resource has had an impact on the extracurricular activities aimed at developing the speech activity (listening, speaking, reading, and writing) of younger students. Accurate calculations are crucial for the interpretation of the study's results and to provide reasonable confirmation of the experiment's effectiveness. To perform the mathematical processing of the study's results, quantitative data from the control section (SAs 1, SAs 2, SAq 2), intermediate section (SAs 1, SAs 2, SAq 3), and final section (SAs 1, SAs 2, SAq 4) are entered into the SPSS program. The quantitative data acquired during the experimental study on the research topic of "Enhancing speech activity among younger students through communication technologies" encompasses the outcomes of SAs 1, which assess the development of listening and speaking skills, the outcomes of SAs 2, which measure the progress in reading and writing skills, and the outcomes of SAq 2, 3, and 4, which gauge the overall level of speech activity advancement in both the control and experimental groups of students.

For the analysis of nominal and rank variables, only nonparametric methods are used, which do not require preliminary assumptions about the type of the initial distribution, therefore, a nonparametric statistical criterion was chosen – the Mann-Whitney U-test, which is used to assess the differences between two samples by a feature measured in a quantitative or ordinal scale, where the U-criterion is rank, because it is invariant with respect to any monotone transformation of the measurement scale. The results of the criteria calculation include the average ranks in individual groups, the values of the criteria and the probability of error. Further, the data obtained, for the purpose of rational work, are upgraded into one summary table, which presents only the identified differences. Indicators, the differences of which are absent, are not presented in the table, so as not to complicate its reading. A similar editing procedure is performed for tables with the results of correlation analysis.

The Wilcoxon W-test is a nonparametric statistical test criterion that is used to test the differences between two samples of paired measurements. The criterion is designed to compare indicators measured under two different conditions on the same sample of subjects (control and experimental groups), which will allow establishing not only the direction of changes, but also their severity, will help determine whether the shift of indicators in one direction is more intense than in the other. The statistical calculations of the study's results involved the utilization of two criteria: the Mann-Whitney U-test and the Wilcoxon T-test. The subsequent step in processing the statistical data is conducting a correlation analysis. The primary objective of this analysis is to identify any correlations between two or more variables under investigation and determine the degree of consistency in changes between the studied characteristics. The correlation coefficient (denoted by "r") is calculated using a special formula and varies from -1 to +1. Indicators close to +1 ("direct connection") indicate that as the value of one variable increases, the value of another variable increases. Indicators close to -1 ("feedback") indicate feedback, with an increase in the values of one variable, the values of the other decrease [35]. The Kendall correlation coefficient "τ" (tau) is nonparametric, that is, when calculating this coefficient, the nature of the distribution of the variables being compared does not matter.

The coefficient "τ" is designed to work with data obtained in a rank scale. Sometimes this coefficient can be used instead of the Spearman correlation coefficient, since the method of calculating it is simpler. It is based on calculating the sum of inversions and coincidences. The coefficient of rank correlation τ-Kendall (Kendall'stau-b) is an independent original method based on the calculation of the ratio of pairs of values of two samples having the same or different trends (increasing or decreasing values). The t-Kendall statistic is equivalent to Spearman's r both in power and in the fulfilment of the basic assumptions [36]. When working on a computer, a statistical program (SPSS, Statistica) accompanies the calculated correlation coefficient with a more accurate value of the "r" level. For a statistical decision to accept or reject H 0, $\alpha = 0.05$ is usually set, and for a large volume of observations (100 or more) $\alpha = 0.01$. If the connection is not detected, but there is reason to believe that there is actually a connection, possible reasons for the unreliability of the connection should be checked. During the initial stage of the experiment, the academic achievements of students in the second quarter were examined and analysed to establish the control and experimental groups. Table 4 shows statistical data obtained by mathematical processing, indicating the absence of significant differences, which confirm that the groups at the time of the study are aligned according to all performance criteria, none of the groups has any advantages.

Table 4. A comparative analysis was conducted to examine the initial results of the experiment between the experimental and control groups.

Variables	Groups	Average rank	Mann-Whitney U criterion	Reliability
SAs 1	CG	56.89	1588.500	0.486
	EG	61.08		
SAs 2	CG	60.64	1616.000	0.597
	EG	57.39		

Op 1	CG	64.65	1383.500	0.071
	EG	53.45		
Assessment	CG	63.23	1465.500	0.138
	EG	54.84		

Table 5 displays the analysed data showing the progression of educational achievements among younger students in the control group, where no additional pedagogical interventions were implemented for the study. It is important to mention that there is a noticeable increase in the indicators for COp 1 and COp 2 during the second quarter, compared to the third quarter. The shaded cells in Table 5 indicate the presence of statistically significant differences in the indicators.

Table 5. The progression of verbal activity levels in the control group of students throughout the process of natural learning

Variables	Average rank	Wilcoxon criterion	Reliability
SAs 1 – quarter 3	10.17	-5.883	0.000
SAs 1 – quarter 2	27.75		
SAs 1 – quarter 4	20.10	-1.280	0.200
SAs 1 – quarter 3	21.17		
SAs 2 – quarter 3	9.83	-5.967	0.000
SAs 2 – quarter 2	27.01		
SAs 2 – quarter 4	30.36	-6.496	0.000
SAs 2 – quarter 3	4.50		
SAq 2 – quarter 3	23.15	-1.293	0.196
SAq 2 –quarter 2	18.38		
SAq 2 – quarter 4	19.12	-1.612	0.107
SAq 2 – quarter 3	23.12		
Assessment – quarter 3	19.50	-2.828	0.005
Assessment – quarter 2	9.50		
Assessment – quarter 4	8.50	-1.000	0.317
Assessment – quarter 3	8.50		

Table 6 presents the data that demonstrates a favourable progression in the enhancement of listening, speaking, reading, and writing skills among younger students in the experimental group through additional training. The results from SAs 1 and SAs 2 in the third quarter indicate an increase in performance indicators.

Table 6. Changes in the Speech activity level of younger students in the experimental group during additional training

Variables	Average rank	Wilcoxon criterion	Reliability
SAs 1 – quarter 3	10.80	-5.844	0.000
SAs 1 – quarter 2	28.17		
SAs 1 – quarter 4	24.89	-3.130	0.002
SAs 1 – quarter 3	19.96		
SAs 2 – quarter 3	12.50	-5.650	0.000
SAs 2 – quarter 2	30.64		
SAs 2 – quarter 4	29.50	-6.195	0.000
SAs 2 – quarter 3	8.88		
SAq 2 – quarter 3	20.05	-894	0.371
SAq 2 –quarter 2	25.83		
SAq 2 – quarter 4	12.92	-2.794	0.005
SAq 2 – quarter 3	23.03		
Assessment – quarter 3	7.50	-1.604	0.109
Assessment – quarter 2	7.50		
Assessment – quarter 4	6.50	-2.309	0.021
Assessment – quarter 3	16.50		

A noteworthy observation in the experimental group is the consistent and steady improvement in results, indicating the effectiveness of using a set of exercises and tasks with communication technologies for developing the speech activity of younger students. The findings demonstrate a positive correlation, indicating a balanced distribution of indicators before and after the experiment in the development of speech activity. Students with higher results in SAs 1 also exhibit higher performance in SAs 2 and SAq 2, as well as higher subject grades in each quarter. Furthermore, there is a strong relationship between the growth of indicators across quarters. These results are depicted in Figure 5. Therefore, the descriptors developed based on the criteria for the development of speech activity

within the updated curriculum accurately reflect the actual progress in students' speech activity.

"τ" (тау) KENDALL	COp1 – quar. 2	COp2 – quar. 2	COч2 – quar. 2	Ev-n – quar 2	COp1 – quar. 3	COp2 – quar. 3	COч2 – quar. 3	Ev-n – quar. 3	COp1 – quar. 4	COp2 – quar. 4	COч2 – quar. 4	Ev-n – quar. 4
COp1 – quar.2	1.000											
COp2 – quar. 2	0.443**	1.000										
COч2 – quar.2	0.433**	0.426**	1.000									
Ev-n – quar.2	0.663**	0.704**	0.693**	1.000								
COp1 – quar.3	0.423**	0.325**	0.447**	0.485**	1.000							
COp2 – quar.3	0.403**	0.411**	0.551**	0.521**	0.438**	1.000						
COч2 – quar. 3	0.547**	0.458**	0.564**	0.614**	0.410**	0.565**	1.000					
Ev-n – quar.3	0.561**	0.518**	0.643**	0.710**	0.620**	0.723**	0.765**	1.000				
COp1 – quar.4	0.447**	0.374**	0.519**	0.508**	0.416**	0.494**	0.547**	0.575**	1.000			
COp2 – quar. 4	0.504**	0.419**	0.581**	0.605**	0.391**	0.480**	0.560**	0.595**	0.572**	1.000		
COч2 – quar4	0.435**	0.434**	0.542**	0.602**	0.443**	0.437**	0.578**	0.614**	0.494**	0.550**	1.000	
Ev-n – quar.4	0.566**	0.503**	0.596**	0.695**	0.498**	0.540**	0.671**	0.747**	0.681**	0.705**	0.754**	1.000

Figure 5. Coefficients of τ-Kendall rank correlation
Note: ** – correlation is significant at 0.01 (1-sided).

The results presented in Table 7 depict the comparison of the development level of speech activity skills among younger students in the experimental and control groups before and after the experiment. It is evident that the indicators for the experimental group are significantly higher than those of the control group. This difference indicates the effectiveness of the conducted experimental work.

Table 7. Comparison of results between experimental and control groups post-experiment

Variables	Groups	Average rank	Mann-Whitney U criterion	Reliability
SAs 1	CG	50.09	1028.500	0.050
	EG	67.88		
SAs 2	CG	40.64	1016.000	0.048
	EG	77.39		
Op 1	CG	54.05	1103.500	0.031
	EG	64.45		
Assessment	CG	43.23	1165.500	0.003
	EG	64.84		

The results of the experimental work provide evidence of the effectiveness of utilizing a set of exercises and tasks, supported by communication technologies, as an additional educational resource for enhancing the speech activity of younger students. The formative experiment demonstrated a consistent and significant improvement in the development of all aspects of speech activity in the experimental group. Significantly, the application of the t-Kendall test in the correlation analysis produced robust data substantiating the efficacy of criteria assessment within the revised curriculum. The criteria and descriptors developed for the enhancement of speech activity skills among primary school students accurately reflect their actual educational achievements.

Conclusions

Communicative technology is a set of methods and techniques that contribute to the development of a person's speech activity through the implementation of the functions of communicative technology. In order to assess the effectiveness of the developed set of exercises as an additional educational resource for enhancing the speech activity of younger students, a criterion assessment was employed. This assessment method is being implemented and tested as part of the updated educational curriculum. Criteria-based assessment allows for determining the training level of students, gives an opportunity to provide feedback between students and parents and individual support in achieving the expected results. The evaluation results make it possible to correct teaching, to increase the motivation of students in achieving high learning outcomes. During the initial stage of the study, an assessment to determine the present level of speech activity development among younger students was conducted.

Through primary diagnostics, control and experimental groups were formed based on a criterion assessment of students' academic achievements. During the formative stage of the experiment, a set of exercises and tasks were implemented as an additional educational resource to develop speech activity among younger students, utilizing communicative learning technologies. Consequently, the development of speech activity in this context fosters student activity and independence; in a dialogue or discussion, the involvement of personal life experience, the ability to express their own thoughts, correctly argue, reflexive activity; the expansion of students' horizons occurs through acquaintance with new concepts and phenomena as they learn new words. The development of cognitive activity, which consists in the ability to listen, speak, convey the meaning of the read text and write one's own messages, is inextricably linked with the development of speech activity.

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Conflict of Interest

None.

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Моделювання мовленнєвої діяльності молодшого школяра як платформа для впровадження комунікативних технологій

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Анотація

Актуальність. Стаття є актуальною в освітньому контексті, оскільки підкреслює важливість розвитку креативності, критичного мислення та емпатії серед молодших школярів за допомогою підходів до розв'язання проблем.

Мета. Метою статті є розвиток критичного мислення, самодисципліни та креативності у молодших школярів за допомогою комунікативних технологій та освітніх стратегій, заснованих на таксономії Б.С. Блума, з акцентом на покращення мовленнєвої діяльності та рівня володіння мовою в початковій школі.

Методологія. Експеримент проводився в умовах природного педагогічного процесу на базі пілотної школи з упровадження оновленого змісту освіти. В експерименті взяли участь 118 учнів третього класу. Контрольна та експериментальна групи складалися з 59 учнів, по рівній кількості в кожній групі.

Результати. Стаття демонструє ефективність використання комунікативних технологій для розвитку мовленнєвої активності молодших школярів за допомогою різних стратегій навчання, таких як самокерована, експериментальна, критична та контекстна стратегії. Впровадження комунікативних технологій навчання у процесі викладання іноземних мов у початковій школі сприяє розвитку мовленнєвих навичок, критичного мислення та самостійного прийняття рішень, що призводить до значного покращення мовленнєвої активності та загальної академічної успішності учнів.

Висновки. Стратегії навчання в комунікативних технологіях відіграють вирішальну роль у сприянні розвитку не лише мовленнєвої діяльності, а й усіх когнітивних аспектів учнів початкової школи. Функції комунікативних технологій сприяють гармонійному мовленнєвому розвитку мовної особистості, а використання різноманітних методик дозволяє закріпити набуті знання, вміння та навички учнів початкової школи.

Ключові слова: технологія навчання; учень; рефлексія; професія; знання.