

# Assessing Cognitive and Creativity Competences in Pre-primary Children Based on Language Education Achievements

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**Abstract**—The research examines the assessment of preschool children's cognitive and creative competences based on their linguistic achievement. It highlights that in early childhood education, language skills are closely linked to the development of critical thinking, problem solving and creativity. Although international and national educational documents stress the importance of these skills, there is a lack of clear methodologies for assessing them in the educational process. The study used a quantitative analysis to develop a specific test (a set of tasks) to assess the cognitive and creative competences of children aged 5-6. The tasks of the test focused on the ability to understand and analyse texts, to create stories and to solve linguistic tasks. Data analysis was carried out using IBM SPSS software and Cronbach's Alpha coefficient was calculated to assess the reliability of the test. Descriptive statistics, paired t-tests and Spearman's correlation analysis were used. The results showed that there were no significant differences in cognitive and creative abilities between boys and girls, but there were individual variations in performance. Analytical competences proved to be slightly higher than creative competences, with no statistical significance. Note also that learning skills have a strong correlation with critical thinking skills and problem-solving bears a relationship to cognitive attainment. The research confirmed that language education composes an integral part of developing the child's cognitive and creative skills. These results can be further implemented in the training process by developing methodical materials of the pre-primary age based on the requirements for effective diagnostics of cognitive and creative abilities in children.

**Keywords**—preschool, smart ability, imagination ability, language teaching, child's evaluation.

## I. INTRODUCTION

**Relevance.** The development of cognitive and creative abilities in children of preschool age is one of the priorities of modern education because the years spent in school are essential for the future success of the individual at personal and academic levels. International and national documents

on education stress that quality education in early childhood develops the critical thinking of the child, in addition to creativity and problem-solving ability [7], [4]. According to studies, stories and play are activities that help critical and creative thinking in children [18], [25].

The mastery of language shapes how children will develop their communication skills and contribute positively to the formation of aptitudes, both cognitive and creative [3]. Previous studies note that the integration of digital technology in early childhood education has a positive impact on creativity and problem-solving skills [2]. Also, STEAM-based learning, which stands for Science, Technology, Engineering, Arts, and Mathematics, has become a relatively strong tool regarding the fostering of creativity in the perspectives of early childhood education [24].

In its document, language education for the early years should be integrated with other competences, according to the National Education Agency [16]. It promotes self-expression, critical thinking, and experimentation with language in the child. The 2024 Inventory of Educational Achievements for Preschool Children highlighted to what extent output in language is related to children's abilities since through language they can analyse information, express themselves with ideas, and even solve problems [17]. So far, the educational documents have highlighted the need to check the cognitive and creative competences of children based on the effect of language learning. here is a scarcity of research on effective assessment strategies.

**Novelty.** Over the past two decades, scholarly literature has increasingly highlighted the importance of early childhood creativity and its connection with cognitive abilities [27], [9], [20]. Research has shown that children's creativity can be enhanced through storytelling, narrative, and digital storytelling, which foster both language development and analytical thinking [14], [18]. However,

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the practical assessment of these skills in pre-primary education is still without a common method.

Recent studies suggest that pedagogical strategies have a significant influence on children's creative and cognitive skills [28]. Many methods exist worldwide to apply certain criteria systematically to evaluate such competencies at educational institutions, yet there is little methodology for teachers in the use and control of competency assessment within the educational process. Another problem is that the methodology of measurement in the field of early childhood education is underdeveloped, leaving no opportunity to systematically assess children's cognitive and creative abilities to reveal their level of competence and development dynamics.

*Issue.* Cognitive and creative abilities constitute parts that are developed by pre-primary education but not directly traceable to successes in the acquisition of a language. Most of the assessment systems that are in use now concentrate on the general competences of children without having specific ways to relate these competences with the skills in language. The issue that is hence raised is how the cognitive and creativity competences of preschool children can be accurately assessed through their achievements in learning a language.

*The aim of the study* is to assess the cognitive and creativity competences of pre-primary children (aged 5-6 years) based on their language education achievements.

*Study objectives:*

1. To study educational documents and scientific literature on the development and assessment of cognitive and creativity competences and language learning achievements in pre-primary children (aged 5-6 years).

2. To develop, empirically validate and test a test (set of tasks) to assess the cognitive and creativity competences of pre-primary children (aged 5-6 years) based on their language education achievements

3. To analyse the results of a test (set of tasks) based on critical thinking and creativity indicators to assess the cognitive and creative competences of pre-primary children (5-6 years old) based on their language education achievements.

*Methods:*

- The study used a quantitative analytical approach to obtain objective data on children's cognitive and creativity competences. The research instrument was a specially designed test (a set of tasks) (hereafter referred to as 'the test'), the tasks of which focused on children's ability to understand and analyse texts, to create narratives and to solve linguistic problems.
- The data were analysed using IBM SPSS statistical software and Cronbach's Alpha coefficient was calculated to assess the reliability of the results, which showed the internal consistency of the test.

- The study employed descriptive statistics such as mean, median, standard deviation, skewness, kurtosis, and percentiles, statistical tests which include paired samples t-test and Shapiro-Wilk test, and Spearman's correlation analysis for the study.

The purpose of this study was to find out whether there is any significant difference between the cognitive and creative skill competence results of boys and girls and to determine the relationship between the said competencies. Based on the research objectives and method of data analysis described above, the following specific hypotheses are formulated:

H<sub>01</sub>: The results for the boys and girls in cognitive and creativity competencies are not significantly different.

H<sub>11</sub>: The results for boys and girls in cognitive and creativity competencies are statistically significantly different.

H<sub>02</sub>: There is no significant relationship between cognitive and creativity competencies.

H<sub>12</sub>: There correlation. is a statistically significant

## II. MATERIALS AND METHODS

### A. Literature review

#### A1. *Methodological aspects and innovations in the language education of pre-primary children*

Language acquisition comprises a vital part of early childhood education and develops not only linguistic competences but also social, cognitive, and emotional aspects. According to Vélez and Prieto [23], it is through literature and storytelling that children find a route for emotional expression and intellectual development. Personalized learning experiences resulting from various approaches in language education—narrative teaching, digital storytelling, and STEAM education, which integrates everything—mobilize students into abundant interaction [20], [18], [14].

Studies indicate that structured storytelling methods play a significant role in emergent literacy and social competence development in young children [1], [6]. Research further demonstrates that systematic language education in early childhood has a strong correlation with later academic success and personal development [7], [16], [17].

In the General Framework for pre-primary Education by the National Education Agency [16], language education is defined as involving listening and speaking, appreciation of the mother tongue, basic skills in reading and writing, and meaningful interaction with books and other print materials. It fosters among children active listening, verbal expression, exploration in writing, and the use of structured elicitation from texts to develop essential literacy competencies right from the start.

TABLE 1 LANGUAGE EDUCATION FOR PRE-PRIMARY CHILDREN

Area of achievement	Key indicators for language education
Listening, speech perception and speaking	Respect for mother tongue, dialect and other languages.
	Listens to others, expresses his/her own opinion and applies some rules of language etiquette.
	Listening to texts being read or narrated, discussing their content (events, time, place, characters), describes the theme of the text.
	Speak according to purpose and situation.
	Speaks coherently, stays on topic, speaks emotionally, uses non-verbal language.
	Playing with language, increasing vocabulary, understanding the figurative meaning of words.
Beginning reading and writing	Exploring and experimenting with language.
	Recognizes letters, reads short texts.
	Writes in block capitals and copies words.
	Explores books and identifies their structural parts.
	Talk about books, distinguish between verse and prose.
	Creates simple texts using visual expressions.
	Respect for mother tongue, dialect and other languages.

Compiled according to the pre-primary Framework [16].

Digital tools are also pivotal to the creativity nurtured by language education. As Robin [21] posits, digital storytelling gives children a chance to not only invent and imagine their stories but also reflect on content and structure. According to Su and Yang [22], interaction technologies bring diverse forms of expression, through which children can increase their imaginative powers. According to Blackwell et al. [2], early access to technology-enhanced learning environments greatly improves language skills and literacy at an early age.

Creativity can be firmly connected to the growth of one's problem-solving skills. According to Leggett [13], methods that encourage children to play with language help them acquire better communication skills and learn to find new solutions in various contexts. Another study by Jankūnaitė and Bagdonas [8] argues that game-based methods can develop the creative thinking of children much better since such methodology offers possibilities for playful uses of language and unexpected ideas to emerge.

In summary, the development of creative competence in the use of language is inseparably interwoven with the child's capacity for understanding and expression through language, as well as for fostering independent and original thought. Research consistently supports the amalgamation

of digital technologies, storytelling methodologies, and play-based learning as effective pedagogical approaches that enhance the creative and cognitive abilities of children [6], [25]. Additionally, storytelling methods, digital platforms, and game-based activities work as highly effective catalysts of linguistic creativity and self-expression. Thus, teachers should strategically apply these methods to help bring out the creativity in each child and to help every child find his or her individual, peculiar linguistic voice.

### A2. The Harmony of Cognitive Skills in Language Learning

Cognitive ability is a key component in learning a language for children since it allows them to think about and judge information, thereafter, applying the knowledge gained in various situations. According to the National Education Agency [16], cognitive ability is expressed through learning as well as critical and problem-solving thinking, essential in the context of teaching a language. Kids who can grasp and explain texts can use language skills in a hands-on way within the needs of that text.

Studies have indicated that manual and active activities, which enhance the linguistic labour of children, help in the development of reasoning abilities. According to Cremin et al. [5], the use of storytelling and acting techniques by children helps them understand causal relationships so that the child structures their thoughts and can put them into purposeful expression. Playing and storytelling make children more expressive linguistically [18], but also enhance the development of critical thinking, since children must analyse the structure of stories and the behaviour presented by the characters along with the decisions made.

The National Education Agency's Framework for pre-primary Education [16] provides a mapping between cognitive competence and language learning achievements, showing how these competences are integrated in practice (see Table 2).

TABLE 2 COGNITIVE COMPETENCE COHERENCE IN LANGUAGE EDUCATION

Cognitive competence	Language learning achievements
Knowledge and skills: understand and apply the structures of written language.	B2. Through play, observation and exploration, learns to read and write distinguishes letters from other signs and symbols, relates sound to letter; recognizes most letters of the alphabet; reads simple single words, notes, short sentences and multi-sentence easy-to-read and understand texts.
Critical thinking: analyses, evaluates and summarizes information and compares different points of view.	A3. Listens to short reading or narrative texts and discusses their content: clearly stated events (what happened?), time (when did it happen?), place (where did it happen?), identifies and briefly describes clearly identified characters

	in the text, identifies a clearly stated theme (what is the text about?).
Problem solving explore, analyses and solve linguistic challenges through practical activities.	B1. Explores and experiments with language by playing a variety of language games, asking questions, searching for information in sources of his/her own choice or suggested sources (books, internet, etc.).
Learning: assessing your own performance, learning from mistakes, reflecting on decision-making.	A2. Listening to others, expresses his/her own opinion and listens to others' opinions, describes the course of a planned activity, the outcome, responds to others' questions, requests, observations, clarifications, asks for a repetition if he/she has not understood something, applies some rules of language etiquette: greeting, farewell, thanking, etc.

Compiled according to the pre-primary Framework [16]

New methods like digital storytelling can also aid in improving the cognitive capacity of children. As per the research conducted by O'Byrne et al. [19], creating digital content can advance language development in children, fostering critical thinking. This result aligns with the findings of Kervin and Mantei [12], as new interactive technologies provide children with opportunities to learn the intricacies of language and express their thoughts and ideas.

Problem-solving skills play a crucial role in language activities since children advance in cognitive proficiency through mastery of language. As emphasized by Jankūnaitė and Bagdonas [8], a play-based approach offers opportunities to test language, which supposedly makes children more logical and thoughtful individuals. Kazakevičiūtė et al. [11] point out that the competence in critical thinking since early age ensures the possibility of linguistic expression, sets conditions for generating adequate judgments, and requires an evaluation of information while building logically structured arguments.

To sum up the entire consideration of injecting thinking skills into itself forms a fundamental ultimate core on development both cognitively and linguistically in children. The evidence indicates that interactive activities, digital technologies, and play-based methods help children improve their analysis of problems, developing problem-solving skills as well as reflection on their own learning. It is this process that makes them acquire language structures as an instrument rather than mere product, which facilitates an entire general cognitive and academic social ad healthy competency appropriate to healthy development.

Creativity is one of the most important factors in language teaching because through it children not only reach a high linguistic level but also develop abilities of self-expression as well as start original thinking and innovation, be it in problem-solving. In the words of the National Education Agency [16], creativity is born in the very process of linguistic activities of children as an ability to generate ideas, look for solutions, and experiment with

language. and creative competence supports linguistic variation and allows the expression of ideas with various degrees of freedom through meaningful narratives.

Research reveals that creative capacities are most closely associated with proficiencies in two principal genres: storytelling and acting. Participation in creating stories and narrating them to others allows children not only to attain concepts but also to develop their imaginative and innovative thinking as stated by Cremin et al. [5]. Nicolopoulou et al. [18] similarly suggest that these types of activities make children more inventive in adopting linguistic forms and codes to tell stories while improving their social and emotional stratagems.

The National Education Agency's Framework for pre-primary Education [16] provides a mapping between the competences of creativity and achievements in language education, illustrating how these competences are integrated in practice (see Table 3).

TABLE 3 COHERENCE BETWEEN CREATIVITY COMPETENCE AND LANGUAGE EDUCATION ACHIEVEMENT

Creativity competence	Language learning achievements
Exploration: identifies problems and creative opportunities; gathers, relates and critically evaluates information for creative work; shares knowledge, ideas and experiences.	B1. Explores and experiments with language by playing a variety of language games, asking questions, searching for information in sources of his/her own choice or suggested sources (books, internet, etc.).
Exploration: identifies problems and creative opportunities; gathers, relates and critically evaluates information for creative work; shares knowledge, ideas and experiences.	B1. Explores and experiments with language by playing a variety of language games, asking questions, searching for information in sources of his/her own choice or suggested sources (books, internet, etc.).
Generation: generates ideas, proposes solutions; chooses ideas that are meaningful to oneself and others and considers them from different perspectives.	A6. Playing with language, expanding vocabulary with new easy words. Usually it recognizes (guesses) the meaning of an unknown word based on context and/or own experience. Gives synonyms and antonyms for some words (without using terms) and begins to understand the figurative meaning of some frequently heard words.

Compiled according to the pre-primary Framework [16].

Digital tools play a crucial role in fostering creativity in language learning. According to Robin [21], digital storytelling provides children with an opportunity to create and visualize their own stories, as well as to reflect on the content and structure of their narratives. Various forms of interactive technology enable children to experiment with different modes of expression and channel their creative energy into linguistic activities [22].

Problem-solving ability is another aspect closely related to creativity. Leggett [13] notes that techniques used by educators to encourage children to explore and discover new ways of linguistic expression help them become better communicators and find innovative solutions in various scenarios. The play-based methodologies are very effective in the development of creative thinking since it enables children to experiment freely with language, spontaneously finding unexpected ideas.

Development of language and creativity in children will benefit greatly from having such abilities well integrated as time goes by, making them more unique and not mere copies of others. Development of language and creative gifts in children will draw much benefit from this ability when it gets well integrated over time and becomes more and more unique than mere copy. Research speak of the possibility for narrative modes, digital artifacts, and playing tools to act as rather potential accelerators in the development of creativity of thought and oral expression among children. Therefore, efforts must be oriented not only to find the ways enabling each child to find his creative side but also to find the ways enabling the child to find his unique linguistic personality.

*B. Methodology of the research*

A quantitative research approach was chosen for the study. Quantitative methods allow for mathematical evaluation and systematic analysis of data, as well as for establishing statistical relationships between variables [10].

*B1. The study took place in six phases:*

- In the first stage (February 2024), the analysis of scientific and methodological literature sources, documents regulating education allowed to reveal the relevance of the topic, to define the aim and objectives, and to formulate the problem of the research.
- In the second phase (March 2024), a test instrument was developed, empirically validated and tested to assess the cognitive and creativity competences of pre-primary children based on their language learning achievements (see Tables 1 to 3)
- In the third phase (April 2024), 42 pre-primary children, 21 boys and 21 girls, were recruited. Participants were selected from two schools in a Lithuanian city using availability sampling.
- In the fourth phase (May 2024), testing of pre-primary children took place in May 2024. The test was conducted based on the principles of voluntariness, privacy and confidentiality. All participants were informed about the objectives of the study, and their results were analysed anonymously [26]. Parents of the students were informed about the aims of the study and gave written consent for their children's participation in the study.
- In the fifth phase (August 2024), the analysis of the survey data was conducted. The collected data were

processed using statistical methods, ensuring accurate and reliable results. Descriptive and inferential statistical analysis was carried out to observe significant patterns and relationships within the data. Results obtained will be interpreted more deeply within the purview of a study related to cognitive and creative competences of children in early childhood education.

- This will be presented in Phase 6 that is results, synthesis, and discussion, and draws conclusions and methodological recommendations.

*B2. Survey instrument*

No instrument has been found to assess cognitive and creativity competences of pre-primary children based on their language learning achievements, so the second objective of the study was to develop such an instrument. It was decided to model a test (set of tasks) that would meet the following parameters (matrix): duration of the test (set of tasks) 90 min. The maximum score that pre-primary children could score was 14 points, 50% each of the cognitive and creativity competences, according to the pupils' basic level of achievement (see Table 4).

The test is based on the story "The Teddy Bear's Search for Friends," which explores the protagonist's quest to find friends in the forest and his encounters with various animals. The story enables children to grasp the meaning of the text, to analyse the sequence of events and to interpret the characters' actions and interactions.

The test consisted of eight items divided into two main groups according to competences:

- Cognitive competence tasks (1, 2, 3, 4.1-4.4) aim to develop children's critical thinking, problem-solving skills, learning and application skills. The tasks encourage children to analyse the text, to understand the relationships between the characters, to understand the sequence of events, to identify key information and to relate it to the narrative and moral message.
- The aim of the Creativity Competence Task (5) is to stimulate children's creativity and develop their ability to create stories, structure their thoughts and communicate ideas visually.

TABLE 4 TASKS FOR DEVELOPING COGNITIVE AND CREATIVITY COMPETENCES IN LANGUAGE EDUCATION

Task	Competence strand	Goal	Method of execution
1. What was the teddy bear looking for?	Critical thinking	Identify the main idea of the story.	The child must choose the correct answer from the answers given.
2. Where did the teddy bear look for friends?	Problem solving	Understand the context of the character's actions.	The child associates the organization's trip with the

			habitat and labels it correctly.
3. List in order what the teddy bear met on his journey.	The ability to learn	Developing the ability to reconstruct the sequence of events.	The child arranges the correct order of the characters' appearances from the given pictures.
4.1. Crossed-out word finds all the words written.	Subject knowledge and skills	Identify key information in the text and relate it to the questions.	The child looks for the words and labels them according to the colours indicated.
4.2 When did the teddy bear meet the hare?	Problem solving	Understand the time of the event and relate it to the story.	The child looks for the answer in the text and marks the correct time.
4.3 When did the teddy bear listen to animal stories?	Critical thinking	Understand the sequence of events and their significance.	The child marks the correct time in the story and links it to the action.
4.4 When did the teddy bear realise the importance of friendship?	The ability to learn	Link the moral message of the story to the character's experience.	The child decides the interpretation of the moment and writes the response.
5. Write out for the story of the other teddy bear's adventure in the woods and draw the picture on the paper given to represent it.	Development	Develop creative thinking, storytelling and visualization skills.	The child creates a new story, writes it down or tells it, and then illustrates it with a drawing.

### B3. Reliability and validity

Reliability is one of the most important characteristics of qualitative research. Reliability refers to the trustworthiness of the instrument [29], the accuracy and stability of the measurements [30], and the internal consistency and constancy of the measurements [26]. The items were piloted before the test (item set) was developed. The process of piloting the items was intended to confirm the external validity of the test (item set), as it allowed us to see the typical errors made by pre-primary children. Each task and its assessment instructions were piloted in a group of 9 children, and 5 pre-primary teachers and 2 researchers were involved in the evaluation and reflection of the results and in the modelling of the competence of the task.

To test the internal consistency of the developed test/item set (the variables that make up the test scale),

Cronbach's Alpha was calculated to indicate the correlation between the test/item set and whether all the items in the test adequately represent the variable under study. The Cronbach's Alpha coefficient (0.763) indicates that the 8 variables of the test (item set) are consistent with each other, i.e. the scale of the test items is reliable as a measurement tool.

### B4. General information about the test (set of items)

Statistical indicators for the test/item set were calculated using frequency analysis. Values such as mean, median, standard deviation, skewness, skewness, minimum and maximum values and percentile distribution were assessed (see Table 5).

TABLE 5 STATISTICAL INDICATORS OF THE RESULTS OF THE COGNITIVE AND CREATIVITY COMPETENCES TEST (SET OF TASKS) FOR PRE-PRIMARY CHILDREN

Parameters		Meanings
Mean		9,38
Median		9,00
Std. Deviation		2,197
Skewness		0,037
Kurtosis		-0,345
Minimum		5,00
Maximum		14,00
Percentiles	25	8,00
	50	9,00
	75	11,00

The analysis of the study results revealed that the mean (Mean) score of the children's test results was 9.00, while the median (Median) was also 9.00, indicating that most children scored close to the average value. This suggests that the children's performance was evenly distributed around the mean. The standard deviation (Std. Deviation) was 0.717, which implies that most children's results did not deviate significantly from the mean. This indicates a relatively homogeneous distribution of results with no extreme outliers. The skewness (Skewness) value was -0.345, indicating a slight leftward skew in the distribution. This suggests that more children achieved slightly higher scores than the mean, although this difference was not substantial. Kurtosis (0.037) indicates that the distribution approaches a normal curve. Therefore, the spread of results was not too peaked nor too flat; it has moderate variance performance.

The lowest recorded score (Minimum) was 5, while the highest (Maximum) was 14, showing that there were some differences in children's results, but extreme values were not frequent. Evaluating the percentile values, the 25th percentile (lower quartile) was 8.00, the 50th percentile (median) was 9.00, and the 75th percentile was 9.38. This suggests that most children scored between 8 and 10 points. In summary, the study's findings indicate that pre-

primary children's cognitive and creativity competency test results were relatively evenly distributed, with most children performing around the mean. The slight negative skewness suggests that a higher proportion of children obtained above-average scores, while the standard deviation reflects a moderate spread of results without significant variation.

Looking at the histogram of the distribution of the scores of the pre-primary children who took the test (set of items) (see Figure 1), it can be assumed that the distribution follows a normal distribution.

To test the hypothesis of normality of the distribution of the test scores, the Shapiro- Wilk test was used.

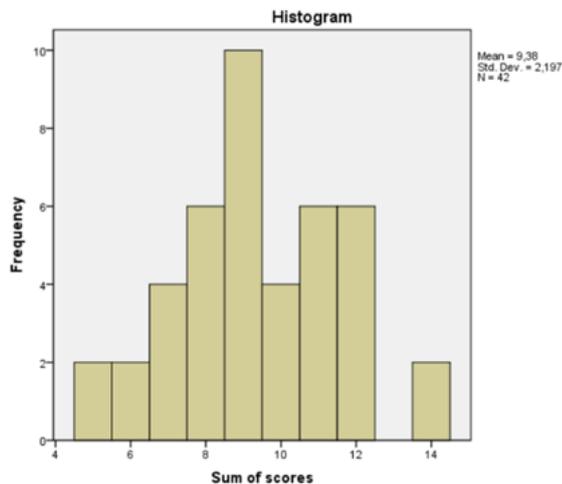


Fig. 1. Histogram of test score distribution among preschool children.

The test/task set scores of the 42 children who completed the test/task set were found to follow a normal distribution ( $W(42) = 0.969, p = 0.279$ ). Coefficient of asymmetry (0.037); coefficient of excess (-0.345). The coefficient of internal consistency (Cronbach's Alpha 76.3%) indicates that the test is appropriate.

#### B5. Research ethics

The study adhered to the guiding principles of the *European Code of Conduct for Research Ethics* [15].

1. Reliability - used to ensure the quality of research in terms of design, methods, analysis and use of resources.
2. Integrity - applies to the transparent, fair, complete and impartial preparation, conduct and verification of studies and reports.
3. Respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment.
4. Responsibility for research, from conception to publication, management and organisation, training, guidance, advice and wider influence.
5. To ensure anonymity, only aggregated data is published and made public, and information obtained during the study is used only for its intended purpose.

The author of the study has undertaken to publish only aggregated data from the study.

The Principles of Research Ethics require that students' participation in research is voluntary. Participants were informed that they could withdraw from the study at any time they wished and would not be subject to any pressure if they did so. However, to avoid attrition, regular contact was maintained with the participating pupils and their parents. According to [15] the data collection procedure may cause anxiety for the participants because of its unusual and novel nature. With this threat in mind, the researchers reassured the participants before data collection began by providing them with as much information as possible about the data collection procedure and by pre-emptively allaying any anxieties about the data collection.

### III. RESULTS AND DISCUSSION

#### *Distribution of Cognitive and Creativity Competency Results by Gender*

This study aimed to analyse the distribution of cognitive and creativity competencies among preschool children (5-6 years old) based on gender. A total of 21 girls and 21 boys participated in the study (see table 6).

TABLE 6 DISTRIBUTION OF PRESCHOOL CHILDREN'S COGNITIVE AND CREATIVITY COMPETENCY TEST RESULTS BY GENDER

Gender	Girl	Boy
N	21	21
Mean	9,24	9,52
Std. Deviation	2,047	2,379
Skewness	1,036	-0648
Kurtosis	1,196	-0,732
Percentiles 25	8	8
Percentiles 50 (Median)	9	9
Percentiles 75	10	12

The results showed that the mean test score for girls was 9.24, while for boys, it was 9.52, indicating that both genders achieved relatively similar scores. The median value was 9.00 for both groups, suggesting that most children obtained scores close to this value. The standard deviation for girls was 2.047, whereas for boys, it was 2.379, showing that boys' results had a slightly wider distribution, meaning their scores varied more than those of the girls. The skewness value for girls was 1.196, while for boys, it was -0.732, indicating that boys' scores were slightly skewed towards lower results, whereas girls' scores showed a tendency towards higher values. The kurtosis value for boys was -0.648, while for girls, it was

1.036, suggesting that the distribution of girls' scores was more peaked, whereas the boys' distribution was more spread out. The lowest score among girls was 6, and the highest was 14, while boys' scores ranged from 5 to 12. Examining the percentiles, the 25th percentile for girls was 8.00, the 50th percentile (median) was 9.00, and the 75th percentile was 9.52, indicating that most girls scored between 8 and 10 points. Among boys, the 25th percentile was 8.00, the median was 9.00, and the 75th percentile was 9.24, showing a similar pattern.

Thus, the mean results were almost equal for the girls and boys. The girls' achievements leaned more towards high values since the boys' results had wider dispersion. More individual variability among boys was indicated by wider spread of scores around similar mean scores for both genders. Such cognitive and creative abilities development might be dependent on the individual style of learning itself and the methods of education applied as a process of learning affecting boys and girls in different ways.

*Cognitive and Creativity Competency Results* This study set out to carry an analysis of the distribution of cognitive and creativity competencies present among preschool children.

The aim was to analyse the test results of pre-primary children on Cognitive competence and Creativity competence. Descriptive statistical approaches were used in the analysis, presenting mean (Mean), median (Median), standard deviation (Std. Deviation), skewness (Skewness), kurtosis (Kurtosis), minimum-maximum values (Minimum, Maximum), and percentiles (Percentiles) (see table 7).

TABLE 7 DISTRIBUTION OF PRESCHOOL CHILDREN'S COGNITIVE AND CREATIVITY COMPETENCY RESULTS

		Cognitive competence	Creativity competence
Mean		4,86	4,52
Median		5,00	5,00
Std. Deviation		1,983	1,452
Skewness		-,305	-,300
Kurtosis		-1,359	-,467
Minimum		1	2
Maximum		7	7
Percentiles	25	3,00	3,75
	50	5,00	5,00
	75	7,00	5,00

The results indicated that cognitive competency scores were slightly higher than creativity competency scores, but the difference was not significant. The mean cognitive competency score was 4.86, while the mean creativity competency score was 4.52, suggesting that cognitive skills were marginally more developed. The median for

both competencies was 5.00, indicating that most children achieved a mid-range score.

The standard deviation for cognitive competencies was 1.983, whereas for creativity, it was 1.452, revealing that cognitive competency scores were more widely dispersed, while creativity competency scores were more concentrated around the mean. The skewness value for cognitive competencies was -1.359, while for creativity, it was -0.467, suggesting that cognitive scores tended to be skewed towards higher values, while creativity scores were more evenly distributed.

The kurtosis values for cognitive and creativity competencies were -0.305 and -0.300, respectively, indicating a nearly normal distribution. However, cognitive competency scores exhibited a slightly flatter distribution, whereas creativity scores were more clustered around the mean. The minimum score for both competencies was 2, and the maximum was 7, demonstrating that all participants reached a certain level of competency. In terms of percentiles, the 25th percentile for cognitive competency was 3.00, the 50th percentile (median) was 5.00, and the 75th percentile was 5.00, showing that most children scored between 4 and 5. The same distribution was observed in creativity competency scores, with a 25th percentile of 3.00, a median of 5.00, and a 75th percentile of 5.00.

In summary, the study found that cognitive competencies were slightly more developed than creativity competencies, but the difference was minimal. Scores in the cognitive competency were widely distributed whereas in the creativity competency, they were more concentrated around the median. It implies that, perhaps, formulaic creativity must be given more attention in the learning process to effectively balance the development of both competencies.

A paired samples t-test was conducted to determine whether the difference between the two competencies was statistically significant. The analysis yielded a mean difference of 0.333 with a standard deviation of 2.693 and a standard error of 0.16. The 95% confidence interval for the mean difference ranged from 0.506 to 1.173, and the two-tailed significance value ( $p = 0.427$ ) exceeded the conventional threshold of 0.05. These findings indicate that the observed difference in means is not statistically significant, suggesting that there is no strong evidence to support a meaningful disparity between cognitive and creativity competencies in this dataset.

The results imply that while cognitive competence appears slightly higher than creativity competence on average, the lack of statistical significance suggests that the two competencies are relatively balanced in the given sample. The very low correlation between them, therefore, further confirms that cognitive development does not always go along with an equal increase in creativity. These perspectives drive home the need for equipping educational and developmental initiatives with cognitive and creative capabilities rather than concentrating on one. Subsequent research could look into other drivers of these

capabilities – maybe, environmental factors, pedagogical factors, and/or sociocultural factors – for a fuller picture of their dynamics.

*Analysis of Preschool Children's Cognitive Competencies*

The cognitive competency of preschool children was evaluated using a language-based assessment consideration. These are some problem-solving or learning to learn components critical thinking-based cognitions and creativity competencies among preschool children aged five to six years.

TABLE 8 PRESCHOOL CHILDREN'S COGNITIVE COMPETENCY RESULTS

	Critical thinking	Problem solving	Learning to learn
Mean	1,33	1,43	1,33
Median	1,00	2,00	1,00
Std. Deviation	,570	,801	,650
Skewness	-,123	-,953	-,455
Kurtosis	-,622	-,735	-,635

Statistical analysis was conducted to determine the mean scores, standard deviations, medians, minimum and maximum values. The data were analysed using descriptive statistical methods.

The statistical analysis revealed that the highest results were observed in the Problem-Solving competency, where the mean score was 1.43, with a standard deviation of 0.801. This indicates that children's ability to solve problems was the most developed among the assessed competencies, though the higher standard deviation suggests a significant variation in individual results. The Critical Thinking competency had a mean score of 1.33 and a standard deviation of 0.570. Although the mean was slightly lower than for Problem Solving, the lower standard deviation suggests that the results were more evenly distributed among all participants. The lowest median score (0.63) was observed in this category, indicating that a significant portion of the children scored lower, although some achieved higher results.

The Learning to Learn competency also had a mean score of 1.33, but with a standard deviation of 0.650, indicating a broader distribution of results compared to Critical Thinking. The minimum score in this category was 1.00, while the maximum was 1.48, suggesting a relatively narrow range of achievements among the children. However, the mean value indicates that the learning ability was well developed.

In brief, the Problem-Solving skill stood as the strongest amid the checked youngsters, while Critical Thinking and Learning to Learn revealed akin average tallies though with dissimilar spreads. This indicates that nursery schooling ought to focus on improving critical thinking and learning aptitudes to ensure more even

competency growth and lessen the disparity between the top and bottom students.

*Analysis of the Interrelations Between Children's Cognitive Competencies*

This study aimed to determine the intercorrelation among the cognitive competencies of preschool children, namely Subject Knowledge and Skills, Critical Thinking, Problem-solving, and Learning to Learn, as shown in Table 9.

TABLE 9 SPEARMAN'S RANK CORRELATION COEFFICIENTS BETWEEN COGNITIVE COMPETENCIES

Spearman's Correlations					
		Subject knowledge and skills	Critical thinking	Problem solving	Learning to learn
Subject knowledge and skills	Correlation Coefficient	1	,508**	,565**	,481**
	Sig. (2-tailed)	.	0,001	0	0,001
Critical thinking	Correlation Coefficient	,508**	1	,645**	,673**
	Sig. (2-tailed)	0,001	.	0	0
Problem solving	Correlation Coefficient	,565**	,645**	1	,573**
	Sig. (2-tailed)	0	0	.	0
Learning to learn	Correlation Coefficient	,481**	,673**	,573**	1
	Sig. (2-tailed)	0,001	0	0	.

\*\* . Correlation is significant at the 0.01 level (2-tailed).

To test the hypothesis regarding the normality of the distribution of cognitive competency achievements among the study sample, the Shapiro-Wilk test was used. It was determined that the data do not follow a normal distribution ( $p < 0.05$ ).

Since the Shapiro-Wilk test indicated that the data do not follow a normal distribution ( $p < 0.05$ ), the Spearman rank correlation coefficient was chosen for further correlation analysis. This method is appropriate when data do not meet normality assumptions, as it assesses monotonic relationships between variables rather than linear ones.

The correlation table reveals that all four cognitive competency components exhibit statistically significant positive correlations ( $p < 0.01$ ), indicating that children's achievements in one competency are associated with their performance in others. The strongest correlation was found between Critical Thinking and Learning to Learn ( $r = 0.673$ ), suggesting that stronger critical thinking skills are closely linked to better learning-to-learn abilities. A high correlation between Problem Solving and Critical Thinking was found, namely 0.645, which means that there is a strong relationship between these two skills

children who are good at puzzle solving usually have good critical thinking skills.

A good correlation resulted between Subject Knowledge and Skills and Problem Solving ( $r = 0.565$ ), indicating that if a student has better knowledge and skill regarding the subject, they will be able to solve problems more effectively. The weakest but still significant correlation has been observed between Subject Knowledge and Skills and Learning to Learn ( $r = 0.481$ ), suggesting that while Problem Solving and Learning to Learn might be related, their relationship tends to be weaker than some other analysed pairs.

In brief, cognitive competency compartments of children are closely interrelated. Therefore, enhancing one of these competencies may positively affect the others. The most explicit relationship was between Critical Thinking and Learning to Learn, showing that analysing information and making an inference is a component part of learning. For that reason, educational programs must cultivate these sorts of qualities as related skills capable of having long-term impacts on the learning success of children.

#### IV. CONCLUSIONS AND DISCUSSION

The language results confirmed that preschool children's cognitive and creative abilities were related to language achievement, which echoed the results of previous research on the role of language in shaping children's thinking process and creativity [18], [5]. Tests of text analysis, narrative construction, and problem-solving language tasks showed that most children had average or better abilities. The pattern of results shows that there is no statistically significant difference between boys and girls in cognitive and creative abilities. The distribution of results for boys is more scattered, while girls are more clustered around the mean, which indicates that the learning process may differ by gender [11]. Also, it was seen that kids with good language did well in both smart and creative jobs. This backs the idea between speaking well and growing thoughts [16].

The used tool proved to be reliable in objectively testing children's cognitive and creative abilities. The achieved results showed an even distribution of children's achievements. She also agreed with the previous observation that there are no systematic methodological norms, which hinders the control and monitoring of these abilities in the educational system. This conclusion confirms similar statements of previous studies that there is no clear methodology and tool that pedagogues can use to systematically monitor the development of children's creative and cognitive abilities [8].

Earlier, the factors of language development and creativity development were considered. According to research, "Story and play-based activities foster children's creative thinking and shape their minds" [18], [5]. Other studies have shown that "Digital storytelling technologies can help teachers more effectively promote children's language and cognitive abilities" [21], [19]. This study

also reveals that conventional assessment tools may not be suitable for measuring a child's creative and cognitive dynamics, so new assessment tools need to be sought.

Based on the research, it can be recommended to increase the implementation of interactive and digital teaching tools in the preschool education system, as previous studies have proven that the methods are effective enough to promote children's creative expression and critical thinking [22], [12]. Secondly, the training of pedagogues in the field of creative and cognitive education should be improved, because structural methods can be used to better monitor and develop children's abilities. The created criteria for evaluating creativity and critical thinking would allow not only to better reveal the development of these abilities in children but also ensure the process of individualization in studies [8], [16].

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