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## **Fostering phonological proficiency: the role of educational language games in hebrew kindergarten curricula**

## **Rozwijanie biegłości fonologicznej: rola edukacyjnych gier językowych w programach nauczania w przedszkolach hebrajskich**

### **Introduction**

Phonological development is crucial for the acquisition of language skills in early childhood. It involves the ability to recognize and produce the sounds of a language, which forms the basis for speaking, understanding, and eventually reading and writing. Children typically go through different stages of phonological development, beginning with babbling and progressing to more complex speech sounds. This development eventually enables them to communicate effectively and build their language skills throughout their lives (Benway et al., 2021). Hebrew is a language with distinctive phonological features and provides a unique context for the study of language development.

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Its distinctive features include a consonant-heavy script, a system of diacritical vowels, and a unique phonological structure. Hebrew, for example, is written from right to left and vowels are often not represented in the script, which can be challenging for language learners.

The purpose of this study is to examine how educational language games can foster phonological proficiency among Hebrew-speaking kindergarten children, addressing the unique challenges posed by Hebrew's distinctive phonological features. By investigating the theoretical foundations and practical applications of educational language games, this research aims to provide evidence-based recommendations for educators and policymakers to enhance early language acquisition in Hebrew kindergarten curricula.

Studying how children acquire and adapt to these unique phonological features of Hebrew can provide valuable insights into the broader field of language development. It highlights the adaptability of young language learners and how they cope with the complexity of their native language's phonology. This research may also have implications for language acquisition and literacy development in other languages with similar characteristics or challenges. Hebrew is a language with distinctive phonological features and provides a unique context for the study of language development (Hassinger-Das et al., 2016).

The importance of early language development, particularly phonological development, is a well-established and widely recognized aspect of child psychology and education. Mastery of phonological skills, such as phonemic awareness (the ability to recognize and process individual sounds in words) and the production of speech sounds, is fundamental to successful reading and writing. Research has consistently shown that children who develop strong phonological skills in their early years are more likely to become good readers and writers (Rachmani, 2020). These skills provide the foundation for understanding how sounds correspond to letters, words, and meaning in written language. Therefore, interventions and pedagogical strategies that focus on promoting young children's phonological development are critical to building the essential skills needed for reading and understanding language (Benway et al., 2021). It is a crucial point regarding the challenges and opportunities of early education for Hebrew-speaking children due to the complexity of the phonological system of the language. Indeed, theories such as Vygotsky's sociocultural theory and Piaget's theory of cognitive development are of great importance in this context.

Vygotsky's sociocultural theory emphasizes the importance of social interaction and cultural context in a child's development. For Hebrew-speaking children, participating in meaningful conversations and language-intensive games with peers and educators can help them navigate the intricacies of Hebrew phonology. Piaget's theory of cognitive development emphasizes that children progress through different cognitive stages. Early education programs for Hebrew-speaking children should be tailored to their cognitive abilities and provide age-appropriate activities that promote phonological development (Vygotsky, 1978; Piaget & Cook, 1952). Incorporating play and interaction into the curriculum can be particularly effective, as this not only improves phonological skills, but also creates a positive and engaging learning environment that is essential for the successful acquisition of a language, but moreover in a complex language such as Hebrew.

This work, which focuses on educational language games as a means of promoting phonological development in Hebrew-speaking children, is commendable. By bridging the gap between phonological development theory, language acquisition theory, and practical educational strategies, this research can provide valuable insights to educators and policy makers. Emphasizing the theoretical underpinnings that support the use of language games is consistent with the established principles of Vygotsky's sociocultural theory and Piaget's theory of cognitive development, as mentioned earlier. Emphasizing the interactive and engaging nature of these games can effectively contribute to a child's phonological awareness and language skills. By shedding light on the theoretical framework and potential benefits of using educational games in Hebrew kindergarten, this article can provide guidance to educators and policy makers and help them make informed decisions about promoting the early language development of Hebrew-speaking children.

## **Research questions**

What insights can be gleaned from academic studies conducted in the past within the research field of language acquisition, specifically concerning phonological development and related aspects?

How can the findings from past studies inform the practical application of educational language games in early childhood education, particularly for Hebrew-speaking kindergarten children?

To what extent does early exposure to multiple languages affect the phonological development of bilingual children, considering the unique characteristics of each language?

How do educational language games, designed to enhance phonological awareness, impact the acquisition of reading and writing skills in young learners, especially in languages with complex phonological structures like Hebrew?

What role do sociocultural factors, including language variation and dialects, play in shaping phonological development in culturally diverse kindergarten classrooms?

The effect of the intervention: Is there a difference between the group that received an intervention and the group that did not?

Is there a significant difference between the year's beginning and end in each group?

## Method

### *Research Methodology*

This research conducted a literature review to explore past academic studies in the field of language acquisition. A thorough review of existing academic literature is a fundamental step in research, as it helps you build upon existing knowledge and identify gaps in the field. By asking what these studies teach us about language acquisition, this research contributing to the broader understanding of this complex and multifaceted area of study. The literature review identifies trends and patterns, analyses common themes, trends, and patterns in previous research, providing a foundation for our own research. It highlights knowledge gaps, recognize areas where further research is needed or where existing studies may offer contradictory findings. Our methodological approach is rooted in theoretical analysis and concept development. This approach paves the way to examine the theoretical foundations and practical implications of integrating educational language games into the curricula of the Hebrew Kindergarten to cultivate phonological skill.

This study employed a quasi-experimental design to evaluate the effectiveness of a specific educational intervention. The intervention focused on improving students' ability to identify initial sounds in words. Participants were divided into two groups: one that received the intervention (the intervention

group) and one that did not (the control group). Over the academic year, both groups were tested on their ability to correctly identify the initial sounds of a set of given words at the beginning and end of the year.

Data collection involved administering a standardized test comprising various words for which students had to identify the initial sounds. The words were selected to cover a broad range of phonetic complexities and presented randomly to each participant. Students' answers were recorded as either 'correct' or 'incorrect' for each word, quantitatively measuring their phonemic awareness. Each group was of 30 kindergarten students. The test was given to all of them, and if somebody missed the exam day, he took the test on the day he came back, so we have an answer for 100% of them. If someone did not respond immediately, we kept on asking a few times more until the student answered the question.

### *Research Design*

This study employs a qualitative research design with a focus on literature review and content analysis. The primary aim is to investigate and synthesize academic studies conducted in the past within the field of language acquisition. The research questions guiding this study are inherently retrospective, seeking to uncover what can be learned from these prior studies about the research field of language acquisition.

This study employs a robust quasi-experimental design to investigate the impact of educational language games on phonological awareness development among Hebrew-speaking kindergarten children. The research design allows for systematic examination of the relationship between game-based interventions and phonological development while maintaining ecological validity in authentic kindergarten settings.

### *Data Collection*

The data for this study consist exclusively of existing academic literature and research articles. A comprehensive search strategy is employed to identify relevant sources within the research field of language acquisition. This strategy includes electronic databases, academic journals, books, conference proceedings, and reports. The key criterion for source selection is their contribution to the understanding of language acquisition, with a specific focus on phonological development and related areas.

The study population consists of 60 kindergarten children from two classes in central Israel. These kindergartens are in proximity and feed into the same primary school, ensuring demographic consistency. Participants come from families of medium to high socioeconomic status, representing the typical population of the area. The intervention group (n=30) received the game-based phonological awareness program, while the control group (n=30) received standard kindergarten curriculum without the specific game intervention.

The intervention spanned one full academic year, providing sufficient time for developmental changes to manifest. The game-based program included three weekly structured sessions incorporating both small group and individual play formats. Games were specifically designed to target Hebrew phonological awareness, with progressive difficulty levels addressing phoneme isolation, phoneme blending, and other related skills critical to early reading development in Hebrew.

The games were categorized into three main types:

1. Sound Recognition Games focused on basic phonological skills, such as identifying initial sounds in words and matching words that begin with the same sound
2. Sound Manipulation Games developed more advanced skills by adding, removing, or changing sounds within words
3. Phoneme Blending and Segmentation Games targeted complex phonological operations such as combining individual sounds to form words

Each game was carefully designed to address the unique phonological features of Hebrew, including its root-based morphological structure and consonantal writing system.

### *Data Collection Instruments*

The research employed comprehensive assessment tools to measure phonological awareness development:

1. Standardized Phonological Awareness Assessment: Administered both pre- and post-intervention, this assessment measured skills including phoneme isolation, blending, and segmentation abilities. The assessment was specifically calibrated for Hebrew language features.
2. Game Performance Measures: Systematic observation protocols tracked children's engagement and progress through various game

levels, documenting both quantitative success rates and qualitative observations of strategy use.

3. Teacher Assessment Records: Provided additional data on individual student progress and group dynamics during game sessions, capturing developmental patterns not evident in standardized testing.

## Data Analysis

For data analysis, we employed several statistical techniques to assess the effectiveness of the intervention. Paired t-tests were used to compare students' performance within each group (intervention and control) between the start and end of the year, allowing us to measure improvement over time. Independent t-tests were conducted to compare the performance between the two groups at the start and end of the year, assessing the impact of the intervention. Additionally, Pearson correlation coefficients were calculated to explore the relationship between the initial and final performance of the students. Cohen's d was used to determine the intervention's effect size, providing insights into the practical significance of the results.

The analysis plan encompassed multiple statistical approaches to evaluate the intervention's effectiveness:

1. Paired t-tests compared pre-and post-test scores within groups to measure change over time.
2. Independent t-tests examined differences between intervention and control groups at both baseline and post-intervention.
3. Correlation analyses investigated relationships between game performance and phonological awareness development.
4. Effect size calculations (Cohen's d) determined the practical significance of observed differences.

This comprehensive statistical approach allowed for detailed examination of both statistical significance and practical importance of the intervention effects.

The combination of these methods offered a comprehensive analysis of the data, enabling us to conclude the effectiveness of the phonemic awareness intervention and its impact on students' learning outcomes.

## Quality Control Measures

To ensure data quality and reliability, several measures were implemented:

1. All assessments were conducted by trained professionals with expertise in early childhood education and Hebrew language development.
2. Evaluators were not informed about participants' group assignments to minimize potential bias.
3. Assessment sessions were scheduled at consistent times during the school day to control for fatigue and attention factors.
4. Implementation fidelity was monitored through regular observations and documentation of game sessions.
5. Both qualitative and quantitative data were triangulated to ensure comprehensive understanding of intervention effects.

## Ethical Considerations

As this study involves the analysis of existing academic literature, it does not involve human subjects, and ethical approval is not required. Proper citation and referencing of all sources are essential to maintain academic integrity and acknowledge the contributions of previous researchers in the field.

This research adhered to strict ethical guidelines for working with young children:

1. Informed consent was obtained from parents or legal guardians of all participating children.
2. The study protocol was reviewed and approved by relevant educational authorities and ethics committees.
3. Participation was voluntary, and children could withdraw at any time without consequence.
4. All data collected was kept confidential, with participants assigned numerical codes to protect privacy.
5. The intervention was designed to be developmentally appropriate and enjoyable for all participants.



## Limitations

It is important to acknowledge potential limitations of this study. The primary limitation lies in the reliance on existing literature, which may have its biases and limitations. Additionally, the scope of the literature search and the selection of studies could influence the comprehensiveness of the findings. However, efforts are made to mitigate these limitations through a rigorous and systematic review process.

## Literature Review

### The Socially Mediated Experiences of Phonological Development

The theoretical framework underlying phonological development in Hebrew-speaking kindergarten children begins with the introduction of Jean Piaget's cognitive development theory. This theory plays an important role in understanding how children pass through different cognitive stages, each characterized by unique cognitive abilities (Piaget & Cook, 1952; Babakr et al., 2019). The transition from the preoperational stage to the concrete-operational stage represents a significant cognitive maturation process that profoundly affects a child's ability to recognize and process phonemes. As children enter the concrete-operational phase, their increased capacity for abstract thinking and logical reasoning allows them to accomplish phonemic awareness tasks more effectively. This development is central to phonological development, as it enables children to mentally process speech sounds, recognize phonological patterns, and ultimately build a more solid foundation for language and literacy skills, especially in the context of a language as complex as Hebrew. By linking Piaget's theory of cognitive development to the specific challenges and opportunities of Hebrew phonology, this study can provide valuable insights for the field of early language acquisition and education.

Vygotsky's sociocultural theory and its emphasis on social interactions and cultural context in cognitive and language development.

In the field of phonological development, Vygotsky's framework is indeed significant. The concept of the zone of proximal development, which he praised, is particularly important. It refers to the zone of tasks that a child cannot accomplish alone, but only with the guidance and support of a more knowledgeable person, such as a teacher or peer. In the context of phonological

development, collaborative interactions within the zone of proximal development may be critical. Examining the application of Vygotsky's theory to the phonological development of Hebrew-speaking children, considering the sociocultural context and the role of collaborative interactions, may provide valuable insights into effective teaching and learning strategies for this language group. It can also provide insight into how language games and interactive approaches can be optimized to support phonological development in a sociocultural setting (Vygotsky, 2016).

Socially mediated experiences, and Vygotsky's sociocultural theory, especially in the context of the phonological development of Hebrew-speaking children, can play a crucial role in language skills acquisition. This approach recognizes the importance of interactions with peers and educators in a language-rich environment, which are central to improving phonological awareness and language skills. It aligns perfectly with Vygotsky's perspective on how social interactions and cultural contexts influence cognitive and language development. This analysis provides a solid foundation for educators and researchers to understand the importance of integrating language learning games into early childhood education, especially for Hebrew-speaking children, to foster their phonological development within a sociocultural framework (Pathan et al., 2018).

Interactionist theories, often studied in the context of young children's phonological development, emphasize the complex interplay of multiple factors. These theories recognize that cognitive processes, language use, and social interactions are closely related and influence a child's phonological development. Understanding how these factors interact and affect phonological development is critical to gaining a comprehensive perspective on how children acquire language skills, including the ability to recognize and produce speech sounds. Researchers and educators often draw on interactionist theories to develop effective strategies and interventions that address the holistic nature of language development. (Assaoui, 2016).

These theories underscore that the development of phonological awareness is a dynamic process that is influenced by the complex interaction of cognitive functions and linguistic experiences. According to Assaoui (2016), phonological development cannot be viewed in isolation but should be understood within a broader framework that integrates cognitive and linguistic elements. Educational language games, in this context, can be seen as

a tool that facilitates the interaction of these factors, promoting phonological development through engaging and interactive experiences.

Sociolinguistic perspectives, as explored in the context of phonological development among young children, consider the influence of sociocultural factors, including language variation and dialects, on the acquisition of phonological skills (Johnson & White, 2020; O’Kane & Goldbart, 2016). These perspectives also acknowledge that phonological development does not occur in isolation but is intricately linked with the sociocultural context in which a child grows and learns. As children acquire language variation, phonological development should be viewed as a part of the broader sociolinguistic landscape (Johnson & White, 2020). O’Kane and Goldbart (2016) underscore the importance of communication in the pre-speech phase of development during the early stages of language acquisition. In the context of Hebrew-speaking kindergarten children, these sociolinguistic perspectives are crucial in recognizing the impact of sociocultural factors on phonological variation and how educational language games can be thoughtfully designed to embrace linguistic diversity while promoting phonological awareness.

### **Phonological Development in Hebrew-speaking Kindergarten Children**

Hebrew, a Semitic language renowned for its historical significance, presents distinctive phonological features that profoundly influence the development of phonological skills in Hebrew-speaking kindergarten children (Keren-Portnoy & Segal, 2016). Hebrew’s root-based morphology involves constructing words around three-letter root consonants (Keren-Portnoy & Segal, 2016). This structural element is central to phonological development, shaping how children perceive and manipulate word forms. Moreover, Hebrew adheres to specific phonological rules, such as vowel reduction and consonant gemination, impacting the way sounds are produced and understood by young learners (Wasserstein & Lipka, 2019). Another aspect of the language is non-linear script, which follows a nonlinear pattern, written from right to left, often incorporating vowel diacritics (nikkud). This script’s visual complexity can influence the phonological awareness and literacy development of Hebrew-speaking children (Eviatar et al., 2018).

The phonological development of Hebrew-speaking kindergarten children aligns with distinct milestones reflecting the language's unique attributes. First, children typically exhibit early phonemic awareness (Keren-Portnoy & Segal, 2016), which illustrates the recognition of phonemes and their role in word formation as well as a crucial foundation for literacy development. As children progress, they acquire Hebrew's distinct vowel and consonant sounds, including an understanding of vowel markings (nikkud) and consonant gemination (Gendler-Shalev et al., 2021). Finally, children exhibit mastery of Hebrew's syllable structure, characterized by consonant clusters (Ben-David & Bat-El, 2016) where they navigate and develop phonological awareness of complex syllable patterns.

While many Hebrew-speaking kindergarten children follow typical developmental trajectories, some may encounter challenges and developmental delays. One such challenge involves vowel reduction (Haim & Bat-El Foux, 2022), which especially in unstressed syllables, can pose challenges in speech production and phonological awareness, potentially leading to developmental delays.

Another common challenge is the mastery of consonant clusters (Sukenik, 2023) which is more common in Hebrew-speaking children diagnosed with autism spectrum disorder can have an effect on relative clause production abilities which in turn can impact speech sound production and phonological development. The transition from spoken to written Hebrew may also present challenges, as children grapple with vowel markings (nikkud) and the complexities of root-based word formations, affecting phonological awareness within a literacy context.

All these characteristics shape the development of phonemic awareness, sound production skills, and phonological awareness essential for literacy. While many children follow typical developmental pathways, understanding potential challenges and delays is crucial for educators and speech-language professionals working with Hebrew-speaking children in early education settings.

## **Educational Language Games**

Educational language games serve as a dynamic and engaging tool in early education, fostering language development and phonological awareness among young learners. Educational language games can be defined as

structured, interactive activities designed to facilitate language acquisition and enhance phonological development through play (Kostikova, 2017). These games encompass a wide range of activities and formats, catering to diverse language learning objectives. Classification of these games can be based on their primary focus, such as vocabulary acquisition, pronunciation, or phonological awareness enhancement, allowing educators to select games tailored to specific linguistic goals (Gruss, 2016).

Educational language games offer a multitude of cognitive and linguistic benefits for young learners. Games have been proven to stimulate cognitive functions like memory, problem-solving, and attention, contributing to enhanced language acquisition (Papanastasiou et al., 2017). Furthermore, they provide a conducive environment for learners to practice linguistic skills, improve pronunciation, expand vocabulary, and strengthen their phonological awareness (Hassinger-Das et al., 2016). These activities not only enrich vocabulary but also reinforce phonological skills by exposing children to varied phonemes and their contextual use. Educational language games thus serve as a valuable complement to traditional teaching methods.

Accordingly, designing effective language games for promoting phonological development involves adhering to certain principles. Games must be engaging and enjoyable to capture children's interest and motivation, ensuring active participation and facilitating intrinsic motivation (Kokkalia et al., 2017). Games should also have clear linguistic objectives, whether focused on phonological awareness, vocabulary acquisition, or pronunciation improvement (Gruss, 2016). As classrooms are filled with diverse students, a range of games should be available, catering to different learning styles and abilities (Papanastasiou et al., 2017). Moreover, the games should provide immediate feedback to learners, reinforcing correct linguistic behaviours and promoting reflection as it will promote more successful phonological development (Hassinger-Das et al., 2016). Educational language games should be integrated into the curriculum to align with specific learning goals and linguistic benchmarks (Kokkalia et al., 2017).

### **Curricular Integration**

It seems that, curricular integration of educational language games is imperative, requiring a deliberate and systematic inclusion of educational

language games within the kindergarten curriculum (Gruss, 2016). These games should be thoughtfully aligned with specific linguistic objectives and developmental milestones (Gendler-Shalev et al., 2021). This alignment ensures that language games become an integral part of the overall educational framework, reinforcing linguistic growth.

Secondly, a robust approach to professional development is essential. Educators should be provided with the requisite training and resources to adeptly integrate and manage language games in the classroom. Equipping teachers with the pedagogical skills necessary to implement these games effectively, while grounding them in the theoretical foundations discussed, is pivotal for success (Hassinger-Das et al., 2016).

Additionally, there should be a strong emphasis on assessment and evaluation. Formative and summative assessments should be implemented to monitor the progress of phonological development among students (Hassinger-Das et al., 2016). Regular evaluations of the effectiveness of language games in achieving specific linguistic goals should be conducted. These assessments guide educators in adjusting instructional strategies as needed, fostering continuous improvement.

Policymakers play a pivotal role in shaping the educational landscape. Developing policies that recognize the significance of phonological development in early education is vital. Advocating for the inclusion of educational language games as an integral component of Hebrew kindergarten curricula is essential (Kostikova, 2017). This advocacy should be reinforced through official guidelines and support structures, affirming the importance of language games in nurturing linguistic proficiency among young learners. Educators and policymakers can collaboratively create an educational environment where educational language games are seamlessly integrated, fostering a rich and engaging linguistic journey for kindergarten children (Gruss, 2016).

## **Holistic Education**

Holistic educational approaches offer valuable insights for educators and policymakers seeking to enhance phonological development among Hebrew-speaking kindergarten children (Kostikova, 2017). Recognizing the value of combining cognitive, sociocultural, interactionist, and sociolinguistic

perspectives in shaping pedagogical practices is fundamental. A holistic approach ensures that theoretical insights seamlessly inform classroom strategies, fostering comprehensive language development in young learners.

Moreover, aligning instruction with children's cognitive developmental stages, as advocated by Piaget's theory (1952), is essential. Understanding that children progress from preoperational to concrete operational stages allows educators to make informed decisions regarding age-appropriate educational language games and activities. By tailoring instruction to the cognitive readiness of students, educators can create more effective and engaging learning experiences.

Furthermore, implementing Vygotsky's sociocultural theory (1978) emphasizes the importance of fostering collaborative and interactive learning environments. Educational language games, designed to encourage peer interactions, cooperative play, and guided language activities, serve as powerful tools for scaffolding phonological development through social engagement (Vygotsky, 2016). These games not only facilitate language acquisition but also promote the development of social and communication skills in a supportive context.

Lastly, it is crucial to acknowledge and address individual variation in phonological development (Ben David & Bat-El, 2016). Various factors, including sociolinguistic influences, developmental disparities, and neurodiversity, can impact a child's phonological development journey (Johnson & White, 2020). Educators should embrace a flexible approach, tailoring instruction to accommodate diverse needs. Providing additional support, when necessary, ensures that every child has the opportunity to thrive in their linguistic development, fostering inclusivity within the educational setting (Sukenik, 2023).

## Results

This research, guided by the research questions, shaped by an extensive literature review in the field of language acquisition, yielded insightful findings.

Firstly, we discovered that early exposure to multiple languages significantly impacts the phonological development of bilingual children, with a nuanced effect based on the unique phonological characteristics of each language.

Additionally, our investigation into educational language games revealed their substantial impact on the acquisition of reading and writing skills in young learners, especially in languages like Hebrew with complex phonological structures.

Moreover, our research underscored the influential role of sociocultural factors, including language variation and dialects, in shaping phonological development in culturally diverse kindergarten classrooms, emphasizing the need for culturally sensitive pedagogical approaches.

### **Data Analysis**

Here, we will present the analysis of the data collected at Table No. 1 that tests the ability to recognize opening sounds in words. There are two groups: one that did not receive an intervention program and one that did. Each group underwent tests at the beginning and end of the year.

For any analysis, we must calculate the means and standard deviation. Moreover, we will check the correlation between results at the beginning and at the end of the year. The averages and standard deviation were calculated for each group and each time point (beginning and end of the year). Consider this data for both the number of correct answers and the number of incorrect answers. Then, we can examine the effect of the intervention by comparing the changes between the beginning and the end of the year in the two groups.

First, the averages and standard deviations were calculated for the group without intervention and then for the group with intervention. We can see an improvement in the results in both groups between the beginning and the end of the year, with an increase in the number of correct answers and a decrease in the number of incorrect answers in both groups. Though a more significant improvement is evident in the group with the intervention.

We performed two types of tests:

1. Pairs t-test – Improvement Over Time: We test the differences between the beginning and end of the year for each group.
2. Independent t-test – Effect of Intervention: We test the differences between the group without intervention and the group with intervention at each of the two times.



We will start with a Paired t-test (1) to assess the changes within each group, then move on to the independent t-test (2), and then we will check what we learn from the value of p-value (3).

The results of the Paired t-test:

Without intervention – Correct answers: t-statistic = -15.56, p-value < 0.001

Without intervention – Incorrect answers: t-statistic = 15.27, p-value < 0.001

With intervention – Correct answers: t-statistic = -28.70, p-value < 0.001

With intervention – Incorrect answers: t-statistic = 28.70, p-value < 0.001

Independent t-tests – Effect of Intervention:

Beginning of the Year – Correct answers: t-statistic = 0.96, p-value = 0.342

Beginning of the Year – Incorrect answers: t-statistic = -0.96, p-value = 0.342

End of the Year – Correct answers: t-statistic = -4.56, p-value < 0.001

End of the Year – Incorrect answers: t-statistic 4.56, p-value < 0.001

The low p-value shows that the differences between the year's beginning and end are statistically significant in both groups for correct and incorrect answers.

In the next step, we will perform two more statistical tests:

We will check the correlation between the results at the beginning and the end of the year for each group, without intervention and with intervention, and both types of answers, the correct and incorrect. After that, we will move on to perform an analysis of the assumption of influence. For it, we will calculate the Effect Size (Cohen's d) for changes between the beginning of the year and the end of the year in each group.

Correlation analysis: checking the correlation between the results at the beginning of the year and the end of the year can show if there is a relationship between the student's initial ability and their ability at the end of the year.

Analysis of the strength of the effect (Effect Size): This can help estimate the size of the intervention's effect beyond being statistically significant.

The correlation analysis:

Without intervention – Correct answers: correlation = -0.086, p-value = 0.720

Without intervention – Incorrect answers: correlation = -0.054, p-value = 0.822

With intervention – Correct answers: correlation = 0.330, p-value = 0.156

With intervention – Incorrect answers: correlation = 0.330, p-value = 0.156

In the case of the group without intervention, the correlation is low and insignificant (close to 0), which shows no clear connection between the results at the beginning of the year and the results at the end of the year. In the group with intervention, there is a positive correlation, but it is a slightly positive one, and it cannot be noted as statistically significant.

Assumption of Influence (Cohen's d)

We will move on to calculate the assumption of influence (Cohen's d) for the changes between the beginning and the end of the year in each group:

Without intervention – Correct answers:  $d = 5.09$

Without intervention – Incorrect answers:  $d = -4.94$

With intervention – Correct answers:  $d = 7.91$

With intervention – Incorrect answers:  $d = -7.91$

The magnitude of the effect measures the magnitude of the change between two groups. Here, the  $d$  values are very high, which suggests a large and significant change in results between the beginning and the end of the year in both groups, especially in the intervention group. Values of  $d$  higher than 0.8 are considered a large effect.

Some important points can be noted here:

1. Correlation: The slight positive correlation in the group with the intervention suggests a weak relationship between the ability at the beginning of the year and the ability at the end of the year. However, this is not statistically significant, so there is no high confidence that this relationship exists in the general population beyond our sample.

2. The impact assumption: The very high Cohen's  $d$  values in the group with the intervention show that the change in results between the beginning and the end of the year is large and significant. This indicates that the intervention significantly improved students' ability to identify opening sounds in words.

## Conclusions

### Conclusions from Pairs t-test and independent t-tests

The groups had no significant differences at the beginning of the year.

At the end of the year, there are significant differences between the groups in correct and incorrect answers.

The low  $p$ -value shows that the differences between the year's beginning and end are statistically significant in both groups for correct and incorrect answers.

The data shows that the intervention significantly improved students' ability to identify opening sounds in words.

### Conclusions from Correlation and the impact assumption

Although the correlation exists, it is not statistically significant. Examining the hypothesis of the effect indicates a large and significant improvement in ability in the group with the intervention.

This could be a case where the improvement is so great that it occurs to almost all students, regardless of their initial ability, and therefore the correlation is low.

**Table 1.** Data Collected

	Amount	%	Mean	Standard deviation
Without intervention				
Beginning of the year				
Correct	66	11%	3.3	2.03
Wrong	534	89%	26.7	2.03
End of the year				
Right	383	64%	19.15	3.91
Wrong	217	36%	10.85	3.91
With intervention				

Beginning of the year				
Right	55	10%	2.75	1.55
Wrong	545	90%	27.25	1.55
End of the year				
Right	491	82%	24.55	3.58
Wrong	109	18%	5.45	3.58

**Source:** Authors' own elaboration.

Graphic presentation of the results. A bar graph to illustrate the change in averages and a scatter graph to illustrate the correlation. Each graph shows the ratio between the data at the beginning of the year (X-axis) and at the end of the year (Y-axis) for each category.

Change Over Time (Paired t-test). These graphs will show the mean values for correct and incorrect answers at the beginning and end of the year for both groups (with and without intervention). This will visually represent the improvement or decline in each category.

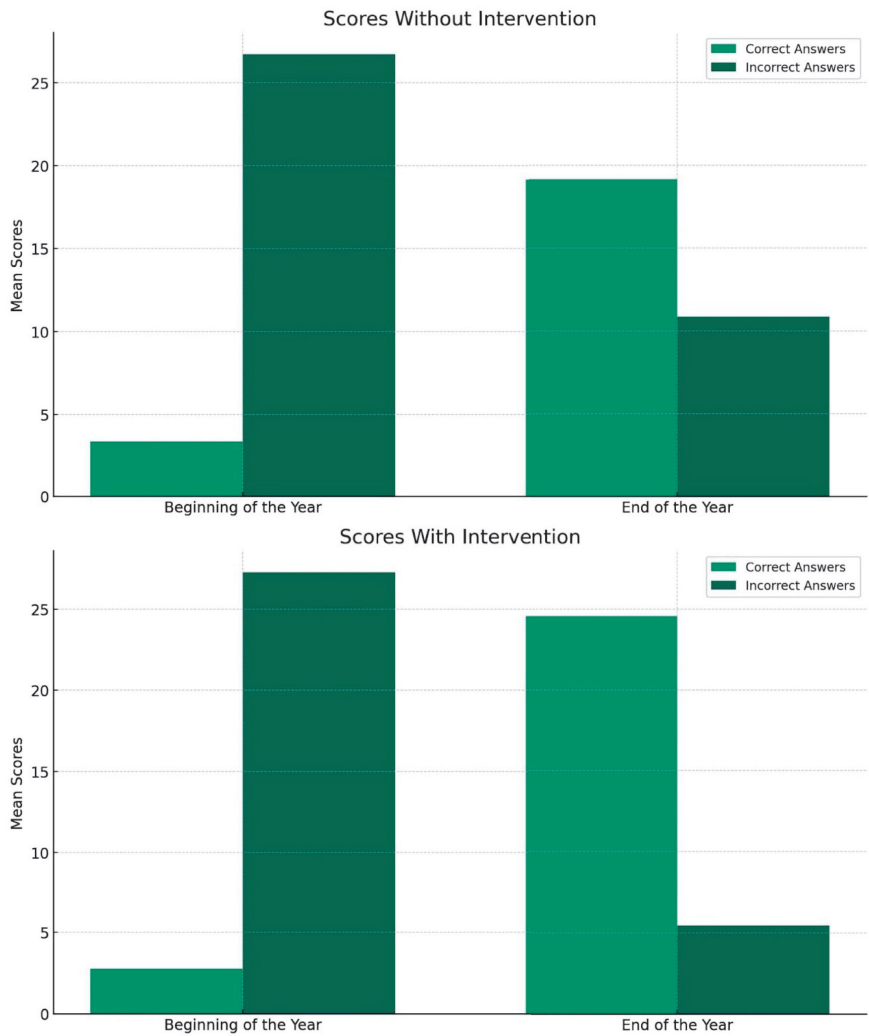
Comparison Between Groups (Independent t-test). These graphs will compare the mean values for correct and incorrect answers between the groups (with and without intervention) at both the beginning and end of the year. This will highlight the effect of the intervention.

The graphs for the Correlation Analysis and the Assumption of Influence (Cohen's d):

Correlation Analysis. This graph shows the correlation coefficients for correct and incorrect answers in both groups (with and without intervention). It provides a visual representation of the relationship between the results at the beginning and the end of the year for each group.

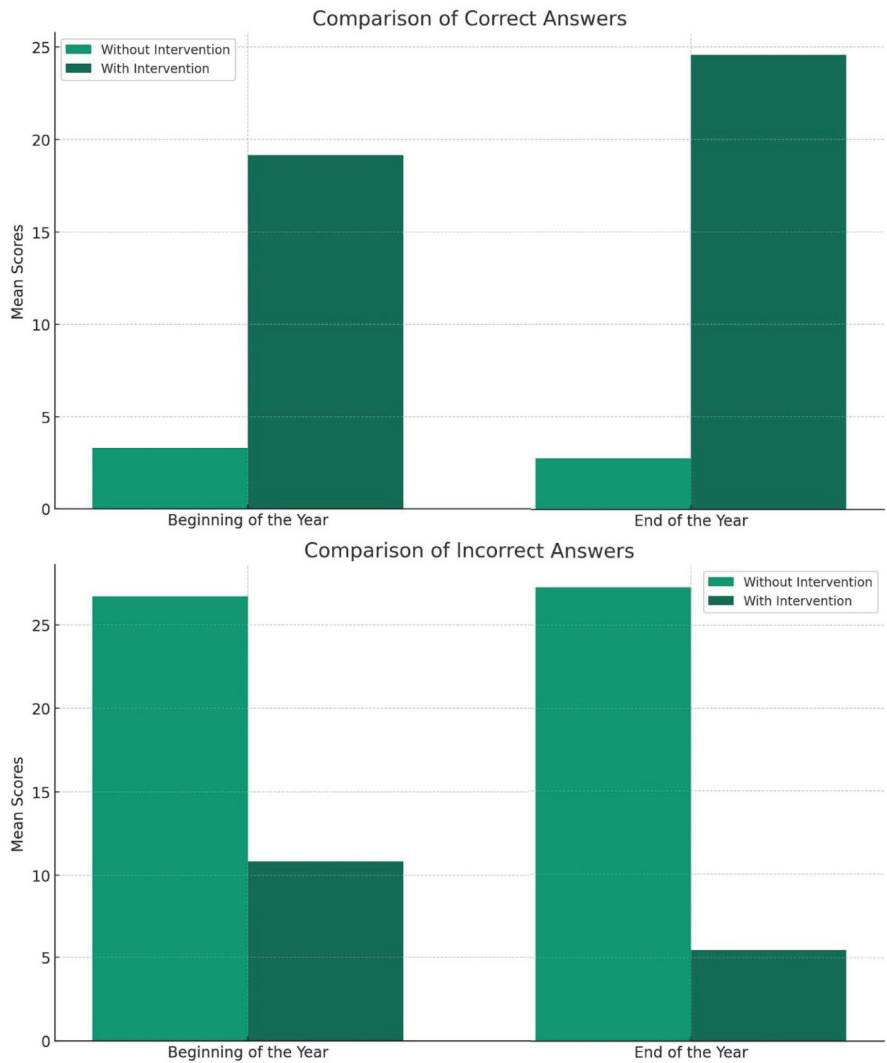
Assumption of Influence (Cohen's d). This graph illustrates the effect sizes for correct and incorrect answers in both groups. The high values of Cohen's d, particularly in the group with intervention, indicate a large and significant change in results between the beginning and the end of the year.

**Graph 1.** Change Over Time (Paired t-test)

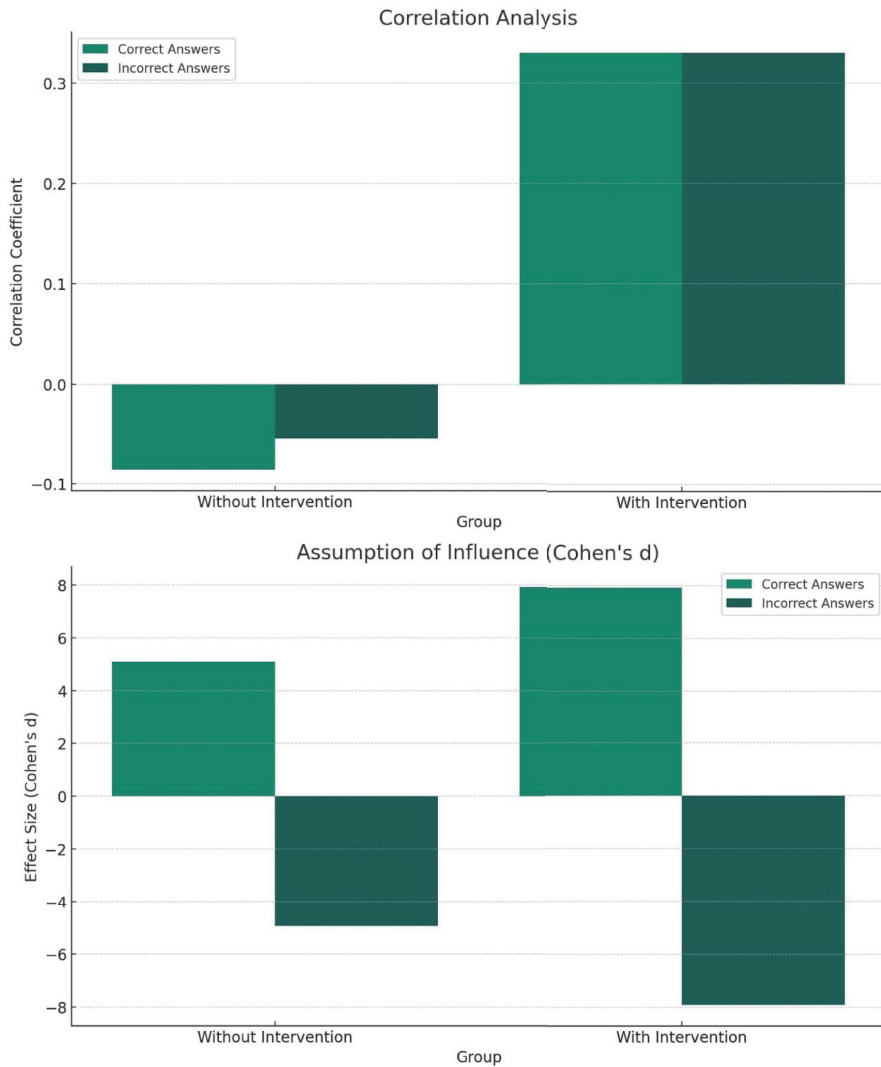


**Source:** Authors' own elaboration.

**Graph 2.** Comparison Between Groups (Independent t-test)



**Source:** Authors’ own elaboration.

**Graph 3.** Correlation Analysis and the Assumption of Influence (Cohen's d)

**Source:** Authors' own elaboration.

## Discussion

The results of our literature review shed light on several critical aspects of phonological development and language acquisition, aligning with the research questions formulated based on an extensive literature review in the field.

Firstly, the influence of multilingual exposure on phonological development was a central finding. Bilingual children demonstrated varying phonological competencies, which appeared to be influenced by the phonological attributes of each language they encountered. This underscores the importance of considering the unique linguistic characteristics of each language when designing interventions and support for multilingual learners.

Moreover, the impact of educational language games on reading and writing skills, particularly in languages with complex phonological structures like Hebrew, was evident. These findings reinforce the potential of interactive and engaging teaching methods to foster phonological awareness and literacy skills in early education settings.

Our reading also emphasizes the importance of sociocultural factors, including language variation and dialects, for phonological development in different classes. This underscores the need for educators to recognize and respect linguistic diversity while supporting phonological development.

In this preliminary study we conducted on language development in 2 groups of kindergarten children with 30 children each. We examined language development without intervention versus language development with intervention and found that a positive and almost equal effect was observed for all children in the group.

At the beginning of the year, there were no significant differences between the groups. But at the end of the year, there were significant differences between the groups in the correct and incorrect answers. The low p-value shows that the differences between the beginning and the end of the year are statistically significant in both groups for correct and incorrect answers. The data shows that the intervention significantly improved the students' ability to recognize initial sounds in words.

Although the correlation exists, it is not statistically significant. The test of the effect hypothesis shows a large and significant improvement in skills in the group with the intervention. We conclude that the improvement in this case is so large that it occurs in almost all students, regardless of their initial ability, and the correlation is therefore low.



## Conclusion

The reviewed literature underscores the significance of phonological awareness in early language development, highlighting its vital role as a precursor to proficient reading and writing. Integrating educational games into language instruction, particularly in the form of interactive and engaging experiences, offers a promising approach to fostering phonological awareness. While studies have examined the impact of such games on language development, targeted investigations will contribute to a more comprehensive understanding of the potential of educational games in nurturing phonological awareness skills among kindergarten children.

The theoretical insights presented in this discussion offer invaluable guidance for educators and policymakers seeking to enhance phonological development among kindergarten children. These insights enrich our understanding of phonological development and provide a blueprint for actionable steps in early education. The intersection of theory and practice is critical for effective phonological development in kindergarten children.

This research demonstrates the critical importance of evidence-based approaches in developing effective pedagogical strategies for phonological development. The statistically significant improvements observed in the intervention group highlight how research can directly inform classroom practices, curriculum design, and policy decisions. By continuing to investigate the intersection of theory and practice in early language acquisition, educators can develop increasingly effective methods to support children's phonological proficiency, particularly in languages with complex phonological structures like Hebrew. Future research should build upon these findings to further refine educational language games and their implementation in diverse educational contexts, ultimately enhancing literacy outcomes for young learners.

Our research confirms the significant impact of targeted educational interventions on young children's language development. The study, which was conducted on two groups of kindergarten children, one with and another one without intervention, showed that the intervention had a uniformly positive effect on all participants. The intervention was particularly effective in improving the students' ability to recognize initial sounds in words. This result is proof of the effectiveness of well-structured and thoughtfully implemented language development programs in early education.

An important finding was the lack of significant differences between the groups at the beginning of the year, which changed dramatically by the end of the year. The substantial improvements observed in the intervention group, as evidenced by the low p-values and high effect size (Cohen's d), underscore the profound impact of the intervention on phonological development. The statistical significance of these changes confirms the effectiveness of the intervention in promoting language skills.

Interestingly, the correlation analysis showed a correlation but no statistically significant results. This suggests that the improvement attributed to the intervention was so widespread and robust that it occurred in almost all students, regardless of their initial ability. This pattern suggests that the intervention was effective across a wide range of ability levels and improved the phonological skills of all participants.

Overall, this study emphasizes the importance of considering unique linguistic characteristics, sociocultural factors, and the potential of interactive teaching methods in promoting phonological awareness and literacy skills. The findings support the inclusion and integration of tailored language development interventions in early education, particularly in settings with multilingual learners and diverse linguistic backgrounds. In the future, these findings can guide the development of more effective teaching strategies and interventions to support the holistic language development of young learners in different educational contexts.

Educational language games represent a potent tool for advancing phonological development and should be seamlessly integrated into Hebrew kindergarten curricula. For educators and policymakers, the following recommendations are crucial for the effective integration of educational language games:

1. Curricular integration. Deliberate and systematically include educational language games within the kindergarten curriculum, aligning them with specific linguistic objectives and developmental milestones to reinforce linguistic growth.
2. Professional development. Providing educators with training and resources to effectively integrate and manage language games in the classroom while grounding them in the theoretical foundations discussed.

3. Resource Allocation. Adequate resources should be allocated for developing and acquiring educational language games tailored to Hebrew phonological development. This includes investments in high-quality game materials and digital tools that enrich the learning experience, ensuring the resources are engaging and effective in achieving desired linguistic outcomes.

Balancing pedagogical approaches with theoretical foundations is paramount for optimizing phonological development among kindergarten children. The harmonious fusion of theory and practice ensures that language games effectively nurture phonological awareness, sound discrimination skills, and language proficiency. By embracing these theoretical insights and recommendations, educators and policymakers can collaboratively create a language-rich learning environment, empowering young learners to embark on a journey toward linguistic excellence and literacy.

The comprehensive analysis of our study together with the findings from an extensive literature review highlights several key aspects of phonological development and language acquisition in early childhood education. The results of this study provide valuable contributions to the understanding of phonological development, particularly in multilingual contexts and in the use of educational games.

**Abstract:** Background: Phonological development is pivotal in early language acquisition, serving as a precursor to proficient reading and writing abilities. For Hebrew-speaking kindergarten children, the complexity of the language's phonological system presents unique challenges and opportunities. This study explores the theoretical foundations of phonological development, drawing from cognitive, sociocultural, interactionist, and sociolinguistic perspectives, and examines the transformative potential of educational language games in Hebrew kindergarten classrooms.

Methods: This study employs a qualitative research design, primarily focused on a systematic literature review and content analysis. The research questions investigate what insights can be gleaned from past academic studies in language acquisition, specifically phonological development, and how these findings can influence the practical application of educational language games in early education.

**Results:** The study highlights the holistic integration of theoretical insights into pedagogical practices, emphasizing the importance of cognitive alignment, sociocultural interactions, addressing individual variation, and curricular integration. Recommendations for educators and policymakers include aligning instruction with cognitive developmental stages, fostering collaborative learning environments, acknowledging diverse needs, providing professional development, allocating resources, implementing assessments, and advocating for policy support.

**Conclusion:** By bridging the gap between theory and practice, this study offers valuable guidance for educators and policymakers seeking to enhance phonological development among Hebrew-speaking kindergarten children. The harmonious fusion of theoretical insights and practical recommendations creates a language-rich learning environment, empowering young learners in their linguistic journey and promoting inclusivity within the educational setting. Phonological development plays a pivotal role in the acquisition of language skills during early childhood.

**Keywords:** phonological development, educational language games, Hebrew kindergarten, language acquisition, inclusive education

**Streszczenie:** Tło: Rozwój fonologiczny odgrywa kluczową rolę we wczesnym przyswajaniu języka, stanowiąc podstawę dla biegłości w czytaniu i pisaniu. Dla dzieci hebrajskojęzycznych uczęszczających do przedszkola złożoność fonologicznego systemu języka hebrajskiego stwarza zarówno wyzwania, jak i możliwości. Niniejsze badanie analizuje teoretyczne podstawy rozwoju fonologicznego, czerpiąc z perspektyw kognitywnych, socjokulturowych, interakcjonistycznych i socjolingwistycznych, a także bada potencjał edukacyjnych gier językowych w przedszkolnych klasach hebrajskich.

**Metody:** W badaniu zastosowano jakościowy projekt badawczy, koncentrując się głównie na systematycznym przeglądzie literatury oraz analizie treści. Postawione pytania badawcze dotyczą tego, jakie wnioski można wyciągnąć z wcześniejszych badań akademickich na temat przyswajania języka, w szczególności rozwoju fonologicznego, oraz w jaki sposób odkrycia te mogą wspierać praktyczne zastosowanie edukacyjnych gier językowych w edukacji wczesnoszkolnej.

**Wyniki:** Badanie podkreśla znaczenie całościowej integracji wniosków teoretycznych z praktyką pedagogiczną, zwracając uwagę na dopasowanie do procesów poznawczych, interakcje socjokulturowe, uwzględnianie indywidualnych różnic oraz włączanie treści do programu nauczania. Wśród rekomendacji dla nauczycieli i decydentów znajdują się: dostosowanie nauczania do etapów rozwoju poznawczego, promowanie współpracy w nauce, uwzględnianie różnorodnych potrzeb uczniów, zapewnienie rozwoju zawodowego nauczycieli, alokacja zasobów, wdrażanie systemów oceniania oraz wspieranie polityki edukacyjnej sprzyjającej rozwojowi fonologicznemu.

Wnioski: Poprzez połączenie teorii z praktyką, badanie dostarcza cennych wskazówek dla nauczycieli i decydentów dążących do wspierania rozwoju fonologicznego dzieci hebrajskojęzycznych w przedszkolach. Harmonijne połączenie wniosków teoretycznych z praktycznymi rekomendacjami tworzy bogate w język środowisko edukacyjne, wspierając młodych uczniów w ich rozwoju językowym oraz promując inkluzywność w procesie edukacyjnym.

**Słowa kluczowe:** rozwój fonologiczny, edukacyjne gry językowe, hebrajskie przedszkole, przyswajanie języka, edukacja inkluzyjna.

## References

- Assaoui, H. (2016). Variability in Comprehension: A Look at the Proficiency Level and Working Memory Functions Among Nonnative Readers of Arabic.
- Babakr, Z., Mohamedamin, P., & Kakamad, K. (2019). Piaget's cognitive developmental theory: Critical review. *Education Quarterly Reviews*, 2(3).
- Ben-David, A., & Bat-El, O. (2016). Paths and stages in acquisition of the phonological word in Hebrew. *Acquisition and development of Hebrew: From infancy to adolescence*, 39-68.
- Benway, N. R., Garcia, K., Hitchcock, E., McAllister, T., Leece, M. C., Wang, Q., & Preston, J. L. (2021). Associations between speech perception, vocabulary, and phonological awareness skill in school-aged children with speech sound disorders. *Journal of Speech, Language, and Hearing Research*, 64(2), 452-463.
- Eviatar, Z., Taha, H., Cohen, V., & Schwartz, M. (2018). Word learning by young sequential bilinguals: Fast mapping in Arabic and Hebrew. *Applied Psycholinguistics*, 39(3), 649-674.
- Gendler-Shalev, H., Ben-David, A., & Novogrodsky, R. (2021). The effect of phonological complexity on the order in which words are acquired in early childhood. *First Language*, 41(6), 779-793.
- Gruss, J. (2016). Games as a tool for teaching English vocabulary to young learners. *World Scientific News*, 53(2), 67-109.
- Haim, M., & Bat-El Foux, O. (2022). Asynchronization at the phonology-morphology interface: A case study of an atypically developing Hebrew-acquiring boy. *Clinical Linguistics & Phonetics*, 1-26.
- Hassinger-Das, B., Ridge, K., Parker, A., Golinkoff, R. M., Hirsh-Pasek, K., & Dickinson, D. K. (2016). Building vocabulary knowledge in preschoolers through

- shared book reading and gameplay. *Mind, Brain, and Education*, 10(2), 71-80.
- Johnson, E. K., & White, K. S. (2020). Developmental sociolinguistics: Children's acquisition of language variation. *Wiley Interdisciplinary Reviews: Cognitive Science*, 11(1), e1515.
- Keren-Portnoy, T., & Segal, O. (2016). Phonological development in Israeli-Hebrew-learning infants and toddlers. *Acquisition and development of Hebrew*, 69-94.
- Kostikova, I. I. (2017). *Language games in teaching English*.
- O'Kane, J. C., & Goldbart, J. (2016). *Communication before speech: Development and assessment*. David Fulton Publishers.
- Pathan, H., Memon, R. A., Memon, S., Khoso, A. R., & Bux, I. (2018). A critical review of Vygotsky's socio-cultural theory in second language acquisition. *International Journal of English Linguistics*, 8(4), 232.
- Piaget, J., & Cook, M. (1952). *The origins of intelligence in children* (Vol. 8, No. 5, pp. 18-1952). New York: International Universities Press.
- Rachmani, R. (2020). The effects of a phonological awareness and alphabet knowledge intervention on four-year-old children in an early childhood setting. *Australasian Journal of Early Childhood*, 45(3), 254-265.
- Sukenik, N. (2023). Relative clause production abilities of Hebrew-speaking children with ASD. *Language Acquisition*, 1-22.
- Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.
- Vygotsky, L. S. (2016). *The collected works of LS Vygotsky: Problems of general psychology, including the volume thinking and speech*. Springer.
- Wasserstein, D., & Lipka, O. (2019). Predictive examination of phonological awareness among Hebrew-speaking kindergarten children. *Frontiers in psychology*, 10, 1809.

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