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Designing a Test to Assess Articulation (First Level of Oral Language) in Children with Speech mechanism Deformities

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Abstract :

This study aimed to construct a standardized test to assess articulation in children with deformities of the speech mechanism—an essential component of oral language. A secondary objective was to evaluate the test's psychometric properties, including its validity and reliability. The test was constructed following established scientific principles commonly employed in the assessment and diagnosis of speech disorders in pediatric populations. It was administered to a sample of 40 children, aged between 6 years and 6 years and 11 months, drawn from various municipalities within the province of Laghouat. The findings indicate that the test demonstrates sound psychometric qualities and is effective in evaluating speech abilities in children with structural speech impairments.

Keywords: Test construction ; articulation; oral language

1.STUDY PROBLEM

Oral language is one of the most intricate and remarkable aspects of human behavior. It is not only a tool for communication but also a means of social interaction, a foundation of civilization, and a carrier of human culture since the earliest days of humankind. Just as people grow and evolve, so too does their language. For children, speech and spoken language are among the first tools they use to connect with the outside world, to express themselves, and to meet their needs. Its significance lies in its role as the primary channel through which we convey, share, and exchange ideas and information with others.

Language can be understood as a system of symbols that members of a society agree upon and use collectively. Present from our earliest years, it shapes almost every aspect of our lives. Guided by its own rules and structure, language is a uniquely human characteristic, supported by an innate ability that allows children to naturally acquire their mother tongue. In their early years, children can master the intricate components of language — pronunciation, grammar, syntax, and vocabulary — a complex network of interconnected systems. A disruption in any one of these areas can lead to language disorders, with speech disorders being among the most common.

Research by Gibson (2003) indicates that around 75% of children in middle childhood experience speech and voice difficulties. The widespread nature of these issues across many societies is a fact that cannot be overlooked (Naaji Aida, 2013, p. 266).

2. DEFINITION OF ARTICULATION:

Articulation refers to the physical process by which speech sounds are formed through the precise coordination of the vocal and speech organs as air is expelled from the lungs. It involves shaping raw sound into meaningful, consistent patterns that adhere to the phonological rules of a given language (Marwa Adel El-Sayed, 2016, p. 1). In this sense, articulation is not merely a biological act but a linguistically governed process that transforms acoustic signals into recognizable symbols of communication.

From a linguistic perspective, articulation is the systematic arrangement of sounds produced by the vocal tract into structured forms that carry meaning. These sounds, produced through the interaction of airflow and articulatory movements, are the essential building blocks of spoken language. Richard (2001) emphasizes that articulation encompasses more than just sound production—it involves the orchestration of speech elements such as intonation, rhythm, stress patterns, and clarity, which together shape one's manner of speaking and communication style (Abdel-Moneim Ahmed El-Dardeer, 2022, p. 127).

Articulation disorders, therefore, are characterized by a person's difficulty in producing speech sounds correctly, often due to factors such as muscular incoordination, structural anomalies, neurological dysfunction, or poor control of the vocal mechanisms (Nouran Ahmed Taha et al., 2022, p. 213). Amal Abdel-Sami Abaza (2003, p. 124) explains that these disorders typically manifest as unclear speech, often requiring others to reinterpret or reformulate the child's utterances. While common in children with developmental or neurological conditions, persistent articulation issues may signal deeper underlying disorders.

Keegstra et al. (2010, p. 184) define speech disorders as impairments in the motor processes of speech production, which may result from incorrect movements of the jaw or tongue, improper sequencing of speech movements, or faulty coordination of the articulatory muscles. These impairments often manifest

in errors such as sound distortions, omissions, substitutions, or additions, and can significantly impact intelligibility.

Mohamed El-Noubi (2018) points to neurologically based disorders where disruptions in vocal features such as pitch, tone, and intonation arise due to muscular or neurological dysfunctions. Similarly, Abdelrahman Ibrahim and Mansour Mohamed (2008, p. 42) note that some children demonstrate unintelligible speech patterns because of reliance on phonological processes that systematically affect groups of sounds.

Importantly, not all articulation issues are linked to visible anatomical abnormalities. Many fall under the category of functional articulation disorders, where speech is affected by non-organic factors and may persist into later developmental stages. In some cases, mild articulation errors—such as lisps or mispronunciations—appear in early childhood and resolve naturally. In others, they persist, requiring formal assessment and therapeutic intervention.

From a clinical standpoint, articulation disorders can be described as:

The inability to correctly produce specific phonemes, including errors in place and manner of articulation or voicing;

Manifestations involving both consonants and vowels, ranging in severity from minor distortions to complete unintelligibility;

Outcomes of either functional or organic causes—such as muscle incoordination, structural defects, or central nervous system impairments;

Disorders that affect not only communication but also social integration, academic performance, and psychological well-being.

Although estimates vary across contexts, it is generally accepted that approximately 10% of children aged eight experience some form of articulation disorder (Ihab El-Beblawi & Ashraf Mohamed Abdel-Hamid, 2014, p. 38). These disorders often take the form of:

Omissions: leaving out a sound (e.g., "ca" for "cat"),

Substitutions: replacing one sound with another,

Additions: inserting extra sounds into words,

Distortions: producing an inaccurate version of the correct sound.

Both Ibrahim Abdallah (2012) and Fikry Latif (2015) stress the communicative challenges these disorders pose. When a child omits critical sounds in words, listeners may struggle to infer their intended meaning. For example, saying "ca" may leave ambiguity as to whether the child means "cat" or "cap" (Ibrahim Abdallah, 2012, p. 195).

Explanation of Key Articulation Concepts:

Place of Articulation: Refers to the specific point in the vocal tract where the speech organs meet to form a sound (e.g., the tongue contacting the alveolar ridge).

Manner of Articulation: Describes how the airflow is manipulated—either fully blocked, partially restricted, or allowed to flow freely—resulting in distinct types of sounds such as stops, fricatives, or nasals.

Voicing: Indicates whether the vocal cords vibrate during sound production. Sounds are categorized as:

Voiced (e.g., /z/, /j/, /w/, /y/): produced with vocal cord vibration.

Voiceless (e.g., /s/, /ʃ/): produced without vibration.

(Abdelrahman Ibrahim & Mansour Mohamed, 2008, p. 45)

Articulation Assessment and the Need for Standardized Tools

In clinical and educational settings, the assessment of articulation skills in children typically relies on standardized diagnostic tools. These tools are essential for providing objective, quantifiable data on speech performance and for ensuring consistency in evaluation across cases. According to Maamria Bachir (2007, p. 92), standardized assessments offer several advantages over informal methods:

They allow for accurate measurement of specific psychological and linguistic traits.

They provide objectivity by comparing the child’s responses to normative data.

Chevrie-Muller further emphasizes that standardized testing should be a routine part of any clinical language assessment, particularly when evaluating formal aspects of speech and language performance. These tools remain the most

reliable method for diagnosing speech disorders, identifying their severity, and guiding subsequent intervention strategies.

Tests are designed to be systematic in both construction and scoring. They facilitate meaningful comparisons between the individual and a normative sample, usually composed of peers from the same age group or educational level (Adi Dalila & Barah Said Ahmed, 2018, p. 155). Moreover, even in cases where a formal diagnosis may not be confirmed, clinical assessments play a critical role in identifying areas requiring therapeutic support.

The Present Study's Contribution

Despite the importance of articulation assessment, there remains a noticeable lack of standardized tools that are culturally and linguistically adapted to the Algerian context. To address this gap, the current study seeks to develop a locally validated articulation test tailored for children aged 6 years and 1 month to 6 years and 11 months.

This test draws upon and adapts elements from several established tools, including:

The Illustrated Articulation Efficiency Scale (Ihab El-Beblawi, 2006),

The Illustrated Articulation Disorder Scale for Cochlear Implant Children (Ashraf Mohamed, 2014),

The Articulation Disorder Scale (Mohamed El-Noubi, 2006),

The Speech Disorder Observation Form (Saleh Al-Amidi, 2009).

By grounding its design in both theoretical frameworks and empirical data, this study aims to provide a reliable and culturally relevant resource for clinicians and educators working with children who experience articulation difficulties.

3. STUDY OBJECTIVES

The present study seeks to achieve the following objectives:

_To design and develop a standardized evaluative test in the field of speech-language pathology .

_To examine the psychometric properties of a speech assessment scale intended for use with children.

_To produce a valid and reliable assessment tool that can be applied by speech-language specialists for evaluating speech across various cases.

_To contribute to the body of applied research in the field of test construction, thereby enriching academic and professional resources.

4. IMPORTANCE OF THE STUDY:

The significance of this research can be understood through the following considerations:

_It represents a substantive and methodical effort to construct a speech evaluation test, which forms a core component of the work carried out by speech-language pathologists.

_It is among the pioneering initiatives aimed at enhancing the clinical field with a specialized language assessment instrument.

_Speech evaluation plays a pivotal role as a foundational step for the acquisition of expressive language and for implementing effective early intervention strategies.

_The findings of this study may serve as a reference point and catalyst for future research in closely related areas.

_There is a pressing need for a speech assessment tool tailored to the developmental characteristics of primary school students in the early years of education.

5. OPERATIONAL DEFINITIONS OF STUDY TERMS:

Speech (Articulation): The capacity to produce spoken sounds. In this study, speech is evaluated through the child's performance on a test measuring their ability to recognize and pronounce letters and words, with accuracy determined by the number of pronunciation errors recorded.

Speech Assessment Test: A structured measurement instrument comprising a set of vocabulary items presented to the examinee to elicit specific linguistic sounds in various word positions (initial, medial, and final). The examinee's actual pronunciation is compared against the standard pronunciation, and performance is quantified based on the number of articulation errors identified according to a predefined scoring scale.

6. LITERATURE REVIEW :

6.1. Study: DRAP (2021)

Rapid Screening Test of Articulation and Speech for Children Aged 3–6 Years

This study introduced a brief screening tool designed to identify articulation and speech difficulties in children between the ages of 3 and 6 years. The test is administered within 3 to 5 minutes, aiming for maximum efficiency. Its primary purpose is to enable the rapid detection of speech sounds, provide an initial evaluation of speech abilities, and identify articulation and phonetic challenges among preschool and first-grade children.

Participants:

The sample comprised 199 children—104 from Geneva and 95 from San Francisco—including 98 girls and 101 boys, with ages ranging up to 6 years and 11 months. The participants were categorized into two groups: monolingual and bilingual.

Test Description:

The assessment involved a picture-naming task with 20 colored images. Each child was asked to name the pictures to elicit word production. The test was administered individually, and performance was measured using two indicators:

The total number of correct words produced

The accuracy of consonant articulation

The scoring system ranged from 0 to 20, with one point awarded for each correct response.

Psychometric Properties:

The tool demonstrated an average sensitivity of 92.72 (SD = 7.67) and an item suitability rate of 97%. Age was found to be a significant factor influencing the number of correctly articulated words.

6.2. Study by Emad Ahmed Hassan Ali, Ahlam Desouki, and Mohamed Abdel Moneim (2024)

Validity and Reliability Indicators of a Speech Disorder Scale for At-Risk Children in Primary Education at Al-Azhar, Egypt

Participants:

The study included 150 fourth-grade students in Assiut, Egypt, aged between 108 and 121 months (approximately 9–10 years) during the 2023/2024 academic year. A descriptive-analytical approach was employed.

Scale Description:

The instrument was developed to detect speech disorders and consisted of images representing all Arabic phonemes. It encompassed five domains, 28 statements, and a total of 84 items. During the assessment, each child was asked to repeat a letter sound followed by a word after the examiner.

Psychometric Properties:

The scale demonstrated strong validity and reliability, confirmed through:

Expert validity assessment

Internal consistency analysis

Test–retest reliability evaluation

6.3. Study by Walid El-Sayed Ahmed and Shaimaa Othman El-Hassanein (2024)

Development of a Speech Disorder Scale for Children with Autism Spectrum Disorder in Kindergarten and Validation of Its Psychometric Properties

Participants:

The sample consisted of 25 children diagnosed with autism, residing in Matrouh, Egypt, during the 2023/2024 academic year. The study adopted a descriptive research design.

Test Description:

The scale comprised 10 dimensions, each containing 10 items, resulting in a total of 100 statements. Responses were rated on a three-point scale, yielding a total possible score ranging from 100 to 300.

Psychometric Properties:

The instrument was validated and found to be reliable through:

Contrasted groups validity

Internal consistency of items

Internal consistency of dimensions with the overall score

Spearman's correlation coefficient

Cronbach's alpha coefficient

6.4. Study by Nour Ahmed El-Ramady, Mohamed Helil, and Mohamed Abdel Aal (2022)

Psychometric Properties of a Pictorial Speech Disorder Scale for Early Middle School Pupils

Participants:

Fifteen children aged 6–9 years participated in the study, conducted at the Kalemat Center and Al-Ro'ya Center in Fayoum, Egypt, during the 2021/2022 academic year.

Test Description:

The test was picture-based and contained 84 words representing familiar concepts. Scoring was straightforward, with one point awarded for each correct response.

Psychometric Properties:

The scale's validity and reliability were established using:

Internal consistency analysis

Expert validity assessment

Criterion validity testing

Cronbach's alpha coefficient

6.5. Study by Abdel Moneim Mohamed and Doaa Mohamed Abdel Aziz (2020)

A Rating Scale for Speech Disorders and Speech Defects in English among Preparatory School Students

Participants:

Thirty first-year preparatory female students from Sohag Governorate, Egypt, participated in this descriptive study during the 2019/2020 academic year.

Test Description:

Details of the test content were not specified in the report.

Psychometric Properties:

The scale was found to be both valid and reliable, based on:

Criterion validity

Internal consistency

Cronbach's alpha coefficient

Split-half reliability

6.6. Study by Mohamed Amin Yass Qassem, Khairy Ahmed, Medhat Al-Taf, and Nahed Awad (2021)

Psychometric Properties of a Speech Disorder Scale for Children with Cochlear Implants

Participants:

The study involved 30 children aged 4–10 years from Aswan, Egypt, conducted in 2021.

Scale Description:

The assessment aimed to evaluate children's ability to articulate Arabic phonemes (from Alef to Yaa) in different word positions—initial, medial, and final. The scale consisted of three dimensions:

Articulation of isolated letter sounds

Articulation of sounds with short, long, and sukun vowels

Articulation of letters within words

Scoring was conducted on a 1–2–3 scale for each item.

Psychometric Properties:

The instrument demonstrated strong validity and reliability, verified through:

Expert validity assessment

Discriminant validity

Cronbach's alpha coefficient

Test–retest reliability

Internal consistency of items.

7. COMMENTARY ON PREVIOUS STUDIES

In terms of objectives:

The reviewed studies primarily sought to design and develop scales and assessment tools for detecting speech disorders in children. Accordingly, their objectives are consistent with those of the present study.

In terms of sample characteristics:

Most previous research focused on child populations. An exception was the study by Ahmed Abdel Moneim and Doaa Mohamed Abdel Aziz (2020), which examined preparatory school students. The samples also varied in nature: while the majority targeted typically developing children, Walid Ahmed's (2024) study focused on children with autism spectrum disorder, and Ahmed Qassem's (2021) research addressed children with cochlear implants.

In terms of sample size:

Sample sizes ranged considerably, from as few as 25 participants to as many as 199.

In terms of methodology:

All studies adopted the descriptive–analytical research approach.

In terms of statistical analysis:

Data in these studies were processed and analyzed using the SPSS statistical software package.

In terms of results:

The collective findings indicated that the tools developed in these studies demonstrated satisfactory validity and reliability. The present researchers drew on the insights from this body of work to inform the theoretical framework of the study, select suitable statistical procedures, and guide the interpretation of results.

8. STUDY METHODOLOGY

The current study employed the descriptive–analytical method, which involves systematically collecting data, extracting results, and analyzing them using appropriate statistical techniques.

9. STUDY BOUNDARIES

9.1. Human Boundaries

The sample comprised 40 children (18 boys and 22 girls) aged between 6 years and 6 years 11 months. The participants were purposefully selected based on the following criteria:

All children spoke colloquial Arabic in the home environment.

All children were free from auditory, visual, sensory, or motor impairments, as verified by school health records.

All were enrolled in the first year of primary school.

All had speech organ deformities, such as missing teeth, dental malformations, or cleft lips.

9.2. Spatial Boundaries (Location)

The study was conducted in the following primary schools: El-Fath Private School, Allal Baroudi, Latrech Slimane, and Harath Abdelkader.

9.3. Temporal Boundaries (Timeframe)

The theoretical development of the test took place between September and December 2024.

Practical implementation occurred in the third term of the 2024/2025 academic year, specifically between March and May 2025.

10. STUDY TOOL

Step 1 – Literature Review:

A comprehensive review of literature related to speech disorders and the methodologies for developing diagnostic scales and tests was conducted.

Step 2 – Review of Existing Tools:

Previous assessment tools for speech and articulation disorders were examined to identify effective technical features and to draw methodological insights for the development of the present test. Key references included:

Speech Disorder Scale by Mohamed El-Noubi Mohamed Ali (2006)

Scale for Estimating the Severity of Speech Disorders by Asmaa Ibrahim Matar (2017)

Observation Form for Speech and Articulation Disorders by Saleh Al-Ghamdi (2009)

Step 3 – Test Construction Process

Test Objective:

The test was designed to assess articulation skills in 6-year-old children, providing a descriptive and preliminary evaluation of speech.

Test Specifications:

Items were required to be simple, clear, and easily understood, while ensuring comprehensive coverage of the dimensions under assessment.

Test Dimensions:

Assessment of isolated letter sounds:

A list of individual Arabic letter sounds from Alef (أ) to Yaa (ي), including short vowels (fatha, damma, kasra).

Assessment of letter sounds in initial position:

84 words grouped into 28 items, each item containing three words incorporating the short vowels.

Assessment of letter sounds in medial position:

84 words grouped into 28 items, each with three words using short vowels.

Assessment of letter sounds in final position:

84 words grouped into 28 items, each with three words using short vowels.

Test Instructions:

The child listens to a sound or word and repeats it.

Scoring System:

Correct response: 2 points

Incorrect response: 1 point

Responses were recorded on a prepared scoring sheet.

Following the initial drafting, the test was submitted for evaluation by a panel of ten experts, including psychologists, speech-language pathologists, primary school teachers, and practicing clinicians. A guide outlining the test's objectives and target population accompanied the draft. The panel assessed the clarity of instructions, wording of items, and overall relevance of the test.

Expert Review Outcome:

There was 95% agreement among the experts. They recommended replacing four words in the test items to improve clarity and appropriateness.

11. PSYCHOMETRIC PROPERTIES OF THE STUDY

1. Test Validity: **Total Score and Dimensions**

A. Discriminant Validity: Contrasted Groups Method

The validity of the scale was verified using discriminant validity through the contrasted groups method, which "relies on one of the core concepts of validity: the test's ability to distinguish between the extremes of the trait being measured" (Maamriya, 2007, p. 158).

Participants' scores were ranked in descending order. Then, 27% of the participants were selected from each end of the distribution, resulting in two extreme groups of 11 participants each—one high group and one low group. Mean scores and standard deviations were calculated for each group, followed by the calculation of T-values to determine the significance of differences between the groups.

Variable	High Group (n=11)	Low Group (n=11)	T-Value	Significance (α=0.05)
Total Score	Mean: 272.00 SD: 2.08	Mean: 222.18 SD: 13.12	5.355	Significant
Sounds	55.54	50.18	5.355	Significant
Beginning of Word	55.54	50.18	5.355	Significant

Middle of Word	55.54	50.18	5.355	Significant
End of Word	55.54	50.18	5.355	Significant

As shown in Table (1), the T-values for the differences between the means were statistically significant at the $\alpha = 0.05$ level. This indicates that the test can effectively distinguish between the extreme groups in both the total score and all sub-dimensions, thereby confirming the validity of the test.

B. Internal Consistency Validity

Internal consistency validity refers to the correlation between the test dimensions and the overall score. All correlations were statistically significant at either the 0.05 or 0.01 levels, indicating a high level of internal consistency for the scale.

Variable	Total Score	Sounds	End of Word	Middle of Word	Beginning of Word
Pearson Correlation	1.000**	1.000**	1.000**	1.000**	1.000**
Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000
Sample Size	40	40	40	40	40

2. Reliability

A. Kuder-Richardson Formula (KR-20) for Total and Sub-Dimensions

Subscale	Number of Items	KR-20 Coefficient
Total Test	112	0.928
Sounds	28	0.704
Beginning of Word	28	0.704
Middle of Word	28	0.704
End of Word	28	0.704

As shown in Table (3), the reliability coefficients using the KR-20 method ranged from 0.704 to 0.928, which are very acceptable values, indicating that the test has high reliability.

B. Split-Half Method

In this method, the test was divided into two equal halves. Each participant received two scores—one for each half. Then, Pearson's correlation coefficient was calculated between the two halves (Maamriya, 2007, p. 176). After that, test length was adjusted using the Spearman-Brown or Guttman formula, depending on variance and alpha between the halves.

Subscale	Number of Items	Pearson Correlation	Spearman-Brown Coefficient
Total Test	112	1.00	1.00
Sounds	28	0.57	0.72
Beginning of Word	28	0.57	0.72
Middle of Word	28	0.57	0.72
End of Word	28	0.57	0.72

As shown in Table (4), the split-half reliability coefficients ranged between 0.57 and 1.00, and after adjusting for test length using the Spearman-Brown formula, the values improved to between 0.72 and 1.00, which are very acceptable and confirm the high reliability of the test.

12. DISCUSSION AND ANALYSIS OF RESULTS:

After completing the steps for constructing the aforementioned test, we now proceed to analyze, discuss, and interpret the results. Through the procedures for calculating the validity and reliability coefficients, we aimed to ensure that the

test items match the intended objective and adequately cover the trait being measured. Based on this, we confirm that the constructed test for assessing articulation disorders has reliable and acceptable psychometric properties, making it suitable for use by researchers, students, and specialists.

We noticed some recurring errors during the application of the test:

- After analyzing the participants' errors, we found that most of them were due to sound distortion, sound substitution (replacing one sound with another), or complete omission of the sound.
- We found 6 cases with normal articulation despite having minor dental deformities.

- As for two cases involving cleft lip and palate (surgically treated), and one case with tooth erosion, they had severe articulation issues, with the number of distorted sounds ranging from 8 to 14.

- In other cases, existing dental deformities relatively affected the pronunciation of alphabetic sounds.
- The most commonly substituted letters were:

(k) substituted with (t)

(dˁ) substituted with (d)

(q) substituted with (tˁ)

(s) substituted with (ϴ)

(r) substituted with (l)

CONCLUSION:

The aim of this study was to construct a test for assessing articulation disorders in children, given that it is one of the most important components of oral language that speech-language specialists focus on during assessment and treatment. Therefore, it was essential to provide measurement tools with psychometric properties adapted to the local context.

This test is designed for children aged 6 years and aims to assess pronunciation. By adopting a descriptive methodology appropriate to the study's goals, we collected data related to articulation skills in children within the targeted age group.

After designing the test as a tool for analysis and assessment, which allowed us to numerically analyze articulation skills, we studied the psychometric properties of the test to verify its applicability. In terms of validity, we relied on face validity (after presenting the items to experts) and discriminant validity, as well as internal consistency. For reliability, we used Cronbach's alpha for the total score and subscales, and the split-half method to calculate the reliability coefficient.

STUDY RECOMMENDATIONS:

To conclude, the test constructed for evaluating articulation disorders, after considering the essential stages of test construction, can be used to assess pronunciation. We recommend the following at the end of this article:

- The need to standardize this test on a larger sample of children to determine the normative scores.
- Encouraging further research in constructing, adapting, and standardizing tests within the field and publishing them.

REFERENCES:

Aida Naji (2013). Some studies in language, speech, and communication disorders research. "Journal of Human Resource Development", Algeria, Vol. 8, Issue 2, University of Setif 2, pp. 264–294.

Marwa Adel El-Sayed (2016). "Strategies for Diagnosing and Treating Speech and Language Disorders", 1st ed., Egypt: Modern Library for Publishing and Distribution.

Hamdi Ali Farmawi (2011). "Language Processing and Speech Disorders", Cairo: Angelo Library.

Abdel Moneim Ahmed El-Dardiri (2022). "Speech Disorder and Communication Deficiencies Assessment Scale in English Among Preparatory Stage Students", Egypt: Journal of Qena University, Issue 43, April, p. 127.

Nuran Ahmed Taha, Mohamed Helil, Noura El-Ramady, and Mohamed Abdel Aal El-Sheikh (2022). "Psychometric Properties of the Illustrated Speech Disorder Scale Among Lower Secondary Education Students", Egypt: Fayoum University Journal of Educational and Psychological Sciences, Vol. 16, Issue 10, December, p. 213.

Amal Abdel Sami Abaza (2003). "Communication Disorders and Their Treatment", Cairo: Anglo Egyptian Library.

Ihab El-Beblawy and Ashraf Mohamed Abdel Hamid (2014). "Effectiveness of Phonological Awareness Training in Reducing Some Speech Disorders in Children with Cochlear Implants", Egypt: Journal of Special Education, Zagazig University, Vol. 1, Issue 8, p. 38.

Ibrahim Abdullah Faraj Al-Zureikat (2012). "Speech and Language Disorders: Diagnosis and Treatment", Amman, Jordan: Dar Al-Fikr for Publishing and Distribution.

Abdel Rahman Ibrahim and Mansour Mohamed (2008). "Speech Disorders in Children: A Guide for Families and Teachers", Saudi Arabia: King Fahd National Library Publishing.

Maamriya Bashir (2007). "Psychological Measurement and Its Design Tools for Students and Researchers", 2nd ed., Algeria: Al-Heber Publications.

Adi Dalila and Bara Sid Ahmed (2018). "The Importance of Language Tests in Assessing Oral Language", Algeria: Journal of Social Sciences, Mostaganem, Vol. 4, Issue 7, pp. 155–162.

Tomic, G., Stojanović, M., & Pavlovic, A. (2009). "Speech and language disorders secondary to diffuse subcortical vascular lesions: Neurolinguistic and acoustic analysis. A case report". Journal of the Neurological Sciences.

Keegstra, A., Post, W., & Brouwer, S. (2010). "The discrepancy hypothesis in children with language disorders: It works". International Journal of Pediatric Otorhinolaryngology, 74(2), 184.