Analysis on Morphological Characteristics of Tamil Young Individuals with Down's Syndrome: Study Based in Ozanam Center for Special Needs, Batticaloa.

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ABSTRACT

Down syndrome is a genetic condition resulting from the presence of an extra chromosome 21, which can generate several health problems during the development of the subject. One of these changes is the delay in language development and cognition in the child, who presents a greater deficit in expressive language than in comprehension. This study aims to analyze the morphological characteristics and communication development in Down syndrome among Tamil speaking individuals. In this study, the approach is suggested as a teaching methodology which is Mirror Teaching technique. A total of 30 population of young Downs' syndromes were selected and analyzed. After this initial analysis, it was identified that more than half of this population made basic errors in their language production and acquisition because of inefficient morphological condition, and this was integrally analyzed. It was found that there is a consensus regarding the presence of a deficit in language development in children with Down syndrome compared to the process of children with typical development. The suggested teaching method was applied for the selected individuals and the improvement of Tamil morphological context was observed. The successful results were obtained, that the mirror teaching technique stimulated and increased their expressive language skills especially, the morphological abilities.

Keywords: Language, Expressive language, Language Acquisition, Language Development, Down syndrome, Morphological abilities.

INTRODUCTION

Down syndrome is the most common known cause of intellectual disability and occurs in approximately 1 in 700 births worldwide. Down syndrome is caused when there is an extra chromosome. People with Down syndrome consists of 47 chromosomes in their cells instead of 46. They have got an extra chromosome on 21st align, which is why Down syndrome is also sometimes known as trisomy 21. Down syndrome is not a new condition. People with Down syndrome have been recorded throughout history. Language skills of children with Down syndrome are more severely affected than their nonverbal cognition. Expressive language skills are poorer than receptive ones, especially a perfect morphological acquisition among them tends to be considerably delayed. Moreover, children with Down syndrome tend to make more grammatical errors than typically developing children.

The purpose of this study is to examine the morphological abilities of children with Down syndrome and to identify an effective technique for their future betterment. Linguists and language acquisition researchers identified a number of indices to access language development in mentally retarded children, such as length and the grammatical complexity words children utter. This study suggests a technique for practical educational implication for the individuals with Down syndrome.

Background and Justification

This research has been a close look of the morphological characteristics of Tamil individuals with Down syndrome. Background of the study informs the general view of the introduction, current status and morphological development of young individuals with Down syndrome (DS) in Ozanam center, Batticaloa.

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Despite considerable individual variability, individuals with Down syndrome have a characteristic profile of language and communication strengths and difficulties. Receptive language is typically stronger than expressive language, with phonology, morphology, and some aspects of language presenting particular developmental challenges (Martin et al., 2009).

Several studies on the acquisition of grammatical morphemes in children with Down syndrome found differences when comparing to children with normal development. Children with DS use to produce less grammatical morphemes. These children tend to have peculiar difficulty in properly using morphemes, such as tense and linking words (or connectors), which are often omitted or used in a wrong way.(Eigsti, I.-M., L. Bennetto, and M.B. Dadlani,2007)

During early language development, these children commonly use specific nouns more frequently than closed class words (like auxiliary verbs, conjunctions, determinants, prepositions, and pronouns). In fact, they have difficulties in using prepositions, avoiding them and using a few pronouns. Also the development of structural aspects of the language was also under serious limitations in the social usage of structures. (Seung, H.K., 2007.)

The delay in this area is reflected in an atypical developmental pathway, slower and less complex, with difficulties with word endings, change in the order of words in the sentence, fixation on certain sentence structures, use of short and simple structures, as well as the omission of grammatical elements (such as prepositions and conjunctions) Children with DS have difficulties in evolving from the combination of words into the construction of structured sentences and tend to use a more restricted set of syntactic structures, mainly simple, that is, they tend to rigidly depend on a particular word formation, even though they are able to employ greater variety in speech.

Problem Statement

This study aims to assess the morphological abilities of children with Down syndrome and to propose feasible techniques that can enhance their language perception and acquisition. Morphological development plays a crucial role in language proficiency; however, children with Down syndrome often experience significant challenges in this area, particularly in relation to their mother tongue.

In order to achieve the main objective of this study, the following research questions are addressed:

- How can this study contribute to the improvement of morphological abilities in children with Down syndrome?
- What barriers do children with Down syndrome face in developing morphological skills in their mother tongue?
- What types of remedial morphological interventions can be effectively applied to support their language development?

This research is conducted with careful consideration of the above problem statement and seeks to provide meaningful insights and practical strategies to address these challenges, ultimately contributing to improved language outcomes for children with Down syndrome.

Research Objectives

The current study is focused on following objectives in order to understand the morphological behavior of the children with Down syndrome and other associated challenges and inabilities which are affected their efficacy in their basic language production.

General Objective

- To assess the morphological abilities of children with Down syndrome and to identify effective strategies to enhance their language acquisition, particularly in relation to their mother tongue.

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Specific Objectives

- To examine the current level of morphological skills among children with Down syndrome.
- To identify the key barriers that affect the development of morphological abilities in their mother tongue.
- To analyze the relationship between morphological competence and overall language development in children with Down syndrome.
- To explore suitable remedial techniques and interventions that can improve morphological skills.

REVIEW OF LITERATURE

Several literature reviews were conducted to contribute the conceptualization and characteristics of Down syndrome and assessed the morphological model of the individuals with Down syndrome and finally, presents the key aspects of the literature review that makes the connections with the current study

Etiology of Down syndrome

Human bodies are made up of millions of cells. In each cell there are 46 chromosomes. The DNA in our chromosomes determines how we develop. They have got an extra chromosome on 21st align, which is why Down syndrome is also sometimes known as trisomy 21(Patterson, 2010).

This disorder is caused because there is an extra copy of the chromosome 21, that is, individuals with DS have 47 chromosomes instead of the 46 presented in any human body. Within this condition, there are three different categories of Down syndrome (Ndss.org 2017a4):

This research describes the specific pattern and characteristics of morphological abilities among the individuals with Down syndrome in terms of speech production as well as the relationship between morphological and cognitive skills. Currently, Down syndrome is the most prevalent known cause of intellectual disability. It is emphasized that this is not a disease, but that like all syndrome has a set of signs and symptoms, intellectual disability being the only universal symptom (Leyfer et al., 2006). In this sense, they show troubles in the perceptual cognitive and psychological level, communication level, psychomotor level and personal autonomy level, most individuals with Down syndrome have mental retardation, speech and language deficits, particularly in language production, syntax and poor speech intelligibility. This research describes language development in individuals with Down syndrome across four domains: especially morphology and phonology.

Linguistic Stage of Children with Down syndrome

Of the many deficits observed in children with Down syndrome, the greatest detriment is apparent in language development. As language bridges most people together through communication, language delays may have damaging effects on future abilities such as independent living and complete acceptance into their immediate environment (Abbeduto et al., 2007). Kumin (1998) however, argues that speech and language characteristics are not unique to children with Down syndrome, as similar delays are displayed in typically developing children. A variety of language difficulties are present among children with Down syndrome, but Kumin (1998) believes that children with Down syndrome do not present with consistent speech and language characteristics. Roberts et al. (2007) dispute findings by Kumin (1998), as they explain several patterns of language development typically observed in children with Down syndrome start with deficits in phonology. Martin et al. (2009) agree with Roberts et al. (2007), as they report the commonality of deficits in children with Down syndrome does exist; specifically, they found that it is typical for these children to have lower speech intelligibility than nonverbal mental aged matched typically developing peers. In addition to phonological deficits, Martin et al. (2009) reported expressive vocabulary, syntax (expressive & receptive) and pragmatic characteristics to be a deficit amongst the Down syndrome population. Children with Down syndrome begin to demonstrate phonological deficits when transitioning from babbling to speaking their first word, which occurs around 21 months of age (Abbeduto et al., 2007), evidenced by a slower elimination time of phonological processes such as the deletion of final consonants on words. According to Roberts et al. (2007) speech intelligibility affected by

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phonological factors is a lifelong challenge for those with Down syndrome. The exact etiology is not as explicit, as it may be due to several factors including sound error patterns, reduction of word shapes, apraxia of speech, dysarthria, rate of speech, improper stress placement and voice quality. Martin et al. (2009) support this as they report that speech intelligibility may be affected by voice quality, apraxia of speech, and dysarthria. Decreased speech intelligibility not only creates communication barriers between individuals, it may also negatively affect the development of appropriate language skills (Martin et al., 2009). Abbeduto et al. (2007) believe delays in early vocabulary development manifest from general cognitive delays, since their first word appears at the same mental age as typically developing children. Receptive vocabulary observed in children with Down syndrome appears to be consistent with typically developing children, although some research appears to contradict this belief with evidence of delays in this area (Abbeduto et al., 2007). Martin et al. (2009) also found contradictions in research regarding receptive vocabulary skills in children with Down syndrome; however, their reports described several studies suggesting that children with Down syndrome can understand spoken language in the same manner as their mental aged matched typically developing peers.

Morphological skills of children with Down syndrome

John Starbuck, Roger H. Reeves and et-al said that morphological integration, a method of analysis that has not previously been used to investigate developmental aspects of the DS facial phenotype. Morphological integration, evaluated by statistical correlation or co-variation among phenotypic traits, refers to the relationships among morphological elements (Olson and Miller, 1958; Cheverud, 1996). Analyses of morphological integration are useful for demarcating subsets of phenotypic traits that strongly covary, which can occur due to shared function and/or developmental origin(Starbuck et al., 2011). In this research compared patterns of morphological integration of facial dimensions in individuals with DS and siblings of individuals with DS to reveal patterns underlying developmental associations among different parts of the face. From this study, the important of morphology in language development of children with Down syndrome was realized.

Children with DS display specific problems when it comes to controlling morphological elements. In the Phrase Repetition Test, used to evaluate the children's ability in the morphological and syntactic aspects of production, the children with DS repeated a smaller number of phrases than normal children, and made far more mistakes in all the verbal categories investigated(Vicari et al., 2000). Therefore, according to this study morphological skills of children with Down syndrome a in Ozanam home was deeply analyzed.

First Language Cognitive and Linguistic Profile of DS

Regarding Down syndrome’s cognitive profile, it is important to mentioning that in these individuals working memory is affected due to their genetic disability. The work by Jarrold & Baddeley (2001) will serve as a basis for a detailed clarification of working memory in DS individuals.

First, the average number of items to retain in memory is 7, although this number is even lower for people with DS. However, it is important to consider that memory can be of different types, that is, there is also visual memory in which “the individuals’ visual-spatial short-term memory is relatively unimpaired, in contrast to their verbal short-term memory performance” (Jarrold & Baddeley 2001: 18). Potential clarifications about their poor performance in short-memory may be because of their physical weaknesses, that is, hearing loss and discourse explanation issues. In this vein, memory is a fundamental workforce for language learning, consequently this idea needs to be considered when showing DS understudies. Additionally, the functioning memory length can contrast among DS individuals, as there are cases revealed of people with a higher range than others. As has been referenced previously, DS people experience a few challenges in gaining their first language because of their disability.

Firstly, the study by Rondal (1995) will be taken as the core work in order to outline the linguistic profile of individuals with Down syndrome due to the work’s exhaustive description. Taking phonology and the production of sounds, toddlers with

Down syndrome start babbling at the same stage as any other child, but there are delays when DS infants begin to talk (Chapman 1997). The speech difficulties that Down syndrome infants encounter are due to the physiognomy of their speech organs.

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Moreover, the knowledge of the way sounds are pronounced affects the skill of reading, which is named as phonological awareness. In this respect, individual differences have been seen in DS learners "although the majority of children with Down syndrome performed poorly on tasks of phonological awareness, some children demonstrated perfect scores" (Fletcher & Buckley 2002: 12).

In relation to the reading skill, it has been stated that reading comprehension is less affected in Down syndrome people. However, it is suggested that they employ other strategies for reading as they find it complex to use an alphabetic reading strategy. In turn, they seem, first, to rely on a logographic strategy and, then, an alphabetic and orthographic one (Fletcher & Buckley 2002: 11). Despite this, the benefits of reading in these children have ranged from an improvement of spelling competence to make them aware of the sounds of phonemes. Thus, this might suggest that phonological awareness remains in a close relationship with reading.

In line with reading, DS individuals have problems in mastering syntax and grammar in the first and last stages of acquisition. As Rondal (1995) claimed, their sentences are short and simple because, generally, neither verb tenses nor verb inflection appear to be right, leading to grammatical errors. According to Rondal (1995: 9), "there was less than one article per utterance and slightly over one inflection marking gender or number on the noun phrase in two utterances"7. Many researchers on the issue claim that DS communication reminds of a telegraphic message (Rondal 1995; Buckley 2002).

Lastly, vocabulary acquisition in DS people has been regarded as a strength due to the positive results of this kind of skill. Apparently, these students are very competent in the comprehension of the lexicon whereas production is likely to be delayed (Rondal 1995). However, Chapman (1997) highlights the similarity of vocabulary production among DS and typical developing children. Many critics on the issue identify that Down syndrome children perform better in closed-class vocabulary - pronouns, determiners, prepositions and so on - than open-class vocabulary - nouns, adjectives, adverbs, or verbs. It is necessary to comment that verbs have a particular characteristic in this disorder, as "individuals with DS may have difficulties accessing rather than comprehending verbs, despite being able to access event contexts and roles associated with the verb" (Loveall et al. 2016: 162). Despite the controversy and disagreement about verb development, it might be observed that the learning of nouns and other open-class vocabulary might be easier than verbs.

In order to strengthen these language abilities, many professionals have encouraged involving DS students in intervention programmes. These interventions, for instance, Chapman (1997: 310) claims, "support for hearing initiation of communicative requesting, and sufficient amount of input tuned to the child's level". As a consequence, the DS student will face a positive language improvement and will benefit from this programme. In the research by Burgoyne et al. (2016), the evidence of the effectiveness of intervention is of great matter and students showed positive outcomes in receptive language skills.

Sri Lankan Special Education Policies for Mental Retarders

The Department of Education and Skills (DES) accommodates the schooling of kids with a specialized curriculum needs through various help systems relying upon the kid's assed inability. A kid with uncommon education necessities will be taught in a comprehensive environment with children who don't have such requirements except if the nature or level of those requirements of the kid is to such an extent that to do as such would be inconsistent with (education/Circulars-and-Forms/Active-Circulars/cl0030_2020):

- The best interests of the child as determined in accordance with any assessment carried out under this Act
- The effective provision of education for children with whom the child is to be educated."

In general, educational provision for children with special needs is made In special schools;

The nature and level of the educational response is based on the child's professionally-assessed disability. The Department's policy is to achieve as much integration as possible, as envisaged in Section 2 of the EPSEN Act. Where placement in an integrated setting is considered to be the appropriate response, provision will normally take the form of resource teaching or special needs assistant support, or both, depending on the pupil's assessed level of need.

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Kids with more serious degrees of inability may require position in an uncommon school or exceptional class joined to a standard elementary school. Each such office is devoted to a specific incapacity bunch and each works at an exceptionally decreased understudy educator proportion. Understudies going to these offices draw in uncommon paces of capitation subsidizing and are qualified for benefit of the exceptional school transport administration and the school transport escort administration. (education/Circulars-and-Forms/Active-Circulars/cl0030_2020)

Correlative Analysis of research

Most of the researchers have done the study on semantics in two ways both semantic processing in receptive language and semantic processing in expressive language. Georgia Andreou and et al. did a study on this area and they had collected some information from both children with Down syndrome and ordinary children, and they had assessed some statistical analysis too, despite they did not suggest any feasible methods in terms of improving the semantics skills of children with Down syndrome. In this study as we discussed earlier, a valuable method is suggested in order to improve the morphological skills of the children in Ozanam home. Further when considering the children are fostering in Ozanam home, they are not only having inabilities in morphology but also they have problematic issues in other aspect of linguistics as well.

In most of the past researches, they obtained the data from children with Down syndrome and analyzed the data, finally they came to their conclusions, amongst only few researches suggested some methodology to improve the linguistic deficiencies of children with Down syndrome. In this study, then those data was analyzed and some conclusions was derived from statistical analytics. Based on those analytic conclusions some valuable solutions are suggested in order to alleviate the deficiency of children with down syndrome.

METHODOLOGY

This study adopts a qualitative research design with supportive quantitative elements to assess the morphological abilities of children with Down syndrome. The design allows for an in-depth understanding of linguistic challenges and the effectiveness of remedial interventions. At the end of the research discussion and suggestions were made to prove whether the research has achieved the expected goal of objective or not.

Data Collection Method

Data were collected during 5 weeks with two questionnaires: pre-questionnaire and post questionnaire. The sessions focused on the ability of their basic language acquisitions, especially words and sentences related to their environment and daily life. As mentioned before, the class was divided according to their age groups, so each group covered different types of activities. Several methods were used to gather the data from DS children. Questionnaires, interviews and some observation tasks were given to check the morphological ability of those children. Conclusion was made according to the result of given tasks and which led the application of suggested technique of this study.

Table 5.1 Details of children with Down syndrome who are in Ozanam home

Total Number of children in Ozanam Home	30
Children with Down syndrome	24

Sampling Technique

A **purposive sampling method** is used to select participants who meet the criteria of having Down syndrome and basic exposure to their mother tongue. This approach ensures that the sample is relevant to the research objectives.

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Data Collection Methods

Data are collected using multiple methods to ensure reliability and depth:

Children with Down syndrome show an uneven profile when learning to talk. There are four components to develop when learning to talk, communication, learning vocabulary, learning grammar and developing clear speech. As this study restricted into morphological skills, the main focus was given in their differentiation in singular plural nouns and in basic tenses. Children with Down syndrome usually want to communicate and persist in getting their message across using words and signs. They are slower to develop their vocabulary but continue to do so steadily so that by teenage years their vocabulary progress is ahead of their grammar progress. Most children with Down syndrome struggle to develop clear speech production.

Table 5.2 Data collected from the children with Down syndrome who are in Ozanam home

Tasks	**Number of children participated**	**NC**	**NF**
Receptive Vocabulary task	24	18	06
Words picture matching task	24	21	03
Words description task	24	16	08
Lengthy utterance task	24	11	13
pragmatics skills checking task	24	10	14

Ethical Considerations

- **Informed Consent**: Permission is obtained from parents or legal guardians before involving children in the study. Participants are informed about the purpose and procedures of the research.
- **Confidentiality**: The identities of participants are kept strictly confidential. Pseudonyms or codes are used in reporting data.
- **Voluntary Participation**: Participation is entirely voluntary, and participants have the right to withdraw from the study at any time without any negative consequences.
- **Protection from Harm**: The study ensures that no physical or psychological harm is caused to the children. Activities are designed to be safe, engaging, and appropriate for their developmental level.
- **Respect and Dignity**: All participants are treated with respect, dignity, and sensitivity, especially considering their special needs.
- **Approval**: Necessary approval is obtained from relevant institutional authorities before conducting the research.

RESULTS AND DISCUSSION

This chapter presents the analysis and interpretation of the data collected to assess the morphological abilities of children with Down syndrome. The data were gathered through questionnaires, observational tasks, and language-based activities conducted over a period of five weeks. The analysis focuses on identifying patterns in morphological performance, highlighting key challenges, and evaluating the effectiveness of the implemented remedial techniques.

Analysis of Pre-Assessment Data

The pre-assessment was conducted to evaluate the initial morphological abilities of the children. The results indicated that most children demonstrated limited control over basic morphological structures, particularly in the use of plural forms and tense markers.

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Children showed relatively better performance in receptive vocabulary tasks, suggesting that they could understand words more effectively than they could produce them. However, difficulties were observed in tasks requiring expressive language, such as word description and lengthy utterances.

Task-Based Performance Analysis

The following table summarizes the performance of children across different tasks:

Table 6.1: Performance Analysis of Morphological Tasks

Tasks	**Number of Children Participated**	**NC**	**NF**
Receptive Vocabulary Task	24	18	06
Word–Picture Matching Task	24	21	03
Word Description Task	24	16	08
Lengthy Utterance Task	24	11	13
Pragmatic Skills Checking Task	24	10	14

NC: Number of children who completed the task successfully.

NF: Number of children who failed to complete the task.

Receptive Vocabulary Task

A majority of the children (18 out of 24) successfully completed this task. This indicates that children with Down syndrome possess relatively stronger receptive language skills. They were able to recognize and understand familiar words, especially those related to their daily environment.

Word–Picture Matching Task

This task showed the highest success rate (21 children). The use of visual aids appeared to significantly support comprehension. This suggests that visual-based learning strategies are highly effective for children with Down syndrome.

Word Description Task

Only 16 children successfully completed this task, indicating moderate difficulty. This task required expressive language skills, which are generally weaker in children with Down syndrome. Many children struggled to form correct morphological structures while describing objects.

Lengthy Utterance Task

This task presented significant challenges, with only 11 children completing it successfully. Most children had difficulty constructing longer sentences and applying appropriate grammatical markers such as tense and plurality.

Pragmatic Skills Checking Task

This was the most challenging task, with only 10 children demonstrating successful performance. The results indicate that children faced difficulties in using language appropriately in social contexts, which involves both morphological and pragmatic competence.

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Identification of Barriers in Morphological Development

Based on the analysis, several key barriers affecting morphological development were identified:

- Limited grammatical understanding, especially in tense and pluralization
- Difficulty in expressive language production
- Delayed speech clarity and articulation issues
- Dependence on visual cues for comprehension
- Reduced ability to construct complex or lengthy sentences

These barriers confirm that while children with Down syndrome may have relatively strong receptive abilities, their expressive and grammatical skills require targeted support.

DISCUSSION

The results of each section have led to answer the research questions provided in the introduction. Consequently, it has been seen that the use of visual cues helped the students to learn the contents and, also, facilitated the completion of some exercises such as in picture descriptions, spontaneous conversations, sentence manipulations and judgment tasks. Moreover, it seemed that the use of their mother tongue in class and in the development of the exercises was a beneficial teaching technique. It helped the students to comprehend better the meaning of the terms and expressions. As seen in the post-questionnaire and directly observed from the students, the reason for activities that motivated them was the use of mirror teaching method. The activity that promoted the word constructions in a favorable way and not only motivated during learning period but also paved the way for different learning environment, which resulted in a good teaching strategy.

In addition, the three research hypotheses have been confirmed by the investigation's findings, namely:

(1) DS students can grasp and clear their language profile if there is an effective methodology approach and the teaching practice is adapted to their abilities;

(2) DS students will be more motivated to learn language if their preferences are considered in the design and plan of the class; and

(3) Different kind of activities that involve trying out identities with the suggested teaching approach (mirror method) will have a positive effect on content learning.

In this aspect, this study analyzed the morphological ability (receptive and expressive) of the children with Down syndrome at Ozanam Center was by using the real world strategy and it was found that the semantic area of language is a district of deficiency in children with DS. The findings are in accordance with those of different examinations which demonstrated that vocabulary securing and expression are defenseless in this particular populace(syndrome & 1988, n.d.). Besides, these outcomes strengthen past discoveries distinguishing shortcomings in expressive language capacity contrasted with receptive in DS(Boudreau & Chapman, 2000). Findings and result also show that the expressive language skills are very low than receptive language skills of the children with Down syndrome who are in Ozanam home.

The individuals with Down syndrome who are severely unintelligible, initial treatment targets may include more functional vocabulary, such as words for basic needs and names of family members (Martin et al., 2009). For specific strategies for improving speech production skills(Howse et al., 2006). Target more complex language given that many individuals with Down syndrome have deficits in expressive skills (sentence manipulation, spontaneous conversations and judgments) were likely to be a focus of intervention. In fact, Chapman et al. (2002) argue that intervention goals should continue to address expressive syntax in adolescents and young adults with Down syndrome because this area continues to develop into adulthood.

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Late discoveries have indicated that children with DS experience a bigger number of troubles in the expressive territory instead of the receptive one, contrasted and regularly creating kids(Martin et al., 2009). The findings of this study arose in accordance with these investigations, since kids with DS in this study accomplished low scores in every morphological tasks, made more mistakes in the expressive task.

Spontaneous conversation task was one of the techniques for helping kids to get progressive complex linguistic skills. In this methodology, the expression of the child was reshaped by the correspondence accomplice (clinician, instructor, or relative) to incorporate extra linguistic data. For instance, if a child says "doggy sleep," the correspondence accomplice could expand "the doggy is sleeping."(Camarata et al., 2006). It is additionally conceivable to help kids in explaining their linguistic structure by remarking on their thoughts and communicating enthusiasm for how their thoughts fit together while they are taking part in narrating by utilizing communicated in or composed language(*(Nelson, Roth, and Van Meter, 2009) - Google Scholar*, n.d.).

Some other techniques suggested by researchers to improve the expressive language skills such as, Individuals with Down syndrome may be taught to request clarification through the use of barrier games, in which the clinician intentionally gives unclear messages in order to create opportunities for the child to request clarification(*(Nelson, Roth, and Van Meter, 2009) - Google Scholar*, n.d.).

The above mentioned methodology (mirror technique) was taken as an effective technique and was applied to improve the expressive knowledge, particularly the morphological skills of the children with Down syndrome, while they learn they need to stand in front of a big mirror, the teacher will teach them and the child will observe teachers' body language, mouth motion, face expression & etc. when they get their chance they will try to imitate what they observed from the teachers. The teacher can utter the words and sentences with proper mouth motion, so the children can follow the teacher. A big mirror was deployed and then the suggested technique was practiced continuously at Ozanam home. The technique was identified as partly an effective method because the children who in Ozanam center were very poor in their basic language skills and a long duration and continuous practice are needed to their language improvement. However a minor improvement on expressive language skills has been observed especially in morphological part.

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

This study has aimed at investigating morphological ability of children with Down syndrome. More specifically, the aims of the investigation were threefold:

(1) To examine the morphological characteristics of the children with Down syndrome.

(2) To develop a technique and a methodology for those individuals to overcome the morphological challenges.

(3) To provide teachers with some resources and teaching techniques to the morphological development of the individuals with Down syndrome - recommendation

In order to reach these objectives, a series of materials have been designed and adapted following the counselling and learning profile of DS students (Buckley 1993; Rondal 1995; Chapman 1997; DSAWM 2010; Polišenská & Kapalková 2014). As seen in the previous section, the analysis and results of the resources employed seem to confirm the stated hypotheses. They also provide the answers to the established research questions, which will be repeated here for the sake of clarity:

However, this dissertation encountered some limitations mainly regarding the search of institution for Down syndrome children that was willing to implement 5 sessions of activities directed to Down syndrome students. Besides, it must be emphasised that further research in this field needs to be done. First, it should be considered that a longitudinal study on students with Down syndrome and the learning of proper mother tongue is required. Secondly and closely linked to the prior, an investigation that proposes the elaboration of a specific methodology (Mirror teaching method) taking into consideration DS students' characteristics, needs and likes would be essential for their language development.

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Finally, the outline, design and application of some other new and effective methodology for language acquisition are also required to those Down syndrome children. Overall, the outcome of this dissertation strongly believes that people with Down syndrome are capable of good language learning, and only if, their learning needs are considered in the creation of the lesson.

Several works have been done based on the children with Down syndrome in different manner, the topic is vast and notwithstanding significant individual fluctuation, the language and correspondence qualities of individuals with Down syndrome pursue a typical profile. Receptive language is regularly more grounded than expressive language and vocabulary is more grounded than linguistic structure. Solid proof recommends that phonology, expressive vocabulary, receptive and expressive skills can be developed through suggested method. In particular, syllable structure phonological procedures, for example, bunch decrease and last consonant cancellation, have all the earmarks of being regular in kids with Down syndrome.

To implement the proposed technique, a big mirror was fixed in the class room to allow the students to stand in front of a big mirror. While they learn, the teacher guide the children to observe teachers' body language, mouth motion, face expression & etc. and then they will try to imitate what they observed from the teachers. A comparison has been done to check the effectiveness from their traditional teaching method and it was found that the mirror teaching technique is an effective methodology if they get regular practice, as it was observed that the mirror teaching technique was stimulated and increased their ability of expressive skills. The utterance of sounds is realized in front of a mirror by the DS children, and they managed to utter back correctly. They adapted the skills of imitating and decoding the significance of different gestures, there were used games which combine the mimicry and gesture. The gestural expressions were outlined very well, which led to accomplish this study in a pleasurable way. The scientific study on the suggested technique was not conducted, and it is planned to be carryout in future.

Recommendations and Limitations

As a result of the conclusions reached above, there are a number of areas which need further research in the field of acquisition of forms in languages which are typologically different from the language acquisition of normal children.

Further studies in the area of language acquisition of DS children would shed more light on appropriate measures of levels of development. The number or types of different morphemes which need to be learned in order to claim that a learner has reached particular milestones needs to be determined by examining the language pattern of many more DS learners.

Further research into the teaching of language needs to be conducted. For example, the effect of using a syllabus based on the order of appearance of morphemes in their language could be tested. In addition, there seems to be a need to introduce a more communicative way of teaching so that learners practice oral skills and actually use their inter language to perform useful communicative functions (see also Duvené de Wit & Ntuli 1994).

Further number of other issues related to Down syndrome were referred in order to understand the research problem that was investigated in the current study. Some of those issues need to be investigated in greater depths as they are closely connected to the language efficacy of the mentally retarded children.

In this sense, recent advances in sensor research and innovation have boosted the prospects of the use of these technologies for assisting people with disabilities. Sensors are used for many different purposes in regards to disabled people. Monitoring and alarm systems can ameliorate the adverse effects of unpredictable events, such as sudden illness, falls, or wandering. Pressure sensors have been employed in robotics for the treatment of children with DS. IMUs and laser systems have been used in building a virtual cane for the blind. In sort, the use of sensors can improve the quality of life of people with disabilities, as well as promoting their independence.

This Special Issue invites contributions on the following topics (but is not limited to them):

- Sensors in health monitoring
- Sensors in rehabilitation

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- Indoor navigation aid
- Real time tracking of disabled people
- Home Medical Assistance
- Privacy, safety or standardization issues

Children with Down syndrome need much more practice to acquire new skills and ICT can provide as many opportunities as necessary to repeat the same objective in exactly the same way. So specialized software can help them in self-paced learning. The child is able to respond without prompting them before they have had time to fully process the information and construct their response. This study has contributed to the understanding of students' values reflected in their language use in a blended learning environment. As the study progressed, above mentioned areas surfaced as suggested areas which technologically connected for future studies.

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