CHAPTER 1

Introduction

1 - 1 introduction

Literacy is an important facet of every human being's life. Most individuals with Down syndrome, the most common chromosomal disorder in the world and cause of intellectual disability, experience difficulty with reading and writing.

Reading is a basic skill which should continue to be taught to older students with Down syndrome, and not discontinue reading instruction once they reach early adult years. They need that skill to take an active part in society.

This research is an experimental work that tries to find the effectiveness of the proposed program, derived from the Montessori Phonic Approach (Britton-Joffick, 2000), to teach teenagers with Down syndrome (henceforth DS) reading skills. It is done at a special school (Al Rajaa) in Damascus (Syria), at which an experimental group of teenagers with DS (5 girls and 5 boys) attended lessons to obtain reading skills through this program. A control group was set for the research from another special school (Haza Bayti), consisting 5 teenage girls and 4 teenage boys all with DS as well. The implementation of the program lasted for 10 weeks

(March, 1st-May 18th), and was designed and carried out by the researcher.

The research tries to employ the Montessori Phonic Approach placing emphasis on the' Bottom Up' method for teaching reading: reading lessons will start from teaching the letter-sound relationships and gradually building up to the phoneme/grapheme association. Thus, teenage students with DS will learn to match the sound (phoneme), to the letter (grapheme) and continue the process throughout their road to literacy.

The researcher will try to shed light on some characteristics of individuals with DS, their cognitive development, selected reading acquisition theories and their applicability to teenagers with DS, and the obstacles children with DS encounter during the process of acquiring their reading skills. Among the issues discussed in this research are the lack of phonological awareness and memory impediments in individuals with DS, e.g. setbacks in their phonological awareness and short-term memory. Developing and assisting the latter issue is of utmost importance for future research due to its prominent role for learning a spoken language (Buckley & Bird, 2001).

In recent years, the importance of reading instruction for children and adults with DS has been increasingly recognized. In contrast,

people in Syria still assume that the majority of 'those children' can never read and need not learn to read. Contrary to that view, studies have indicated that due to slowness in development, it is likely that the young person with DS is ready to benefit from formal education at about the time that it is no longer available (Tigney, 1988).

We return to the reading skill which is "one of the highest functions of the human brain-of all the creatures on earth, only people can read" (Doman &Doman, 1994, p. 1) and it is still the basis for learning. A child, who is a skilled reader, i.e. a fluent reader with reading skills of a student's above 5th grade level, could decode more than 29 pseudowords, and comprehend what he reads, will understand in the future the multitude of information and sciences he will encounter in his studies and his life. A 'fluent reader' is also an individual who reads orally with speed, accuracy, and vocal expression, and whose decoding processes are 'automatic' requiring no conscious attention and is more able to deploy his attention selectively, which can facilitate ongoing comprehension and integration of material with prior knowledge (Gibson, 1965).

The Main issue of this research is connected to applied linguistics which is the field that stems studies on reading. It is an interdisciplinary field of study that identifies, investigates, and offers solutions to language-related real life problems. It is "the

academic discipline concerned with the relation of knowledge about language to decision making in the real world." (Cook, 2003, p.5) Some of the academic fields related to applied linguistics are education, linguistics, psychology, anthropology, and sociology. Applied linguistics is the science of language, how people acquire it and how we can teach them better. It is closely related to 'Linguistics' but somehow, there are sound differences because linguistics is the scientific study of natural language with an important topical division between grammar and semantics.

Major branches of applied linguistics include bilingualism and multilingualism, computer-mediated communication, conversation analysis, language assessment, literacy, discourse analysis, language pedagogy, sociolinguistics, second language acquisition, language planning and policies, pragmatics, forensic linguistics, and translation. In his book, Cook clarified that: "Applied linguistics is concerned with the most emotive and most important issues: the education of children, the rights of the disadvantaged, the changing balance of cultures and language, the effects of technology on communication…" (Cook, 2003, p.78) Following parts of that orientation, the researcher tries to draw on some of the academic fields related to applied linguistics; mainly, language and education,

to facilitate teaching individuals with Down syndrome to acquire reading skills.

Language is the most important system which humans have created to communicate, correspond, and to obtain their needs and express their feelings hopes and emotions (Mutlak & Kanaan, 2005). If we presume that a child with DS could obtain his listening and speaking skills from his home environment and his first years of schooling, it would be too unrealistic to expect total success in those two, especially concerning speaking, due to the innate nature of the syndrome which generates obstructions imposed on the child. Later on, this child is left with the two yet more imposing issues: learning reading and writing skills. It is an idea presented expressively by Alvin M. Liberman when he talked about the typically developing individuals' process of obtaining skills of speaking, reading and writing:

> Speech must, of course, be learned, but it need not be taught. For learning to speak, the necessary and sufficient conditions are but two: membership of the human race and exposure to mother tongue. Indeed, given that these two conditions are met, there is scarcely any way that the development of speech can be prevented. Thus learning to speak is a precognitive process, much like learning to perceive visual depth and distance of the location of sound. In contrast reading and writing need to be taught, although given the right ability, motivation and opportunity, some will infer the relation of script to language and thus teach themselves. But however learned, reading- writing is

> an intellectual achievement in a way that learning to speak is not (Gelder, Morais, 1995, p.18).

We can say that it is necessary for individuals with DS to learn language's four skills: listening, speaking, reading and writing. In this context, it is vital to say that there is now little doubt that literacy is within the capability of many in this population and not the exceptional few (Appleton, 2000; Byrne 1997; Fowler, Doherty & Boynton 1994; Farrell 1996; Kay- Raining Bird, Cleave & McConnell 2000; Sheppardson 1994).

To sum things up, this research tries with the help of its phonic program to overcome the impediments teenagers with DS have, and help them obtain or improve their reading skills with the aim of being active individuals in their society.

1 - 2 Problem of the Research

The problem of the research can be explained as follows:

1 - 2 - 1 Sensing the problem

It is a well known fact that the incidence of DS occurs in one out of 660 (some estimations1/1000) births worldwide and affects people of all ethnic and social backgrounds. Because of the rapid population growth in Syria in the last few decades, the population of people with DS is rising as well. (400 000 declared cases of

mentally impaired individuals according to a 2005 Syrian government count, among which, the number of individuals with DS is unknown precisely). Consequently, Syria has experienced rapid social, economic, and cultural changes. As an outcome of that, some of the mentally challenged individuals have experienced the misfortunes of neglect. It is so because many other more urgent problems were pressing on the government to be solved e.g. the unemployment issue, building proper infra-structure, improving higher education, and entering the social economic market.

The researcher observed that when children with DS reach the age of 3 or 4, they attend local mainstream kindergartens. The real problem begins when they go to the elementary school [called Basic Education in Syria] where they face the problem of not catching –up with their typically developing peers. Inclusion is a relatively new concept (the year 2000) in Syria, consequently, the teachers in such classes find a durable time organizing and instructing lessons to special–needs children as well as typically developing ones. Students with DS find it difficult too to follow the curriculum due to their cognitive delays. Thus their problems materialize: they either leave school all together or go to specialized schools that do not take academic teaching very seriously.

The researcher perceived that many teenagers with DS in Syria face a hopeless future regarding their literacy, particularly their reading skills. The majority of them, long before the time they reach their teens, are dropped out of the regular schools to join special-education ones or stay home and live a dreary life; others are placed in organizations for occupational habilitation to learn handy-crafts and manual skill-oriented simple proficiencies to enable them to have a profession just as a past time or as a financial source. The very lucky ones obtain jobs at government or private companies. It is rarely heard that an individual with DS has learned to read [and write] and consequently has made a radical improvement on his or her life.

1 - 2 - 2 Identifying the problem

As a result of those observations, and through the researcher's endurance and familiarity with children, adolescents and young adults with DS, she sensed that the majority of them cannot become skilled at reading, which affects their inclusion in society and the safeguarding of their physical and mental well being. Therefore this research is prepared to undertake that problem: Can we teach reading skills to teenagers with DS, who are already judged as 'done with' learning reading, to improve their place in society?

This research deals with the problem that individuals with DS have: not being able to read. Reading acquisition is not a simple task for them because of the impairments they have in their speech production organs (e.g. the hard palate is highly arched, constricted, and narrow and stair type with malformed misaligned teeth and a large and fissured tongue) (Bhagyalakshmi, Jai Renukarya & Rajangam, 2007). Speaking influences reading as they have a reciprocal bond; when the child is not able to sound the phonemes, morphemes, syllables and words, he will not be able to read them later on. In fact, reading begins with the child's acquisition of spoken language. He learns later to differentiate the graphic symbols from one another and to decode these to familiar speech sounds (Gibson, 1965).

In addition to verbal communication problems, children and teenagers with DS have problems in both short- term memory (Buckley, 2008) and explicit long-term memory (Jarrold, Nadel &Vicari, 2008). Upon testing both, the experimental group and the control group of the research at hand, the researcher noticed that some of the students with DS know almost all the Arabic alphabet (phoneme- grapheme wise and letter names) but when it was needed to read a new word they could not make the connection between its

phonemes and morphemes to articulate it correctly. Thus the research will also try to discover the problem behind that common situation among individuals with DS. In brief, the **problem** of this research can be identified as follows: what is the **effectiveness of** a **phonic method** in **teaching reading skills** for **teenagers** with **DS?**

1-3 The Montessori Phonic Approach as basis for research's program

The reason behind choosing this approach as basis for the research's program is a particular text the researcher has read about a study of Fowler et al.: *The Basis of Reading Skills in Young Adults with Down Syndrome*. The study was done on a group of 33 young adults with DS in the USA. The particular part which the researcher drew on was:

> Given the **important association** between **phoneme awareness** and **reading** in our group, the same instruction should prove helpful here [group with DS] as well. It is important, from the developmental perspective, to note that **phoneme awareness training programs** have been **successful at the kindergarten level**, **<u>yet retain their ability into adulthood</u>**; the programs can vary significantly without loosing their effectiveness. Consistent with this, we were interested to learn that **<u>several of our most successful readers had spent several years beyond the preschool level in Montessori schools; the Montessori program does focus on the structural analysis of the syllable</u>** (Fowler et al., 1994, p.194).

1-3-1 Founder Maria Montessori

Maria Montessori was born in Italy in 1870. She studied medicine and was the first female physician in Italy and graduated as a medical doctor in 1896. Her study to be a doctor and her first jobs made her acquire a strong scientific basis which facilitated for her to invent a new method known as the Montessori Method (Elias, Murtada, Ali, 2004).

In her work at the University of Rome's psychiatric clinic, Dr. Montessori developed an interest in the treatment of children and for several years wrote and spoke on their behalf. At age twenty-eight, she became the director of a school for mentally-disabled children. After two years under her guidance, those children, who formerly had been considered uneducable, took a school examination along with normal children and passed successfully.

1-3-2 The Montessori Philosophy

Stated below are some of the specific elements on which the educational method of the Montessori Philosophy is based, assuming that the teacher has had the most exacting Montessori teacher-training course available. Summarized from:

(www.a child's place Montessori schools.com, (2009), http://www.carlsbadmontessori.com/montessori, (2009),

Multi-aged grouping based on periods of development:

Children are grouped in three-year age spans and have the same teacher for three to six years. There is constant interaction, problem solving, child-to-child teaching, and socialization.

The 3-Hour Work Period: At every age, a minimum of one (3-hours) work period per day, uninterrupted by required attendance at group activities of any kind is required for the Montessori Method of education to produce the results for which it is famous.

The human tendencies:

The practical application of the Montessori method is based on *human tendencies* – which Dr. Montessori studied in detail– tendencies to explore, move, share with a group, to be independent and make decisions, create order, develop self control, abstract ideas from experience, use the creative imagination, work hard, repeat, concentrate, and perfect one's efforts and creations.

The process of learning:

There are three stages of learning: (Stage 1) Introduction to a concept by means of a lecture, lesson, or something read in a book. (Stage 2) Processing the information, developing an understanding of the concept through work, experimentation, and creation. (Stage

3) “Knowing” it is the ability to pass a test with confidence, to teach another, or to express with ease.

Indirect preparation:

The steps of learning any concept are well analyzed by the adult and are systematically offered to the child. A child is always learning something that is indirectly preparing him to learn something else, making education a joyful discovery instead of drudgery.

The prepared environment:

Since information passes from the environment directly to the child, not through the teacher, the preparation of this environment is vital. It is the role of the teacher to prepare and continue to adapt the environment, to link the child to it through well-thought-out lessons, and to facilitate the child’s exploration and creativity. Children often surpass the level of knowledge of the teacher in all areas and learn to find answers.

Observation:

Scientific observations of the child’s development are constantly carried out and recorded by the teacher. These observations are made on the level of concentration of each child, the introduction to and mastery of each piece of material, the social development, and physical health.

Work Centers:

The environment is arranged according to subject area. The children are always free to move around the room and to continue to work on a piece of material with no time limit.

Teaching Method:

Children learn directly from the environment and from other children, more than from the teacher. The teacher is trained to teach one child at a time, with a few small groups and almost no lessons given to the whole class. She is facile in the basic lessons of math, language, the arts and sciences, and in guiding a child's research and exploration capitalizing on his interest in and excitement about a subject. Large groups occur only at the beginning of a new class or in the beginning of the school year.

Class Size:

The most successful 3 to 6 or 6 to 12 classes are of 30 to 35 children with one teacher and one non-teaching assistant. This provides the most variety of personalities, learning styles, and work being done at one time. This class size is possible because the children stay with the same teacher for three to six years.

Basic lessons:

Each lesson is planned in a way to recognize a child's readiness – according to age, ability, and interest – for a specific lesson The teacher is prepared to guide individual progress. Although she plans

lessons for each child for each day, she will bow to the interests of a child following a passion.

Areas of study linked:

All subjects are interwoven. For example, history, art, music, math, astronomy, biology, geology, physics, and chemistry are not isolated from each other and a child studies them in any order he chooses, moving through all in a way unique for each child. At any one time in a day all subjects –math, language, science, history, geography, art, music – will be available to be studied at all levels.

The schedule:

There is uninterrupted work time every day. Adults and children respect concentration and do not interrupt someone who is busy at a task. Groups form spontaneously.

Assessment:

There are no grades or other forms of reward or punishment, subtle or overt. Assessment is by the teachers' observations and record keeping. The test of whether or not the system is working lies in the accomplishment and behavior of the children, their happiness, maturity, kindness, and love of learning and work.

Learning styles:

All intelligences and styles of learning – musical, bodily kinesthetic, spatial, interpersonal, intuitive, and the traditional linguistic and logical-mathematical – are nurtured.

Character education:

Education of character is considered more important than academic education. Children learn to take care of themselves, their environment, each other and each others.

1-3-3 Montessori materials

The Montessori materials " are intended for the direct and formal training of the senses; it includes apparatus designed to aid in the purely physical development of the children" (Montessori, 1912, p. xxvi).

Materials are natural with no "kits" or "sets" but rather a good supply of real materials that the child uses to carry out real work. As far as the "didactic" or teaching materials in Montessori schools, there is an international committee that has overseen the production of such things as the sensorial materials for many years. An impulsive or artistic change in the production, which can result in a breakdown of the success of the method, is then avoided.

1-3-4 Montessori teachers

The most important consideration, in deciding to set up a Montessori class, is the training of the teacher. A well-trained Montessori teacher spends a lot of time during teacher training practicing the many basic lessons with material in all areas. She must pass a written and oral exam on these lessons in order to be certified.

Teacher's role in a Montessori environment is: To follow the child's interest and needs; to prepare an environment that is educationally interesting and safe; to lead the child to discover his/her own truth and develop his/her own abilities; to observe, analyze and provide materials and activities appropriate for the child's sensitive periods of learning; and to maintain communications with the parent on a regular basis.

1-3-5 The results of learning in this way:

Montessori schools have proven successful all over the world, with all kinds of children (wealthy, poor, gifted, normal, learning disabled, blind, etc.) and environments (from refugee camps and slums to elegant schools in beautiful homes).

1 – 4 Importance of Research

The significance of this research stems from the following points:

1. According to the researcher's knowledge, it is the first research on the subject to be done in Syria.

2. It is important for teenagers with DS in Syria because it tries to find clarifications for the lack of reading skills among them, motivate them through instructions, teach them reading skills, and motivate their teachers and caregivers to continue language instructions throughout their lives.

3. The research offers a program for teenagers with Down syndrome reading skills. If they continue to learn reading, and actually acquire its skills at some point, those skills are going to be essential ones in their lives in the present and future.

1 – 5 Aims

The researcher aims to attain the following goals from the research and application of the designed program:

1. Designing a program for teaching reading skills to teenagers with DS.

2. Applying the program to teach teenagers with DS reading skills. e.g. teach Arabic letters' phonemes (35 Arabic phonemes; 8 vowels and 27 consonants) and graphemes (28 Arabic letters): vowels are underlined (the 5 extra vowels include: آ،َ،ُ،ِ،أو English equivalents from first Arabic symbol on the right : /α:/, /Λ/, /u/, /i/, /ō/).

(ا، ب، ت، ث، ج، ح، خ، د، ذ، ر، ز، س، ش، ص، ض، ط، ظ، ع، غ، ف، ق، ك، ل، م، ن، ه، و، ي). These letters represent the following English sounds (starting from the first Arabic letter from the right until the last): /α/, /b/, /t/, /θ/, /dz/, /h/, /kh/, /d/, /ð/, /r/, /z/, /s/, /ƒ/ , /s/, /dh/, /t/, /ð/ , /ζ/, /gh/, /f/, /q/, /k/, /l/, /m/, /n/, /h/, /u:/, /i:/, plus the additional three letters: *alef maqsoura* (ى), the *Taá marbouta* (ة), and the *hamza*(ء). The first is a variation of the Arabic letter ا (α), the second is a variation of ت (t). Also, teaching the most frequently used words in our daily life by representing them as sight words, then move to the process of decoding words in order to read them.

3. Checking the effectiveness of the program to teach reading skills to 10 teenage students with DS forming an experimental group from a special school (Al Rajaa), comparing their progress with 9 students from another special school (Haza Bayti), both in Damascus.

4. Exposing the individual differences in gender of the advantages acquired from the reading program in learning.

5. Identifying the difficulties students with DS face while learning with the program.

6. Recommending suggestions for improving the effectiveness of the research's program.

1-6 Hypotheses of Research

The researcher assumes that using the program based on the Montessori Method can advance teenagers with DS reading skills and proposes the following hypotheses:

1. There are no significant statistical differences ($\alpha = 0.05$ level) in means of the pre-test scores of members of the control group and experimental group.
2. There are no significant statistical differences ($\alpha = 0.05$ level) between the means of the post-test scores of members of the control group and experimental group.
3. There are no significant statistical differences ($\alpha = 0.05$ level) between the means of the pre-test scores and post-test scores of members of the control group.
4. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the pre-test scores and post-test scores of members of the experimental group.
5. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the male members of the experimental group and their counterparts in the control group in the pre-test.

6. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the male members of the experimental and their counterparts in the control group in the post-test.

7. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the pre-test scores and post-test scores of male members of the control group.

8. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the pre-test scores and post-test scores of male members of the experimental group.

9. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the female members of the experimental group and their counterparts in the control group in the pre-test.

10. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the female members of the experimental and their counterparts in the control group in the post-test.

11. There are no significant statistical differences at ($\alpha = 0.05$ level) between the means of the scores of the female members of the control group in the pre-test and post-test.

12. There are no significant statistical differences at (α = 0.05 level) between the means of the scores of the female members of the experiment group in the pre-test and post-test.

13. There are no significant statistical differences at (α = 0.05 level) between the means of the scores of males and females in the control group in the post test.

14. There are no significant statistical differences at (α = 0.05 level) between the means of the scores of males and females in the experimental group in the post test.

1 – 7 Questions of Research

The research aims to provide answers to the following questions:

1. Can the research's program help the teenage Students with DS to acquire reading skills?

2. Having problems with their attention span and short–term working memory, is it possible to make teenagers with DS remember the Arabic's phonemes? Can they remember the Arabic graphemes and their metamorphoses? Can they use that knowledge to blend morphemes/graphemes into pronounceable or readable words? e.g. can students with DS recognize the changing graphemes of letters according to their positions at the onset or rime? For example: the Arabic letter (ش) in the following three words where it

takes different forms according to it's place in the word: (شمس، مشمس and عاش) (*mushmes, shams* and *ash*) which represent the meanings: (*sunny*, *sun* and *lived*).

3. Also, with the difficulty seen in teenagers with DS differentiating between Arabic **vocalization** *Altashkeel* **التشكيل (~ َ ُ ِ ْ ً ٌ ٍ ّ)** (starting from the right: *madda, fatha, damma, kasra, sukoun, tanween al fateh, tanween al damm, tanween alkaser, alshadda…*) These vocalizations are as follows translated into in English vowels- starting from right: /Λ /, /U/, /i/, *silence mark sukoun*, *an*, *on*, *en*, *the stressing mark shadda*): How can students learn to recognize the differences while pronouncing the Arabic letters when they are accentuate with these vocalization marks?

4. What kind of tasks and homework can teachers give to students to sustain their knowledge?

1-8 Methodology and Procedures

The experimental method was used in this research because of its quantitative nature. In this type of researches, data collection and analysis enables a detailed account of the tutoring program and of the participants' literacy experiences and development. There is a point here worth mentioning: we have to differentiate between procedures and results. Procedures are important for future

researches; consequently, this research is important for future studies.

1- 8-1 Participants

Ten students had been randomly chosen as participants of the experimental group from a special education school (Dar Al Rajaa) five girls and five boys, their ages ranged between 11-18 years, M = 13.1. Another nine were chosen as a control group from a second special education school (Haza Baiti School), both in Damascus, syria. The latter students were singled out as the whole population of students with DS. They were five girls and four boys; their ages ranged between 9- 21 years, M = 15.1. Both schools are in Damascus, Syria.

1-8- 2 The independent variables of the experiment

1. The teaching method: this variable has two options to compare: teaching teenager students with DS according to the already existing method and by using the designed program.
2. Gender: to evaluate the effect of gender on attainment.

1 -8- 3 The dependent variables of the experiment

They are the achievements of the two-experimental and control-groups as measured by a post-test prepared by the researcher and tested for validity and reliability.

1- 8– 4 Instruments and tools

Program

The researcher developed an Arabic program for teaching reading skills based on the Montessori Phonic Approach. The program comprises multi sensory materials which teach letters by means of their phonemes, sight words, and key words which the readers encounter most in all Arabic readable materials.

Assessment of the program

The program was presented to the supervising professor, 2 special education specialists, and teachers at both schools. The researcher benefited from their comments, ideas and suggestions.

Materials

Flashcards with mounted sandpaper letters, picture cards, word cards, sand box, letters tray, story reading, acting, pantomiming, and conversing were used with students during lessons. The researcher also used songs, light physical exercises, and breathing exercises before commencements of lessons.

Questionnaire

A questionnaire in Arabic (Appendix 1, translated into English) was written and sent to parents at the beginning of the program to aid the researcher in promoting better familiarity with the participants in both groups. This questionnaire also assisted the researcher in her study by finding factors contributing to reading readiness among participants, and percentages and correlations between different variants and present reading skills of the sample e.g. correlation between letter recognition and reading skills (Table 2).

Measures

The students from both groups: control and experimental, were assessed before the start of teaching the program, on standardized measures of reading and short term memory and number, using the Arabic Reading Skills for Mentally Challenged Test Pilot (Al Rawsan, 2003). The children were assessed individually at school during the second school term of the school year 2008-2009, starting on February, 22nd. The assessments were typically completed in 2 sessions lasting 20 – 30 minutes for each student.

At completion of program, students of both experimental and control groups were reassessed using the same test to evaluate their reading skills.

1-8-5 Duration of experiment

The experiment lasted for a period of two and a half months. During the first six weeks, the researcher gave four lessons per week, one hour and fifteen minutes each. For the remaining four weeks, she gave two lessons per week, an hour and fifteen minutes each.

1 –9 Research Limitations

The program was designed and then applied to a group of teen-age students with DS at the 'Dar Al Rajaa' special school, Syria. The control group consists of student with DS from 'Haza Baiti' special school both in Damascus.

The research's program was carried out on students who have DS and attend that school. They were taking the national Arabic language curriculum using books of grade 1. The program was designed to teach those students reading skills only, without trying to teach writing or spelling. Writing was applied only as a mean to enforce recalling the letters and words taken, and were given to be written as homework so students will remember them while writing them at home on their notebooks. Teaching materials used in carrying out the program for teaching reading skills were completely designed, made, and implemented by the researcher.

1 – 11 Definitions of Terms

Down syndrome: is the most common genetic cause of mental retardation in children. The term is related here to the theme of reading skills acquisition.

Chromosome: a structure that contains the genetic information we need to grow and develop normally and is present in all our cells.

Teenager: or an adolescent is an individual who is at a transitional stage of physical and mental human development that occurs between childhood and adulthood. Teenage years are from ages 13 to 19. This transition involves biological (i.e. pubertal), social, and psychological changes. The end of adolescence and the beginning of adulthood varies by countries. At this turning point, an individual is considered to be mature enough (this might not apply to individuals with DS) to be entrusted by society with certain tasks. Such milestones include, but are not limited to, driving a vehicle, having legal sexual relations, serving in the armed forces or on a jury, purchasing and drinking alcohol, voting, entering into contracts, completing certain levels of education, and marrying. The term 'teenager' is taken in this research to represent individuals with DS who fall into the age group 13-19 years. Nevertheless, teenagers

with DS might not be developmentally, psychologically, and legally, at the same level with their normally developing peers.

Reading skills: are the specific abilities which enable the reader to read the written form as meaningful language, to read with independence, comprehension and fluency, and to mentally interact with the message. In this research, Reading skills signal the ones which are aimed for the teenagers with DS to acquire.

Reading acquisition: is the process of acquiring the basic skills necessary for learning to read. In this research, they are taken to mean reading acquisition in teenagers with DS.

Explicit long- term memory: memory which involves things like facts and events that participants consciously recollect. Individuals with DS have impaired explicit long-term memory for verbal information.

Short-term memory or (working memory): a subcomponent of the human memory where active, ongoing maintenance of information takes place. It is further divided into verbal and visuo-spatial short-term memory systems. In this research it is taken to explain how DS is associated with particularly poor verbal short-term memory performance, but not visuo-spatial short-term memory

Phonological memory: the codes used to store verbal material for memory span. It manipulates tasks requiring immediate, verbatim and ordered recall (digits, letters, and pronounceable non-words. **Phonological awareness**: ability to identify, reflect, and manipulate the sound structure of one's own language.

Phonemic awareness: is the ability to segment syllables into individual speech sounds and to blend phonemes to form pronounceable words.

Working memory skills: short term visual and verbal memory spans. They denote here the skills which individuals with DS have a real problem in representing verbal or phonological information in short-term memory.

IQ: Intelligence Quotient. It is taken here to mean intelligent quotient for individuals with DS.

Language skills: there are four basic skills: listening, speaking, reading, and writing.

Montessori Method: is an approach and a philosophy of teaching while considering children as they really are, and of creating environments which foster the fulfillment of their highest potential- spiritual, emotional, physical, and intellectual- as members of a family, the world community and the Cosmos. It is restricted in

this research to the phonic method from which the researcher derived her program for teaching adolescents with DS.

Graphemes: A grapheme is the fundamental unit in written language. Examples of graphemes include alphabetic letters, Chinese characters, numerical digits, punctuation marks, and all the individual symbols of any of the world's writing systems. In a phonemic orthography, a grapheme corresponds to one phoneme.

Morphemes: the smallest unit of sounds in a spoken language.

Cognitive development: is the construction of thought processes, including remembering, problem solving, and decision-making, from childhood through adolescence to adulthood. In this research, the term refers to cognitive development in individuals with DS.

Phonics Approach: is an approach to reading instruction that emphasizes letter-sound relationships and generalized principles that describe spelling-sound relationships in language. This term denotes the method the researcher used for teaching adolescents with DS reading skills. It is restricted in this research to Montessori's Phonic Approach for teaching teenagers with DS reading skills.

CHAPTER 2

Down Syndroe, Facts and Problems

2 -1 Definition and background

DS is the most common genetic cause of mental retardation and one of the most frequently occurring neurodevelopmental genetic disorders in children. It is a term used to describe the specific medical and physical characteristics seen in individuals born with a specific chromosomal abnormality. It happens with an average of one every 1000 births (Mursi, 1996). The syndrome acquired its name from its discoverer, the British doctor J. L. Down in 1866.

DS results when all or part of the 21st chromosome occurs in triplicate at or shortly after conception. Triplication of this chromosome results in small changes in the formation of certain biological structures. Initial structural differences constitute one important influence on development (Couzens, 2008). Children with DS typically experience a constellation of symptomology that includes developmental motor and language delay, specific deficits in verbal short-memory, and broad cognitive deficits. Children with DS are also at increased risk of medical problems, which can exacerbate their cognitive deficits.

The estimation of number of individuals with Down syndrome is one child in 660 of the total population worldwide (Laney, 2008). Therefore, out of the present world population which is 6,600,000,000 (www.nationalgeographic.com, 2009), and by the mean of a simple calculation, the total population of Down syndrome worldwide would be approximately 10,000,000 individuals.

Although the diagnosis of DS is facilitated by cytogenetics testing and the unique physical phenotype, the development of proper interventions for this group of children is less obvious.

Having a child with DS is a constant struggle regarding all facets of his life, and the lives of his immediate family. It is a struggle because DS is a congenital condition characterized by mental retardation associated with some impairment of cognitive ability and physical growth as well as specific recognizable physical appearances. Despite the fact that it is not an illness or a disease, Individuals with DS tend to have lower than average cognitive ability, often ranging from mild to moderate developmental disabilities. A small number have severe to profound mental disability. Fine motor skills are delayed and often lag behind gross motor skills and can interfere with cognitive development.

2 - 2 What Causes Down Syndrome?

DS is a chromosomal abnormality characterized by the presence of an extra copy of genetic material on the 21st chromosome in all (or part) of the cells of an individual. Chromosomes are structures that contain the genetic information we need to grow and develop normally and are present in all our cells. Each cell in the human body normally contains 46 chromosomes. These chromosomes exist in 23 pairs labeled from 1 to 22, with the 23rd pair being known as the sex chromosome. Females have 2 X sex chromosomes and males an X and a Y sex chromosomes. Each egg or sperm cell our bodies produce contains one copy of each of the 23 pairs of chromosomes. We inherit one copy of each pair of chromosomes from our parents at the time of conception.

In DS, the additional number 21chromosome, because of the genes it contains, causes an excessive amount of certain proteins to be formed in the cell. This disturbs the normal growth of the fetus (Selikowitz, 1997). The cells of the growing fetus do not divide properly, thus it will have fewer body cells and, therefore, a smaller baby. It is all happening before the baby is born:

> The migration of the cells that occurs in the formation of different parts of the body is disrupted, notably in the brain. Once the individual with DS is born, all

> these differences are already present. The baby, having fewer brain cells and a different brain formation, will learn slowly. These changes are established before birth and cannot be reversed afterwards (Selikowitz, 1997, p. 34)

2 –3 Characteristics

"There are over 50 clinical signs of DS, but it is rare to find all or even most of them in one person" (Laney, 2008, p. 34). Individuals with DS may have some or all of the following characteristics:

2- 3- 1 Head

At a gross morphological level DS brains are smaller than normal, and the depth and number of sulci are reduced (Rondal, Rasore-Quartino & Soresi, 2004) , microcephaly in head size, 80% have smaller than normal head circumference (Al Shareed, 2008).

They have the following characteristic facies; they might have broad head, flat facial profile, very round face, upward and outward slanting eyes which make the child look like some nations in Eastern Asia. Babies with DS might have white spots on the iris of the eye (Brushfield spots), small chin, thin dry lips, large protruding tongue (due to small oral cavity), an enlarged tongue near the tonsils, roof of the mouth can have a high arch, small low set ears, jaw bone and mouth can appear to be small, teeth tend to be small,

irregularly spaced, abnormally shaped and misshapen; can be, flat nasal bridge, nasal bone can be underdeveloped, and short neck.

2- 3- 2 Body and limbs

Usually, individuals with DS are short, with legs and arms that are often shorter in relation to the torso. They have short and broad hands, (Generally, the three creases inside of the palm join together, in one of the hands or both, to form a single palmer fold that divides it into two parts, this fold is perpendicular to fingers' direction20%), a single flexion furrow of the fifth finger, flat oblate feet, and excessive space between large toe and second toe, genitals maybe small, skin might have a mottled appearance, hair is sometimes fine and strait. (Al Kuraiti, 1996)

2- 3- 3 Associated congenital abnormalities

Individuals with DS have some disorders which might be immediately diagnosed. Congenital hypothyroidism, characterized by reduced basal metabolism, an enlargement of the thyroid gland, leukemia (ALL and AML) (Hill, 2009), and disturbances in the autonomic nervous system, occur slightly more frequently in babies with DS (www.nichd.nih.gov, 2007). Other congenital

abnormalities might include ones in gastrointestinal tract (duodenal stenosis or atresia, imperforate anus, and Hirshchsprung disease)

Congenital heart defects are common (40-50%) in babies with DS, some of which cannot be definitively treated therefore they are a major cause of morbidity and mortality through childhood (http://trumble.html). Approximately 30-40% Of newborns with DS have complete atrioventricular septal defects (early diagnosis generally allows corrective surgery to be performed), 43% have endocardial cushion defect, 32 % have ventricular septal defect, 10% have secundum atrial septal defect, 6% have tetralogy of Fallot, and 16% have patent ductus arteriosus (Hill, 2009).

They have Musculoskeletal abnormalities such as poor muscle tone; excessive joint laxity including atlanto-axial instability, hypotonia, Congenital dislocation of the hips, spine anomalies, scoliosis, and a higher number of ulnar loop dermatoglyphs (ibid.).

Significant hearing impairment occur in the majority of children with DS 90% of all patients). Visual impairment due to refractive errors or strabismus is also common.

2- 3- 4 Motor skills and cognitive development

Individuals with DS have impaired motor skills: *fine motor skills* (skills that involve a refined use of the small muscles usually with coordination with the eyes controlling the hands, fingers, and thumb). The development of theses skills (which allow one to write or draw) are delayed and often hinder behind *gross motor skills* (major muscles, coordination, balance, throwing and picking/ catching, and kicking) all of which can interfere with cognitive development, speech impairment and problems in their vision and hearing. Consequently, individuals with DS have neurological (mental) retardation.

2- 3- 5 Personality

People have generally described children with DS as good-hearted and docile, friendly as they go and shake hands with people and hug them, with a tendency to imitate and emulate.

Researchers and practitioners argued for a stereotype involving a pleasant, affectionate, and passive style (Gibbs &Trope, 1983; Rodgers, 1987). In this stereotype, children with DS are described as affectionate, lovable, nice, getting on well with people, cheerful, generous, and fun (Carr, 1995).

Other studies report of a pleasant aspect of personality with a positive and rhythmic mood (Gunn &Berry, 1985) and predictability in behavior. On the other hand, reports were made of lower activity levels, less persistence, and more distractibility than other children, supporting the more passive aspects of the stereotype (Gunn & Cuskelly, 1991).

Furthermore, some researchers describe individuals with DS as showing motivational orientation involving lower level of task persistence and higher levels of off-task social behaviors (Kasari &Freeman, 2001; Landry& Chapieski, 1990; Pitcarin & Wishart, 1994; Ruskin et al., 1994; Valchou & Farrel. 2000). This lowered persistence is sometimes accompanied by a stubborn or strong willed personality streak, described in studies of temperament in DS (Carr, 1995; Gibson, 1978).

Poor persistence and stubborn temperament may have far-reaching implications for developmental outcomes in DS. Some researchers suggest that those characteristics contribute to some of the inconsistency in developmental performances observed in young children with DS (Wishart &Duffy, 1990; Morss, 1983).

In addition, we can see some behaviors like avoiding tasks which has been described as 'cognitive avoidant' or 'quitting out' behaviors while performing on developmental assessments (Wishart, 1996). Wishart implies that this weak motivational orientation impacts other areas of functioning in DS, including performance in educational and intervention settings (ibid.).

Individuals with Ds have deficits in means-end thinking (instrumental thinking) which generally involves linking a chain of behaviors together as a means to reach an end-state (Piaget, 1952), and problem solving (Ruskin et al., 1994). Means-end thinking has important implications for developing a motivational orientation that involves engaging with new and challenging tasks.

Finally, Children with DS have a relative strength in social-emotional functioning (Fidler, Hepburn & Rogers, 2006) and orienting and engagement behaviors that grow of a faster pace than other areas of development like emotional regulation and motor functioning (ibid.).

2- 3- 6 Intelligence

In intelligence level, most of individual with DS fall in the mild (IQ 50-70) to moderate retardation (IQ 35-50) (Al Kariti, 1996) (Mursi, 1996), with "95% of persons with DS function in the mild-to-moderate range of mental retardation" (Laney, 2008, p.15). Individuals having Mosaic DS have typically 10-30 points higher IQ. But these indications do not appear necessarily on every individual with DS.

2 - 4 Classification of Down Syndrome Cases

The three genetic variations that can cause DS include:

2 - 4 -1 Trisomy 21

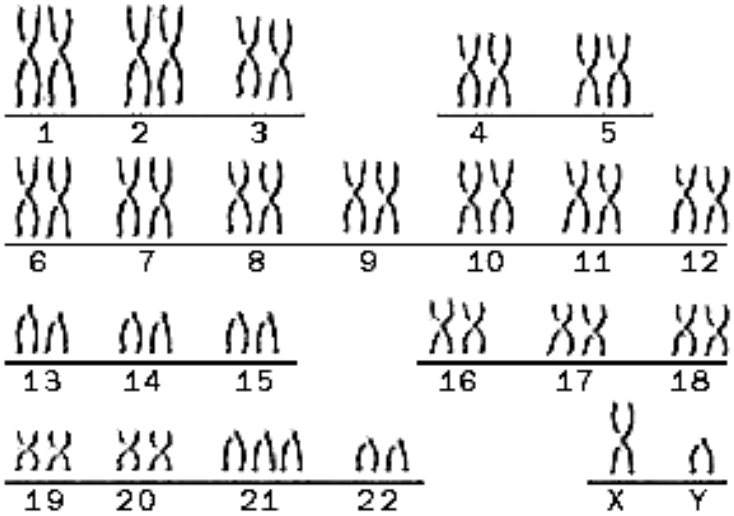

Figure1. The genetic basis (karyotype) of Trisomy 21 Down syndrome.

In 95% of cases of DS, the cause is trisomy 21. It is the commonest form of DS in children born to mothers of any age. It results from one of the parents giving two number 21 chromosomes rather than only the usual one, to the child through the egg or the sperm.

A child with trisomy 21 has three copies of chromosome 21- instead of the usual two copies - in all of his or her cells. This form of DS is caused by abnormal cell division during the development of the sperm cell or the egg cell.

> Normally, when eggs or sperm are formed, a cell in the ovary or testicle divides to form two new cells, each with half the original number of chromosomes. It is from these cells that the eggs or the sperm originate. In the case of trisomy 21, this division is abnormal, and the egg or sperm receives an extra number 21 chromosome. This process is known as non-disjunction, because the pair of number 21 chromosome in the original cell does not separate (disjunct), but remains together in one of the new cells (Selikowitz, 1997, p. 36).

We have a general idea about *how* this non- disjunction occurs: During the process of formation of the egg or sperm, the two number 21 chromosomes of the original cell come to lie together preceding cell division. Instead of each chromosome moving in an opposite direction to become part of one of the two new cells, they both move together. The new cells so formed consist of one cell with both number 21 chromosomes, and the other with no number

21 chromosome at all. The latter cannot survive, and soon disintegrates (ibid).

Scientists do not know at present *why* non- disjunction occurs. It is dubious to be caused by one factor alone. Different factors must play the role together to cause non- disjunction. Some of these (probably unimportant) factors are: genetic predisposition, exposure to radiation, and the presence of thyroid antibodies in the mother's blood. The most significant factor appears to be the mother's age. It is only one of many factors, most of which are presently unknown.

Maternal age	**Incidents of Down syndrome**
20	1/2000
21	1/1700
22	1/1500
23	1/1400
24	1/1300
25	1/1200
26	1/1100
27	1/1050
28	1/1000
29	1/950
30	1/900
31	1/800
32	1/720
33	1/600
34	1/450
35	1/350
36	1/300
37	1/250
38	1/200
39	1/150
40	1/100
41	1/80
42	1/70
43	1/50

44	1/40
45	1/30
46	1/25
47	1/20
48	1/15
49	1/10

Table2. The relation of mother's age with incidents of having a baby with Down syndrome

In this research's questionnaire, and in a sample of 52 individuals with DS in the Damascus area, the statistical mean of mothers' age at incidents of giving birth to a child with DS was 33.46 years. Non-disjunction does not always come from the mother. In 20% of cases the extra chromosome comes from the sperm (ibid., p. 37).

2 - 4 - 2 Mosaicism

In this rare form of DS (1% of DS cases), children have some cells with an extra copy of chromosome 21, but not all. The rest of the cells are normal. "It is called Mosaicism, because the cells of their body are like a mosaic made up of different pieces, some normal and some with the extra chromosome." (ibid., p. 40) This mosaic of normal and abnormal cells is caused by abnormal cell division after fertilization. It is associated with fewer effects on the individuals because of the counteracting effect of the normal cells.

Those individuals have less prominent physical features of DS, and develop and function closer to the normal range. The range of

the physical problems may vary, depending on the proportion of cells that carry the additional chromosome 21 (www.nichd.nih.gov, 2007). Very rarely, individuals with this form of DS can be intellectually normal.

2 - 4 - 3 Translocation

This form of DS is uncommon: (In 4 % of cases of DS) it can occur when part of chromosome 21, and not the whole, becomes attached (translocated) onto another chromosome, before or at conception. Children with translocation DS have the usual two copies of chromosome 21, but they also have additional material from chromosome 21 stuck to the translocated chromosome. Thus, there is still too much material from chromosome 21, resulting in the features associated with DS.

2 – 5 Is Down Syndrome Inherited?

Most cases of DS are not inherited. They are caused by an error in cell division during the development of the egg, sperm or embryo.

Translocation DS is the only form of the disorder that can be passed from parent to child. However, only about 4% of children with DS have translocation. And only about half of these cases are inherited from one of the parents.

In these cases, the mother or father is a balanced carrier of the translocation, which means he or she has some rearranged genetic material, but no extra genetic material. A balanced carrier has no signs or symptoms of DS, but he or she can pass the translocation on to children.

The chance of passing on the translocation depends on the sex of the parent who carries the rearranged chromosome 21: If the father is the carrier, the risk is about 3%. If the mother is the carrier, the risk is about 12% (www.mayoclinic.com , 2009).

2 - 6 Mental Abilities

2- 6- 1 Definition of mental ability

According to the American psychologist L.L. Thurstone, a pioneer in the fields of psychometrics and psychophysics, there are seven factors, which he identified as the " primary mental abilities." These seven abilities are *verbal comprehension* (as involved in the knowledge of vocabulary and as in reading), *verbal fluency* (as involved in writing and in producing words), number facility (computational ability), *spatial visualization*, *associated memory*, *perceptual speed*, *and reasoning* (Thurstone, 1939).

2- 6- 2 What is mental retardation?

It is sometimes essential to classify children who differ in significant ways from the norm in order to plan and finance special education for them. The American Association on Mental Deficiency (AAMD) proposed this definition of mental retardation: "Mental retardation refers to significantly subaverage intellectual functioning existing concurrently with defects in adaptive behavior and manifested during the developmental period (Grossman, 1997, 1983)." The AAMD applies the term *Mental retardation* to individuals having IQ scores of 67 and below, and classifies those with IQ scores within that range into the following categories:

- Mild retardation- IQ score between 67 and 52
- Moderate retardation- IQ score between 51 and 36
- Severe retardation- IQ score between 35 and 20
- Profound retardation- IQ score of 19 and below (Biehler, snowman, 1993)

2- 6- 3 Mental abilities of individuals with Down syndrome

If we ask: What are the highest extents that a child with DS can reach within each of those seven primary mental abilities? The answer would be: it is just as in the normal population, there is a wide variation in mental ability, behavior and developmental

process in individuals with DS. But individuals with DS are among the ones classified as 'mentally retarded'. Individuals with DS's level of retardation may range from mild to severe, with the majority functioning in the mild to moderate range (IQ 35- 70).

In his study, *Families of children with DS*, Cliff Cunningham observed that in the first three years of their life, children with DS with severe health (mainly heart) problems may have slower physical progress with no effect on mental ability (Cunningham,1996). Early intervention and intense structured training during the first two years of life could have an immediate small impact on the targeted behaviors but with no generalized or long term effects. The main predictor of later development would be the earlier scores on the mental abilities (Gibson & Field, 1988; Shonkoff et al., 1992).

From around two years of age - mental ages of around 18 -24 months significant associations appear between mental age scores and social class and educational level of parents - with the latter showing the strongest influence. By 4 to 5 years the girls have higher mean group scores than the boys. This is the same pattern as is found for ordinary children (Cunningham 1996).

From around the second to third year of life the mental ability scores on the children becomes increasing stable with correlations falling in the 0.7 to 0.9 range (ibid.). Carr reports similar levels with a correlation of 0.9 between IQs measured in the early years and those at 21 years and good prediction for around 80% of the sample. She confirmed a rise in mental ability scores in the later teenage and early adult years except for the young people with DS who were most severely disabled (Carr, 1988).

2- 6- 4 Can we Modify Intelligence [in individuals with Down syndrome]? The work of Reuven Feuerstein

It is sensible to mention here the name of Reuven Feuerstein, a clinical psychologist (born 1921), who studied at the University of Geneva under Jean Piaget, Andre Rey, and is a peer of Lev Vygotsky. He has a PhD in developmental psychology from the Sorbonne.

Dr. Feuerstein claims that intelligence is not a motionless structure, but an open, lively system that can continue to develop throughout life (Feuerstein, 1984).This idea, not yet widely accepted by the psychological and educational establishments, make an enormous difference in how we perceive the role of education. If intelligence is modifiable, and if indeed intelligence can be taught

and learned, education has a much greater role than might have been previously imagined.

> He is well known for his work with students who struggle to learn. It is with the students who are considered lost, uneducable, or beyond change that Feuerstein has had his greatest success. Feuerstein's work with these students is based on his theory of Structural Cognitive Modifiability [SCM] and the practices that support the theory (Mentis, Dunn-Bernstein, Feuerstein, 2007, p. 3).

His life's work has been the development of the theory of Structural cognitive Modifiability (SCM) and its emergent practices of dynamic assessment, active intervention, and placement of both children and adults in "shaping environments." He says:

> The concept of mediated learning experience, which we describe as the proximal determinant of differential cognitive development, is based on the assumption that a human development can be neither conceived of as a sole epiphenomenon of neuro-physiological maturation nor considered as simply the individual's chance encounter with and direct exposure to stimuli and his active interaction with them. In addition to these determinants, it is by the flow of information transmitted to the individual by a process of mediation through channels produced by the mediation itself that higher mental functions are developed (Feuerstein, 1980, p. xvii).

He states that the Mediated Learning Experience (MLE) is a process that creates both its content and structure. It is a concept that implies an additional relationship determined by the strong need for ensuring continuity beyond the biological existence of the

individual. Intelligence can be developed within a mediated learning environment created with the theory of MLE. According to Feuerstein, a mediator is a person who works in relationship with the learner in developing cognitive functions leading to clearer thinking and improved learning processes. For his two theories, SCM and MLE, Feuerstein organized for them two applied methods: Instrumental Enrichment (IE) and Learning Propensity Assessment Device (LPAD). IE is an intervention program designed by him to enhance the cognitive skills necessary for independent thinking. The goal of the program is to shape the cognitive structure of the individual and set in motion his further development. The aim is to modify the mentally challenged performer by changing his or her passive and dependent cognitive style into one of an autonomous and independent thinker (Feuerstein, 1984). For individuals with DS, Feuerstein's work is important because he thinks that the parents of mentally challenged children had been unable to give order and meaning to their children's experiences.

CHAPTER 3

Cognitive development, Memory, and Attainment in Down Syndrome

3- 1 Cognitive development: Definition

We need to understand the 'normal' cognitive development in order to comprehend the 'abnormal' one as it is said in the following statement: "Understanding normal development is a prerequisite for understanding abnormal development." (Michel & Moore, 1995, p. 411)

Cognitive development is the construction of thought processes, including remembering, problem solving, and decision-making, from childhood through adolescence to adulthood. It refers to how a person perceives, thinks, and gains understanding of his or her world through the interaction of genetic and learned factors. Among the areas of cognitive development are information processing, intelligence, reasoning, language development, and memory. Piaget supposed that cognitive development is caused by two general factors: **heredity** and **environmental experience**. Heredity establishes the basic nature of physical structures (e.g. the brain), the development of physical structures, the existence of reflexes

(sucking, grasping, crying), and the tendency to organize experiences and adapt to the environment (through assimilation, accommodation, and equilibration). Experience refers to the variety of interactions we encounter: physical, mental, and social experiences (Biehler, Snowman, 1993).

3- 2 Description

It was once believed that infants lacked the ability to think or form complex ideas and remained without cognition until they learned language. It is now known that babies are aware of their surroundings and interested in exploration from the time they are born. From birth, babies begin to actively learn. They gather, sort, and process information from around them, using the data to develop perception and thinking skills.

3- 3 Evaluating cognitive development

Historically, the cognitive development of children has been studied in a variety of ways. The oldest is through intelligence tests, such as the widely used Stanford Binet Intelligence Quotient (IQ) test pioneered in 1905. IQ scoring is based on the concept of 'mental age,' according to which the scores of a child of average intelligence match his or her age, while a gifted child's performance is comparable to that of an older child, and a slow learner's scores are

similar to those of a younger child. IQ tests are widely used worldwide, but they have come under increasing criticism for defining intelligence too narrowly and for being biased with regard to race and gender.

In contrast to the emphasis placed on a child's native abilities by intelligence testing, learning theory grew out of work by behaviorist researchers such as John Watson (1878–1958) and B. F. Skinner (1904–1990), who argued that children are completely malleable. Learning theory focuses on the role of environmental factors in shaping the intelligence of children, especially on a child's ability to learn by having certain behaviors rewarded and others discouraged.

3- 4 Piaget's Theory of Cognitive Development

Turning to Piaget's theory of cognitive development (Jean Piaget 1896-1980), we become aware of his conception of intellectual development, one that reflects his basic interest in biology and knowledge.

3-4-1 Basic principles of Piaget's Theory

They can be summarized as follows: he suggests that human beings inherit two basic tendencies: *organization* (the tendency to systematize and combine processes into coherent general systems) and *adaptation* (the tendency to adjust to the environment). He

assumes that these tendencies govern both physiological and mental functioning. He proposes that the intellectual processes transform experiences into a form that the child can use in dealing with new situations. Piaget then says that the intellectual processes seek a balance through the process of *equilibration*: a form of self-regulation that all individuals use to bring coherence and stability to their conception of the world, it is the tendency to organize schemes (organized pattern of behavior or thought) to allow better understanding of experiences (Biehler, Snowman, 1993). Other principles of Piaget's cognitive theory include the notion of *schemes* which are the organized pattern of behavior or thought, *assimilation* (new experience is fitted into existing scheme) and *accommodation* **(**changing an existing scheme to incorporate a new experience**)**. The latter two subprocesses create a good match between one's concept of reality (one's schemes) and the real life experiences one encounters.

3-4-2 Piaget's Theory of Stages of Cognitive Development

The stages of cognitive development according to Piaget can be summarized as these basic steps: schemes evolve through four stages which reflect a generally continuous pattern of cognitive development. These stages do not happen overnight as it is clear in the following words:

> Children do not generally jump from one stage to the next. Their cognitive development follows a definite sequence, but they may occasionally use a more advanced kind of thinking or revert to a more primitive form. The rate at which a particular child proceeds through these stages varies, but Piaget believes the sequence is the same in all children (Biehler, Snowman, 1993, p. 61).

1. Piaget's first cognitive stage, at the age range of birth to two years, is the *sensorimotor stage* where schemes reflect sensory and motor experiences. In this stage, the child passes an important cognitive development milestone which is called *object permanence*, when he is between fourth and eighth month of this stage. i.e., infants treat objects that leave their field of vision as if they no longer exist. During the same period, intentional behaviors become increasingly apparent. By the age of two, toddler's schemes have become more mental in nature (they imitate people they have not previously observed, animals, even when the model is no longer present). These behaviors show the child's increasing ability to think in terms of symbols.

2. According to Piaget, the second cognitive stage is the *preoperational stage* (the pre- logical stage). The children pass through it between the ages of two till six years. At this stage, the child forms many new schemes but does not think logically. The main obstacles to logical thinking that the preschoolers have to

overcome are *perceptual centration* (tendency to focus attention on only one characteristic of an object or one aspect of a problem or event at a time), *irreversibility* (tendency of not being able to understand the logic behind simple mathematical reversals (like 4+5= 9; 9-5= 4), and *egocentrism* (assumption that others see things the same way). These obstacles appear when children try to solve *conservation* problems, which are problems that test their ability to recognize that certain properties stay the same despite a change in appearance or position. e.g., a child thinks a taller glass contains more water than a shorter one even though he sees that we pour the same amount of water into both.

3. The third cognitive stage is the *Concrete operational stage* of children seven to eleven years old. At this stage, the child is capable of mentally reversing actions but generalizes only from concrete experiences. The child understands logic- based tasks like *conservation* (matter is neither created nor destroyed but simply changes shape or form or position), *class inclusion* (constructing hierarchical relationships among related classes or items), and *seriation* (arranging items in a particular order). Operational thinking is limited to objects that are actually present or that children have experienced concretely and directly.

4. The fourth cognitive stage as Piaget suggests is the *formal operational stage*, it is when children aged eleven years and older are able to deal with abstraction, form hypotheses, and engage in mental manipulation. New schemes develop gradually: most twelve year olds solve problems haphazardly, using trial and error. It is not until the end of high school years that adolescents are likely to attack a problem by forming hypotheses, mentally sort out solutions, systematically test the most promising lead, respond to the form of a problem rather than its content, and understand and use complex language forms such as proverbs, metaphors, sarcasm, and satire (Summarized from Biehler, Snowman, 1993).

3- 4-3 Accelerating cognitive development

Piaget believed that the amount and quality of environmental experiences can alter the details of cognitive development for better or worse but cannot affect such basic tendencies that are governed by heredity such as *organization* and *adaptation*. Accordingly, he maintained that the rate of cognitive development cannot be accelerated through formal education. Many American psychologists are not willing to accept this conclusion as face value (Biehler, Snoman, 1993).

Teachers who apply Piaget's theory of cognitive development to their teaching special needs children could nurture the process of

cognitive growth at any particular stage by presenting lessons in a form that is consistent with but slightly more advanced than the student's existing schemes, thus the student is helped to assimilate and accommodate new and difficult experiences as efficiently as possible

Lev Vygotsky's (1896- 1934), a Russian psychologists and contemporary of Piaget, emphasized more than the latter the influence of social experience (of which teaching is a large part) on cognitive development. He sustained that the diverse things we learn, such as facts, concepts, rules, problem solving skills, and attitudes, are strongly influenced by the type of social interactions that characterize our culture. He referred to the difference between what a child can do on his own versus what can be accomplished with some assistance as the *zone of proximal development* (ZPD). He supposed that students with wider zones are likely to experience greater cognitive development when instruction is pitched just above the lower limit of ZPD than will students with narrower zones because they are in a better position to make the most of the instruction. Vygotsky reflected that instructional methods that are likely to help students traverse their ZPD include modeling, the use of rewards and punishments, feedback, cognitive structuring (using such devices as theories, categories, labels, and rules for helping

students organize and understand ideas), and questioning (Gallimore & Tharp, 1990; Ratner, 1991). Vygotsk's notion of producing cognitive development by embedding instruction within a student's ZPD is an attractive one and has many implications for instruction.

3- 5 Cognitive development in individuals with Down syndrome

3-5-1 Definition

The case of DS results in small changes in the formation of certain biological structures. Initial structural differences constitute one important influence on development (Couzens, 2008). Individuals with DS (versus comparison subjects) have smaller overall brain volumes, larger subcortinal gray matter volumes, relative preservation of parietal lobe gray and temporal lobe white matter, abnormal volumes of specific regional tissue components. The presence of these abnormalities from an early age suggests that fetal or early postnatal development differences may underlie the observed pattern of neuroanatomic abnormalities and contribute to the specific cognitive and developmental deficit s seen in these individuals (Pinter et al, 2001).

These Initial structural differences constitute one important influence on development that they disrupt the cognitive

development like it takes place in typically developing children, thus children with DS make progress in all areas of development but usually at a slower pace.

In general, the cognitive profile observed in children with DS is typically uneven with stronger visual than verbal skills, receptive vocabulary is stronger than expressive language and grammatical skills, and often shows strengths in reading abilities (Snowling, Nash, Henerson, 2008).

3-5-2 Improving cognitive development in Individuals with Down syndrome

In recent years there has been much research interest in looking for behavioral phenotypes, i.e., specific profiles of strengths and weaknesses that are associated with specific conditions, particularly conditions with genetic origins such as DS. This kind of information may be very helpful in alerting parents and professionals to the particular difficulties a child may have. Buckley confirmed that this information "may also lead to the development of different approaches to treatment or interventions for children with different conditions- even when they all have similar global levels of delay as measured by mental ability tests." (Buckley, 2008, p. 90)

Some recent studies proposed ways to improve the cognitive development process in individuals with DS, among them is a paper by (Fidler , Philofsky , Hepburn, 2007) in which they review the information on the language and communication development of children with DS and Williams syndrome or fragile X syndrome. They present a range of evidence supporting the view that there are distinct patterns of abilities and disabilities associated with each of these conditions (Fidler, Philofsky, Hepburn, 2007).

Their suggestions for children with DS include strengthening oral-motor and speech development from the babbling stage onwards, thinking about ways to improve fundamental processes which may be having an impact on speech and language learning such as verbal short-term memory and using strengths in visual memory to support learning, using signing as a bridge to talking and targeting 'means-end thinking' (early problem solving skills). They strengthen their argument with a review of some evidence that children in these specific groups do respond differently to intervention strategies and with a call for more of the research community to take an interest in developing and evaluating interventions (ibid.).

Continuing on the specific phenotype theme, an experimental study from Joanne Roberts and her colleagues reports on the

receptive vocabulary, expressive vocabulary and speech production skills of boys with fragile X, boys with DS, and typically developing boys, matched on non-verbal cognitive abilities.

Boys with DS showed significant delay in all 3 aspects of communication when compared with typically developing boys, supporting the evidence of specific speech and language impairment for boys with DS – that is speech and language skills that are poorer than expected in relation to their non-verbal cognitive ability (Roberts, Price, Barnes, Nelson, Burchinal, Hennon, Moskowitz, Edwards, Malkin, Anderson, Misenheimer, & Hooper, 2007).

The research found that the gap between cognitive ability and expressive vocabulary was greatest for the youngest children and disappeared at the older ages. The authors suggest this may be due to social confidence and life experience leading to accelerated vocabulary learning and use over time.

The study also found an effect of maternal education on both expressive and receptive vocabulary – that is mothers with more education tended to have children with larger vocabularies – reminding readers that there are considerable social influences on language and communication learning. The authors note the need for interventions that focus on increasing speech accuracy as well as

word learning for boys with DS and also stress the need to assess each child as an individual. (ibid)

One danger of pursuing the 'phenotype' model in research studies is that it leads to a belief that phenotypes, linked to genetic disorders, cannot be changed but are an inevitable outcome of a condition. Both these papers take the positive view that we can use the information on the expected differences in early developmental phenotypes in order to be more effective in our interventions and possibly then *reduce the expected weaknesses* for the next generation of children with these conditions. There is already some evidence that this is possible (Buckley, Bird, Sacks 2006) (Buckley SJ, Bird G, Sacks B, Archer T. 2006), But much more is needed (Buckley, 2008).

3-6 Memory

3- 6- 1 Definition

Memory is the ability to store and recall events. All memory systems including those used in computers, mice, and people, need storage space. This storage space in humans and animals is in their brains. Memory systems also need means for information to enter and exit its storage. Psychologists believe that the following three

processes are crucial for all memory systems: ciphering information, storing it, and retrieving it (Davidoff, 2000).

3-6- 2 Human memory, the Atkinson-Shiffrin Model

In 1968 Atkinson and Shiffrin proposed a model of human memory which posited two distinct memory stores: short-term memory, and long-term memory. Later a third memory store (actually the first in sequence) was added: sensory memory. Here are some of the characteristics of each memory system:

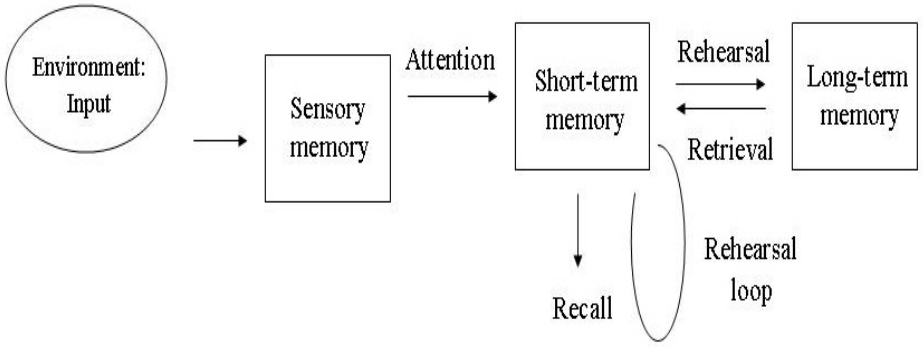

Figure 2. A diagram summarizing Atkinson- Shiffrin (1968) multi- memory model

Sensory Memory

Information enters the human information processing system via a variety of channels associated with the different senses. Perceptual systems operate on this information to create perceptions. But because of a limited processing ability at the higher levels, most incoming information cannot be immediately dealt with. Instead, we *attend* only to certain information. However, information not

immediately attended to is held briefly in a very temporary *buffer memory*, making it possible to attend to some of it a bit later, as when we can still hear someone asking us a question even though we weren't really listening when they asked it. This buffer memory is called *sensory memory*. Sensory memory is really many sensory memory systems, one associated with each sense, e.g., there is a sensory memory for vision, called *iconic memory* its duration: About 0.5 to 1.0 seconds; and one for audition (hearing), called *echoic memory* its duration: About 4 to 5 seconds (ibid.).

Short-term Memory (STM) or 'Working Memory'

Information that is 'attended to' arrives to another temporary store called *short-term* or *working memory*. The more recent term 'working memory' is intended to convey the idea that information here is available for further processing. In general, information in working memory is information we are conscious of and can work with. Here are some properties of STM: its capacity is low, as it holds about 7 (plus or minus 2) 'chunks' of information simultaneously- with a 'chunk' being as an independent item of information, one whose recall did not aid in the further recall of the other items. Miller defined random letters such as 'FRG' would each be considered a chunk, but letters that form a recognizable larger

whole, such as 'bat' would not: In this case the word 'bat' is a single chunk (Miller, 1956). The duration of STM is about 18 to 20 seconds (Peterson & Peterson, 1959).

The information held in STM, is often *encoded* verbally, although other strategies may also be used such as visualization. These strategies make it possible to 'rehearse' the information.

Information that enters STM fades away, or *decays* as soon as it is no longer attended to. (The duration of 18-20 seconds assumes that the information is not being actively rehearsed.) Information that is being actively attended to is represented by a pattern of neural activity in the brain may become represented more permanently by guiding changes in neural connectivity in the brain, a process referred to as *storage*. But information that is not more permanently stored is simply lost shortly after attention is directed elsewhere.

STM system or the working memory is a system of 3 interlinked components that are actually located in different areas of the brain- a *central executive*- the part of the system which processes information, and two temporary stores for holding information- *articulatory* or *phonological loop* (verbal short-term memory store), and *visuo-special short-term memory* store (visual short-term

memory) (Baddeley & Hitch, 1974; Baddeley, 1986). The two temporary stores may well be separate systems:

> Both experimental and neuropsychological evidence suggests that there may be separate verbal and visuo-spatial short-term memory systems, with potentially domain- general control of these storage systems in working memory (Jarrold, Nadel & Vicari, 2008, p. 68)

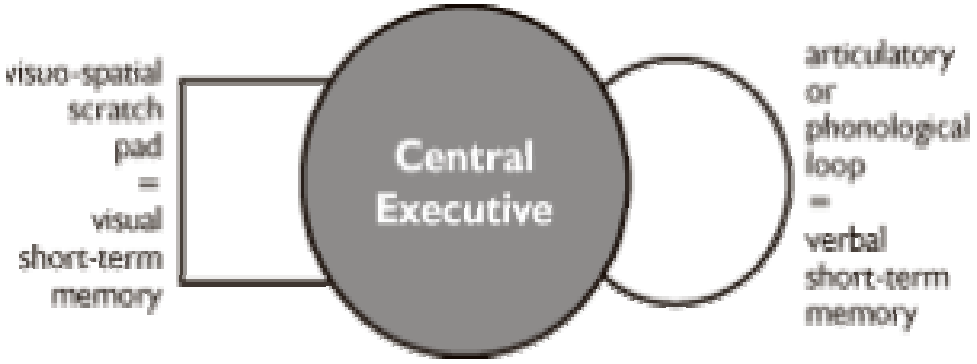

Figure 3. The working memory model, (Baddeley & hitch, 1974)

We have seen in Baddely & Hitch's 'working memory model' above that the STM is formed by three components to hold and manipulate information. The actual storage of verbal information relies on a sub-system of the model called the *phonological loop* (Baddeley, 1986). Digit and word span tasks are seen as measures of phonological loop functioning.

The loop itself consists of 2 sub-systems: the *phonological store* and *the process of subvocal rehearsal*.

Figure 4. The phonological loop, (Baddeley, 1986)

The phonological store is seen as a *passive* system, and the information is lost from the store over time due to the decay of information held there. However, this decay can be averted by *subvocal rehearsal*. This is a process of covertly repeating verbal information over and over to oneself. By doing this individuals can prevent the decay of information in the store, by refreshing the traces of items held there. Rehearsal is more efficient when one can rehearse more rapidly the items coming into the phonological store. Two empirical effects provide evidence for this process. Firstly, verbal STM span is directly related to the speed with which typically developing individuals can articulate words (Hitch, Halliday, Dodd &littler, 1989; Hulme, Thomson, Muir & Lawrence, 1948; Nicolson, 1981). Secondly, individuals typically show superior recall for words of a shorter spoken duration than for words of a longer spoken duration (Baddeley, Thomson &Buchanan, 1975).

This is because longer words take longer to rehearse, leading to greater decay from the phonological loop.

Because STM presents severe limits on the amount of information that can be held in mind simultaneously and on the duration for which it lasts once attention is withdrawn from it, STM has been described as the *bottleneck* of the human information processing system.

Long-term Memory (LTM)

Long-term memory is the relatively permanent memory store in which we hold information even when we are no longer attending to it. Information held in LTM is not represented as patterns of neural activity (as in STM), but rather as changes in brain wiring - in the 'conductivity' of existing synapses, and in the formation new synapses and destruction of old ones. Storing information in LTM is equivalent to a tape recorder writing patterns of magnetization onto tape to record music. The recording process is called *storage* and the 'playback' process, *retrieval*. The Capacity of LTM is virtually unlimited; its duration is up to a lifetime: when storage/retrieval capability is lost it is due to deterioration of brain systems rather than to systems exceeding their holding capacity. Its processing: Information is organized according to *meaning* and is associatively

linked. LTM can be sub-divided along a number of lines as jarrold, Nadel & Vicari describe:

> One common distinction is between 'explicit' (conscious) memory for facts and events and 'implicit' (non-conscious) knowledge and learning. A related distinction can be drawn between the learning of 'declarative' knowledge about facts and 'procedural' knowledge about how to perform particular tasks. The former represents an aspect of explicit memory, while the latter is often (though not necessarily) implicit (jarrold, Nadel & Vicari, 2008, p. 68)

It is difficult to determine how long memories can exist in LTM. If we cannot remember something we once knew, is it because it has been lost from the system, or because we have developed a problem locating it for retrieval. Permanent losses do occur as a result of brain damage, and it is possible that some memories simply decay away if they are not accessed for a very long time. We do know with certainty, however, that some failures of retrieval are due to temporary blockages and not to the loss of the information in memory. We may be unable to remember someone's name at present, for example, but later it comes to us. Obviously, it was there in memory all the while.

A common idea is that everything we have ever experienced has created a long-term memory, but this is unlikely to be so. Much of what we experience is never attended to, or not attended to beyond a

few brief moments, and probably does not result in activation of the storage process.

Evidence that STM and LTM are physically distinct systems

Memories in STM consist of patterns of neural firing that are being sustained in the brain, and that memories in LTM consist of altered patterns of brain wiring. The latter changes supposedly make it possible for certain inputs to regenerate something like the original patterns of neural firing that were present when the long-term memories were being laid down. One especially convincing piece of evidence for this distinction is found in the case of a victim of an accident who received a surgery in an attempt to control the symptoms (severe disabling pains). The surgery involved destruction of the hippocampus in both cerebral hemispheres. Following the surgery, he could no longer store new information in LTM, although he could still retrieve information that had been stored there in the years before the surgery. His STM was unaffected. He had become like a tape recorder that could still play back old tapes but could no longer record new ones. The fact that his LTM was severely affected without damaging his STM shows that these are two functionally distinct systems. (Davidoff, 2000)

There is also evidence that LTM involves a rather slow process requiring many hours to complete, called *consolidation*. If an individual is rendered unconscious (as in an accident), memories just beginning to consolidate at that time may not form. Of course, STM involves no such consolidation process.

3-6- 3 Memory in Down syndrome

For more than 26 years we have known that children with DS have a specific impairment in working memory particularly in the verbal STM part of the system (Jarrold, Nadel, Vicari, 2007).

Short- term memory in Down syndrome

There is clear evidence that DS is associated with particularly poor verbal short- term memory component performance (ibid). STM plays an important role in the development of aspects of language, particularly vocabulary development and perhaps also of reading ability. Poor STM is not seen in all individuals with DS but it appears to be associated with DS. The results of Jarrold and colleagues' paper are consistent with the suggestion of dysfunction within the hippocampal system in DS, and problems in verbal memory may be linked to the impaired functioning of pre-frontal brain region (ibid.).

The Phonological loop in Down syndrome

Out of the three components of the STM -the *central executive*, and the two temporary stores: the first being the *verbal STM* or the *articulatory* or *phonological loop*, and the second is the *visual STM* or *visuo-spatial scratch pad*, the phonological loop seems to be the locus of deficit in the STM in individuals with DS. This impairment will make processing of single words and speech difficult as well as reducing the ability to remember two or three items.

Individuals with DS perform poorly in digit and word span tasks which measure phonological loop functioning. A number of authors have suggested that the relatively poor performance on these tasks shown by individuals with DS reflects some form of impairment to the phonological loop component of this model (Jarrold, Baddeley, & Phillips, 1999; Jarrold & Baddeley, 1997).

Some authors suggested that the phonological loop deficit in DS have taken the form of *rehearsal* problem (Broadley & MacDonald, 1993; Comblain, 1996; Hulme & Mackenzie, 1992) where rehearsal means covertly repeating verbal information over and over to one self. Thus the individual prevents the decay of information in the store. Rehearsal might be the problem because individuals with DS might rehearse less efficiently than other individuals as they

rehearse more slowly. Another possibility is that individuals with DS do not tend to rehearse at all.

Other researchers suggested that a phonological loop deficit in DS might take the form of impaired functioning of the phonological store. In particular, Gathercole & Baddeley suggested that there are three ways in which phonological store might be impaired in children with DS. They propose that phonological representations might be noisy or degraded, that the store itself might be of reduced capacity, or that information might be lost from the store abnormally rapidly due to unusual fast trace decay (Gathercole & Baddeley, 1990a).

Suggestions for activities to improve working memory function in teenagers with DS

If one can improve the STM skills of individuals via some form of intervention program, then this may lead on to important benefits in terms of language and reading skills (ibid).

There have been many findings about deficits in the phonological loop, reduced memory spans for lists of items, and limited central executive capacity (there has been no specific research into central executive function as the tasks used are too difficult for most children with DS indicating very limited processing capacities. However, research with typically developing children suggests that

increasing attentional skills and increasing processing efficiency should help in addition to increasing the storage capacity in the two storage systems). These findings suggest 3 types of intervention strategies that may help to develop the working memory system (Buckley, Bird, 2001):

1. Activities to improve phonological loop function

Those could be activities that teach and develop *auditory discrimination of words* or phonics such as word discrimination games. e.g. point to objects with similar names: chair, bear; dog, frog; red bread. Other activities can include *auditory discrimination for sounds in words*- phonological awareness which is the sound in speech. These activities are for detecting sound patterns within words. Some of those include identifying words that rhyme and words that start or end with the same sound.

2. Activities to improve remembering lists of items

Many teenagers only have short-term spans for 3 or 4 items when using pictures and maybe only 2 or 3 items if asked to remember spoken words. Activities of this kind can be Simple memory games using objects or picture materials to increase short-memory spans. However, students should be helped by explicit rehearsal training.

3. Activities to improve attention and to increase processing capacity

Attentional skills have a role in increasing working memory capacity. The teenager with DS should not only be able to sustain attention but he or she should be able to switch attention between tasks or manage several aspects of a task simultaneously. Activities to improve attention can include reading books with an adult, play with an adult to teach them how to develop meaningful play, simple choice tasks, encouraging meaningful choices at home, having practice and experience of handling more complex tasks with support, and encouraging a teenager to record each step in the process rather than try to hold them in memory while tackling the next step.

Long term memory in Down syndrome

Individuals with DS also show impaired *explicit long- term* (the conscious memory which involves things like facts and events that people consciously recollect) *memory* of verbal information, this is why they score low on tests of free recall of word lists and short stories. They may also have particular problems in *explicit long-term memory* for *visual- object associations*. However, *implicit memory* (non-conscious memory which can be demonstrated indirectly, without conscious recollection) appears to be less

affected in DS, and may therefore provide an important basis for intervention approaches (Jarrold, Nadel, Vicari, 2007).

1. A visual-object long-term memory in Down syndrome

Visual–object long- term memory is the memory for the physical characteristics of objects. Individuals with DS show poorer learning of visual- object patterns compared to their own control group of mental age matched typically developing children (Wang, 1994). The impairment mentioned here cannot be attributed simply to the presence of intellectual disabilities but it is a peculiar characteristic of the syndrome (Jarrold, Nadel, Vicari, 2007).

2. A visual-spatial long- term memory in Down syndrome

Visual- spatial long- term memory is the memory for position and motion in space. Individuals with DS show similar learning of visual- spatial sequences compared to their own control group of mental age matched typically developing children (Wang, 1994).

The performance profile observed in people with DS highlights dissociation between more preserved visual-spatial memory and greater impairment of visual-object learning ability. There is general agreement in the literature that the neuropsychological profile of people with DS is characterized by their performance on graphic, constructive and spatial tasks, which are generally less

impaired than linguistic abilities (Abbeduto, Benson, Short, Dolish, 1995).

Finally, we can say that the relative sparing of implicit memory function may help explain why infants with DS show unimpaired performance on a memory task that requires acquisition of a motor response and why 20-43 month old children with DS are able to succeed at a deferred imitation task (Rast, Meltzoff, 1995).

3– 7 Attainment in Down Syndrome

A number of studies tried to describe attainments of individuals with DS. Among few is the one of Cunningham, Turner, and Knussen. The attainments in reading, number and writing skills, of 117 children with Down's syndrome, aged 6 to 14 years, were assessed using checklists completed by teachers. In a study of child and family functioning a wide range of variables was measured and the relationships of these to academic attainments were investigated using multivariable analysis. The children's mental age scores were most strongly related to academic attainments scores, but, in addition, type of school attended, gender, chronological age and fathers' scores on a measure of locus of control were significantly related. The results were discussed in terms of their implications for

educational placement and curriculum, and the role of fathers in their children's education (sloper, Cunningham, Turner, Knussen, 1990).

3- 7- 1 Academic attainments in Down syndrome

Academic attainments (reading, writing, and number skills) and self-sufficiency scores have steadily increased over the years for over 90% of the children. The most powerful predictor of progress has been the child's mental ability score accounting for around 60% of the variance for academic attainments and 40 to 50 % for self-sufficiency scores. For academic attainments greater progress was consistently and independently found for those children attending mainstream schools and who had high attentional-low distractibility scores. In 1986 research also found girls to have higher attainments than boys but this was reducing in significance by 1991. However girls were found to be less distractible than boys. In 1986 it was found that children, and more likely boys, of fathers with low locus of control scores made less progress. Thus fathers who feel they may not be able to apply much influence on events may be less inclined to become actively engaged in the child's education or have different aspirations. In 1991 more progress was found for children whose mothers used more practical and problem solving coping strategies to deal with child-related problems (Cunningham, 1996).

An indirect influence was found for occupation and educational level. Children of non-manual and higher educated parents were more likely to be placed in mainstream schools from the early years. It was found that about half the children of such parents went to a mainstream pre-school setting. However the effect was due more to lower educated manual occupation families seeking mainstream school from the cohort of the study.

Cunningham's research also found that the main factors related to attendance at mainstream school was mental ability and low distractibility scores. Yet of the children in special schools 15% had similar levels of ability and 63% similar levels of attention. Thus one can speculate that the families' attitudes towards education, and strategies and skills for dealing with professionals are directly influential on educational placement and thus have an effect on academic attainment (ibid).

Self-sufficiency scores are more influenced by family factors than academic attainment.

> In 1986 we found that once we controlled for mental age, higher self-sufficiency scores were associated with children whose mothers used practical and problem solving coping strategies and lower for those who tended to use wishful thinking. Children who had fewer behavior problems and were less excitable also gained higher scores. However, the effect of mothers' style of coping was still significant even for children

> with difficult temperaments and behavior (Cunningham, 1996, p.92).

3- 7- 2 Continuous learning for constant attainments

For the majority of children, as they got older the link between cognitive ability and development of life skills became weaker and the influence of family factors correspondingly stronger. In other words, although their cognitive ability imposes limitations on their intellectual achievements, by the time they reach mid to late childhood (with mental ages over 3-4 years) most have the ability to learn a wide range of life skills (e.g., learning new vocabulary) as Jarrold and colleagues declare: "While one would expect verbal short-term memory to predict vocabulary attainment in typically developing children, one might instead find that chronological age is a better predictor of new word acquisition in DS (Jarrold, Baddeley, & Phillips, 1999). Teenagers and young adults with DS will do so when supported by their family and given applicable educational opportunities (Cunningham, 1996).

3- 7- 3 Variables which influence academic attainment

Earlier studies of young people with DS have investigated a relatively limited range of variables which may influence their academic attainment.

The relative strength of such influences and how they may vary during their school years, has also been under researched (Turner, Albroz, Gayle, 2008). In their paper they tried to identify the contemporary and antecedent predictors of the level of academic attainment achieved by a representative sample of young people with DS. Their sample was a group of 71 young people with DS and their families. The mean IQ at the commencement was 40.4. Mean chronological age was 9 years at t1, 14 at t2, and 21 at t3, when all the young people had left school. The measured academic subjects were reading, writing, and numeracy. Predictors of the outcomes were obtained from questionnaires and interviews from teachers, mothers and fathers. A path analysis approach was used to investigate the pattern of predicators of the outcome over the 3 studies. Their results unveiled factors predicting greater progress in their measure between t2 and t3 were *lower chronological age* and *attendance at mainstream school*. Progress from t1 to t2 was also associated with *attendance at mainstream school* as well as with *higher t1 mental age*, *mother's practical coping style* and *higher child attentiveness*. Background factors predicting higher t1 scores were *higher mental age*, *attendance at mainstream schools* and *father's internal locus of control*. The path analysis model predicted 48% of the variance in 13 outcome scores. Severity of intellectual

impairment was by far the most significant predictor. Their results were broadly in agreement with other studies; Mainstream school attendance had a modest beneficial effect on the cohort's scores throughout the school career of children, independently of level of intellectual disability. Identification of predictors of attainment levels and improvement over time may help parents, teachers and other professionals involved with families of children and young people with DS optimize the attainment of such skills (Turner, Albroz, Gayle, 2008).

CHAPTER 4

Reading and Reading Acquisition

4-1 Definition of Reading:

Reading is a high order perceptual ability with a complicated set of skills which involves the child bringing together information from: letter–sound knowledge, the concept of a word, and comprehension. It means extracting information from text; the meaning of text here is the combination of text, pictures, diagrams, graphs, and illustrated instructions. It is not simply the decoding of written symbols to sound. It is an active process, self directed by the reader in many ways and for many purposes (Gibson, Levin, 1975). Reading is still the basis for learning; by acquiring reading skills, children understand later the multitude of sciences.

4- 2 Reading Acquisition Theories

In their 1975 book, *The Psychology of Reading*, Gibson and Levin declared that:

> Despite all the current emphasis on literacy, the wealth of programs commercially available, the "learning specialists" who have set up in shopping centers, and the arguments over phonics or whole-word [today one might add whole-language] methods, it is the beginning phase of learning to read that we seem to know least about. All the talk is of what the teacher does or should do and not of what happens or should happen in the child. (Gibson & Levin, 1975, p.264)

Since this quote appeared, much of the progress that has been made in understanding the reading acquisition process has occurred because we did start to focus on the process of learning itself. That is justified because if we focus on which processes, traits or skills the *child* actually learns as he or she becomes literate, this focus will be useful to know *what* and *how* the child learns. Consequently, we can better facilitate the passage to literacy. We should concentrate both on researching methods of reading instruction and factors that accompany those methods (Barr, Pearson, Kamil & Mosenthal, 1996).

4- 2- 1 Nonstage models of reading acquisition

Definition

In this view the primary advantage of skilled readers is their *increased knowledge of the world and language*. Better reader uses syntactic and semantic information to form hypotheses about the content of text with minimal reliance on orthographic information (ibid.).

In this model, reading development is thought to parallel language development, being a natural process that evolves because of the need to communicate. Goodman & Goodman state that " there

is only one reading process. Readers may differ in the control of this process but not in the process they use." (Goodman & Goodman, 1976, P. 148)

In nonstage model of reading acquisition, increased reading skill comes from increased language skill. Reading skill will therefore be facilitated by exposure to a text that is rich in natural language (i.e. not a controlled vocabulary). Therefore, reading acquisition will not be helped by focusing on parts of words. Furthermore, Smith suggests that "readers do not use (and do not need to use) the alphabetic principle of decoding the sound in order to learn or identify words" (Smith, 1973, p.105). He proposed (1971, 1973, 1978) that when readers do identify specific unpredictable words, they do so much in the way Gibson suggests they learn to identify letters by using their distinctive features as a starting point, e.g. by noticing their curved segment (Gibson, 1965). Letters are identified by asking the minimal number of questions that will distinguish one letter from another. Smith proposed the same method for identifying words. Individual letters within words are not identified. Rather the printed gestalt functions like a Chinese ideogram. Smith suggests that "in fact, we can read as efficiently as most of us do only

because we treat our written language as if it were ideographic…" (Smith, 1971, p.118)

The Theory of Knowledge Sources and Procedures for Reading Acquisition

In their attempt to explain the procedures for reading acquisition, Thompson & Fletcher-Flinn state that:

> "In a theoretical account of acquisition of any cognitive skill, consideration of the following is merited: *goals* of the learner; the learner's *use* of different classes of procedures for responding; the *sources* of the learner's knowledge used in the different classes of procedures, including antecedent experiences and any transfer from existing knowledge or skills; in each class of procedures, the *relationships* between contributions of knowledge from the difference sources; *links* between skills acquired and existing knowledge and skills." (Nicholson, Tunmer, 1993) I MIGHT DELETE THIS REFERENCE

They declared that there are two main divisions in the skills which encompass reading: skill of *identification of the words*, and skill of *comprehension of the text*. In theory, and after focusing on the object of word recognition, they focus on the goal of reading which is the reception of the meaning. This theory has two classes of procedures for making identification responses to a printed word: the first one is *recall* which means recall from representations which are stored as a consequence of experience with the particular word.

The second one is generation: it is comprised of the procedures that have some generality beyond a specific word and can generate a response to a print word where none is attainable by recall (ibid.).

This theory (KST) claims that one of the 5 assumed sources of knowledge in beginning reading come from interrelationships among the child's vocabulary of familiar reading words. This source gives rise to the *lexicalized phonological recoding* which is a form of phonological recoding that involves all the patterns of relationships between letters and phonemes that children are able to implicitly include from their reading vocabularies, e.g. sit, said, and see, have common initial letter and sound: this called *induced sublexical relations* IRS (Thompson, 1999).

The KST comprises the notion that explicitly taught letter sounds is a potential source of knowledge for beginning reading. However, the theory implies that it is not a necessary source of knowledge.

The KST explains how beginning readers can progress in very diverse instructional environment, a matter of problematic for the commonly accepted theories. It also provides an expanded view of children's acquisition and use of the alphabetic principle. First it should be viewed as the principle that "letters *of words*

systematically map onto phonemes *in words*" (Thompson, 1997). Second, beginning readers should be expected to acquire it as a *principle*, rather than as just a specific set of letter-sound correspondence. For this reason, they should be expected to acquire untaught examples of the alphabetic principle by implicit self-teaching of patterns of letter-phoneme relationships among the words of their accumulating reading vocabulary (Thompson, 1999).

4- 2- 2 Stage models of reading acquisition

Stage models of reading acquisition theories are developmental and psychological theories of reading which were based on Piagetian principles. The development in stage models involves progression through an invariant sequence of stages where skills learned in one stage are prerequisite for the following stage, and where stages cannot be skipped. Stage theories of literacy development were developed in parallel to stage models of spelling development. They are based on analysis of children's first attempts at reading aloud words, and can account for some developmental disorders of literacy by assuming arrest at particular stages of development.

These models have common features e.g. initial stage is 'picture' recognition, middle stage is phonic decoding, and final stage is orthographic word recognition. (Pitchford, Sellman, 2007).

Marsh's Theory of Reading Acquisition

At each stage of this theory, children use qualitatively different strategies in their approach to reading.

1. At *Stage 1* the child makes simple *rote associations* and recognizes words as a whole on the basis of visual clues.

2. At *Stage 2* the child uses his *guessing strategy* based on his word knowledge. He responses to unknown words on the basis of their *graphemic features* and the *context* in which the word is found.

3. *Stage 3* is characterized by *sequential decoding* where the children can use complex rules and translate letters into sounds, thereby decoding print.

3. At *Stage 4* the child learns *hierarchical decoding* and conditional rules and can apply those to reading, such as the pronunciation of 'c' when followed by certain vowels (Marsh, Friedman, Welch & Desberg, 1981).

Frith's Integrative Theory of Reading Acquisition

Frith proposes that the child goes through three main types of strategy in a fixed sequence as he becomes literate. Each strategy is added to the next so that by the end of development the child has all three strategies at his disposal. According to Frith:

1. *Stage 1* is named the *logographic stage* where recognition takes place by associating a familiar word with its graphic form based on features such as its length or its overall shape. Frith declares that this stage is unreliable and an inexact strategy often called 'sight vocabulary'.

2. *Stage 2* in Frith's Theory is called the *alphabetic strategy stage* where the child begins to 'break the code' and tries to apply a new approach to reading by exploiting the correspondences between graphemes and phonemes. Clearly with an irregular script such as the English language (or the Arabic language) many errors are made at this stage.

3. At *stage 3* the child begins to learn the *exceptions to the rules* of reading thus he develops his own lexicon and can analyze words using an 'orthographic strategy'. In this process words are read as whole units or segments and the child begins to recognize letter strings (such as 'ight'). This, Frith argues, is done without phonological conversion (Frith, 1985).

Goswami &Bryant's Theory of Reading Acquisition

This theory does not outline discrete and identifiable stages of development but refers to a more interactive developmental process in which the child's knowledge about the orthography is affected by,

and in turn changes, the child's phonological knowledge (Goswami, 1993).

Goswami and Bryant believe that a great deal of development takes the form of children improving the strategies they have available to them. It draws on the literature which has investigated reading related to cognitive skills rather than focusing on the strategies used by children in their reading development and it allows for the fact that some children progress faster in their literacy acquisition than others. The theory suggests three causal connections:

1. The first causal connection occurs before the child begins to read and involves the child's *sensitivity to sounds in words*. Goswami and Bryant found that the important phonological units for children are *onset* (salt, soft) and *rime* (pink, mink). They found that children begin categorizing words that rhyme very early on form which they can make inference about new words. Children who are sensitive to rhyme eventually do much better at reading (Goswami & Bryant, 1990).

2. The second causal connection is *learning the alphabetic script* which happens usually as a result of being taught to read and write. After being introduced to the alphabet, an *awareness of phonemes*

develops extremely rapidly for most children. In keeping with Frith's (1985) theory, this new found alphabetic strategy is not supposed to be used immediately in reading, but in spelling (ibid.).

3. The third causal connection in this model was first suggested by Utah Frith. It is the link between children's reading and their spelling. Here, cause and effect travel both ways. As soon as children begin to read and spell, they begin to link spelling sequences with onset and rimes. At a later stage, after approximately two years' experience of learning to read, they begin to connect reading with spelling (ibid.).

Ehri's Theory of Reading acquisition

Ehri's portrayal of skilled reading is presented as a "psychological guessing game in which the reader processes and coordinates simultaneously three types of information: graphics, syntactic, and semantic" (Ehri, 1978, p.1). On the other hand, Ehri added that reading is not only a psycholinguistic guessing game in which readers learn to use context to predict words in text (Goodman, 1976), but that readers also build a dictionary of written words in memory (Ehri, 1978).

As children read the same words repeatedly, the *spellings* of the words become bonded to syntactic, semantic and phonological

identities already stored in memory. When readers see words that they have learned in this way, they read them not by guessing or sounding out, but rather by accessing the combinations in memory. Guessing or sounding out words are used mainly to read unfamiliar words (ibid.).

According to Ehri, readers remember how to read a specific word by interpreting *graphemes* they see in its spelling as *symbols for phonemes* they detect in its *pronunciation*. Connections are made between the two, are stored in memory, and are accessed to read the word the next time it is seen (Ehri, 1998).

The key point is that general grapheme-phoneme knowledge provides readers with a powerful mnemonic system that bounds the spellings of individual words to their pronunciations in memory. Once this system is known, readers can learn to read words and build a lexicon of sight words easily. Ehri also advocates that spelling influences children's sound segmentation ability (Ehri, 1979; Ehri, Wilce, 1980-b, 1986).

According to Ehri, phonemic awareness (segmenting syllables into individual speech sounds) is a cause as well as a consequence of literacy acquisition, with each influencing the other as children learn to read and spell. However, when it comes to practical

questions like: how to teach phonemic awareness? When to introduce letters? How to introduce letters? She was not so sure a complete resolution has been achieved (Ehri, 1998).

4-2-3 Supporting evidences and criticism for the stage theories of reading acquisition

I Supporting evidence for stage theories of reading

This evidence came from studies that tested the validity of the claims which these theories generated. As an example, here are the central tenets of Frith's (1985) integrative theory of literacy acquisition and studies which generated supporting evidence:

1. *An initial logographic stage of reading*. This claim was tested by a study of Berninger et al. (1990) which found that visual language skills at the end of kindergarten predicted reading.

2. *Logographic reading drives the development of logographic spelling*. Evidence for this claim came from a study by Berniger et al. (1990), they found that early reading and spelling are logographic in nature then shift to alphabetic processing.

3. *Phonological awareness is related more to early spelling than reading development*. A study found that logographic reading had less effect on later reading ability than early alphabetic reading

suggesting a shift from logographic to alphabetic reading over grade-one (Wimmer et al. 1991).

4. *Training in phonological awareness influences spelling development before reading*. A research of Lundberg et al. (1988) suggested that phonological awareness training influenced spelling but not reading in Grade 1. However, phonological awareness training had a later influence on reading in Grade 2.

5. *Increased phonological awareness gained from spelling drives the development of an alphabetic reading strategy*. The same above mentioned research asserted that training in phonological awareness influenced an alphabetic strategy in spelling that later influenced development of an alphabetic reading strategy (ibid.).

6. *The acquisition of orthographic knowledge gained from reading becomes implemented in orthographic spelling*. In their studies, Cunningham & Stanovich (1990, 1993) have demonstrated that continuous exposure to letter sequences of words in reading leads to the development of orthographic spelling. They suggested that orthographic knowledge builds up from print exposure from the start of literacy acquisition and not only at the final stage (Stanovich, Cunningham 1990, 1993).

II. Criticisms for stage theories

Criticisms include the following: are stage theories universal like Piaget thought stages of cognitive development to be? The other criticism is that stage theories assume that all children are alike and receive similar literacy instruction. Yet this is not so. Individual differences exist that question the notion of stages in reading development. Finally they have difficulty accounting for double dissociations e.g. subtypes of dyslexia (Pitchford, Sellman, 2007).

4- 3 Educational Approaches for the Reading Process

Reading processes are either bottom up or top down. A reader might approach a text using 3 strategies; the first two are top-down (schematic) and bottom-up (linguistic) processes (Hedge, 2000). The third reading process is a combination of both.

4- 3- 1 Bottom-Up Process

This approach advances as follows: training the child first in Phonological awareness→ letter recognition→ word recognition→ word meaning→ use of word in language.

This educational approach starts with the smallest units of language and emphasizes sound-letter identification. Progress of child requires mastery of sub-skills, and the meaning is extracted through decoding (e.g. breaking down words into sounds and blending to approach difficult words).

Teaching a child by means of this approach will require:

1. Training him in *phonic and graphic* awareness, sound/ symbols relationships, and phonetic alphabet.

2. Teaching him the *letters and sounds* of his language by following 5 graded phases: starting with basic sound awareness, then increasingly complex segmenting and blending, later practice fluency, and finally practice and learn how to spell irregular words. Teaching phonics in this approach is as means to an end: to facilitate comprehension in later years.

3. Playing games such as I spy, Odd one out, rhymes.

4. Using phonic videos in class.

5. Showing the students sequenced pictures and asking: what is the story? (Pitchford, Sellman, 2007)

4- 3- 2 Top-Down Process

At this process the child should have prior knowledge and language skills as a starting point; furthermore, the search for meaning is central from the outset. The main strategies for decoding words are prediction and guessing (Britton-Joffick, 2000).The letter-sound and word knowledge gained trough exposure to meaningful text and comprehension. This approach emphasizes whole language

approaches (e.g. shared reading, closed passages). It also uses word attack: the use of whole sentence and contextual clues to identify words that are difficult to read (Pitchford, Sellman, 2007).

Teaching a child by means of this approach will require:

1. For comprehension, a teacher might present a text then ask questions about it.

2. Dependence on previous experiences of the child (e.g. to complete a story with missing words).

3. Using Clozing (ibid.).

Components of the reading from the 'Top-Down' process

From a summary by Roger Beard, Components of reading using the 'top-down' process include:

1. Finding pleasure and purpose in literature.

2. Efficiently locating written materials.

3. Effectively understanding texts.

4. Appreciating organization in texts.

5. Using cohesion and syntactical structure in texts.

6. Recognizing words.

7. Detecting patterns of meaning within words.

8. Analyzing letter-sound relationships.

9. Recognizing letters (Beard, 1987).

4- 3- 3 The Interactive Model of Reading

In this model, the reader obtains his information from the text's features and his own resources, from both he constructs the meaning of the text. Educational practices tend to use both approaches with an increasing trend towards bottom up approaches within the early years. There is some evidence that bottom up approaches teach reading skills (i.e. decoding) most consistently (Rice & Brooks, 2004).

4- 4 Methods of Teaching Reading

At the present time we have seen a shift from the 'contrived' (as called by the proponents of the 'Whole Language' and 'Real Books' approaches) methods of teaching reading to the 'natural' way. The so called 'contrived' methods include the alphabet and phonic methods, the 'natural' approaches include 'Whole Language' and 'Real Books' methods. Nowadays, there is a shift away from the 'natural' because too many children have failed to learn to read and there is now a move towards more 'balanced' approach (Britton-Joffick, 2000). Methods of teaching reading include the following methods summarized from Britton-Joffick, (2000):

4- 4- 1 The Alphabet Method

It is based on children learning the letter names. This method was used till the beginning of the 20th Century.

4- 4- 2 The Traditional Phonic Method

This method was used from the beginning of the 20th Century well into the 1950s. Children learn the most common letter–sound relationship e.g.'d' as in duck. 'e' as in eagle. Next the child learns to sound the letters of a word consecutively, e.g. 'd'-'u'-'c'-'k' and proceeds to build the word 'duck'. This becomes the child's strategy for new words as the child learns to match the letter (grapheme) to the sound (phoneme). Graded phonic reading schemes were used but because the words were limited, the stories were contrived and uninteresting.

4- 4- 3 The Whole Word Method

This was a popular approach and was influenced by the child development theories of Dewey and Forebel. Children were presented with whole words and they learned by rote. Similar approaches were called 'Look- and Say' and 'The Sentence Method'. The main problem with these methods was that the children were too dependent upon the teacher.

4- 4- 4 The Phonic-Word Method

This method was introduced in 1956 by Daniels and Diack in the UK and in 1959 by Flesh in USA. In it, children would learn the letter sound but not in isolation of a word e.g. they would learn the word 'd-u-c-k' blending the sound together. This approach contrasted to the Traditional Phonic Method where the letters were learned in isolation from each other and the word.

4- 4- 5 Initial Teaching Alphabet

This approach was devised by pitman in 1960. It consisted of a set of characters (each phoneme in the English language was represented by one character, which would make it easier for the children to understand the basic principles of writing) extending the traditional orthography to include new shapes representing additional vowel sounds, e.g. there were four different ways representing the letter 'a', depending on the sound of 'a' within a word. It was used in many schools in the 1960s. The problem with this method was that children had to unlearn it when they switched to regular reading.

4- 4- 6 Key Word Approach

Published by McNally and Murray in 1968, this approach is based on research which analyzed vocabulary studies. They found that 12

words made up over a quarter of all adult and children reading matter and that 100 words made up over half. The 12 words were: a, and, he, I, in, is, it, of, that, the, to, was. The Key Word study formed the basis of the Ladybird reading scheme and this has been one of the most successful reading schemes in terms of sales to parents as well as schools.

4- 4- 7 Phonics 44

The Phonic 44 Approach is based on a published linguistically informed scheme by Dr. Joyce Morris in 1974 called " Language in Action" which she based on a system she called 'Phonics 44'. This consisted of the 20 vowel sounds and the 24 consonant sounds found in Received Pronunciation (RP) of the English language.

In her book *The Morris-Montessori Word List* Dr. Morris stated that the name "Phonics 44" was chosen for the method to emphasize the fact that it is the product of linguistic analyses concerned with the study of the number and frequency of relationships between the 44 speech sounds of RP and the alphabet letters, which singly and in combination, represent them in the English writing system (Morris, 1990). In her book, she included the 'Phonic44' approach and it has been used as the basis of the updated and recommended Montessori approach.

4- 4- 8 Language Experience Approach

It is a highly individualized approach which allows for several different methods to be used at the same time. Language Experience Approach is based on three assumptions:

1. Children have had and will continue to have experiences.
2. Children are able to talk about their experiences.
3. If children learn to write down what they say, this may be used as an instructional tool to teach them to read.

   This approach reflects the belief that a child can learn to read if reading is presented in a way that the following thinking process is followed (Oelwein, 1995):

a. what a child is thinking, he or she can talk about it
b. What he talks about, he can write about (or someone else can write it for him.
c. What is written can be read (by the student). Therefore, the student can read also what others have written for him or her to read.

4- 4- 9 Individualized Reading Approach

Similar approaches are also referred to as 'free reading', 'personal reading', 'self selected reading', or 'voluntary reading'. It is indicated

that individualized reading depends on the teacher's decision to give students guidance in reading on an individual basis. A framework was suggested for the Individualized reading based on grouping books into 13 levels divided into 4 stages:

1. Pure picture books.
2. Introductory.
3. Developmental reading.
4. Bridging reading.

Criticisms for this approach are that there is not enough time, that children often stick at a level they find easy and do not progress further and some children continually opt out.

4- 4- 10 'Real Books' approach

This approach recommends using real books as opposed to a reading-scheme. The criterion for choosing a book is that it must be worth reading.

The books introduced to a class can be presented as graded books that range from easy books, into a little more difficult book, into ones which need an effort to understand. Each book is read first to the whole class then the children choose the story they wish to read.

4- 5 Reading Readiness Skills

Reading readiness skills indicate weather a child is ready to learn to read. These skills are summarized from a list at the site of the National Institute for Literacy (www.readingrockets.org, 1998).

1. Age- appropriate oral language development and vocabulary.

2. Appreciation of stories and books.

3. Phonemic awareness i.e. the ability to hear and manipulate all the phonemes in words regardless to meaning (Fowler et al., 1994). It requires the pupil to detect *rhyme*: e.g. coat, goat; *segment words into their phonemic segments*: sun into sss-uuu-nnn; or to *categorize words on the basis of shared segments*: *c*at and *c*ough, ri*b* and ca*b*. It is mostly linked to *decoding* (the ability to apply letter-sound correspondences to sound out new or unfamiliar words). Decoding skill is an important component of *word recognition* (the ability to identify previously encountered highly familiar real words) (Gough & Walsh, 1991). Word recognition does not guarantee reading comprehension; nevertheless, it is an important component. Reading comprehension is a product of both decoding and listening comprehension; both must be in place for text to be understood (Gough & Tunmer, 1986).

4. Understand of basic print concepts (e.g. understand that: printed text represents spoken words, spaces between words are meaningful, pages written in English are read left to right starting at the top of the page, and that books have a title and an author.)

5. Understanding of the alphabetic principle (letters represent the sounds of language.)

6. Ability to distinguish shapes (visual discrimination.)

7. Ability to identify at least some letters of the alphabet.

4-6 Concepts of Print: what do beginning readers need to know about print?

Children should acquire letter knowledge i.e. recognize and name letters and recognize other concepts such as:

Orientation i.e. place the book correct way up; recognizing that print carries the verbal message; understanding that print is read from right to left (in the Arabic case); Locating the first and last parts of the story; recognizing that the top line of print is read first; and finally, understanding that the page number is not part of the story (Clay, 1979).

CHAPTER 5

Down Syndrome and Reading

5-1 Background:

Back in 1979, children with DS were not thought capable of learning to read at all by most professionals and parents and there was very little research into the causes for this spoken language difficulties (Buckley, Bird, 1993).

Nevertheless, few years ago, studies from Australia and UK have indicated that some 60% to 70% of individuals with DS can achieve functional levels of literacy by adult life (Buckley, 2001). Children with DS with continuous experience in classes with language activities from preschool until adult years are the ones with highest levels of achievement in literacy, but individuals may make significant progress at any age into early adulthood, and many late starters do achieve functional levels of literacy.

In Syria, this particular segment of society was, until few decades back, given the silence treatment; that is to say, they were not given sufficient attention regarding their development and their education. For many cases, families were the only source of care and support. Few government and some civil organizations took care of their education and habilitation. In the beginning of this

millennium, more welcomed attention was given to them and more associations and organizations have commenced giving their help and support to children and individuals with DS.

The Syrian government, with the collaboration of the ministry of education, launched in the year 2000 the educational inclusion project for children with special needs. A national seminar was held then to define the mechanism of the project, and the Division for National Inclusion was formed in the Ministry of Education (www.syria-news.com , 2008). The government also passed a law back in 2005 to include the percentage of 4% of the physically and mentally challenged population into the total working power as employees in government run divisions and companies. Unfortunately, the law has a provision for accepting these individuals which is to have academically the minimum of obtaining the national certificate of Grade Six (Resolution No. 8/MW (و.م), the Syrian Arab Republic, Prime Ministry, 2005), which is extremely difficult to be obtained presently by students with DS due to lack of proper teaching programs.

5- 2 Teenagers with Down Syndrome and Reading

5-2-1 Introduction

Reading skills are often an area of relative strength when compared to other language skills for individuals with DS. Most children with DS acquire literacy skills, although a great deal of variability exists in the level of achievement obtained (Snowling, Nash, Henderson, 2008). Consequently, many individuals with DS can learn to read despite of the range of impediments forced on them by the nature of the syndrome (Appleton, 2000). Reading would be a useful independent skill in their everyday lives, improving their ability to participate in formal education, increasing employment opportunities and better inclusion in society.

A study by Rondal et al. stood on the basis that it is possible for people with DS to acquire reading skills even beyond adolescence (Fowler et al. 1994, Farrel, 1996). This study tries to apply previous findings in a way which could provide evidence for an effective intervention strategy to develop the speech and language skills of people with DS (Rondal, Rasore-Quartino, Soresi, 2004). Their results showed significant gains in language comprehension and expression and a significant increase in the range of linguistic structures.

The majority of teenagers with DS will have been introduced to reading during their primary school years. Few would be by now readers, some would be emergent readers, others would know some or all the alphabet (phoneme-grapheme wise), but could not join these units to articulate words, phrases and sentences.

In Damascus, Syria, the researcher encountered few teenagers and young adults with DS who obtained reading skills. She also met a number of teachers at special schools in the Damascus area who also informed her about other incidents where individuals with DS were actually among the reading population. Exact information on *how* they became readers, and *the exact age* they were when they acquired it was vague due to the unavailability of meeting the source of that information (parents, teacher, ex- teachers, and care-takers of those individuals). Nonetheless, the existence of such a group raises hopes about increasing the number of readers among teenagers with DS in Syria.

Teenagers with DS who have not achieved reading success in their primary years may make significant progress during their teenage years (Bird, Buckley, 2002), or even in their early adulthood. For those who want to learn reading skills, they will pass through the same processes, though slower, of learning as their

normally developing peers. They can profit from reading instructions and become readers with a help of a carefully designed method which includes appropriate procedures and materials suitable for their specific areas of strengths and weaknesses.

Life is dull and hazardous for someone who cannot read. He/she cannot read (among other things) street names, malls and shops' names, adverts on billboards, sign posts, different products' names, expiry dates on food packets, on CD's, DVD's, games, equipment instruction manuals, and names and addresses in telephone directories. We take for granted the ability to leave a note, write a reminder on a piece of paper, write a birthday card, write a shopping list, complete a form, and look up TV programs in the newspaper or magazine. Most of us also take for granted our ability to enjoy a novel or read a book for information. These different reading activities require different levels of reading abilities.

Being literate is very important for individuals with DS too. It is simply so, because all of the above situations apply to them as well. Acquiring reading skills helps individuals with DS to use them for practical use and pleasure. Therefore, the significance of this research and its program for teaching reading lies on these starting points:

5 - 2 - 2 Reading is a fundamental life skill

A 'reading age' of eight to nine years is the average level of reading skill of a typical eight to nine year old. It is sufficient to read many daily newspapers and books and to write letters. While some individuals with DS may not achieve this level of reading, many *will* if they are given the chance to learn (Farrell, Gunn, 2000) (Van Kraayenoord, Moni, Jobling, Ziebarth, 2001). If they only achieve a limited level of socially useful literacy, this will be an advantage. The only way to find out what level of literacy each child is able to achieve is to give him or her every opportunity to learn with well planned teaching methods from preschool years to adult life.

For children and adults whose literacy skills are limited it is still important to value them and make them functional, as Christopher Kliewer argues expressively in an article entitled *Citizenship for all in the literate community* and in his book *Schooling children with DS*. Kliewer describes teachers who made insightful and bright use of the limited sight-word reading skills of some students with DS in their classrooms, while others dismissed this level of skill as 'not real reading' (Kliewer, 1998).

5 - 2 - 3 Reading instruction can develop speech, language and memory skills

While being able to read and to write is a practical skill to be used in all the ways described above, reading ability also influences the ongoing development of speech, language, and memory skills. Research on the links between typically developing children's reading progress and other aspects of their cognitive development suggest reciprocal interactions in the following ways:

Since 1966 there have been reports in the literature suggesting that children with DS can achieve functional levels of literacy and that reading might accelerate speech and language acquisition, they used case study evidence to argue for the effect of reading on spoken language (Duffen, 1976; Orme, Fisher&Griggs, 1966; Rhodes, Gooch, Siegelman, Behrns&Metzger, 1969; Saunders& Collins, 1972). In a case study of a Dutch boy it was pointed out that research from English speaking countries has proved that one can start teaching children with DS at the age of 3 or 4, even before they start to speak. The advantages are that "the very first bit of reading proficiency might be used to increase speech production, to train syntax and to improve articulation." (De Graff, 1993, p.87)

New words learned on flashcards by children with DS can soon begin to emerge in the child's speech and may do so more quickly than words the child is only hearing. When the child practices two-word and three-word utterances in reading it accelerates their emergence in the child's speech. When a child practices proper sentences in reading, it leads to the use of function words and increasingly correct grammar and syntax in speech. This would be a great achievement for children with DS considering the difficulty they face to master the rules of grammar and syntax (Buckley, Bird, 1993).

Children vary in their rates of developmental progress in their preschool years and when they start Fulltime School, for example, in any class of 30 five year olds, some children will have more language knowledge and better short-term memory skills than others. Research studies (Buckley, 2001) have shown that the more language knowledge and the better the phonological awareness and working memory skills that children bring to the task of learning to read, the faster they will learn to read in the first year of reading instruction. In the second year in school, reading success appears to develop language, working memory and phonological awareness skills. Over the second school year, children who have better reading skills show greater gains in language learning and in

increased short-term memory spans than children who are not progressing so fast with reading. Progress in reading, speech and language, and memory are interlinked and can support each other in a reciprocal way.

Reading instruction is important for memory and language development in children with DS (Laws, Buckley, Bird, MacDonald & Broadley, 1995). In their longitudinal study, they measured language and memory development of 14 children over the period of nearly four years as part of their research investigating the effect of teaching memory strategies.

> Half of the children were readers or became readers in the course of the study; there were no significant differences between readers and non-readers in vocabulary and grammar understanding, or in auditory and visual memory performance. By the end of the study, a significant advantage of the readers was noted for all language and memory measures." (Ibid., p. 59)

In an experiment done by Leslie Duffen, she noticed two observations while teaching her daughter to read; first that the 3 and 1/2 years old child found learning the words on flashcards easy even though she was just beginning to talk, second that she began to use the words and sentences she read in her speech (Duffen, 1974). In accordance to that, a research conducted by Sue Buckley had some

evidence that print can be used to teach teenagers to speak in longer and more complete sentences (Buckley 1993).

In 1980, Duffen and Buckley had a number of interesting hypotheses:

1. Children with DS can learn to read from the age of 3 years.
2. Such reading instruction will develop the children's speech and language skills.
3. Such reading instructions may make the children 'brighter'. (Buckley 1995)

They collected many case studies about children with DS being taught to read by their parents, with the help of a pre- school teacher and they all confirmed the first 2 hypotheses. Children being taught to read did learn to read and it did lead to better than average speech and language skills. The problem was that they could not follow all the students after they became 5 year olds. The ones which they did follow went into classrooms where teachers did not believe in teaching reading, so their preschool progress was wasted. Some left special schools at 16 reading less than they did at 5 years (Buckley, 1995).This leaves us with the very important issue of this research: keep teaching students with DS language skills into their adult years.

5 – 2 - 4 Reading can develop phonological skills, vocabulary and grammar knowledge

If a child is presented with reading instructions he/she will enhance his/her phonological awareness (Morais et al., 1991) because he would consciously attend to the sound structure of his own language.

In an article based on language, memory and reading information, Laws and Gunn described how they have gathered information for a five year follow-up study of 30 children and adolescents with DS, aged from 10 to 24 years. At the end of the study they stated that at time1, 10 individuals were classified as readers but by time2 this number had risen to 16. Their study verified that readers significantly outperformed non-readers on tests of nonverbal ability, language comprehension and production, phonological memory, and phonological awareness. Phonological memory and early letter knowledge at t1 were significant predictors of reading scores for t2 readers, after controlling for age, nonverbal ability and corresponding t1 reading scores. The study found that early reading skills may be significant predictors of MLU five years later, after controlling for age, nonverbal ability and hearing (Laws& Gunn, 2002).

5 – 2 - 5 Access general knowledge and the school curriculum

Reading opens up access to knowledge from print via the Internet, computer programs, books, magazines, and newspapers. The main vocabulary learning time for typically developing children is between the ages of about seven and sixteen. It has been estimated that children come into school at about five years with vocabularies of some 2000 words but between seven and sixteen years they typically learning on average some 3000 new words every year (Nagy, Herman, 1987). Imagining the vocabulary a reader with DS can acquire if he reads constantly, makes acquiring reading skills a fundamental necessity in his life. These skills will enable individuals with DS read general knowledge inside or outside school, at home or work.

5-2-6 Support for problem solving and thinking skills

When a teenager with DS becomes a skillful reader, he will learn problem solving techniques derived from the procedures he/ she would use to comprehend the text. The teenager might use the context of an unknown word, the pictures on the page or even a simple dictionary to find out its meaning. The accumulated knowledge from the stories and books he/ she reads will make him encounter individuals and animals in a variety of situation where morals are being gained and problems are solved; this in itself is a

wealth of information that no child, teenager, or adult should be denied.

5-3 Reading Theories Applied for Teaching Reading to Teenagers with Down syndrome

Some features from reading acquisition theories can be applied into the process of teaching teenagers with DS the skill of reading. Stage theories might be the most applicable here because they are suitable kind of language development (Bird, Buckley, 1994) individuals with DS usually pass through.

5- 3- 1 Frith's Integrative Theory of Reading Acquisition and its application to teaching reading to teenagers with DS

Teaching reading to teenagers with DS can be done benefiting from Frith's Integrative Theory of Reading Acquisition where at the *logographic stage* recognition takes place by association a familiar word with its graphic form based on features such as its length or its overall shape. A number of studies propose that word identification skills develop relatively well in DS, perhaps suggesting that particular logographic approach with decoding abilities lagging behind (Buckley, 1985). Some children with DS identify words by their visual patterns and access meaning directly from print (ibid.)

Some children with DS can read non-words e.g. *mak*, *rop* which means they rely on grapheme-phoneme correspondences (Gombert, 2002), suggesting a future word reading (Fowler, Dohherty, Bynton, 1994). The *alphabetic strategy stage* in Firth's theory might be used to teach individuals with DS who are linguistically ready for it. There will be difficulties because they might rely for their language skills on their right hemisphere processes in the brain, one of its limitations is that it is not able to use sound to print (grapheme to phoneme) coding (Byrne, Buckley, MacDonald, Bird, 1995).

The third stage in Frith's theory is where the child begins to learn the *exceptions to the rules* of reading, develops his own word list, and analyzes words using an 'orthographic strategy'. If an individual with DS reaches this stage and can read words as whole units or segments, then, he could be taught to recognize letter strings (such as 'ight'.) This application of the theory might not be applicable to teenagers with DS unless they are readers already, have good experience in reading, and are consistent readers.

5- 3- 2 Marsh's Theory of Reading Acquisition and its application to teaching reading to teenagers with DS

Teaching method can benefit from application of its first theoretical stage, '*rote associations': teenagers with* DS can make simple rote association (Buckley, 2001) and recognize words as a whole on the basis of visual clues which are strength in their case.

The '*guessing strategy'* based on word knowledge can be used also. The teenager can respond to unknown words on the basis of their *graphemic features* (Buckley, 1985). But he might not be able to use the *context* in which the word is found to understand it due to lack of comprehension (Laws, Gunn, 2002) of the text in individuals with DS.

The last theoretical stage in Marsh's theory (*sequential decoding,* where children can use complex rules and translate letters into sounds, thereby decoding print.*)* might be also applicable to teaching reading to some individuals with DS (Cologon, Cupples, Wyver, 2007).

Finally the more experienced teenager with DS, who is already a developing reader can enter the *hierarchical decoding stage* and learn conditional rules and can apply those to reading, such as the

pronunciation of the Arabic letter 'ت' when located at the end of a word (e.g. باخرة).

5- 3- 3 Goswami &Bryant's Theory of Reading Acquisition and its application to teaching reading to teenagers with DS

Some concepts of Goswami & Bryant's theory can be applicable to teach individuals with DS reading skills. Concerning sensitivity *to sounds in words*, the *onset* (salt, soft) is identifiable with difficulty in children with DS (Snowling et al., 2002), furthermore, they identify rime with even more difficulty (pink, mink)(Cardoso-Martins et al., 2002) (Hulme et al., 2008) (Nash, 2007).

The stage *learning the alphabetic script* which happens usually as a result of being taught to read and write can be trained. After being introduced to the alphabet, an *awareness of phonemes* might be developed in students with DS with repetition and consistency. Children with DS may not progress to alphabetic or phonological reading strategies until much later than typical children, after developing substantial sight vocabularies (Buckley, Bird, & Byrne, 1996).

The third causal connection in Goswami &Bryant's Theory of Reading is the link between children's reading and their spelling. Accordingly, after the teenager with DS learns to read, he can link

spelling sequences with onset and rimes. At a later stage, after approximately two years' experience of learning to read (for normally developing children, period for individuals with DS is not measured yet), teenagers with DS can begin to connect reading with spelling (Buckley, 2001).

5- 3- 4 Ehri's Theory of Reading Acquisition and its application to teaching reading to teenagers with DS

Ehri's proposal that readers build a dictionary of written words in memory (Ehri, 1978) is applicable in teaching teenagers with DS. Visual presentation of words keeps the words in their visual memory which is more effective than auditory one for short sequences of information.

Repeating words by reading them makes the *spellings* of the words become bonded to syntactic, semantic and phonological identities already stored in memory. When readers see words that they have learned in this way, they read them not by guessing or sounding out, but rather by accessing the amalgams in memory.

According to Ehri, readers remember how to read a specific word by interpreting *graphemes* they see in its spelling as *symbols for phonemes* they detect in its *pronunciation*. Connections are made

between the two, are stored in memory, and are accessed to read the word the next time it is seen (Ehri, 1998).

The key point in Ehri's stage theory is that general grapheme-phoneme knowledge provides readers with a powerful mnemonic system that bound the spellings of individual words to their pronunciations in memory. In DS it is difficult because of their deficit in STM. If the words are introduced visually with visual stimuli and repetition, students can learn to read words and build a lexicon of sight words easily.

5-4 Reading Readiness in Teenagers with Down Syndrome

In normally developing pre-school children, we have seen that there are factors which help them to obtain the reading skills. Research indicates that children with DS learn to read in the same way as other children and the same teaching approaches are successful (Buckley, Bird, 1993; Buckley, 1999).

In their study, Fowler, Doherty, & Boynton mentioned that successful readers with DS should meet the same prerequisites for learning reading skills that have been established in extensive research involving children without DS. According to that research, children who more readily learn to read are not necessarily more

intelligent than less skilled readers of the same age; they do however, "show specific strengths in phonological awareness, in verbal short-term memory, and in the accuracy and speed of word retrieval" (Fowler, Doherty, Boynton, 1994, p. 182).

There are factors that are fundamental to learn reading and facilitate that process, these general factors, summarized from Kanaan and Mutlak (2005) include:

1. The family background of the teenager and his home literacy environment. While home literacy environment had no significant correlation in this research's sample, the number of individuals living in his household had a significant correlation with his reading readiness skills as the table below shows

No. Of pple. living in the household	Reading	
.463(*)	1	Pearson Chi-Square
.046	.	significance
19	19	N

Correlation is significant at the 0.05 level (2-tailed).

Table 3 The correlation between number of individuals living in the household and child's reading skills (according to parents answers) in a sample of 52 individuals with DS ages8-43 years in the Damascus area

Result of this correlation indicates that there is a positive association: $r = 0.463$, $p = 0.046$, when comparing it with (0.05), we find that p is lower than (0.05) which confirms a positive correlation between numbers of individuals living in the household and reading

skills of the individual with DS living in it. It was carried out on a sample of 19 teenagers with DS (control group and experimental group). Reason might be that the teenager with DS has a greater verbal reciprocal interaction with more people in the household, thus increasing his expressive skills which, in turn has a positive effect on reading skills.

2. The level his or her physical maturation concerning vision and hearing (auditory and visual discrimination).

3. Motor skills e.g. orientation, consistent direction, sequencing, and articulation.

4. The teenager's linguistic development. i.e. linguistic manifestations which are important for achieving reading skills. Since reading is a symbolic process, therefore, these linguistic manifestations should include initially the *symbolic functions* which relate to contents of words and their graphemes, phonemes, sound/ symbol links, actions, and things they represent. Then, he needs to have some *communication skills*, it means he should be able to receive and comprehend the message which the text conveys. The following 2 tables display the positive correlations between communicating understandably with reading skills and levels of communication with reading readiness in the sample of

research. The tables show that the more people the teenager communicates with, the better his reading skills:

	Child's reading skills (before)	communicate
pearson	1	.471(*)
significance	.	.042
N	19	19

**Correlation is significant at the 0.05 level (2-tailed).

Table 4 the correlation between communicating understandably and reading skills.

By using Pearson we find that Pearson-chi square = 0.471, p =0.042, by comparing it with (0.05) we find that p is smaller than (0.05) which confirms a positive correlation.

	Child's reading skills (before)	Level of communication
pearson	1	.592(**)
significance	.	.008
N	19	19

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

Table 5 the correlation between level of communication and reading skills.

By using Pearson test we find that Pearson-chi square = 0.592, p =0.008, by comparing it with (0.05) we find that p is smaller than (0.05) which confirms a positive correlation.

The last facet of the teenager's linguistic maturity would be his or her *quantitative linguistic aspect,* namely, the compilation of his general verbal ability. When an individual is familiar with a wide

range of vocabulary, has a fine verbal communication memory, and has a relatively good recital skill, he will have a good chance at gliding through the process of reading skills acquisition (Kanaan, Mutlak, 2005).

5-5 Prerequisites for Reading Skills in Down Syndrome

In typically developing children, phonological awareness and phonological memory (Laws, Gunn, 2002) and phoneme awareness (Fowler, 1991) predict the rate of reading skill development. A similar relationship is found in adolescents and young adults with DS, although sight vocabularies may exceed the levels predicted by sound awareness (Doherty, Fowler, & Boynton, 1993).

Furthermore, we can say that other factors which are associated with reading skills in DS include cognitive ability, (Sloper, Cunningham, Turner Knussman, 1990), expressive and receptive language skills, (Bourdeau, 2002; Sloper, Cunningham, Turner, & Knussman, 1990; Carr, 1995; Lorenz, Sloper, Cunningham, 1985), letter knowledge (Laws, Gunn, 2002,) verbal short-term memory, and accuracy and speed of word retrieval (Fowler, Doherty, Boynton, 1994).

5-5-1 Phonological awareness, phoneme awareness and phonological memory in children with DS

In alphabetic languages, measures of phonological awareness correlate with reading success from kindergarten to adulthood. In addition, most research suggests that phoneme awareness is necessarily involved in achieving fully productive reading skill (Fowler, 1991).

However, children with reading difficulties have been found to fail on tasks of phonological awareness and poor **awareness of phonemes** has been found to correlate with auditory short-term memory deficit and poor reading ability (Gathercole and Baddeley, 1993). Additionally, they stop short of improvement in **segmentation skills**. For children who lack phonological awareness; training programs that draw explicit attention to the internal structure of the word have significantly improved the prognosis for reading success (Fowler et al., 1994).

Additionally, available research indicates that students with intellectual disabilities often have difficulties with the acquisition and application of word decoding strategies (Jenkinson, 1992), but the appropriate teaching may allow these students to acquire **decoding skills** (Fowler et al., 1994). A study by Fletcher and

Buckley on 14 children with DS aged 9-14 years indicated that 9 children achieved scores well above chance levels on the tasks of phonological awareness (Fletcher, Buckley, 2002). This indicates that children with DS could later **identify letters**, **blend sounds**, **associate individual letters** and **consonants blends** to **sounds**, recognize **whole word patterns** but generally have slower reading speeds (Gallahar, Van Kraayenoord, Jobling, Moni, 2002).

While a phonetic approach is ultimately more advantageous for teaching reading skills to children with DS, because it allows individuals to read words which they have not previously encountered, it appears that some young children with DS show a facility to associate the visual form of written words with the appropriate verbal response when beginning to read. On the other hand, Buckley proposes that **phonological processes may not be relevant** for the development of reading ability in individuals with DS because they learn to read words "as if they were an idiographic or picture language and had no print-to-sound relationships" (Buckley, 1985, p. 327). On a similar line of argument, Cossu et al. argued that phoneme awareness is not a necessary precondition for, or even a consequence of, acquiring productive decoding skills (Cossu et al., 1993). His study concluded that children with DS

learn to read in the absence of phonological awareness and that learning it may not predispose them to reading success (ibid.).

If that latter view is true, then why do children with DS fail at the ability to decode words? Even if they know the full Arabic alphabet, students in the current research experimental group failed time after time to decode words i.e. were not able to apply letter-sound correspondences to sound out new or unfamiliar words. They could not use any other technique to read and even familiar words escaped their 'logographic' memory and could not be retrieved (due to deficit in their STM) and read.

Phonological memory is the collection of codes used to store verbal material for memory span tasks requiring immediate verbatim (word for word) and ordered recall (digits, letters, pronounceable non-words). It is also a weakness in teenagers with DS as they perform inadequately in tests of ordered recall.

5-5-2 Cognitive ability

We have observed earlier in this research that children with DS make progress in all areas of development but usually at a slower pace. The case is such because of their uneven cognitive profile with stronger visual than verbal skills, their receptive vocabulary stronger

than expressive language and grammatical skills, with often tangible strengths in reading abilities (Snowling, Nash, Henerson, 2008).

We have also observed that the following interventions might have an effect on the cognitive development of a child with DS: Strengthening oral-motor and speech development from the babbling stage onwards, improving fundamental cognitive processes which may be having an impact on speech and language learning such as verbal short-term memory, and using strengths in visual memory to support learning.

Pueschel and Sustrova stressed that research findings on critical age (for learning and attainment), strengths and weaknesses, connections to other skills, extract three important findings that provide clear lessons for intervention. These findings or lessons are: firstly, in most cases, development can continue beyond childhood; secondly, academic and adaptive skills are separable from purely cognitive abilities; and finally, cognitive abilities play a limited role in everyday functioning during adolescence and early adulthood (Pueschel, Sustrova, 1997).

5-5-3 expressive and receptive language skills in teenagers with Down syndrome

Children with DS show relatively better receptive language skills than expressive language skills (Cohen, Nadal, Madnick, 2002).Their visual skills exceeds their verbal ones, that is to say, they can process information presented to them with help of visual than auditory input. Measures of receptive vocabulary are the ones that predict reading rather than phonological awareness (Snowling, Nash, Henderson, 2008). Furthermore, they understand more than they converse.

Teenagers with DS already show significant delay in all aspects of communication. Speech and language skills are poorer than expected in relation to their non-verbal cognitive ability. Poor expressive language skills are dominant in children and young individuals with DS; "having weaknesses in language execution like deficiencies in acquiring vocabulary, grammar, syntax, processing, and expressive language, therefore, these individuals have problems in expressing themselves due to limited mental abilities" (Al Rawsan, 2003, p. 46).

Another weakness in expressive language skills in DS is their short Mean Length of Utterance (MLU). In their case it is shorter

than it is in normally developing individual, where they start adding words once they have a store of 100 words compared to 50 words in the latter group. Thus, they start to produce utterances of two words as late as after the age of 4 (Chamberlain & Strode, 1995).

Finally, it can be said that consistency and repetition in teaching instructions are the ways to enhance their expressive language skills.

5- 5- 4 Letter knowledge

In a survey done by the researcher's on a sample of 52 students including both the experimental group, the control group, and other individuals with DS in the Damascus area with age ranged 8-43 years, the following percentage was obtained after the preliminary measure of full Arabic letter knowledge:**: 48** % recognized the full alphabet (according to their parents answers), **52%** recognized some letters of the alphabet. The word *some* here could mean sometimes only 1 or 2 letters**.** It suggests a weakness of letter knowledge.

Some studies suggest that letter sound knowledge is not related to reading or phonological awareness skills as strongly in DS as in typical development (Kennedy, Flynn, 2003). Nevertheless, individuals with DS should identify the Arabic alphabet in order to proceed into learning their individual phonemes and their variations according to their place in the word (i.e. onset or rime e.g. the

phoneme ب /b/ in its following variations: بطل، بيس،سحب،جاب) *batal, yabisa, sahaba, jaba* Meaning: hero, dried, pulled, perambulate, and their variations according to their vocalization *Altashkeel* التشكيل (e.g. بَ بُ بِ بـاً بٌ بٍ بْ بَّ بُّ بِّ). English representatives of those graphemes/phonemes are –starting from first letter on the right: short *ba, bu, bi*; *ban, bon, ben*; silent *b*; and stressed *bba, bbu, bbi*).

The table below shows the significant correlation between letter recognition and reading skills in a sample of 50 individuals with DS in Damascus aged 8- 43 years.

Total	READING not	READING yes		
24	21	3	Doesn't read	VAR00012
26	5	21	reads	
50	26	24	Total	

Exact Sig. (1-sided)	Exact Sig. (2-sided)	Asymp. Sig. (2-sided)	df	Value	
.000	.000	.000	1	23.303(b)	Pearson Chi-Square
		.000	1	20.649	Continuity Correction(a)
		.000	1	25.693	Likelihood Ratio
					Fisher's Exact Test
		.000	1	22.837	Linear-by-Linear Association
				50	N of Valid Cases

Approx. Sig.	Value		
.000	.564	Contingency Coefficient	Nominal by Nominal
	50	N of Valid Cases	

Table 6 the correlation between recognition of all Arabic letters and the ability to read (according to parents answers) in a sample of 50 individuals with DS ages 8-43 years in the Damascus area

We observe that the value of Pearson Chi-Square = 23.303 which is statistically significant if P = .000; it is smaller than (0.05) To indicate the intensity of this correlation we used the Contingency Coefficient, its value is .564 and it is statistically significant which means there is a relation.

The results of the questionnaire found also a positive correlation between the teenager with DS recognizing some of the letters in the alphabet and his reading skills in the sample of the research.

	Child's reading skills (before)	recognize some of the letters
pearson	1	.764(**)
significance	.	.000
N	19	18

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

Table 7 The correlation between recognition of some Arabic letters and the ability to read (according to parents answers) in a sample of 19 individuals with DS ages 12-18 years in the Damascus area

By using Pearson Chi-square we found that r= 0.764, p= 0.000, by comparing it to (0.05) we see that it is greater than 0.05 which confirms a positive correlation.

Another problem when teaching Arabic letters is to explain to students the changes in meaning when applying different vocalization on the same word (e.g. كَتَبَ،كُتِبَ، كُتُبْ). The consecutive pronunciations of these words are (from the first word on the right

in parenthesis): *kataba*, *kutiba*, and *kutub*, meaning: *he wrote*, *it has been written* or *had been written* and *books*. Obviously, the three words are identical in logography, but differ in the application of vocalization on their letters. There is a need here to obtain phonological skills because, unfortunately, memorizing the form of the word as seen in the previous example (كتب) is not enough because the decoding of the word changes dramatically with vocalization.

5-5-5 Verbal memory and Accuracy and speed of word retrieval

Verbal short-term memory and facility with word retrieval are additional factors that co-vary with reading skill. It was observed earlier in this research that verbal short-term memory plays a role in reading acquisition. Word retrieval refers to the "ability to rapidly and accurately retrieve the correct label when confronted with pictures of objects. Poor readers tend to respond more slowly and to make more errors" (Fowler et al., 1994, p. 183). Fowler declared that those 2 factors are "generally with less predictive power than phonological awareness" (ibid.)

Both verbal-short memory and word retrieval measures predict later reading skill. Deficiencies in both factors suggest the need to enhance them by repetition of information during reading

instructions, visual stimulation during lessons, and applying teaching through games, songs, and drama.

5-6 Methods of Teaching Reading skills to Teenagers with Down syndrome

5-6-1 Introduction

It has been made clear that intensive structural teaching (Bucley, 1985) is an important and common factor in reading success among persons with DS. Other researchers point out that instruction is a significant factor in reading success (Fowler et al., 1994). Others declared that standard formal reading instruction is important to reach reading success (Cossu et al., 1993). But what methods should be used to teach reading skills for teenagers with DS?

5-6-2 Should we apply the same methods for typically developing children or apply special ones when teaching Down syndrome?

We are still waiting for a definite answer to the question: are there any differences in the way one should teach a child with DS to read comparing with the teaching methods used for typically developing children? To answer this question, a group of Portsmouth psychologists, who support the education of children with DS in

mainstream classes, advise that the same methods should be used for all children, but teachers should consider the delays in language knowledge and memory skills of their students when teaching them to read (Buckley, 2001).

5-6-3 Should we use 'whole word' approach or phonological approach?

There is no published research which evaluates teaching methods for children with DS with the exception of one study in progress at the University of York, UK (Baylis, 2000).

In her research, Baylis proposes 2 teaching intervention schedules based on 2 methods of teaching reading. The first is a *multi-sensory* method that focuses on a *whole word visual approach*; the second is a *multi-sensory phonological awareness approach*. Both taught individually for 3 sessions per week 45 minutes per session. New test batteries were administered pre-intervention and will be administered post-intervention (ibid.). The results of this research could suggest the best method for teaching reading to children with DS.

5-6-4 The Oelwein method for teaching reading to teenagers with DS

Meanwhile, some already solid methods are adopted in learning environments for children with DS. Among them is Oelwein's approach that is based on the 'language experience approach'.

It concentrates on *visual stimuli via sight words* first; and then *introduces the beginning letters of these words*. The approach suggests to move on to teaching *action words, household words, vocabulary for communicating information about body and self-image; vocabulary for feelings; vocabulary for animals and colors; for foods, grocery lists and recipes; and time as in schedules and calendars.* Finally, and after experiencing considerable success in reading sight words, the method directs teachers to move to teaching *writing, spelling, and phonics* (Oelwein, 1995).

In this method, Olewein leaves it to the teacher to develop his own components to build up more sight words that are within the child's experience, interests, and needs, e.g. words for hobbies, words for careers, words for weather, and words for favourite intertainment.

5- 6- 5 Sue Buckley's method for teaching reading to teenagers with DS

Similar to Olwein's, Buckley's method also starts with teaching and establishing a *sight vocabulary* on cards, then, students can build sentences and create messages before they can write, spell or decode.

Then, students are taught phonics in a fun way i.e. by singing, playing games, and writing rhyming poems together. Because of their poor phonological loop functioning in working memory, sounds of letters are represented with visual support to help improve their stored information of the sounds.

For phonological awareness, Buckley recommends a set of exercises which might train students in its skills: exercises for rhyming awareness- which words rhyme or which is the odd one out; awareness of onset and rime- splitting words into initial sound and remainder; alliteration awareness- which words start with the same sound or which does not; Phoneme blending- putting sounds together to make a word; phoneme segmentation- splitting a word into its sounds; phoneme deletion- what is the word left if a sound is taken away.

Buckley suggests reading instructions need to be fun, enjoyable (with help of stories), demonstrate the benefits of being able to record ideas and information right from the start. Computers can be used because of their visual representation of information. The key issues here are: firstly, making the students get the message that *we read for meaning* and that *texts have messages*. Secondly, teaching and learning should be an interactive process with teacher or assistant working together to create and read text (Buckley, 2001).

5- 6- 6 A method currently used in a special school in Damascus

The researcher inquired about the teaching method used with teenage students in a special school in Damascus. One of the students is a 17 years old boy who has good reading abilities which can be described as between emerging and developing. The teacher's description of her method included the following:

Firstly, she taught each letter using 'the traditional phonic method'. She starts by teaching the letter in all its forms, e.g. the Arabic letter ف (f), at the onset of a word as in فم *famm* (mouth), then in the middle of a word as in يفتح *yaftah* (opens), then at the end of a word as in يقف *yaqef* (stands), and then again at the end but not connected to other letters as in آلاف *Alaf* (thousands).

Then she moves to teaching the same letter with all its possible Arabic **vocalizations** *Altashkeel* **التشكيل** **(** َ ُ ْ ً ٌ ٍ ّ **)**, then she teaches the letter connected with the 8 Arabic vowels i.e.

(ألـف المـد ، واو المـد، يـاء المـد، الفتحـة، الضـمة، الكسـرة ، الـواو، اليـاء). These vowels represent the following sounds: ă, ōō, ēē, short æ, short ōō, short ēē, y, i. After that, the students are instructed to learn that same letter with a vowel and a letter which is been acquired before, finally, she teaches spelling and dictation.

5- 6- 7 Other methods used in Syria for teaching Reading skills to teenagers with Down Syndrome

Upon enquiring about methods of reading instruction in various special schools in Damascus and Homs, the researcher found that methods generally ranged from adopting the same books of the national Syrian curriculum of grades 1 and 2 and 3 (depending on the age group the child is at), to using books from Arab countries also for teaching normally developing children.

5-7 Difficulties of Obtaining Reading Skills in Teenagers with Down syndrome

5-7-1 Memory impediments

If individuals with DS really suffer from a specific verbal short-term memory deficit then this may therefore lead on to problems in these domains. Thus, individuals with DS should suffer from specific language problems, and in particular, have marked problems in vocabulary acquisition. Bower & Hayes make this kind of claim explicitly when they suggest that "persons with DS experience specific problems in the area of auditory short-term memory and are therefore among the most language handicapped of the learning disabled population" (Bower & Hayes, 1994, p.49).

Children with DS compensate for poor verbal short-term memory skills in some ways, e.g. their word acquisition during lifelong experiences and learning to read by being taught with visual rather than phonetic strategies (Buckley & Bird, 1993). Individuals can read words either by building the whole word sound from its component sounds or phonemes or by simply learning that a particular visual configuration of letters corresponds to a particular word (Jarrold, Baddeley, Phillips, 1999).

5- 7- 2 Lack of phonemic awareness

This lack might include the **Lack in decoding abilities** where decoding means the ability to apply letter-sound correspondences to sound out new words. Reading non-words is a marker test for underlying cognitive abilities which can manifest themselves in phoneme segmentation tasks. The latter also acquires other abilities which are missing in the DS populations (Morton, Frith, 1993).

This lack might also include the **weakness in the skill of blending phonemes to sound words** because, in general, individuals with DS have a deficit of 'linking' together individual phonemes to sound and read new words (Fletcher & Buckley, 2002).

5-7-3 Short attention span

Some children have difficulty settling down and concentrating. Their attention span is too small to focus on words and their meanings and participate in reading games and activities (Olewein, 1995). Therefore, information should be presented in small chunks and via interesting materials.

5-7-4 Avoidance and lack of motivation

Some children with DS use the "learned helplessness" behavior. It is a behavior very effective for avoiding learning at situations where tasks are too difficult for them. Examples of avoidance or attention

catching behaviors are: avoiding getting dressed to go to school so the parents will dress the "helpless child", refusing to attend and respond, shouting, destroying materials, escaping, hiding, lying on the floor or sitting and refusing to move, and behaving aggressively. Consequently, the child would miss the skills that will be most beneficial to him to allow him to develop independence (Olewein, 1995).

Other children with DS find no meaning while reading books, they could be not interested, could not understand the happenings, nor can they relate to the story or characters. Thus, they get bored, uninterested, loose all motivation, and will do all they can to escape their reading lessons (ibid.).

5-8 Motivation for Learning Reading Skills in Teenagers with Down Syndrome

5-8-1 Introduction:

Keeping in mind the theme of the 10th World Down Syndrome Congress held in Dublin Ireland in Aug. 2009: "Lifelong living and learning", the researcher suggests exactly the same to individuals with DS, their parents and caretakers, and their teachers; to live life to its fullest potentials, and to carry on learning even into middle age . Accordingly, reading should be taught and individuals with DS

should be involved on a daily basis in activities to use and ameliorate literacy throughout teenage and adult years, particularly for those who may not have made development earlier (Buckley, 2001).

5-8- 2 Motivation for learners

For the past 30 years, there have been dramatic changes in the lives of people with DS in the USA and in Europe that could make an important difference in reading outcome. There is better medical treatment, earlier and more professional language intervention, and greater access to systematic reading instruction in and out of school. Perhaps most importantly, the expectations of parents, teachers, society, and the young people themselves have changed dramatically. Consistent with these changes, it is now estimated that a substantial proportion (40%) of adolescents with DS acquire at least some reading skills (Fowler, Doherty, Boynton, 1994). These changes are happening here also in Syria, many young people with DS and their parents are doing everything they can to advance life long learning and communication with society.

5-8- 3 Motivation for parents and teachers

Unfortunately, some parents have the pre-conceived idea that children with DS cannot and do not learn to read and write, and

therefore should not be taught. Parents, and even teachers, feel that literacy instruction should be granted to children with DS in the initial years of kindergarten and elementary school, and then [they think] should be gradually withdrawn at about the fifth grade. It is then when a situation emerges: educators and parents assume a learning plateau has been reached and the individual no longer can be or needs to be taught academic subjects (Gallahar, Van Kraayenoord, Jobling, 2002).

Contrary to that view, Parents and teachers should keep in mind the following idea: some future prospects of intervention suggest that individuals with DS develop long-term knowledge of the language by depending directly on their experience of it, and so might relate closely to chronological age rather than level of intellectual development (Jarrold, Baddeley, & Phillips, 1999).Therefore, keeping this 'lifelong learning' is necessary for them as it goes well with the association between chronological age and their long-term knowledge of the language.

CHAPTER 6

Review of Previous Studies

6-1 Introduction:

The researcher tried in vain to find previous Arabic studies about the subject of reading instruction for children or teenagers with DS. The ones she found were translations from other languages e.g.

(*كيف نساعد اولادنا حاملى متلازمة داون: التعليم و الاحتواء* / مؤسسة الداون سندروم ترجمة المجموعة الاستشارية لنظم المعلومات و الادارة)

(*How to help our children with Down syndrome: education and inclusion*/ Down Syndrome Association, translated into Arabic by the Consulting Group for Directives of Data and Management, year unavailable)

6-2 Books and Studies in English Language about Reading Skills and Related Subjects for Individuals with Down syndrome

The researcher found studies related to reading acquisition in individuals with DS and others about teaching reading skills to children and teenagers with DS. Here are few:

6-2-1 The study of Fowler, Doherty, Boynton (Fowler, Doherty, Boynton, 1994)

Title: The basis of reading skill in young adults with DS

Subject: Reading skills in individuals with DS.

Aim: To document incidents of reading, explore what factors contribute to reading success, and if successful readers with DS bypass the usual phonological route to reading.

Participants: The study was done on a group of 33 young adults with DS full trisomy- 21, ages between 17-25 years old from private and public schools in the Northeastern USA. A special appeal was made for adults who could read.

Procedures: a period of 4 hours of individual testing was completed. Individuals were assessed on their reading ability measured by the Woodcock Reading Mastery Tests-Revised (WRMT-R), and their general abilities measured by the Peabody Picture Vocabulary Test-Revised (PRVT-R) and the Kaufman Assessment Battery for Children-Mental Processing Composite (K-ABC).

Their phonological abilities were assessed via the following: phoneme awareness measurement by the Auditory Analysis Test, Verbal Memory Spans obtained by an expansion of the Number

Recall subtest of the K-ABC, and word retrieval evaluated by the Boston Naming Test

Other measures included: Visual Memory Span measured by the Corsi Block Span, a non-verbal measure of sequential memory,Test of Auditory Comprehension of Language-Revised (TACL-R), and K-ABC Arithmatic.

Results: The results of this study reflect the upper end of a distribution of persons affected with DS (because of the special appeal mentioned above).

Young adults with DS varied greatly in reading skill, with scores ranging from kindergarten to adult levels. Reading scores were linked with general Levels of intellectual function, but phonological skill explains additional variance that cannot be completely explained by general ability.

The researchers found that most persons with DS have not progressed beyond the early stages of reading. These stages may be achieved almost wholly via sight-word recognition; less skilled readers relied almost exclusively on this strategy. The lack of decoding skills severely restricted the reader's sight word vocabulary.

One third of participants who had made substantial progress in mastering orthographic decoding strategies were characterized by better-developed phonological skill. There was a direct correlation between phoneme awareness and decoding skill. These results suggest that young adults with DS can and do acquire productive decoding skills, and that their success depends on the same prerequisites implicated in any other group attempting to read.

Verbal short-term memory proved to be a crucial component of reading success, even more so than in normally intelligent population who vary in reading success. Once the necessary prerequisite for decoding is met (here estimated at a digit span of 4.0), there is no longer any correlation with reading: those individuals with a digit span of 4.0 display the full range of reading skill evident in the sample.

Finally, researchers believe that instruction was a crucial component of the success achieved by their most skilled readers. It could account for young adults obtaining the highest digit span. The most effective instruction focuses on the internal structure of the syllable (phonemes) before or simultaneous with the introduction of letters, which merely represent these phonemes. The researchers stressed that phoneme awareness training is helpful with students

with DS at the kindergarten level, yet retain its utility into adulthood.

6-2-2 The study of Byrne, Buckley, MacDonald, and Bird (Byrne, Buckley, MacDonald, Bird, 1995)

Title: Investigating the literacy, language and memory skills of children with Down syndrome.

Subject: A paper presenting the first phase of a longitudinal study on Literacy and cognitive skills development in children with DS.

Aim: study for the purpose of charting the literacy and other cognitive skills of 24 children with DS and 2 comparison groups of children selected from their mainstream classes.

Participants: 24 children with DS who are receiving their education in mainstream primary schools compared to 2 groups of children selected from their classmates. The comparison groups were a group of typically developing children who were average readers in the classes (n = 42) and a group of children who were matched to the children with DS for reading age (n =31).

Procedures: All 3 groups were being followed longitudinally to explore their progress and look at developmental interrelationships between reading, language, and memory skills.

The literacy, numeracy, language and memory skills were measured by experimentally controlled reading tasks to look at the strategies the children are using to read.

Results: Children with DS had uneven performance profiles with relatively advanced reading skills compared to their other cognitive skills. The reading-matched group attained higher scores than children with DS on all measures other than reading.

Results are currently being analyzed to establish the age and stage of reading development at which children move from using logographic strategy to an alphabetic strategy and to compare strategies used in the 3 groups of children.

6-2-3 The study of Laws, Buckley, MacDonald, Broadely (Laws, Buckley, MacDonald, Broadely, 1995)

Tilte: the influence of reading instruction on language and memory development in children with Down syndrome.

Subject: the importance of reading instruction for children with DS.

Aim: To point out the advantage of children with DS who read for all language and memory measures.

Participants: 14 children with DS out of a group of 51 children who received pre-training assessment in October 1991. After assessment, half were assigned to be trained while the other children

became an untrained control group. All these children were assessed a number of times to measure the effect of the training and to compare the performance of the trained children with the performance of the control children. The final investigation of this project followed up 14 of the trained children to investigate long term maintenance of the trained memory skills in July 1995. As a result we have longitudinal data for these children plotting their memory and language development over more than three and a half years.

Results: results suggest that learning to read has a significant impact on language progress and on the development of auditory and visual memory skills. The longitudinal data show that the readers have made considerably more progress in their language development. This new evidence supports the case study records which suggest that reading encourages improved grammar in speech.

Most of the readers in the longitudinal study started reading using an approach recommended by the Sarah Duffen Centre. A further important feature of this approach is the early introduction of short sentences for reading which can then be practiced and used in everyday speech, and which add to the children's knowledge of

grammar. This is the area of language learning which gives children with Down syndrome the greatest difficulty

For children with Down syndrome, the visual representation of language offers a way to overcome their auditory processing and memory difficulties.

The cross-sectional data comparing the memory measures for children at special schools reflects the evidence from typically developing children in studies comparing good and poor readers. In this study, the researchers compared those who can read anything at all with non-readers with similar results- significantly higher mean memory scores for the readers. This evidence alone would be difficult to interpret since it could be just as easily argued that only those children with better memory capacity were able to read.

However, the longitudinal data overcome the problems of interpretation, and show that rather than some minimum memory capacity is required for reading. Children in the research's study groups began with very similar, extremely low, scores on memory measures. Nearly four years later, those who have received reading instruction are clearly diverging from the non-readers. Despite improvements in memory scores, none of the readers had a word span average more than 3 across three syllable lengths and, at the start of the study, only one of them had an average span as much as

2. It would therefore be a great mistake to withhold reading instruction from children from Down syndrome while waiting for them to attain some minimum level of memory capacity.

Sounding out a word letter by letter requires working memory capacity to hold the early sounds in the word long enough to decode the whole word. If this does account for the readers' memory performance, it might be further speculated that alphabetic reading could have provided working memory practice and helped maintain the trained memory performance.

Furthermore, despite the apparent failure to maintain the effects of rehearsal training in the long term for the group as a whole, it may also be important to include continued memory training for this group. Memory is clearly intimately tied to language and literacy development and interventions designed to improve any one of these abilities could benefit the others.

6-2-4 The study of Bayliss (Bayliss, 2000)

Title: The reading skills of children with Down syndrome

Subject: Assessment and comparison of the reading skills of children with DS attending mainstream schools and others attending special schools.

Aim: Purposes of this study are: to device an assessment package that will offer knowledge of the reading skills of the children, compare the reading skill of children with DS matched for age and ability educated in mainstream schools with others attending special ones, and to carry out a longitudinal method experiment to test the efficacy of a theoretically-based specially designed intensive intervention program using multi-sensory techniques focusing on phonological awareness: by means of 2 teaching intervention strategies to boost reading skills and phonological awareness.

Participants: 34 children with DS who attended 25 mainstream primary and secondary schools in Northern education authority.

Procedures: the study tried to device an assessment package and surveyed the initial assessment battery using the following: on reading measures the BAS reading, Hatcher Early \word Reading, test of Environmental Print, Reading accuracy. On phonological measures the following means were used: nursery rhymes, letter knowledge test (from PAT), rhyme detection (from PAT), simplified word completion, and non-word reading. On cognitive measures the following measures were used: BPVS receptive vocabulary, WISC completion, WISC object assembly, WISC block design

Results: One of the main results of the study was that phonological awareness is contributing to the reading skills of children with DS.

6-2-5 The study of Bochner, Outhred, Pieterse (Bochner, Outhred, Pieterse, 2001)

Title: A study of functional literacy skills in young adults with Down syndrome.

Subject: This research presents information about related topics of the educational innovations and changes in the field of literacy offered for young adults with DS. Moreover, it deals with the relation of age differences and inclusive schools on the outcomes of education, language skills and reading ability in young adults with DS.

Aim: To examine the development of language and literacy skills in Australian young adults with DS.

Participants: 30 Australian young adults with DS who were born either just before, or during the period when radical changes to special education services for people with intellectual disabilities were introduced.

Results: the results of this study showed that all but one of the young adults had learned to read, while for some, these skills were limited. In general, there was evidence of positive relationship between age (for those born after 1970), attendance at an integrated school situation, and the achievement of more advanced reading and language skills. It was also evident that learning to read provides

both a functional daily living skill and a satisfying recreational activity for young adults with DS.

6-2-6 The module of Bird and Buckley (Bird, Buckley, 2002)

Title: Reading & writing for teenagers with DS

Subject: A module that explains and provides principles for learning, and guides on teaching methods and expectations and examples of teenagers' work.

Aim: To Explain how language and literacy teaching can work together to promote the development of teenagers with DS. It also seeks to provide information on how individuals learn to read, the variations that will help pupils with DS, and the benefits of being involved in reading instruction.

Participants: The module is designed to be used on teenage-students with DS for teaching them reading and writing. It provides activities and advice for teachers in mainstream schools or special education settings

Procedures: The module suggests proceeding through the same steps as all other children learn to read words, to decode and to spell, to read with comprehension and to write, but it stresses that children with DS may need each step broken down into smaller steps, with

more practice and support for learning at each stage, than many other pupils.

The method of teaching teenagers with Ds in this module is: teach whole words first then letter sounds and syllables using the teenager's sight vocabulary to help them to understand phonics.

Then, it provides activities at each teen comprehension level for teaching reading and writing, stressing the involvement of the teenager and using resources such as: vocabulary and sentences and grammar checklists, word cards, pictures, symbols, objects, computer and software packages, books, worksheets, language books, and tapes to record ideas for writing.

Results: All teenagers with DS should be included in reading instruction, differentiated and supported as necessary to help them learn, and be provided with materials for use in the classroom and at home.

When planning teaching a teacher should take account of age, hearing loss, language comprehension, phonological awareness, reading skills, handwriting skills, spelling skills, memory skills, conversation and communication skills, support for learning at home, interests, leisure activities, approach to learning, use of media, use of computer, and social and academic confidence.

6-2-7 The study of Fidler, Most, Guiberson, (Fidler, Most, Guiberson, 2005)

Title: Neuropsychological correlates of word identification in DS.

Subject: understanding the relative strength in word identification in individuals with DS.

Aim: To better understand the neuropsychological underpinnings of the relative strength in word identification in individuals with DS.

Participants: 29 children and adolescents with DS compared to the performance of a non-verbal-IQ matched group of 20children and adolescents with developmental disabilities of mixed etiologies.

Procedures: various measures were applied for testing letter-word identification and cognitive-linguistic functioning.

Results: when only children with word identification competence (opposed to letter identification competence) were included in analyses, visual perception stores (total MVPT-R) were significantly associated with word identification in the DS group, but not in the mixed comparison group. Implications for etiology-specific instructional approaches were discussed. DS showed significantly poorer verbal STM and receptive vocabulary skills. Neuropsychological correlates of letter-word identification, significant linear association were observed between letter-word

identification (K-ABC reading/decoding) and verbal STM (K-ABC number recall), as well as receptive vocabulary (PPVT-III) and visual processing (MVPT-R) in both groups.

6-3 Differences between this research and the previous ones mentioned above

The research at hand is similar in its theme to the previous literature in dealing with the subjects of acquisition of reading skills in teenager students with DS. Nevertheless, sample of research is comprised of native speakers of Arabic while previous researches deal with native speakers of English (Laws et al. 1995, Bayliss, 2000, Byrne et al., 1995). Ages of participants in the previous literature ranged from the age of early childhood (Bayliss,2000) to young adulthood (Bochner et al. 2001), but this research examines reading skills of teenagers (early teenage-years to later teenage-years) with DS and their acquisition of reading skills.

Aims in this research and previous researches in the literature were parallel in being focused on reading skills (Fowler et al. 1994), their acquisition (Byrne et al., 1995), and ways of instructions (Bird & Buckley, 2002, Fidler et al., 2005).This research teaching method is derived from the Montessori Phonic Approach while the

researches reviewed used different methodologies and approaches (Bird & Buckley, 2002).

Measures were different and assessments were done by means of a variety of batteries (Bayliss, 2000, Fowler et al. 1994)) whereas in this research they were confined to (Alrawsan, 2003) and the ones designed by the researcher.

In this research, duration was limited to 10 weeks of teaching, while in Laws et al., their longitudinal research lasted for three and half years (1995)

Concerning outcomes, this research resulted with the significance in improvement in reading skills in its sample of teenagers with DS who completed the program which is equivalent to Bochner in positive realation between age and more advanced reading skills. Other literature signaled the advanced reading skills in individuals with DS compared to other cognitive skills (Byrne et al., 1995), achievability of obtaining reading skills (Fowler et al., 1994), necessity of including teenagers in reading instruction (Bird & Buckley, 2002), the contribution of phonological awareness to reading skills of children with DS (Bayliss, 2000).

CHAPTER 7

Research Methodology

7-1 Ethics of Research

The ethics of the research must be an integral part of the research plan and its goals. However it is difficult to be ethical in data analysis when one has formed an attachment for the subject population. This form of ethics might better be referred to as **integrity**.

In this project the researcher found it ethical to inform the parents of the subjects in advance that she was going to research their children's learning behaviors and processes. She also had to be ethical in her observation since she could not claim to be an objective observer, being rather involved with the students and wanting them to succeed. Here again ethical means **honest**. She did not find it necessary to inform the students themselves at any point that they were the subjects of a research program, for them it was just another lesson period in school.

Ethics applies to **publication** of one's finding (which will happen later on when the thesis is translated into Arabic), and the **anonymity of the subjects** as well. Publication will not affect the

privacy of students since in this paper students are neither identified nor identifiable. The principal of the school of experimental group was informed to gain his permission to carry out the research, but was not informed of which specific pupils would be subjects of the project as they were picked randomly, he knew their names after they started participating in the program. The control group were specified and known to their principal because they were the whole population of students with DS the school with suitable age range.

7-2 An Experimental Research

The researcher used the experimental method to test the effectiveness of the designed phonic approach based on the Montessori Phonic Method, and to indicate the differences of achievement of learners pre-instruction and post-instruction.

7- 3 Reasons for Choice of an Experimental Approach

To conduct an experiment could be the most appropriate method to resolve a question about language learning or teaching (Rodgers, 2002). Using this method helps to carry out an experience, observe the procedures, and finally analyze data. All that can help the researcher to find out the validity of his method and then to mark its weaknesses in order to improve the program if it is going to be used later on in teaching teenagers with DS to read.

7- 4 Instruments and Tools

The researcher used the following tools and instruments in her experimental research:

7-4-1 Questionnaire

A questionnaire in Arabic (Appendix 1) was written and sent to parents at the beginning of the program. It was based on Brown & Rodgers' implications for designing surveys and questionnaires (Brown, Rodgers, 2002). Assistance was provided by the supervising professor and a senior professional with long experience in teaching special needs individuals.

Components

The questionnaire has the following parts:

1. General information

It tries to obtain information about the child like his name**,** age, gender, his father's age, educational level and profession, his mother's age, his mother's age when she delivered the child, her educational level and profession. It also inquires about the number of brothers and sisters he has, order of the child between his siblings, how many individuals living in the household and if there is another child having mental retardation in the family.

The child and education

It has questions like: the age of child when he first joined school,

total number of years which the child spent at school, if the child stopped going to school at any time during his life, the reasons behind this withdrawal, whether the child firstly joined a school for normally developing children, number of years he joined that school, and reasons behind leaving that school.

3. The linguistic development of the child

It poses the following inquiries: if the child hears, articulates, how old the child was when he began talking, if the child recognizes all the letters in the alphabet, if the child recognizes some of the letters in the alphabet, the number of letters the child does recognize, if the child reads, his age when he started reading, with whom does the child understandably communicate (With his mother, father, his siblings, his relatives, strangers), his level of communication (good, Mediocre, Weak, Does not communicate).

Personality of the child: Interests, skills and hobbies

This part asks about the interests of the child (Social, academic, occupational, artistic, or musical), If one of the parents reads stories to the child before he sleeps, if the child holds a book or a notebook and wander round the house, if he likes to attempt or try new things (Going to new places, make new friends, practicing a new hobby or sport). It also asks what his reaction in situations when he fails at accomplishing designated task.

The child at the stage of adolescence

This part asks the parents if their child, who is an adolescent now, did not learn to read yet: do they believe that it is possible for him to start learning at this stage. It also asks them if they believe that learning to read is important for their adolescent child. If the previous answer was negative, it inquires about their visualization for child's future Join occupational education (Join handicraft education, Join an artistic education, Work in an occupation).

The child as an adult

This final question was written to probe parents' views about their children getting married when they reach young adulthood and marriage age.

Aims of the questionnaire

It was intended to aid the researcher in promoting better familiarity with the participants. It was also useful for the analysis of correlations between different variables in the research e.g. the correlation between parents' motivation for teaching their child with DS reading and reading skills of the child (table1).

Measure these aims

These results were important for the research because they served as testing ground for reading readiness test of its sample. Examples of these positive correlations are stated below.

Implementation

The questionnaire was distributed to students by the researcher at the beginning of the program. A note was sent to parents to fill it and return it as soon as possible. Parents filled the questionnaires and returned them with the students.

Examples of questionnaire used in the research

This questionnaire also assisted the researcher in her study by finding percentages e.g. average age of mothers in a sample of 52 individuals at the incident of having a child with DS (p.47), and correlations between different variants and present reading skills of the sample e.g. the correlation between number of individuals living in a student's household and his reading skills (Table3), the child's ability to communicate and levels of this communication with his reading skills (tables 4,5) the correlation between the child with DS knowing all the letters of the Arabic alphabet and his reading skills (table 6), the correlation between the child with DS knowing some of the letters of the Arabic alphabet and his reading skills (table 7), the number of years the child has spent in school and his reading skills (table22), and the correlation between teenagers age and his reading skills (23).

7-4-2 Measures

The researcher used the following measures: Arabic Reading Measure (Al Rawsan, 2003), Memory span measure, and measure for general concepts both designed by the researcher. Instruments validity was provided by a special education professional who commented and advised on their production.

7-4-3 Program

The researcher developed a program for teaching reading skills based on the Montessori Phonic Approach. It uses the analysis of words by studying individual sounds or phonemes. In addition, she used the method of associating the visual form of written words with the appropriate verbal response because some children with DS show a surprising facility in that association. She utilized the program for teaching Arabic reading skills to the experimental group which was included 10 teenagers with DS. She chose this method because teenagers who did not progress with whole word teaching or alphabetic teaching methods at a younger age may learn to read well with a combination of whole word learning and phonic teaching between the ages of 11 and 16 years (Bird, Buckley, 2002). Basically, the program comprises the following parts:

- First, teaching letters by means of teaching their phonemes/grapheme relations accompanied by words representing onsets and endings of those letters. Words are accompanied by visual support.
- Second, teaching graphemes (and sounds) of strong Arabic vowels (ا،و،ي) /α/ /u:/ /i:/ and weaker ones (َ،ُ،ِ) /æ/ /u/ /i/ and emphasizing the differences between them.
- Third, teaching words by associating their visual written form (word cards), their phonemes (sounding the words), and visual support like acting, pantomiming and pictures.

Application of Program

The researcher tutored the experimental group a multi-sensory bottom-up teaching method that focuses on individual letter sounds and shapes in words. The method begins with teaching letters and ends with teaching words. She did not use the Montessori Method; rather, she applied parts of the method itself as a mean to teach reading skills to the experimental group. The Method appealed to her because of her belief that learning reading skills might need a phonic bottom-up approach rather than other Methods. This belief came from the researcher's readings through previous literature and

related articles and books. The program lasted from March, 1st to May 18th, 2009.

Commencement of program: meeting the participants

The researcher got acquainted with 16 teenagers with DS at the school from which the control group was chosen (Haza Bayti), and from which the experimental group was chosen (Al Rajaa), before the pre-test. That pre-test took place for 5 days at the week preceding the start of the program. These students made the population of teenagers with DS at the school at which the experimental group was formed. After the pre-test, the experimental group was formed via random choice and the number of group contracted into 10 students, 5 girls and 5 boys, ages ranged between 11-18 years, M= 13.1. Casual conversations took place in class before the start of the program. Through conversing and observing, the researcher got to know the participants names, traits, personalities, dispositions, their overall history, hobbies, and their likes and dislikes.

The control group was formed of the whole population of teenagers with DS (except a woman who is 21 years old and a boy who is 8 and a half years) at the second school at which the control

group was formed. They were 5 girls and 4 boys, their ages ranged between 8 and half years- 21 years, M= 15.1

The main goal of the researcher was to teach the newly formed group reading skills. Other sub-goals included improving articulation using breathing exercises and listening and singing along popular songs, encouraging communication between her and students, encouraging reading through reading stories in class and then asking questions related to those stories, implementing the love of books, and increasing verbal communication in class.

Components of program

Timetable

For the first 4 weeks, the participants had four lessons per week. For the next 4 weeks, she gave 3 lessons per week. For the last 2 weeks, she gave 2 lessons per week. Each lesson lasted 1 hour and 15 minutes. The lessons started at 8:00 AM when students are alert and eager to start a new school day, and ended at 9:15 for their break. Many times, the lessons lasted longer in order for the researcher to write the required words to be written home as homework on students' notebooks. Extra 4 days in May were used for running the post-test. 28 Arabic letters were taught as follows; 4 letters per week

with **2 letters per day**, with the following day's session serving as revision of those letters and words and correction of the homework.

Teaching letters

A typical lesson starts with playing some music while making some exercises to improve breathing and articulation, then playing a popular song and singing along with the song. After that, the researcher introduces **2 letters** with the appropriate cards, pictures, words, and homework.

Lessons were **backed up** with homework which include writing the 2 new letters and the words (representing pictures with objects starting or ending with letter at hand) taken during the lesson (2-3 words). Homework were checked regularly and students were rewarded for doing them. Students who did not do their homework were encouraged to do them constantly.

- **Example 1of teaching letters, (lesson 1, March 1st)**

First, the researcher, holding up a card 12* 18 cm., points at the letter on it, this letter is made of sandpaper cut and mounted on the card. Consonants are mounted on pink cardboard**,** vowels are mounted on blue cardboard. She pronounces the sound (not the name) of this letter repeatedly (ب ب ب) (bbb).

Next, she goes to the students one by one and lets them feel the letter while she keeps saying (ب ب ب). The student feels the letter with his pointer finger following its form as she instructs: exactly the way it is written: starting up from the right and following its curve down and to the left e.g. ب↓, listens to the researcher voicing its sound, and says its sound. Next, she lets him do the same with his eyes closed. All the students do that in turn. This step is done while the researcher points at a picture hanged on the whiteboard representing a picture of ice cream (بوظة) *bouza* with the **word** written on the board representing it. *Bouza* **starts** with /b /. She follows the same procedure with a word **ending** with /b/: door (باب) *bab* with the word written on the board representing it. *Bab* ends with /b/.

After that, she introduces the second letter (ا) /α/: it has to be different in sound and form from the first one, and does the exact same steps the 2 words for /α/ are (أرنب) *arnab* and (بابا) *baba*. Later, she asks holding up both letter cards show me (ب), show me (ا).

Then, she points to one of the letters and asks: **what** is this letter? And then she asks the same for the second letter. Finally She asks the students: **give me another word** that starts with the letter (ب), then she demands: give me another word that starts with the letter

(ا), can you give me a **word that gives the name of something** in the classroom that begins with (ب) /b/? With (ا) /α/?

At the end of the lesson the instructor passes around the students, and one by one she stamps a large impression of the 1st letter (ب) at the top of their notebooks. Then, she writes on it the following: the letter (ب) and the words (بوظة) and (باب). Then, she repeats the same for the letter (ا) and the words (أرنب) and (بابا). She marks the letters and words on the 2 pages in a way so that the students have to write the letter and the words 8 times. Finally, she asks the students to write their homework and to pay attention to their notebooks. The students leave the classroom for their break.

- **Example 2 of a lesson for teaching letters (lesson 24, April 16th)**

By this time the students would have accomplished learning all the letters, therefore, the researcher started introducing the Arabic short vowels (َ، ُ، ِ) *fat'ha, damma, kasra* as follows: she distributes a printout of 5 letters (م ،ب، خ، د، ع), she writes on the board: (ما، مو، مي) she says the sounds of what is written and demands from the students to do the same. Then she writes: (مَ، مُ، مِ), she says the sounds emphasizing them being shorter than the preceding group. She lets the students repeat many times: (ما، مَ), (مو، مُ), (مي، مِ),

emphasizing –in the first parenthesis- the first being a long *ma*: /mα/, and the second being a short *ma*: /mæ/.

The same process is done for the other 4 letters with a lot of practical examples like words which include these long or short vowels. Selected words are given for homework so the students would practice them and remember them better.

Teaching words

Words were taught via 3 ways: firstly, automatically during letter-teaching by writing and pronouncing the 2-3 words of represented pictures of objects depicting onset and ending of each newly taken letter. Secondly, by learning a new given word that is one of the most-used ones in Arabic language, preposition, or important words for the students daily life. Thirdly, students learned words presented by word cards accompanied- few minutes after they are presented- by picture cards, gestures, acting, or pantomimes.

At session 13 (end of first month of the program), and after the usual lesson routine of learning 2 new letters, the researcher started introducing **key words** in the Arabic language that are most frequently read in print e.g. هو، أنا، في، يكون، مَن، مِن، ذلك، إلى، قال، كانت، كان**…** (Him, I, in, is, who, from, that, to, said, was…) Also, taught prepositions, words seen on signs e.g. قف، نساء، رجال، عميق (stop,

women, men, deep water) and words on road signs e.g. امشي، لا تمش، طريق ذو اتجاه واحد (walk, don't walk, one way street). She began by giving 2 such words per day, by the time of lesson 24, 5 new keywords were introduced per day.

A total of **48** words, **10** propositions and **1** conjunction were taught by means of presenting them as flash cards. In addition, the instructor presented **60** original words representing the Arabic letters positioned at the onsets or ending letters of these words. Words were fortified by appropriate pictures and gestures. A total of **118** words were instructed during program time.

Each word was presented written on colored cardboard paper with no picture to match it, then, a picture was presented that represents the word or the situation, the students repeat that word individually then as a whole class. Beginning end of week 4 (session 13), 2 words per day were learned, then, starting from the beginning of the sixth week, 5 words per day were introduced

Parallel to that same stage (session 15) a sand box was brought to the class so students will practice their new letters and words daily, by writing them on the sand on a sand tray designed for that purpose.

b. After 7 weeks from the beginning of the program, the researcher introduced the tray of letters in her teaching routine.

Vocalization was taught at this stage too on the basis of individual letters to represent the change of the sound in the letter when inflected with Arabic vocalization *Altashkeel* **التشكيل** **(** ُ ِ ْ ً ٌ ّ ٍ َ **)** (starting from the right: *fatha, damma, kasra, sukoun, tanween al fateh, tanween al damm, tanween alkaser, alshadda…*) These vocalizations are as follows in English –starting from right: /Λ/, /U/, /i/, *silence mark sukoun*, /*an*/, /*on*/, /*en*/, *the stressing mark shadda*). This was instructed in comparison with the long vowels of the Arabic language e.g. (ا) or the vowel letter sound (α) was compared to the <u>short</u> vowel letter sound (æ) (َ) , (ي) was compared to (ِ): e.g. the long /i:/ to the short /i/.

The students practiced decoding words when they were asked to find the letters **representing** a **given word** from a tray with 30 squares filled with the 28 Arabic letters plus the *hamza* (ء) and the *ta'a marbouta* (ة), a version of (t) but separate and at the end of a word .

- **Example 1 of a lesson for teaching words, (lesson 13. March, 30th)**

In this session, the researcher followed the same procedures of the lesson above (lesson 1) at which letters were taught. 2 new letters were introduced (ل) /l/ and (ت) /t/, and 4 new words (ليمون) *laimoun* (بصل) *basal* (تمر) *tamr* (بنت) *bint.*

After that, 2 words are introduced; they are the type of words that are most commonly found in Arabic print. The instructor carries up card with the word (قال) *qala.* She asks for a male volunteer who is asked to say something, and then she asks the class what did he say? The students say he said …… Said = (قال) *qala* but it is for a male subject. She points to the card and confirms that this word is *qala.* She asks again and again: what did he say? They say: he *said*….she points to the card at the precise time of them saying *said.* She asks for more volunteers and repeats the procedure. Thus, the word is imprinted in students' memories. The instructor presents the second word on the second card: (كانت) *kanat*. She asks for a female volunteer and instructs her to jump. She asks the class: what was she doing? They say: she was jumping. The instructor says: that is right she *was* (كانت) jumping, stressing on (كانت). Other female volunteer are asked one by one to sing, write on the whiteboard, and eat a biscuit. The class answer when asked what was she doing? She was (كانت) singing, writing, eating. Again the word is securely kept in

their memory because of all the activities which accompanied its word card.

Homework is given at the end of the lesson to write the 2 new letters (ل) (ت) and the 4 new words (ليمون) (بصل) (تمر) (بنت). Homework would be checked at the following session, and key words (قال) and (كانت) will be revised and repeated.

- **Example 2 of a lesson for teaching words, (lesson 15. April, 4th)**

In this session, the researcher followed the same procedures of the first lesson above (lesson 1) at which letters were taught. 2 new letters were introduced (ظ) /zh/ and (ر) /r/, and 4 new words (ظرف) *zharf* (محافظ) *mahafez* (رمان) *rumman* (قطار) *qitar*.

After that, 2 words are introduced. The instructor carries up card with the phrase (موقف باص) *mauqef bas.* She asks for a volunteer who is asked: how did you come to school? He answers: by bus, and then she asks: where did you wait for the bus? The student answers: at the bus stop. The instructor points to the card and confirms that these 2 word are *mauqef bas* (bus stop). She repeats the conversation with other students while supporting all that with a picture showing a bus stop. Thus, the words are imprinted in students' memories.

The instructor presents the second word on the second card: (مع) maá. She asks for 2 volunteer and instructs them to walk around the class. She asks the class: who is walking with Lamis? The students answer: Thana is walking with Lamis. The instructor says: that is right, Thana is walking *with* Lamis stressing on (مع) maá (with). Other volunteer are asked in pairs to sing, write on the whiteboard, and eat a biscuit. The students are asked: who is singing with Ahmad? The students shout: with Abdallah. Who is writing with Omar? The class responds: with Fatima. Who is writing with Amir? The class says all together: with Rahaf. Again the word is securely kept in their memory because of all the activities which accompanied its word card.

A sand box is presented to the class so students will practice their new letters and words daily. The instructor asks the students in turn to come to the sand tray and says can you write the letter (ظ)? Can you write (ظا)? Can you write this letter (while showing a letter card)? Can you tell me its sound? Can you write me your name? Can you write Muhannad's name?

Homework is given at the end of the lesson to write the 2 new letters (ظ) (ر) and the 4 new words (ظرف) (محافظ) (رمان) (قطار).

Homework would be checked at the following session, and key words (موقف باص) and (مع) will be revised and repeated

- **Example 3 of a lesson for teaching words**, **(lesson 25, April, 20th)**

The lesson begins by revising all the letters acquired up to now by flashing the 28 Arabic letter cards without their pictures. Then, the instructor presents 5 new key words with their proper representatives of pictures, pantomiming and acting. The words are:

(مدخل) *madkhal*, (أنا) *ana, (هو) houwa, (بِ) be,* and (أملك) *amlik*, meaning *entrance*, *me*, *him*, *with* or *by*, and *I have*.

Next, the instructor introduces the letters tray for the students to practice decoding familiar and new words. She says: find me the letter (ص ص ص) in the box, find me (م م م). If it is difficult, she spreads the sandpaper letters and says: Pick the letter I said between the ones I have spread. She asks the student to feel the same letter he did not relate to the sound she voiced, say its sound, and then find the same one in the tray of letters.

The researcher moves on asking: find me the first letter of the word (أرنب), can you tell me what the sound you heard is? What is the first sound in the word (أرنب)? That is right; it is /α/, very good, put the letter on the table. Can you tell me the second sound you

heard? Put the letter on the table. Can you tell me the third letter you heard? Put the letter on the table. Let us sound those letter as a single word: *arnab*, very good. Then the class moves on to decoding new words e.g. the instructor demands: Can you tell me what the first sound in the word (بطل) is? And so on.

Finally, she asks the students one at a time to come to the tray, and practice decoding a variety of words, some familiar and other completely new.

Teaching aids

- **Letter cards** 28 letter cards each 12* 18 cm. a letter is made of sandpaper cut and mounted on the card. Consonants are mounted on pink cardboard**;** vowels were mounted on blue cardboard.
- **Word cards** 59 word cards, each has a word written clearly with thick felt pen on colored cardboard paper 12*18 cm.
- **Picture cards** 90 colored pictures from story books and magazines were cut and mounted on cardboard 12* 18cm. In addition, 16 signs representing street signs or signs posted on public buildings were also cut and presented as picture cards.

- **Lap top** It was mainly used to listen to songs accompanied by animations and looking at pictures or signs representing words.
- **Sand tray:** its dimensions is 40*50 cm. and its depth is 4 cm.
- **Letters tray provided with separate compartments** a tray (55*66 cm. 4 cm. deep) divided into 30 square cubicles filled with the 28 Arabic letters plus the *hamza* (ء) and the *ta'a marbouta* (ة), a version of (t) but separate and at the end of a word .

7-4-4 Issues of consideration during implementation of the program:

Because visual memory may be more effective than the students' auditory memory for short sequences of information, *that* information was presented to them **visually**. The researcher used **visual stimuli** continuously and incisively during lessons. Not one lesson passed without the use of pictures mounted on cardboard, drawn on the whiteboard, or shown on a laptop screen. During most of the lessons' time, interesting pictures of objects, people, and animals were flashed at the students. Words representing them should start or end with the 2 new freshly learned letters/sounds. For

some letters, up to 6 pictures were introduced; however, only 3 words were chosen for each letter. The **words** representing those pictures were written on the whiteboard. The researcher kept repeating those words, with an emphasis on sounding the desired letter, in order for the students to connect the words with the sounds of the 2 new letters, and learn their graphemes as well.

Students commented on people, animals, and objects in those pictures and related their own experiences to the situations those pictures represented. The responses were made orally or manually by pointing rather than orally for the case of one student with speech difficulty (he didn't speak at all). The relationship between reading skills and visual perception in children and adolescents with DS has been established through researches (Fidler, Most, Guiberson, 2005), as a result, a significant correlation was found between a composite score on the perceptual tests and word identification

Another concern of the researcher was **stimulating short-term memory** by means of visual aid, asking questions about familiar activities and words, story telling, and **repetition of already obtained information.**

7-4-5 difficulties and Impediments during implementation of the program:

The researcher encountered the following difficulties and Impediment before and during her research:

Lack of IQ results for the sample

These results would have been important to determine weather participants are capable of being educated (in basic skills like reading, writing, and math). Mildly retarded individuals (IQ 55-70) may achieve self-sufficiency and the ability to learn up to fifth grade, but not achieving those accomplishments before they reach the age of 8 or 11 (Abou Fakhr, Zahlouk, Al Malli, 2005). Therefore, students with IQ lower than 55 might not achieve reasonable reading skills. The IQ of student was unknown and shortage of time and funds hindered its completion; this led to the ambiguity on weather all members of the experimental group are able to acquire reading skills.

Problems with short term memory

Students needed repetition of letters and words. After the weekend some already given information was already forgotten.

Duration of experiment

Time of implementation of program was short; it was not enough to reach the part where the students are supposed to reach learning to read sentences and texts, consequently, not sufficient for acquiring the desired reading skills.

Lack of motivation among parents

Parents think their child reached his academic plateau and will never read. Some came to meet the researcher and inquired weather the program has any possible advantages for their children's reading skills. Some parents and siblings did the homework for the children. The table below shows the correlations between parents' motivation for teaching their child to read and his reading skills.

	Child's reading skills (before)	motivation for reading
pearson	1	.478(*)
significance	.	.039
N	19	19

Correlation is significant at the 0.05 level (2-tailed).

Table 1 shows the positive correlation between parents' motivation and their child's reading skills

By using Pearson we find that Pearson-Chi square=0.478, p= 0.039, by comparing it to (0.05) we see that it is smaller than (0.05) which confirms a positive correlation.

Lack of motivation among some students

Some students did not write their homework, some did not show eagerness for learning and withdrew or showed defiant behaviors.

Teachers

Some teachers were complaining that the program is interfering with the one that is run regularly in school, sometimes, they held selected students in their original classrooms and did not let them attend the researcher's classes.

Frequent absences of students

Some of the students were frequently absent; one of the frequent absentee is the weakest student with articulation problems.

Lack of Arabic measures for reading, phonological awareness and general cognitive development

The only available one, to the researcher's knowledge, was used for assessing the 2 groups. She tried to create ones to compensate for the shortage of tests she strongly believed could be valuable for reading and cognitive measures. The measures used in the literature found are either not translated now into Arabic for assessing students with DS or available online but with no sufficient time or fund to buy and translate for immediate use.

Examples of the tests required for translating into Arabic and then applied would be: the Woodcock Reading Mastery Tests-Revised (WRMT-R), the Peabody Picture Vocabulary Test-Revised (PRVT-R) ,the Kaufman Assessment Battery for Children-Mental Processing Composite (K-ABC), the Auditory Analysis Test

(Rosner and Simon, 1971) for phoneme awareness measurement, the Number Recall subtest of the K-ABC for Verbal Memory Spans, the Boston Naming Test (Kaplan et al., 1983) for word retrieval, the Corsi Block Span for measuring Visual Memory Span(Milner, 1971), and the Test of Auditory Comprehension of Language-Revised (TACL-R).

CHAPTER 8

Analysis of Data and Discussion of findings

8-1 Introduction

This chapter presents the analysis of data based on testing the hypotheses of research, and discussion of findings.

8-2 Results

8-2-1 Results of testing the first hypothesis

Hypothesis 1 There are no significant statistical differences (α = 0.05 level) in means of the pre-test scores of members of the control group and experimental group.

Group	N	mean	Std. Deviation	t	df	p	Decision
control	9	12.7778	4.86769	.955	17	.353	not significant
experimental	10	10.8000	4.15799				

Table 8. Statistical differences in means of scores of the pre-test scores for the control group and the experimental group

By using the t student test, we found that t = 0.955, p value =0.353, by comparing it with the significance level 0.05 we find that p value is larger than the (α = 0.05) which accepts the null hypothesis and concludes that the level of reading skills of the control group was similar to those of the experimental group prior to the experimental program.

On the other hand, means of the pre-test scores of the control group was higher than means of the pre-test scores of the experimental group although there wasn't a significant difference between the two means in the pre-test scores.

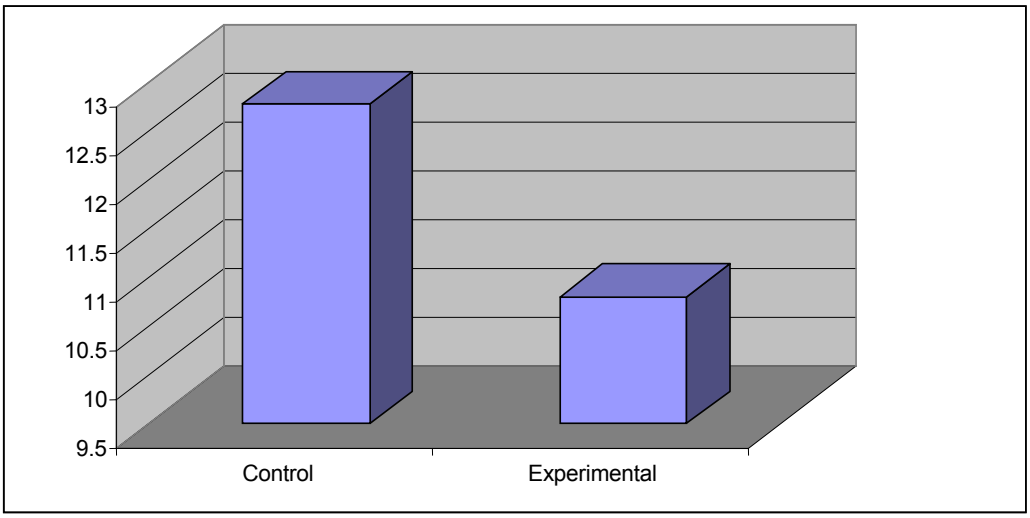

Figure5. Levels of means of **pre-test scores** for reading skills of control and experimental groups.

8-2-2 Results of testing the second hypothesis of research

Hypothesis2 There are no significant statistical differences at (α = 0.05 level) between the means of the post-test scores of members of the control group and experimental group.

Group	N	mean	Std. Deviation	t	df	p	Decision
control	9	13.5556	4.71993	-.775	17	.449	not significant
experimental	10	15.3000	5.05635				

Table 9. Statistical differences in means of scores of the post-test scores of members of the control group and experimental group.

By using the t student test, we found that t = 0.775, p value =0.449, by comparing it with the (ά=0.05) we find that p value is larger than the (α =0.05) which accepts the null hypothesis and concludes that the level of reading skills of the control group was similar to those of the experimental group after the conclusion of the experimental program..

Even though there are no significant differences between the post-test scores of the control group and the experimental group, the improvements in reading skills were greater in the experimental group than they were in the control group. Reason for parallel improvement in reading skills in the control group can be explained by their continuous learning and training of the words of the reading assessment battery presented to them during the pre-test.

On the other hand, means of the post-test scores of the experimental group was higher than means of the post-test scores of the control group although there wasn't a significant difference between the two means in the post-test scores.

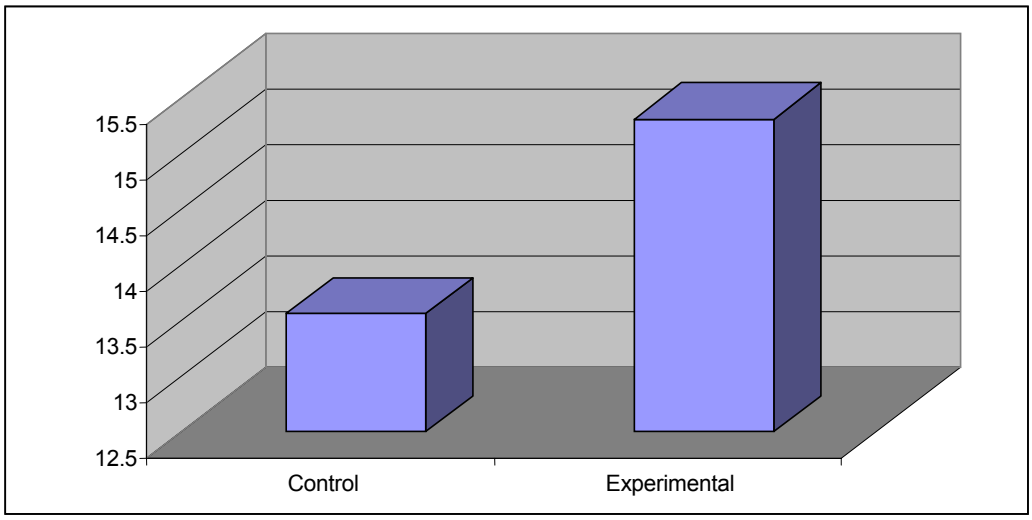

Figure 6. Levels of **means of post-test scores** for reading skills of the control group and experimental group.

8-2-3 Results of testing the third hypothesis of research

Hypothesis 3 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test scores and post-test scores of members of the control group.

Control group	N	mean	Std. Deviation	t	df	p	Decision
Pre-test	9	12.7778	4.86769	-1.360	8	.211	not significant
Post-test	9	13.5556	4.71993				

Table10 . Statistical differences in means of scores of the pre-test and post-test scores for members of the control group.

By using the t student test, we found that t = 1.360, p value =0.211, by comparing it with the significance level 0.05 we find that p value is larger than the (α = 0.05) which accepts the null hypothesis and concludes that after testing the level of improvement of reading skills of the control group we found that it was not significant. This

result proves that the level of improvement in the control group was not significant.

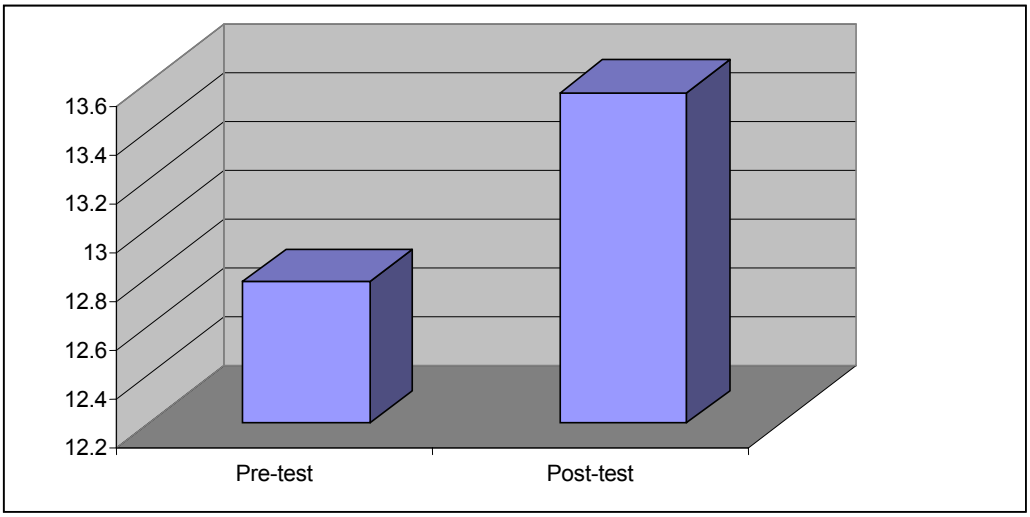

Figure7. Statistical levels of means of pre-test and post-test scores of reading skills of the **control group**.

8-2-4 Results of testing the fourth hypothesis of research

Hypothesis 4 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test scores and post-test scores of members of the experimental group.

Experimental group	N	mean	Std. Deviation	t	df	p	Decision
Pre-test	10	10.8000	4.15799	-6.007	9	.000	significant
Post-test	10	15.3000	5.05635				

Table11. Statistical differences in means of scores of the pre-test and post-test scores for members of the control group.

By using the t student test, we found that t = 6.007, p value =0.000, by comparing it with the (α= 0.05) we find that p value is smaller

than the (a= 0.05 level) which rejects the null hypothesis; therefore there are differences in favor of the post-test scores of the experimental group. It concludes that the level of reading skills for the participants of that group was significantly higher after learning via the proposed program.

This result confirms the effectiveness of the program because it shows a significant improvement in level of reading skills in the experimental group. Participants improved in letter- recognizing, sight word recognizing, decoding words, and blending.

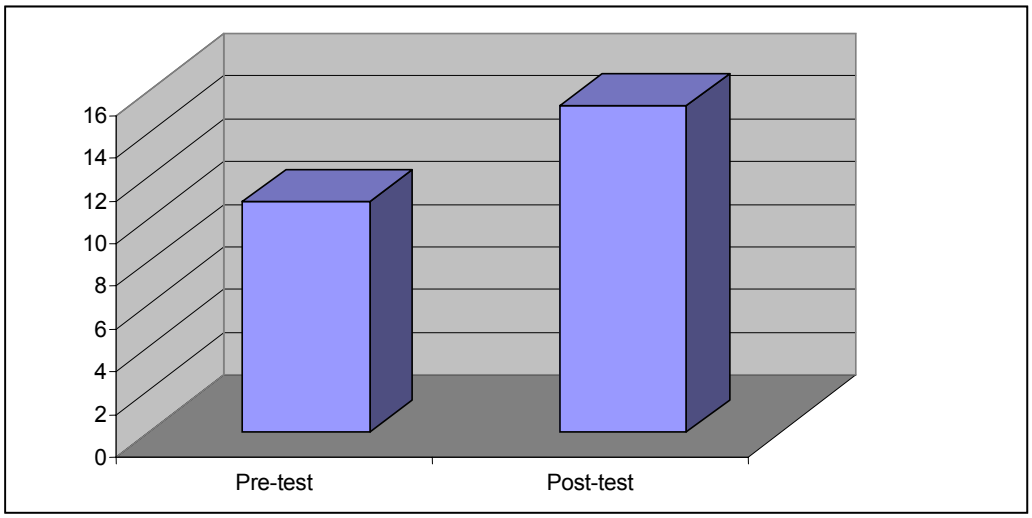

Figure8. Levels of means of pre-test and post-test scores of reading skills of the **experimental group**.

8-2-5 Results of testing the fifth hypothesis of research

Hypothesis 5 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test scores of male

members of the control group and pre-test scores of male members of the experimental group.

	N	Mean Rank	Sum of Ranks
M. control	4	5.38	21.50
M. experimental	5	4.70	23.50
Total	9		

	VAR00002
Mann-Whitney U	8.500
Wilcoxon W	23.500
Z	-.369
Asymp. Sig. (2-tailed)	.712
Exact Sig. [2*(1-tailed Sig.)]	.730(a)

Table12. Statistical differences in means of the pre-test scores of male members of the control group and pre-test scores of members of the experimental group.

We found that Mann-Whitney U =8.500 and p= 0.712, by comparing it with (0.05) we find that p value is larger than the (0.05) which accepts the null hypothesis. Although male participants in control group scored higher than males in the experimental group in the pre-test, there wasn't a significant statistical difference.

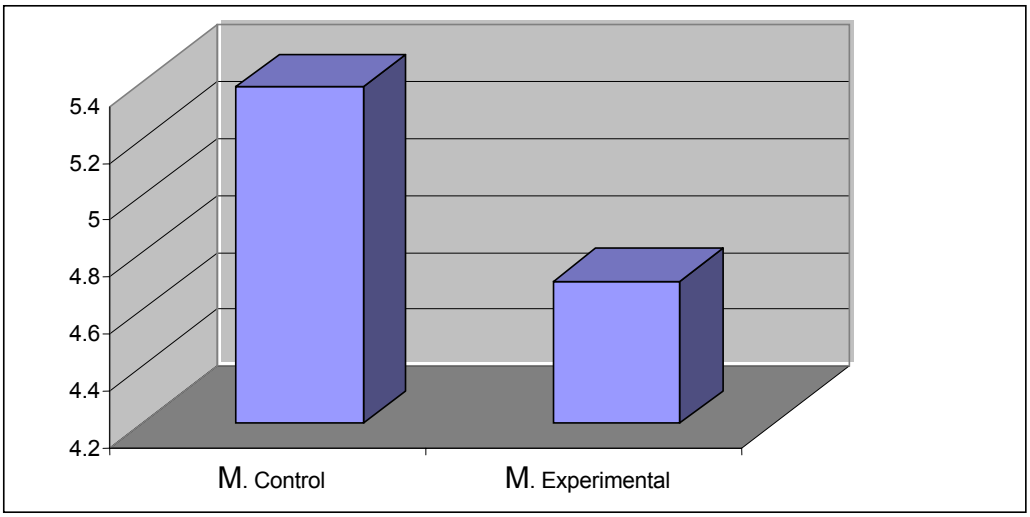

Figure9. Levels of means of **pre-test scores** of males in the control group and **pre-test scores** of reading skills of males in the experimental group.

8-2-6 Results of testing the sixth hypothesis of research

Hypothesis 6 There are no significant statistical differences at (α = 0.05 level) between the means of the post-test scores of male members of the control group and the pos-test scores of male members of the experimental group.

	N	Mean Rank	Sum of Ranks
control	4	4.13	16.50
experimental	5	5.70	28.50
Total	9		

	VAR00003
Mann-Whitney U	6.500
Wilcoxon W	16.500
Z	-.876
Asymp. Sig. (2-tailed)	.381
Exact Sig. [2*(1-tailed Sig.)]	.413(a)

Table 13. Statistical differences in means of the post-test scores of male members of the control group and post-test scores of male members of the experimental group.

We found that Mann-Whitney U =6.500 and p= 0.381, by comparing it with (0.05) we find that p value is larger than the (0.05) which accepts the null hypothesis. Again this result might be because males in the control group were tutored on the words and materials of the test.

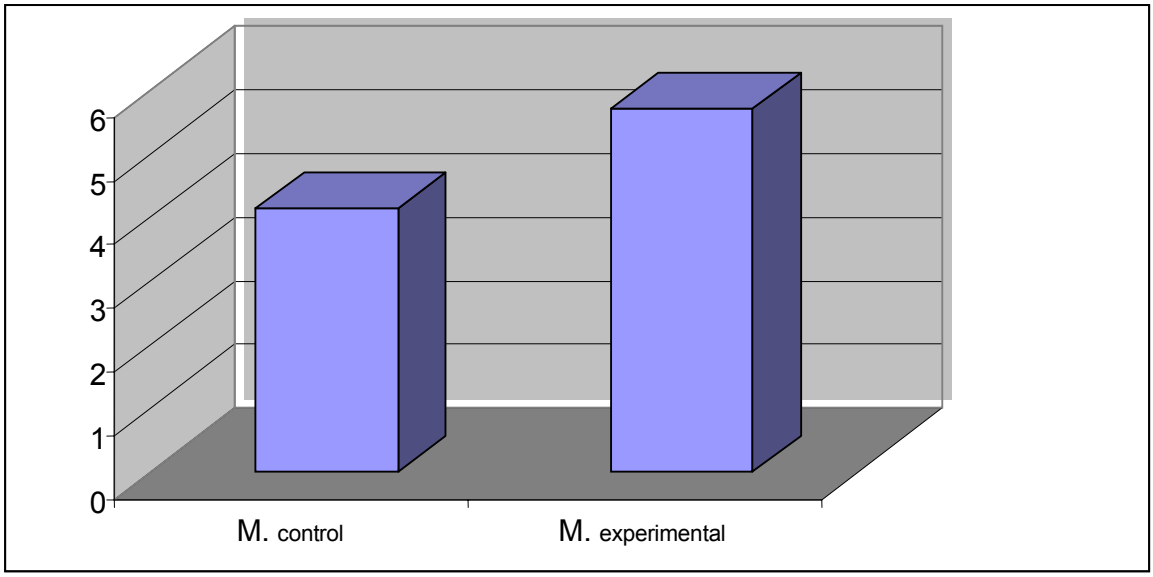

Figure10. Levels of means of **post-test scores** of males in the control group and **post-test scores** of reading skills of males in the experimental group.

8-2-7 Results of testing the seventh hypothesis of research

Hypothesis 7 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test and post-test scores of male members of the control group.

		N	Mean Rank	Sum of Ranks
Pre-test * Post-test	Negative Ranks	1(a)	3.50	3.50
	Positive Ranks	3(b)	2.17	6.50
	Ties	0l		
	Total	4		

	Pre-test * Post-test
Z	-.552(a)
Asymp. Sig. (2-tailed)	.581

Table 14. Statistical differences in means of the pre-test and post-test scores of male members of the control group.

We found that Z=0.552 and p= 0.581, by comparing it with (0.05) we find that p value=0.581 is larger than the (0.05) which accepts the null hypothesis.

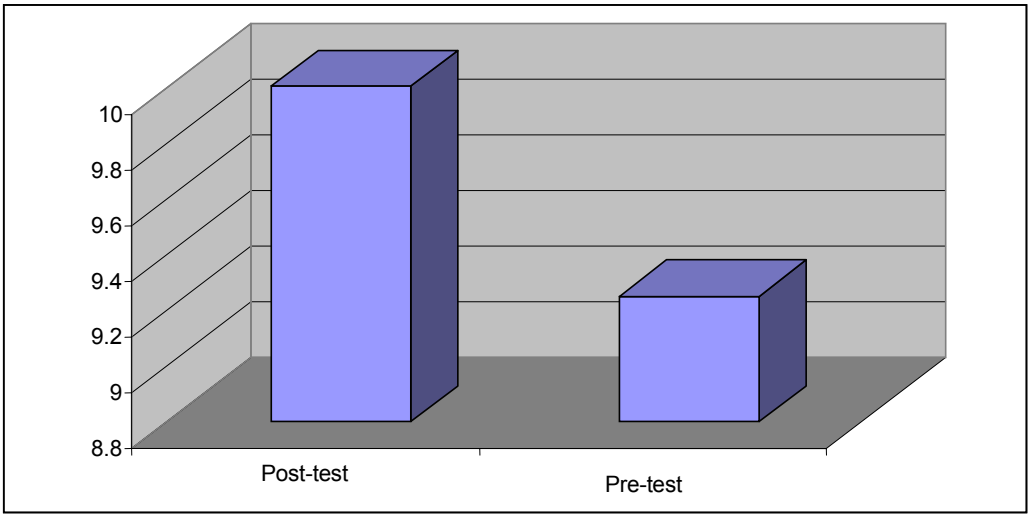

Figure11. Levels of means of pre-test and post-test scores of reading skills **of males in the control group.**

8-2-8 Results of testing the eighth hypothesis of research

Hypothesis 8 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test and post-test scores of male members of the experimental group.

		N	Mean Rank	Sum of Ranks
Pre-test * Post-test	Negative Ranks	0(a)	.00	.00
	Positive Ranks	5(b)	3.00	15.00
	Ties	0l		
	Total	5		

	Pre-test * Post-test
Z	-2.070(a)
Asymp. Sig. (2-tailed)	.038

Table15. Statistical differences in means of the pre-test and post-test scores of male members of the experimental group.

We found that Z=2.070 and p = 0.038, by comparing it with (0.05) we find that p value is smaller than the (0.05) which rejects the null hypothesis. Therefore, there are differences in favor of the means of post-test scores of the experimental group. It concludes that the level of reading skills for the participants of that group was significantly higher after learning via the proposed program.

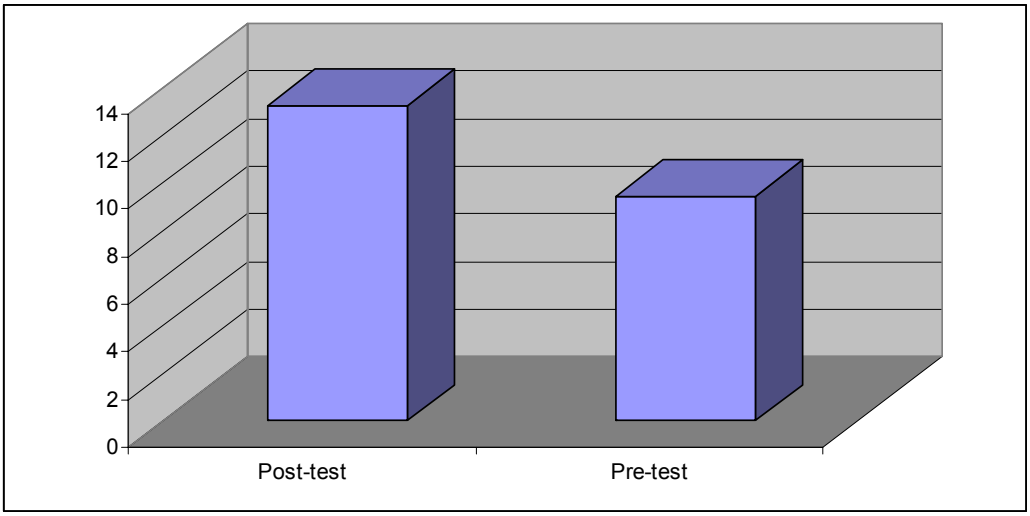

Figure12. Levels of means of pre-test and post-test scores of reading skills **of males in the experimental group.**

.8-2-9 Results of testing the ninth hypothesis of research

Hypothesis 9 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test and post-test scores of female members of the control group and female members of experimental group.

	N	Mean Rank	Sum of Ranks
F. control	5	6.70	33.50

F. experimental	5	4.30	21.50
Total	10		

Mann-Whitney U	6.500
Wilcoxon W	21.500
Z	-1.273
Asymp. Sig. (2-tailed)	.203
Exact Sig. [2*(1-tailed Sig.)]	.222(a)

Table 16. Statistical differences in means of the pre-test and post-test scores of female members of the control group and female members of experimental group.

We found that Mann-Whitney U =1.273 and p = 0.203, by comparing it with (0.05) we find that p value is larger than the (0.05) which accepts the null hypothesis. Once more, this result might be because females in the control group were tutored on the words and materials of the test so the researcher felt they answered with more ease during the post-test.

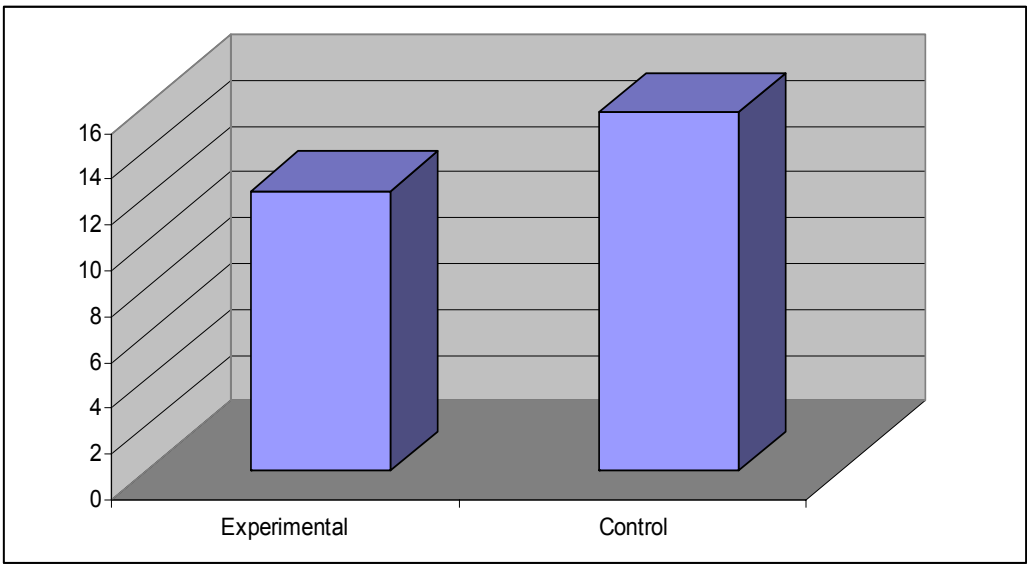

Figure13. Levels of means of **pre-test and post-test scores** of reading skills of **females** in the control group and **females** in the experimental group.

8-2-10 Results of testing the tenth hypothesis of research

Hypothesis 10 There are no significant statistical differences at (α = 0.05 level) between the means of the post-test scores of female members of the control group and means of the post-test scores of female members of experimental group.

	N	Mean Rank	Sum of Ranks
F. control	5	5.20	26.00
F. experimental	5	5.80	29.00
Total	10		

	VAR00003
Mann-Whitney U	11.000
Wilcoxon W	26.000
Z	-.315
Asymp. Sig. (2-tailed)	.753
Exact Sig. [2*(1-tailed Sig.)]	.841(a)

Table17. Statistical differences in means of the post-test scores of female members of the control group and the post-test scores female members of experimental group.

We found that Mann-Whitney U =0.315 and p = 0.753, by comparing it with (0.05) we find that p value is larger than the (0.05) which accepts the null hypothesis. Again we can relate this result to the higher scores of the control group in the pre-test, thus even the higher improvement of the experimental group (shown by their post-test results) did not produce statistically significant improvement.

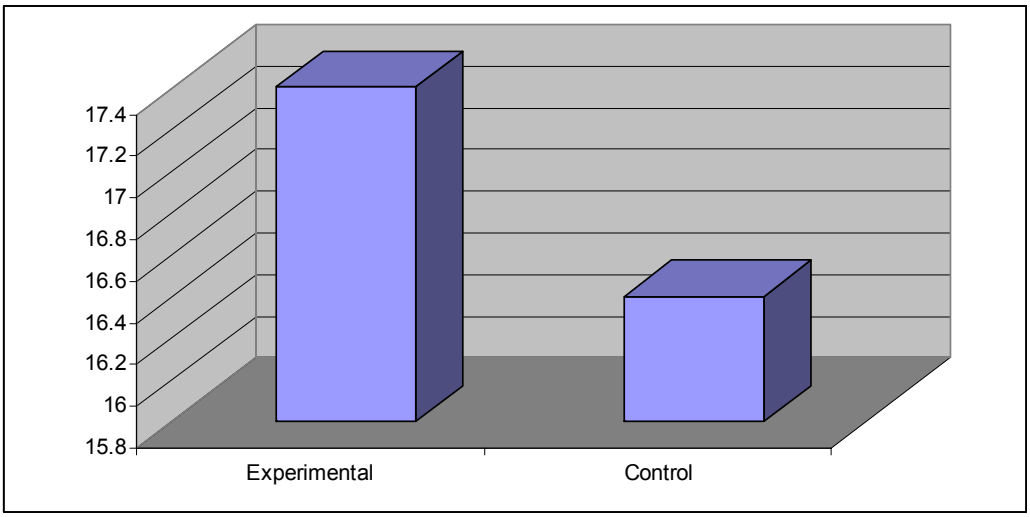

Figure14. Levels of means of **post-test scores** reading skills **of females** in the experimental group and means of **post-test** scores of **females** in the control group**.**

8-2-11 Results of testing the eleventh hypothesis of research

Hypothesis 11 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test scores and means of the post-test scores of female members of the control group.

		N	Mean Rank	Sum of Ranks
Pre-test * Post-test	Negative Ranks	0(a)	.00	.00
	Positive Ranks	3(b)	2.00	6.00
	Ties	2l		
	Total	5		

Z	-1.633(a)
Asymp. Sig. (2-tailed)	.102

Table18. Statistical differences in means of the pre-test scores and means of the post-test scores of female members of the control group.

We found that Z=1.633 and p = 0.102, by comparing it with (0.05) we find that p value is larger than the (0.05) which accepts the null

hypothesis. It proves that there is no significant improvement in reading skills in female members of the control group as tested in post-test.

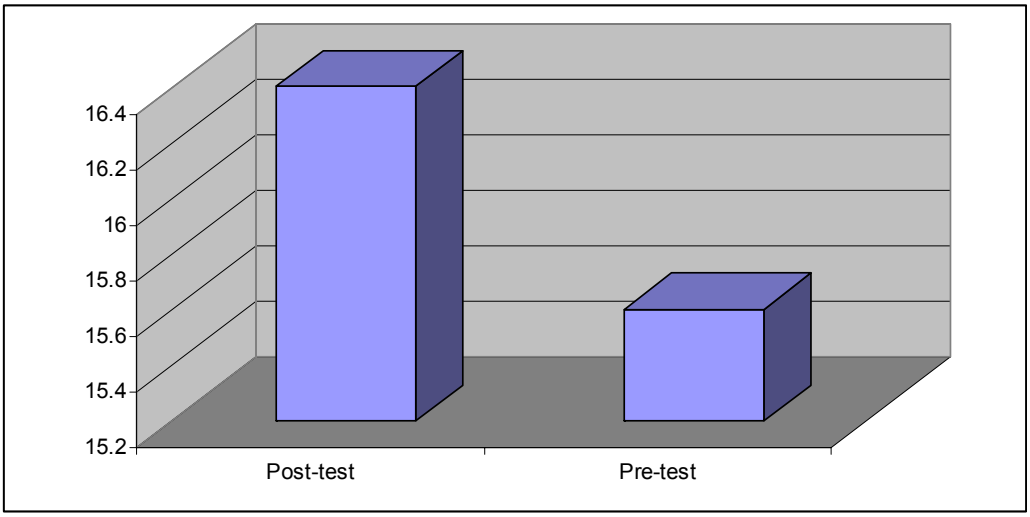

Figure15. Levels of means of pre-test scores and means of the post-test scores of reading skills of **females in the control group.**

8-2-12 Results of testing the twelfth hypothesis of research

Hypothesis 12 There are no significant statistical differences at (α = 0.05 level) between the means of the pre-test scores and means of the post-test scores of female members of the experimental group.

		N	Mean Rank	Sum of Ranks
Pre-test * Post-test	Negative Ranks	0(a)	.00	.00
	Positive Ranks	5(b)	3.00	15.00
	Ties	0l		
	Total	5		

Z	-2.032(a)
Asymp. Sig. (2-tailed)	.042

Table 19. Differences of Statistical means of pre-test scores and means of post-test scores of female members of the experimental group.

We found that Z=2.032 and p = 0.042, by comparing it with (0.05) we find that p value is smaller than the (0.05) which rejects the null hypothesis. Therefore, there are differences in favor of the means of post-test score of the females in the experimental group.

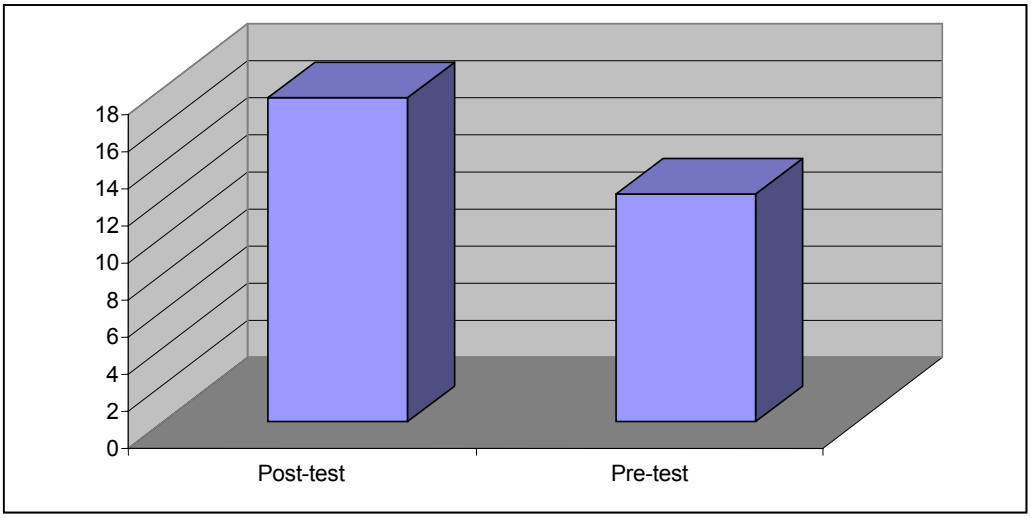

Figure16. Levels of means of pre-test scores and means of the post-test scores of reading skills of **females in the experimental group.**

8-2-13 Results of testing the thirteenth hypothesis of research

Hypothesis 13 There are no significant statistical differences at (α = 0.05 level) between the means of the post-test scores of females and means of the post-test scores of males in the control group.

Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	N	Sex
			2.35372	1.41421	10.0000	4	M
.031	7	-2.703	1.93907	4.50555	16.4000	5	F

Table 20. Differences of Statistical means of post-test scores of female and male members of the control group

By using the t- student test we found that t = 2.703 and p value is 0.031, by comparing it with (0.05) we find that p value is smaller than α which rejects the null hypothesis. This means there are significant differences in attainments in reading skills as tested by post-test in favor of females in the control group.

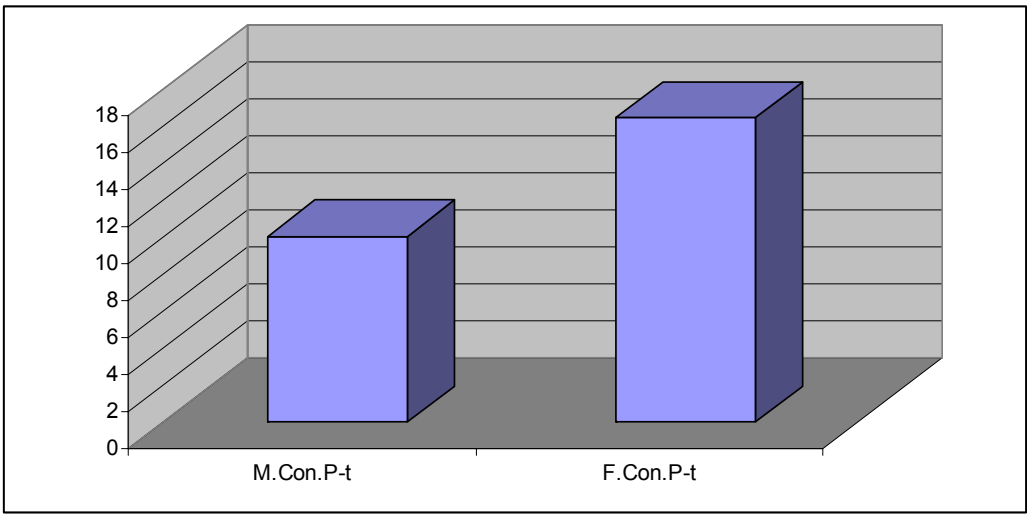

Figure17. Differences of means of post-test scores of females and males in the control group

8-2-14 Results of testing the fourteenth hypothesis of research

Hypothesis 14 There are no significant statistical differences at (α = 0.05 level) between the means of the post-test scores of females and means of the post-test scores of males in the experimental group.

Sig. (2-tailed)	df	t	Std. Error Mean	Std. Deviation	Mean	N	Sex
			2.35372	5.26308	13.2000	5	M
.206	8	-1.377	1.93907	4.33590	17.4000	5	F

Table 21. Differences of Statistical means of post-test scores of female and male members of the experimental group.

By using the t student test we found that t = 1.377 and p value is 0.206; by comparing it with (0.05) we find that p value is greater than α which accepts the null hypothesis. This means there are no significant differences in attainments in reading skills as tested by post-test after completing the program between males and females in the experimental group.

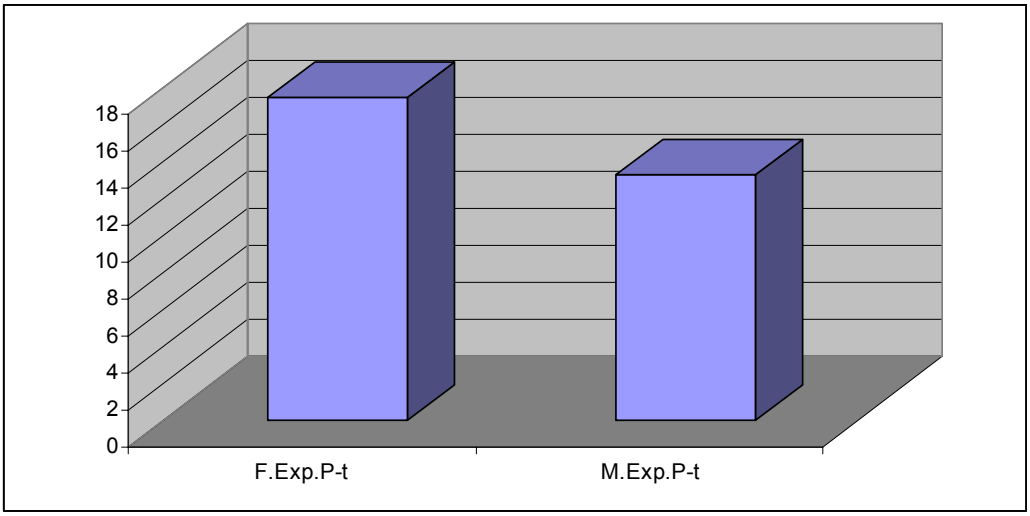

Figure18. Differences of statistical means of post-test scores of females and males in the Experimental group

8-3 Discussion of Findings

Findings suggest that instructing the teenagers with DS in the experimental group according to the proposed program had a significant impact on their reading skills progress. Students participating in the program had an important progress in their reading skills after their 10 weeks of participation in the program. This could reflect changes in expectations about the academic potential of teenagers with DS, and possibly in the emphasis on literacy in the special school curriculum.

There were no statistical differences in means of pre-test scores of control and experimental groups. That means both groups were rather similar in reading skills prior to the commencement of executing the program. However, means of the **pre-test scores** were higher in the control group: **control: 12.77** while the ones for the **experimental group** were **10.8**.

It was quite surprising that statistical differences of means of scores for pre-test/ post-test came with no statistical significance. Nevertheless, means of **post-test scores** came as follows: **control: 13.55**, **experimental: 15.3** which show a higher improvement in the experimental group reading skills. The reason could be that means of the **pre-test scores** were higher in the control group: **control: 12.77** while the ones for the **experimental group** were **10.8**. In

other words, the control group scored higher in the pre-test (which may have prevented the statistical difference reaching significance), and the experimental group scored higher in post-test. Difference of means of pre-test/post-test scores was 0.78 in the control group, 4.5 in the experimental group. Another reason could be that teachers who were present during pre-test trained the control group during the 10 weeks of program time on words and questions of the test battery. The researcher noticed that during post-test, some students of the control group knew the answers automatically when presented with question-flashcards but did not perform that good in composing sentences from given words or reading sentences from freshly presented story books.

Results of the post-test of reading skills in the experimental showed similar means in males and females meaning there is no difference in attainment according to gender. In short, there were no differences in results concerning gender in the present research.

Participants in the program began recognizing more letters than they did when they were pre-examined and more sight vocabulary, words most encountered in all Arabic readable print, and familiar words. They also improved in writing which was evident from checking their daily homework. Students also added new everyday words to their vocabulary, e.g. 'them', 'those', words on road signs

e.g. 'stop', 'one way road', 'bus stop', words written on public buildings e.g. 'men', 'information', 'no entry', prepositions 'to', 'on'.

Some students began sounding the letters and decoding words to read them thus moved on to learning new words which are not yet in their speech list. Others gave a try at blending phonemes to sound words although it is known that individuals with DS have a deficit of linking together individual phonemes to sound and read new words (Gathercole & Baddely, 1993).

A further important result of this program is the introduction and practice of vocalization on letters which enabled students to read new words that carried these vocalizations. Consequently, students began distinguishing between (ماما) and (مَكتب), two words in Arabic the first one starting with /m/ followed by /α/, and the second with /m/ with the vocalization /æ/ above it.

In addition, by using the method of teaching words by associating their visual written form and their sounds (relying more on their form); students responded surprisingly with the appropriate verbal response. Some students of the group showed an exceptional facility in that association.

Finally, Students' motivation has improved towards the end of the program, more and more the researcher noticed the increase in the following points: they came to class on time, were eager to write on

the whiteboard, show homework, and participated in classroom activities and conversations.

Various results of the questionnaire

Some results of the questionnaire showed that some variables did not have positive correlations like those obtained from other researchers e.g. the correlation between Father's educational level and his profession and child's reading skills, they both had no positive correlations with reading skills of the child in the current research contrary to Cunningham's findings which indicate that children with DS whose fathers have higher locus of control have better academic attainments (Turner, Albroz, Gayle, 2008).

The following correlations were also not significant in this research: e.g. correlations between mother's educational level, the age of child when he first joined school, his joining a school for normally developing children (if he ever did that), his hearing ability, his articulation, parents reading stories to the child before he sleeps, the child's motivation for reading (his attachment to books and notebooks) **and his reading skills**.

The percentage of individuals who can read (according to parents' answers) in all the 52 questionnaires in the study: 48%, the percentage of individuals who can read in the experimental group:

30%, the percentage of individuals who can read in the control group: 33.33%, the percentage of individuals who can read in both groups, the experimental group and the control group: 31.57%. Most of the parents did not answer how many letters their child recognizes.

In the question: do you believe that your adolescent child can learn to read now (answered by parents of sample of research)? 18 parents said 'yes' and 1 parent said 'no'. And when asked if they believe that learning to read is important for their adolescent child, 5 out of 19 answered 'no', they all wished their child Joins occupational education.

Finally, when asked weather they wish for their child to marry when he reaches young adulthood and marriage age we had 52%, 'Yes' answers, and 48% gave 'no" answers.

8-4 Discussion of Findings Compared to Previous Literature

Findings of this research were similar to previous literature in that all being experimental ones. It is comparable to the one by Byrne et al. (1995) in that teenagers with DS had relatively advanced reading skills, and with Fowler et al. (1995) where they found that children with DS have not progressed beyond the early stages of reading

where reading is achieved via sight words only, only part of the experimental group made substantial progress in mastering orthographic decoding. This study also corresponds to Bird &Buckley's in its outcome. Both studies focus on its results that all teenagers with DS should be included in reading instructions. The present research's findings are related also to Bayliss's (2000) in that phonological awareness is contributing to the reading skills of children with DS.

The significant improvement in reading skills of this research's sample also relates to Bochner et al. (2001), where all but one of their participants learned to read, although this experiment didn't reach to the point where the entire experimental group learned to read, but advancement was significant.

Findings of this study are also comparable to the one of Law et al. (1995) in that visual presentation of language offers way to overcome their auditory processing and memory processing. It differs from it in that it is longitudinal study where researchers could intervene in memory training.

CHAPTER 9

Conclusion

9-1 Summary

It is a fact that literate individuals with Down syndrome can obtain employment, participate in their communities, and enjoy full social life. Unfortunately, many families in Syria grow to be unenthusiastic once their children with Down syndrome reach their teenage years without acquiring literacy especially reading skills. Contrary to that view, this research tries to establish the inspiration that enrolling teenagers in program for teaching reading can have a positive impact on their reading skills.

Chapter 1 introduces the main subject of the research and its problem which is that the majority of teenagers with Down syndrome in Damascus cannot read and some cannot recognize letters Therefore, it discusses the issue of teaching the participants reading skills so they can acquire or improve these skills. It aims to teach them reading skills in their mother language, Arabic by the application of a phonic-method program. The research tests the program's effectiveness on a sample from two special schools in Damascus, Syria.

The significance of this work lies on the basis of it being the first one done –to the researcher's knowledge- on the subject at hand. Moreover, the experimental method allowed the researcher to test the effectiveness of the proposed program, find its flaws, and suggest further steps to improve reading instructions for teenagers with Down syndrome. The research aims to attain the following goals: Designing a program for teaching reading skills to teenagers with DS, Applying the program to teach teenagers with DS reading skills, Checking the effectiveness of the program to teach reading skills to 10 teenage students with DS forming an experimental group from a special school (Al Rajaa), comparing their progress with 9 students from another special school (Haza Bayti), both in Damascus. It also tries to expose the individual differences in gender of the advantages acquired from the reading program in learning, identifies the difficulties students with DS face while learning with the program, and recommends suggestions for improving the effectiveness of the research's program.

Chapter 2 provides considerable information on DS, its causes and classification, its associated congenital abnormalities, its effects on physical characteristics, motor skills and cognitive development, personality, Intelligence, and mental abilities.

Chapter 3 talks about Cognitive development, its evaluation, Piaget's Theory of Cognitive Development, its Basic principles and Stages. Then it moves to shed some light on the cognitive development in individuals with D S and how to improve it. There is considerable information in this chapter about the human memory, memory in DS, Attainment in DS, *how* to maintain constant attainments, and finally variables which influence academic attainment

Chapter 4 examines some reading acquisition theories and how we can apply selected components of them for teaching. It talks about reading skill acquisition processes. It also talks about educational approaches for the reading process and presents some methods of teaching reading e.g. the Traditional phonic Method, the Whole Word Method, and Key Word Approach. The chapter is wrapped up by mentioning reading readiness skills which are important for a child to have so he is ready to acquire those skills.

Chapter 5 is about DS and reading. It starts by pointing out the importance of reading for teenagers with DS and how it can positively influence their lives e.g. because reading instruction it can develop speech, language, phonological skills, vocabulary, grammar knowledge, and memory skills. The chapter goes through selected reading theories and the applicability of those theories to teaching

reading skills to teenagers with DS. Then it moves to mentioning what is reading readiness among that group of individuals and prerequisites for reading skills. Finally, the chapter offers a selection of methods for teaching reading skills to teenagers with DS and the difficulties they face when trying to acquire them.

At chapter 6, we can look at review of previous studies which are related in some ways to the research. Examples of themes are: teaching methods for DS, strength of word identification in DS, literacy, language and memory skills in DS, and the influence of reading instruction on language and memory development in children with DS.

In chapter 7 we can take a look at the methodology of the research. It is an experimental where a group of 10 students were randomly chosen as participants of the experimental group from a special education school (Dar Al Rajaa) 5 girls and 5 boys, their ages ranged between 11-18 years, M = 13.1. Another 9 were chosen as a control group from a second special education school (Haza Baiti School), both in Damascus, syria. The latter students were singled out as the whole population of students with DS. They were 5 girls and 4 boys; their ages ranged between 9- 21 years, M = 15.1. Both schools were in Damascus, Syria.

The groups were pre-tested and post-tested by a reading measure. The experiment itself lasted for a period of 10 weeks. During the first six weeks, the researcher gave four lessons per week, one hour and fifteen minutes each. For the remaining four weeks, she gave two lessons per week, an hour and fifteen minutes each.

The researcher developed a program for teaching reading skills based on the Montessori Phonic Approach. It uses the analysis of words by studying individual sounds or phonemes. In addition, she used the method of associating the visual form of written words with the appropriate verbal comment/response because some children with DS show a surprising facility in that association. Teaching aids were designed and made by the researcher and she tutored the program as well.

Chapter 8 presents the analyses of data and discussion of findings**.** Findings showed significant improvements in reading skills in the experimental group despite brevity of experiment. Instructing the teenagers with DS in the experimental group according to the proposed program had an important impact on their reading skills progress. That progress was evident in their reading skills after their 10 weeks of participation in the program.

There were no individual differences in gender of the advantages acquired from the reading program in learning.

Chapter 9 presents research's summary and its conclusion which shows the importance of including teenage-students with Down syndrome in classes for teaching reading skills by means of a phonics method because it leads them to acquire or improve reading skills. These results imply the necessity of continuous education especially reading for teenagers with Down syndrome. Further researches could be performed e.g. a longitudinal study to test the effectiveness of the research's program on teenager's reading skills. Further researches can be also made in the fields of mainstream education for individuals with DS in Syria, computer aided instructions, and the effect of teenagers' chronological age on reading acquisition.

This work shows the importance of including teenage-students with Down syndrome in classes for teaching them reading skills by means of a phonic method because it leads them to acquire or improve reading skills. These results imply the necessity of continuous education especially reading for teenagers with Down syndrome.

9-2 Conclusion

The results of the study can be summarized by the following conclusion: results suggest the effectiveness of a program for teaching reading to teenagers with DS by means of a phonics method because it leads them to attain reading skills. The improvement in reading skills of the experimental group was significant despite the brevity of time. This leads to the necessity of enrolling teenagers with DS into classes of reading instruction, and the importance of durability of their academic learning well into their adult years: results of this research as well as of previous literature stem this necessity from their overall finding. The improvement in reading skills among the experimental group could produce changes in expectations about the academic potential of teenagers with DS, and possibly in the emphasis on literacy in the special school curriculum.

9-3 Recommendation and implications

Continuous education The unyielding suggestion of this research would be to convince parents, caretakers and teachers of children and teenagers with DS to continue teaching them academic subjects (specially reading) in schools or at home and not to stand helpless when faced with failure or lack of concern. Maria Montessori said

the following about feelings of indifference sometimes found in teachers or educators of special needs children:

> The prejudice that the educator must place himself on a level with the one to be educated sinks the teacher of deficients into a species of apathy. He accepts the fact that he is educating an inferior personality, and for that very reason he does not succeed. (Montessori, 1912, p.37)

Teenagers with DS should become skilled at reading and not discontinue learning at reaching the skill of decoding the symbols of print. They should be able to understand what they read whether it is stories, information, directions, or questions (Kanaan, Al Mutlak, 2005).

To show the effect of continuous education has on adolescents with DS, the table below shows the positive correlation, taken from the research's sample, between the total number of years which the child spent at school and child's present reading skills:

	Child's reading skills (before)	number of years
pearson	1	.453(*)
significance	.	.048
N	19	19

Table 22. Showing the correlation of number of years the teenager has spent in school and his reading skills

By using Pearson chi-square we find that r= 0.453, P= 0.048, by comparing it to (0.05) we find that p is smaller than (0.05) which confirms a positive correlation

It would be also a great idea to create community colleges (or create classes in already existing universities in Syria) that offer continuing education classes for adults with mental impairments like the Community College of Allegheny County (Pueschel, 1988). These departments could offer classes in such areas as motor skills, language skills, sports, fine arts, safety, leisure skills, and specific skills for transitioning from institutional/home living to community living environment.

A study on the effectiveness of Joining mainstream schools on reading skills Out of 19 Participants In the research, 14 children went first to schools for normally developing children. Reasons behind the child leaving mainstream school (according to answers of parents in the questionnaire) were as follows:

1. His lack of adaptation with the other children: 21.42%
2. Lack of comprehension of curriculum: 35.71%
3. Other reasons: 42.85

A study is needed in Syria on the effectiveness of joining mainstream schools on reading skills acquisition for the important

influence this might play on reading acquisition: "DS children in mainstream schools have a higher academic performance than those in segregated classrooms." (Laney, 2008, p. 59)

In accordance with that, Margaret Farrell, an experienced Australian teacher has pointed out that reading instruction and the primary school curriculum [in mainstream schools] include "the intentional development of social concepts, general knowledge, problem solving and thinking skills" she continues that " language and general cognitive development are the most serious casualties when children are denied access to typical reading instruction and inclusion in this primary curriculum." (Farrell, 1996, p.280)

If the student with DS can't cope with the curriculum being offered in an inclusive environment, a separate curriculum with materials appropriate to the student's abilities (e.g. an adaptation of the research's program) can be delivered within a general classroom that is focusing on the same academic areas (Pueschel, Sustrova, 1997).

Using computers to teach reading skills The researcher noticed that the experimental group learned the names of pictures presented to them on the computer more than other pictures presented to them on flashcards. The advantage individuals with DS having relatively good visual memory can account for that ease and enjoyment.

Therefore, suggesting a computer-aided learning that teaches the research's program can provide visual information, give the students time to think and organize their responses, and do not stress on success and failure like an instructor might.

Make a longitudinal study to test the effectiveness of the research's program A longitudinal study about reading skills instruction by the use of a phonic method is required to taste its effects on teenagers with DS's reading skills. The brevity of time to apply the program at this research made it difficult for the researcher to move into reading sentences and paragraphs, therefore, further research is needed to test the effectiveness of this program in a longitudinal study for 2-3 years.

Make an empirical study on the effect of teenagers' chronological age on reading acquisition There is also a need for empirical research in the area of determining whether individuals with DS develop long-term knowledge of the language by depending directly on their experience of it, and so might relate closely to chronological age rather than level of intellectual development (Jarrold et al., 1999). The need stems from the necessity the researcher felt for exposing individuals with DS to continuous education to obtain continuous attainments. The

correlation that follows is taken from the questionnaire the researcher made and distributed to both experimental and control groups. It shows significant association between the age of teenager and his reading ability.

Attainment	Age		
.576(**)	1	Pearson Correlation	Age
.010	.	Sig. (2-tailed)	
19	19	N	

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

Table 23. Showing the correlation of teenagers' age and his/her reading abilities

This result came contrary to Turner et al. where their findings suggest that lower chronological age predict progress in attainment (Turner, Albroz, Gayle, 2008). Consequently, this result can motivate parents of teenage students with DS to encourage their children to attend reading instruction classes during their teenage years and beyond.

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APPENDIX

Questionnaire for the Child

I General information

1. Name of student: …….

2. Age: ……., Born in the year: ……...

3. Gender: circle around the correct answer:
- Male
- Female

4. Father's age: …….

5. Father's educational level: circle around the correct answer:
   5-1. Elementary diploma
   5-2. Secondary diploma
   5-3. Baccalaureate diploma (high school diploma)
   5-4. Institute degree, please explain in what field…….
   5-5. University degree, in what field?
   ……..
   .
   5-6. Master's degree, in what field?
   ……..
   5-7. PhD, in what field?
   .....

6. Father's profession, circle around the correct answer:
   6-1. educational field: A university professor, teacher, advisor, trainer, etc. ……..
   6-2. Blue-collar vocation, specify: ……..……....
   6-3. Engineer, specify: …….

6-4. Medical Doctor: specify specialization: ……

6-5. Lawyer

6-6. government functionary, specify: ……

6-7. Functionary at the private sector, specify: ……..

6-8. Merchant, specify: ……

6-9. freelancer, specify …….

6-10. Artistic professions, specify: ……..

6-11. Literary profession, specify: ……...

6-12. If you did not find your profession above, please write your profession here: ……...

7. Mother's age now: ……

8. Mother's age when she delivered the child: ……

9. Mother's educational level: draw a circle around the correct answer:

9-1. Elementary diploma

9-2. Secondary diploma

9-3. Baccalaureate diploma (high school diploma)

9-4. Institute degree, please explain in what field……

9-5. University degree, in what field? ……..

9-6. Master's degree, in what field? ……..

9-7. PhD, in what field.....

……

10. Mother's profession: …….

11. Number of brothers and sisters: .....

12. Total number of children (brothers and sisters with the child above): .....

13. Order of the child between his siblings: .....

14. Is there another child having mental retardation in the family?

- Yes

- No

15. Number of individuals living in the household: Circle around the correct answer

15 - 1. 3 - 4 individuals
15 - 2. 4 - 5 individuals
15 - 3. 5 - 6 individuals
15 - 4. 6 - 7 individuals
15 - 5. 7 - 8 individuals
15 - 6. 8 - 9 individuals
15 - 7. 9 - 10 individuals
15 - 8. More than 10 individuals

II The child and education

16. Age of child when he first joined school: Circle around the correct answer:

16-1. Less than a year - three years,
16 - 2. Less than three years - five years,
16 - 3. Less than five years - seven years,
16 - 4. Less than seven years - nine years,
16-5 Less than nine years, eleven years

17. Total number of years which the child spent at school: Circle around the correct answer:

17-1. Less than a year - 3 years
17 - 2. Less than3 years - 5 years
17 - 3. Less than 5 years - 7 years
17 - 4. More than 7 years

18. Did the child stop going to school at any time during his life? Circle around the correct answer:

- Yes
- No

19. The reason behind the child's withdrawal from going to school.

- Health reasons? Explain.....
- Other reasons: What are the reasons? .....
- Number of days of break off/ months of break off/ years of break off…….....

20. Did the child firstly join a school for normally developing children?

- Yes
- No

21. If the previous answer was yes, mentions the number of years he joined that school: ..... years, : from the age of ..... until the age of .....

22. Reason behind the child leaving that school: Circle around the correct answer:

22-1. His lack of acclimatization with the children
22 - 2. Lack of comprehension of curriculum
22 - 3. Other reasons, specify: .....

III The linguistic development of the child

23. Does the child hear? Circle around the answer puts correct:

- Yes
- No

24. Does the child articulate? Circle around the correct answer:

- Yes
- No

24 - 1. How old was the child was when he began talking? explain.....

24-2. Does the child recognize all the letters in the alphabet?

- Yes
- No

24-3. Does the child recognize some of the letters in the alphabet?

- Yes
- No

24-4. How many letters does the child recognize? Explain please:

……..
……..

24-5. Does the child read? Circle around the correct answer:

- Yes
- No

24-6. If the previous answer was yes, how old was the child when he started reading? ……..years.

25. With whom does the child understandably communicate? Circles around all suitable answers:

25-1. With his mother
25 - 2. With his father
25 - 3. With his siblings
25 - 4. With his relatives
25 - 5. With strangers

26. Level of communication: Circle around the answer puts child's communicative skills, Circles around the correct answer:

26 - 1.good,
26 - 2. Mediocre,
26 - 3. Weak,
26 - 4. Does not communicate.

IV Personality of the child: Interests, skills and hobbies

27. What are the interests of the child, are they: Circle around the correct answer:

27-1. Social,
27 - 2. Academic,
27 - 3. Occupational,
27 - 4. Artistic

28. What are the other skills of the child? Circles around all suitable answers:

28-1. Music: listening to music, playing on musical instrument
28 - 2. Ballet, dancing,
28 - 3. Drawing, pottery, sculpting, photography
28 - 4. Embroidery, applied arts
28 - 5. Watching films and series, going to the cinemas, going to theaters to watch plays

28 - 6. Other hobbies: specify:
.....

29. Does the father or the mother read stories to the child before he sleeps: Circle around the correct answer:

29-1. Always,
29 - 2. Mostly,
29 - 3. Occasionally,
29 - 4. Rarely,
29 - 5. Never

30. Does the child hold a book or a notebook and wander round the house? Circle around the correct answer:

30-1. Always,
30 - 2. Mostly,
30 - 3. Occasionally,
30 - 4. Rarely,
30 - 5. Never does that

31. Does the child like to attempt or try new things: Circles around all the correct answers:

Food:

- Yes
- No

Clothes:

- Yes
- No

Going to new places: e.g. theater, cinema, club, garden, a house of new friends:

- Yes
- No

Practiced a new hobby or sport:

- Yes
- No

Make new acquaintances

- Yes
- No

32. In situations when the child fails at accomplishing designated work or task, what is his reaction? Circle around the correct answer:

32-1. Frustration and the sadness

32 - 2. Withdrawal
32 - 3. Anger
32 - 4. Requests help and starts working again
32 - 5. talk and complain incessantly.
32-6. Hurts himself, please explain:……
.....

V The child at the stage of adolescence

33. If your child, who is an adolescent now, did not learn to read yet, **do you believe** that it possible for him to start **learning** at this stage? Circle around the correct answer:

- Yes
- No

34. Do you believe that learning to read is important for your adolescent child? Circle around the correct answer:

- Yes
- No

35. If the previous answer was **(no)**,what is your visualization for child's future? Circle around the correct answer:

35-1. Join occupational education
35 - 2. Join handicraft education
35 - 3. Join an artistic education
35 - 4. Work in an occupation

VI The child as an adult

36. would you wish for your child to marry when he reaches young adulthood and marriage age?

- Yes
- No