Summary

Language and learning are essential for human being. Not only they are important for communication between subjects and acquiring of skills and abilities, but also extending to growth of human civilization and thought communication between communities so, they help and facilitate living of human beings.

All communities have percent of children and adolescents who have difficulties in language and learning that can reach to the level of disability. The problem arise in the family or the school so that they can't understand the level of disability, the mental state and the psyche of those children or adolescents who are language or learning disabled.

In many circumstances these cases were referred as to have deafness or difficulty in hearing or they were referred as to have some degree of mental retardation. Recently, this is changed, the language and learning disabilities are categorized as separate cases that differ from (Deaf-mutism) or from (Mental retard.) this review contains:-

(I) Developmental aspect of language and learning .

(II) Definition and etiology of language and learning disorders (LLDs).

(III) Neurological aspect.

(IV) Intellectual functions of the brain.

(V) Psychiatric aspect.

(VI) Classification and Approach to Diagnosis.

(VII) Differential diagnosis, Assessment, and Prognosis .

(VIII) Treatment and Remediation.

First, we should know the difference between "Language" and "Speech", language is a code used for communication, it may be spoken language, written language or even sign language, while speech is referred to the process of production of voice or words. By another

meaning, we can say that language is structural building of words that is specific to each community, while speech is the work of voice structures to produce sounds in the form of words.

Language is composed of:-

1- ***Phonology:*** governs the sequencing of phonemes (the basic sounds that differ in their distinctive features).

2- ***Morphology:*** governs the sequencing of morphemes (the smallest units of language that carry meaning).

3- ***Syntax:*** governs the ordering of words within sentence or phrases. (grammer is the syntactical rules).

4- ***Semantics:*** Places restrictions on how words must be used to make meaningful sentences.

5- ***Pragmatics:*** use of appropriate conversation that facilitates good communication and good social relations.

While speech contains:-

1- ***Phonation:*** Air flow through the glottis to produce sound.

2- ***Articulation and resonance:*** modulation of sounds to give uttered speech with distinctive character.

3- ***Prosody:*** (or supra-segmental features: include intonation, stress rhythm and juncture of words and phrases).

Language development in childhood takes different stages, the ability to communicate begins so early by responding to different voices, during the first six months, the child expresses himself by (Babbling), during the first year the first words begin to erupt and they are always so simple like (mamma-baba). The child begins stage of repetition of words, by the age of 2 years, the child might have nearly 50 words, and he can say simple sentence of 2 words (what is called telegraphic speech) by the age of 3 years, the child might have nearly 250 words and he can say a sentence of 3 words that is well understood to adults.

By the age of 3-5 years, it is considered a very rich area for acquiring language. After 6 years language is reinforced, and during adolescence language takes different social and emotional dimensions.

While, learning is a general word that means acquiring of new skills and abilities, that might include different human activities, the review is concerned with the academic learning like reading, writing, and mathematics, that the child might be susceptible to learn at age of 6 years (school age).

Different theories have been tried to understand learning and the individual's ability to acquire (e.g., piaget's theory of cognitive development, information processing theory, vaygotsky's sociocultural theory, classical conditioning and operational conditioning that was started by pavlov, Drives and stimulus theory, Motivation, learning by Imitation and Habituation).

So that, by visual perception of the written language, the brain should understand and interpret these words depending on previous visual memory and interpreting with their meaning correlated with voices in the form of spoken language. Writing is a reverse process, so that, it begins with an idea in mind and by psychomotor act it ends by words in the form of written language.

Reading and writing are complex processes, and there is difference inbetween their skills, so there is some reported cases of impairment of one, while sparing of the other.

Mathematics contains skills like number concept, number Imagery, reading and writing of number and the chief processes of calculation, so mathematics needs specific mental skills based on information processing and problem solving.

The definition of language and learning disorders (According to the American psychiatric association DSM. IV) is that, it is the disturbance or delay in language acquisition or learning abilities, the disturbance is significant to the level of disability and interference with academic achievement or activities of daily living, these disorders are not referred to mental retardation, sensory or motor deficit and also not due to sociocultural problems or emotional retardation .

Several studies and many theories have been applied to find the etiology of LLDs, it might be suggested to be familial, genetic, cognitive, and neuro-anatomical factors.

Some factors may be suggested like, intrauterine exposure to hazard that cause functional brain disability, e.g. infection, drugs, narcotics, smoking, lead. Difficult labour, fetal anoxia, sever malnutrition also are suggested, hypothyroidism and epilepsy have strong relation to (LLDs). Traumatic brain damage that affect specific language areas may have a role in some cases. Recent studies are concerned with these items using recent investigation techniques (FMRI, CT-scan, single photon emission spectroscopy- positron emission tomography).

Neuro-anatomical and functional studies of the brain and the nervous system conclude that there are some areas specifically concerned with languagefunction, wernicke's area is concerned with language understanding while, Broca's area is concerned with language expression. Both are connected together by Arcus fasiculus. Also, visual and auditory association areas, sensory and motor areas play important roles. Recent studies have discovered the role of the thalamus in language and the cerebellum and its cognitive role. The cerebral hemispheric dominance and its relation to language is a topic of many studies with great variations conclusively we can say-crudely- that in most right handed persons, the language hemispheric dominance is the left hemisphere,

while the right hemisphere is concerned more for the spatial processes, however, this is not stable, and no sure evidence to that conclusion, but it may be variable.

Functional intellectual higher activities are important items in language and learning studying like, thought, memory, intelligence, and sensorimotor integration.

The psychiatric studying of language and learning disorders show that these disorders lead to emotional and behavioral disturbances in children and adolescents, this is owing to the frustration of the child or adolescent resulting from failure to communicate with others or failure in academic achievement like other classmates. This frustration may be manifested in different forms like withdrawal, regression, fears, or psychosomatic disorders e.g. headache, stomachache, diarrhea, or frequent micturation). This is manifested more in the morning and may disappear in holidays. The disabled child or adolescent may have low self-esteem with overwhelming emotion that he is bad, and can't do anything well.

The child or adolescent with (LLDS) may complain anxiety or even depression manifested by sadness and crying or in younger children it may be manifested by irritability and aggression. The (LLDS) disabled behavior shows emotional immaturity, some of those children or adolescents may manifest a personality disorder and may be shameful to great extent. The behavior of the family with a language or learning disabled child varies from denial, anger, to sense of guilt and may be overprotection that may worsen the problem and aids in the immaturity of those children. On the other hand, the primary psychiatric disturbances that affect children and adolescents (e.g. psychneurosis or psychosis or personality disorder) may cause difficulty in learning or manifest some disturbance in language.

(This review notes to, elective mutism, and Attention deficit/hyperactivity disorder (AD/HD) as they are related to LLDs).

However, it is important to differentiate in the diagnosis between (LLDs) that is accompanied by emotional or behavioral disturbance and that of the primary psychiatric disturbance, also we should mention that feeling of actual improvement of the disability is the basic measure to improve the psychiatric disturbance (emotional or behavioral) of the child or adolescent with (LLDs).

- The classification of language and learning disorders according to **[the American psychiatric Association – DSM –IV]** as following :

(A) Classification of language & communication disorders :

(I) Developmental expressive language disorder.

(II) Mixed Receptive – expressive language disorder .

(III) Phonological disorder .

(IV) Communication disorders not otherwise specified .

(V) Stuttering.

(B) Classification of learning Disorders:

(I) Developmental reading disorder.

(II) Developmental writing disorder.

(III) Mathematics disorder.

(IV) Learning disorder not otherwise specified .

The Diagnosis of language and learning disorders depends on scors obtained from standardized individually administrated tests. The diagnosis requires a discrepancy based on age and intelligence, between potential and achievement. The child with developmental expressive language disorder will complain of markedly limited vocabulary, errors in tense or difficulty recalling words or producing sentences with vocabulary errors (substitutions, circumlocutions, overgeneralizations or jargon), the child show marked delay in language and difficulty acquiring

new words and will have limited grammatical structure. In mixed receptive-expressive language disorder, there is difficulty understanding of language in addition to symptoms of expressive language disorder although there is no hearing deficit or mental retardation.

The term (Aphasia) is usually applied for language disorders. Different classifications have been suggested for aphasia taking different aspects of reception, expression, and fluency of language. According to fluency, aphasia is classified into fluent and non fluent types. The fluent category includes, wernicke aphasia, anomic aphasia, transcrotical aphasia, and conduction aphasia, while, the non fluent category includes; Broca's aphasia and global aphasia. In type of wernuke's aphasia, there is inability to comprehend words or to arrange sounds into coherent speech, i.e. there is a defect in categorization of sounds. The affected person can speak but he confuses phonetic characteristics (word salad), it is often associated with writing disability.

In type of Broca's aphasia, there is difficulty in speaking i.e. the motor expressive part of language although the disabled can understand speech. So, the pattern of speech is slow, with deliberate manner using very simple grammatical structure, thus all the forms of a verb are likely to be reduced to the infinitive or the participle. So, only the key words necessary for communication are used. It is concluded that, in the Broca's type of aphasia, the disorder or the difficulty is not one of making sounds but rather of switching from one sound to another.

- Speech disorders are classified into :

(1) Phonological disorders,

(2) Articulation disorders, and

(3) Fluency disorders that is concerned with rate and Rhythm of speech and it includes cluttering and stuttering.

The phonological disorders include errors in sound production, use, representation or organization, Errors may include substitutions of one sound for another, or omissions of sounds such as final consonants . voice disorders may affect loudness, pitch or quality of phonation, so that the voice may complain loss of its tone or volume (e.g. hoarsness of voice) this may occur in chronic laryngitis, vocal cord nodules or may be hysterical. Spastic dysphonia is a poorly understood disorder in which the voice has a strangled quality, it often has emotional connections although some authorities believe the cause is essentially neurologic. In the articulation disorder, there is difficulty or disturbance in the process of articulation although, the process of speech formulation is normal.

Cases of dysarthria as a general may show local causes as cleft palate, choanal atresia, large adenoids, or tongue tie. Or it may show neurological cause with upper or lower motor neurone lesion (pyramidal, extra-pyramidal or cerebellar lesions). The cranial nerves that may be affected are (5, 7, 9, 10, 12) cranial nerves.

In stuttering disorder there is marked impairment of speech fluency characterized by frequent repetitions or prolongation of sounds or syllables. Also, it may include blocking of sounds or interjections of words or sounds. The extent of the disturbance varies from one situation to another, and it is severe on special pressure to communicate. The cause is unknown but psychological and physiological factors may contribute. It may be accompanied by motor movements such as eye blinks, tics, tremors of lips or face, jerking of head, fist clenching and breathing movements, the child with stuttering may try to avoid certain speech situations, words, or sounds.

Cluttering is a disorder of speech fluency involving an abnormal rapid rate and erratic rhythm of speech that impedes intelligibility, faulty phrasing patterns are usually present.

So that, there are bursts of speech consisting of groups of words that are not related to the grammatical structure of the sentence, the affected person is unaware of his disorder. The onset of cluttering is usually after age seven and it may be accompanied by reading or writing disorders.

While, the learning disorders that include reading disorder, writing disorder, and mathematics disorder. We should differentiate between such disorders and the mere school underachievement due to social or emotional disturbance or that due to individual difference.

Developmental reading disorder it is often referred as (dyslexia), there is great variance in sub-classification of reading disorders or (dyslexia). Reading requires letter identification skills and short term memory skills. The reading process is comprised of two major components: Decoding and comprehension, of which the disability may be due to defect of one or both of the two components. There may be difference in the form of the reading disorders, some children have difficulty in recognizing the shapes of letters, and orienting them correctly, (visuo-spatial disorder), other children found it hard to give meaning to the symbolic sounds they hear and find the symbolic signs that are read have no significance. Third group, may have correlating and synthesizing difficulties i.e. they can't correlate between the visual symbols and the spoken sound. Final group, may perceive letters and the whole words as configurations. Some authorities classify reading disorder into primary or developmental reading disorder and traumatic reading disorder due to organic cause. Diagnosis should exclude mental retardation and visual or auditory disorders.

Disorders of written expression may be referred as (Dysgraphia) or (agraphia), where the disabled cannot combine auditory and visual verbal information into the motor action needed for writing.

Writing disorders is subclassified into :

(1) Pure agraphia (2) Aphasia agraphia

(3) Agraphia with alexia (4) Apraxic agraphia

(5) Spatial agraphia

Mathematics disorder or developmental dyscalculia is a cognitive disorder of childhood affecting the ability of an otherwise intelligent child to learn arithmetic. It is described as a structural disorder of the maturation of mathematics abilities, including number concept and relative value, number imagery, the accurate reading and writing of numbers, spatial processes and retrieval of number, and process of calculation. (the disorder may include one or more of these processes).

Mathematics disorder is subclassified into :

(1) Verbal dyscalculia (2) Practognostic dyscalculia

(3) Lexical dyscalculia (4) Graphic dyscaculia.

(5) Ideognostic dyscalculia. (6) Operational dyscaculia .

As regarding, the diagnosis of language and learning disorders is based on scores obtained from standardized Tests (that are individually administrated) the tests should be mediated by specifically trained personnel, requiring the discrepancy between age & intelligence, between potential and achievement with exclusion of mental retardation, motor or sensory deficit and socio-emotional problems. Assessment of language and learning disorders is important in all stages of treatment for evaluation of results and re-planning and modulation of therapy. The assessment includes different functions of phonation process, receptive and expressive functions of language, intelligence tests either verbal or non verbal, different cognitive skills, in addition to sociocultural and psychiatric assessment, with exclusion of perceptive deficit (visual or auditory).

According to American Psychiatric Association DSM-IV treatment is based on :

(1) Remediation

(2) Psychological

(3) Pharmacological

The role of parents and the family in treatment is very important for socio-emotional support and training of the child to improve his language and communication abilities. The treatment is generally accepted to be multimodal including education and consultation., Different methods of remediation have been applied according to the type of language or learning disorder.

Speech therapy is the basic item in treatment of different language disorders as well as direct instruction as reading instruction and writing instruction are the basic items in treatment of learning disorders. In some cases this may require special schools concerned with remediation of such cases .

Motivation aids much better results of therapy so, using of different games, arts, counting devices, radio programs, television, calculators, taped books, tape recorders, speech-pacs, and computer-aided techniques. Psychotherapy is also important including also cognitive and behavioral therapy.

Pharmacotherapy is applied to the associated and correlated psychiatric disorders. There is no pharmacotheraputic specified for language and learning disorders (still under research based on neurotransmitters, dopaminergic system and cholinergic system).

The prognosis of (LLDs) is different according to the type and severity of the disorder it is estimated that 50% of developmental expressive language disorder eventually obtain normal expressive language development, the other 50% continue to have some degree of difficulty of variance from case to case, while prognosis of mixed-receptive expressive language disorder show worse outcomes so that 25% of cases demonstrate some improvement over a 4 years period. Children with phonological disorders have a variable outcome, with severe types having persistant speech and academic difficulties. While, spontaneous recovery may occur in articulation disorder up to 8 years. Outcome of reading, writing, and mathematics disorder is different according to severity. Finally, it should noted that early recognition, remediation, and treatment of (LLDs) will have a better outcome and at least help accommodation of those cases within the community.