EDUCATIONAL THEORY AND PRACTICE ACROSS DISCIPLINES

(PROJECTING BEYOND THE 21ST CENTURY)

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Abstract

Auditory Processing Disorder (APD) as an auditory impairment impacts on the functional listening abilities of persons with it. For instance, persons with APD usually have difficulty localising sounds, mishear auditory information, and take longer to respond to, and process auditory information, leading ultimately to challenging learning situations- both for the student and the teacher. Strategies of managing students with APD are adequately discussed, with management tips for teachers and suggestions for the school administrators.

Introduction

Management of persons with difficulty in processing or interpreting the received messages and information has been a major challenge in the parlance of rehabilitation. Oftentimes, this condition masquerades individuals with it to behave as if they cannot hear or benefit from the sound energy (speech sounds) generated within the acoustic environment. Rather with them, the very complex set of actions within the hearing mechanism called 'hearing' has been observed to be functionally effective except in the area of understanding spoken messages and remembering of instructions as well as expressing themselves clearly using speech. To this end, individuals with Auditory Processing Disorders (APD) as the condition called

has been observed overtime having auditory capacity receiving the intended messages perfectly, but always failed to carry out the intended expectation (instruction) as a result of poor understanding of the speech sounds.

Auditory Processing Disorders (APD) occur as a condition to be managed whenever there is a difficulty in processing or interpretation of information received through the ear, and is changed into electrical information that can be processed by the brain for expected action(s). With APD, the brain receives the sound energy channels via the human hearing mechanism from the acoustic environment, but the brain functions of individuals with such difficulty always appear defective in recognizing the subtle differences between sounds in words, even though the sounds themselves are sound and clear enough to erupt expected outcomes. Due to this, individuals with this condition appear having difficulty using received sounds (words) to produce speech/language or intended actions, because of their poor or complicated perceptual difficulties and faulty interpretation of information in a meaningful way.

Therefore, in any classroom situation, a student with this kind of difficulty will manifest expressed problems in understanding when listening to instructions or teaching. Understanding spoken messages, especially with competing background noise within the classroom setting; reading and remembering of instructions; as well as staying focused (the British Society of Audiology- BSA, 2010), whenever teaching and learning are going on in line with their difficulties in making use of certain mental abilities, such as attention and memory, which the human communications require to take place before perfect auditory processing is achieved.

Consequently, it is worthwhile to mount up an effective rehabilitative protocol to salvage the aforementioned difficulties in any student observed having such problems in school, so as to benefit maximally from the teaching and learning activities as the capacity to auditorily process the received messages and instructions would be developed by him/her. Thus, the

paper intends to discuss the rehabilitative principles and strategies towards developing the required capacity in students with APD to auditorily process the received messages and information for better performance and actualization. Also, this paper would highlight in details the essential management tips and strategies to be employed by the teachers of students with APD and school administrators to achieve better result in Nigeria.

What is Auditory Processing Disorder (APD)?

An appropriate definition and explanation of a biologically- natural process called Auditory Processing is necessary to fully understand the condition known as Auditory Processing Disorder as well as its impacts and implications on people. Thus, auditory processing is the term used to describe the natural process or functional ability of the human brain in recognising and interpreting the received sound from acoustic environment.

According to the Florida Department of Education (2001), auditory processing can be described simply as what the brain does with what the ear hears. It happens that as sound travels through the ear it causes structures inside the ear to vibrate. These vibrations are then changed into bio-electrical energy. This bio- electrical energy in turn travels through nerves in the central auditory nervous system to the brain. Then, in the central auditory nervous system, sound is interpreted, recognised and processed in what is called Central Auditory Processing (La Trobe University, 2010). Efficient auditory processing results in a number of auditory abilities that are vital in the listening and communication process, according to the Listen and Learn Centre (2012), these include *Auditory discrimination* which is the ability to discriminate between words and sounds by their duration (long vs. short), intensity (loud vs. soft) or frequency (high vs. low). Auditory discrimination can affect reading, spelling, writing and following directions; *Sound localization* which is the ability to identify where the acoustic signal is coming from relative to the listener's

position, contributing to one's listening efficiency; *Auditory attention* which is the ability to direct one's attention to the relevant sounds, specifically speech, and hold that attention for an age-appropriate period of time; and *Auditory figure-ground* which is the ability to identify the primary auditory signal from background and/or competing noise. Others include *Auditory closure* - the ability to comprehend the entire word or message when part of it is missing. This skill is used to understand messages in noisy listening environments; *Auditory synthesis*- the ability to blend or merge single phonemes into words, and critical for reading success; *Auditory analysis*- the ability to recognize phonemes or morphemes that are embedded in words. This skill is needed to distinguish verb tense (e.g. jumped vs. jumps) and other markers that may be masked or lost by background noise; *Auditory association*- the ability to identify the sound and attach meaning to it through labeling. It also involves the association of the sound with the language or non-language acoustic signal. Auditory association facilitates the development of auditory memory; and *Auditory memory*- the recall of the acoustic signal after it has been labeled, and stored (Florida Department of Education, 2001).

Once there is disruption or disorderliness in the recognition, processing and interpretation of information as explained above, then the condition called Auditory Processing Disorder (APD) has set- in. Auditory Processing Disorder is the inability or reduced ability to recognize, understand or discriminate information, which adversely affects listening, comprehension, language and learning. APD is a kind of impaired auditory skills with evidence of reduction in auditory attention (focus, concentration, and distraction); memory (for complex or multi- step instructions) and difficulty with speech perception, though the individuals with such condition may appear hearing better in quiet environment (Bamiou, Campbell, & Sirimanna, 2006; Ferguson, Hall, Riley & Moore, 2011).

Auditory Processing Disorder (APD) is also an observed difficulty in one or more of the following areas: auditory discrimination; sound localization; auditory pattern recognition;

decreased auditory performance in the presence of background noise, competing acoustic signals and or degraded acoustic signals (ASHA, 1996). With APD, the fidelity of the acoustic signal would become compromised; and the individuals with it would find it difficult to recognize subtle differences between sounds in words, most especially whenever they are in a noisy environment or listening to complex information. Whenever sounds cannot be accurately identified and discriminated by the human brain, such sounds will be misrepresented in the auditory cortex, and thus not processed accurately by the brain (Ahissar, Protopapas, Reid & Merzenich, 2000; Sharma, Purdy, Newall, Wheldall, Beaman, & Dillon, 2006).

The British Society of Audiology (BSA) Position Statement of 2011 further states that: (1) APD is characterised by poor perception of both speech and non-speech sounds. Auditory 'perception' is the awareness of acoustic stimuli, forming the basis for subsequent action. Perception results from both sensory activation (via the ear) and neural processing that integrates this 'bottom-up' information with activity in other brain systems (e.g. vision, attention, memory). In so far as difficulties in perceiving and understanding speech sounds could arise from other causes (e.g. language impairment, non-native experience of a particular language), poor perception of speech alone is not sufficient evidence of APD. (2) APD has its origins in impaired neural function. The mechanisms underlying APD can include both afferent and efferent pathways in the auditory system, as well as higher level processing that provides top-down' modulation of such pathways. (3) APD impacts on everyday life primarily through a reduced ability to listen, and so respond appropriately to sounds. (4) APD does not result from failure to understand simple instructions. Primary impairments for which auditory difficulties may be a 'secondary' or 'trivial' consequence include medical problems not affecting the 'mechanisms underlying APD and generalised medical/ psychological problems that render a label of APD impossible, inappropriate or irrelevant (e.g. severe mental impairment). (5) APD is a collection of symptoms that usually co-occurs

with other neurodevelopmental disorders. Like other such symptoms (poor language, literacy or attention, autism), APD is often found alongside other diagnoses.

Accordingly, there are three categories of APD according to the BSA Position Statement (2011) which are:

i. Developmental APD: Cases presenting in childhood with normal hearing (i.e. normal audiometry) and no other known aetiology or potential risk factors. Some of these people may retain their APD into adulthood.

ii. Acquired APD: Cases associated with a known post-natal event (e.g. neurological trauma, infection) that could plausibly explain the APD.

iii. Secondary APD: Cases where APD occurs in the presence, or as a result, of peripheral hearing impairment. This includes transient hearing impairment after its resolution (e.g. glue ear or surgically corrected otosclerosis).

Causes and Symptoms of Auditory Processing Disorders

Human beings hear and understand sounds based on the functional ability or sensitivity of the brain to receive, recognize, interpret and discriminate as the sounds travel through the ear and is changed into bio- electrical information that can be interpreted by the brain. Therefore, faulty processing of this system always results to a kind of disorder known as Auditory Processing Disorder. This disorder manifests with the indication that something is adversely affecting the processing or interpretation of information. Thus, the disorder may be as a result of poor perceptual ability or faulty mental ability required for recognition and interpreting the received information in a meaningful way, and such abilities include attention and memory. Also, it might be as a consequence of impaired sensory processing system, and this might deprive the individual affected of the ability or skill to discriminate speech sound well, based on the inability to pay attention to changes in speech. Poor auditory conceptualization and localization as a result of immaturity of the brain's hippocampus

have been observed as one of the major causes of Auditory Processing Disorder in children. With this condition, the mechanism for processing auditory information becomes immature in persons with APD.

Although some children with APD may have difficulties understanding when listening, expressing themselves clearly using speech, reading, remembering instructions, understanding spoken message and staying focused (MRC Institute of Hearing Research, 2004). APD is a collection of symptoms that typically co-occur with a range of other neurodevelopmental symptoms (e.g. poor reading, language difficulties, inattention, autistic spectrum disorder; Dawes & Bishop, 2009; Sharma, Purdy & Kelly, 2009; Moore, Ferguson, Edmonson- Jones, Ratib, & Riley, 2010). Auditory processing deficits adversely affect an individual's ability to detect and process speech patterns, resulting in impaired or "fuzzy" phonological representations, specifically required for speech perception.

Unclear phonological representations are likely to lead to impaired phonological awareness which in turn may result in the development of reading problems/disorders (Sharma, Purdy, Newall, Whedall, Beaman, & Dillon, 2006; Ouimet & Balaban, 2009; Rosen, 1999). Other symptoms of APD include: consistent delay in processing speech sounds; delayed responses to speech sounds; inability to respond or giving of incorrect responses to spoken messages and information; regular re- auditorization or regular manifestation of echolalic speech and behavior; expressed difficulty in discriminating speech sounds- especially in discriminating the fore- ground sound from background noise; inability to remember names correctly; difficulty in recognizing speech as speech; and expressed distortions of incoming speech sounds. Most children with APD do manifest poor phonological and phonemic awareness, in addition to difficulty with multiple auditory commands; delayed auditory milestones; and difficulty with learning of songs and nursery rhymes, even with perception of music.

Effective Classroom Management Models

Auditory Processing Disorders as a condition often co-exists with attention, language and learning impairments as well as Autism Spectrum Disorder (Bellis, 2008; Dawes & Bishop, 2010; Witton, 2010). Therefore, a multi-disciplinary approach is recommended with the management principle of individualized training, as the ultimate target is to improve the individual's primary auditory processing ability and everyday functioning. Management should be both cost-and time effective, and not cause the child to fall behind in other areas (e.g. reading or other schoolwork) due to time constraints, and should consider the primary complaint/s, case history and multi disciplinary assessment results. Thus, some effective classroom management practices include:

i. Acoustic Changes within the Classroom Environment
Classroom of students with APD requires changes and modifications to reduce noise and effects of reverberation. With this, some architectural interventions must be considered to reduce reverberations and improve the signal while reducing or removing competing noise should be implemented because the synergistic effect of noise and reverberation in a less than ideal acoustic (sound) environment will result in degradation of the speech signal. The acoustic environment should be improved by acoustic treatments such as carpets, curtains, doors (and closing doors) putting seals on doors, rubber shoes on furniture legs, double- glazed windows to reduce outside noise, and the use of soft covers such as installation of noise absorbent partitions and screens within the classrooms to reduce noise by altering the environment. Covering hard reflective surfaces with absorptive material such as acoustic paneling and cork boards can also help to reduce reverberation time (Bamiou et al, 2006). Acoustical modifications in the classroom environment must be taken with all seriousness so as to create a good acoustical listening and learning environment for

students with APD to process received messages and information well with reduced competing or distracting noise. Evidence of the effectiveness of acoustic changes to the classroom environment led to the development of The Building Bulletin 93 document (Acoustic Design of Schools, Building Bulletin 93, 2003), a document which provides a comprehensive guide for architects, building control bodies, building services engineers, clients, and others involved in the design of new school buildings.

ii. Development of Comprehension Skills
This is another way by which students with APD could be managed in the classroom setting. With this arrangement, students with APD would be given the opportunity to sit and work in a quiet place, and after sometime, they would be asked to discreetly repeat whatever they have been told or instructed to do. This procedure ensures accurate and perfect reception and understanding of messages and information, because there would not be an existing background noise to distract them.

iii. Preferential Seating Arrangement
This arrangement would allow for flexibility in seating in order to achieve the preferential seating advantage within the classroom setting. With this, the students would be relocated from competing and distracting noise sources such as external noise, capable of distracting them both auditorily and visually. The preferential seating arrangement would enable both the students and teachers to gain the required attention before instructions are given and received as the students will be well focused and engage other information reception channels such as eye contact. In addition, preferential seating offers direct benefits to students with APD, because it brings the students closer

to the information sources. Also, it allows preferential teaching style and strategy to cater for the individualized needs and challenges of students with APD. Campbell (2010) reiterated the effectiveness of preferential seating arrangement.

iv. Use of Assistive Listening Devices

The use of Assistive Listening devices such as FM devices like personal ear level or desk top (which benefit only the individual) and/or classroom sound-field (which benefit everyone in the room) are useful in remediating students with Auditory Processing Disorders in the classroom setting. FM devices are wireless devices that receive distant auditory input, amplify and transmit the signal to the ear of the listener. A microphone worn by the speaker, and connected to a transmitter picks up the speech signal of the speaker and converts this to an electrical signal, which is transmitted via FM band waves to the receiver. These systems help counteract the problem of distance between teacher and students, as loss of critical speech elements is overcome since the distance travelled by the speech signals is reduced, while masking of the speech signals by ambient noise is minimized and overall audibility is increased (Bamiou et al, 2006).

Johnston, John, and Kreisman (2009) reported on children with APD fitted with FM devices. Baseline measures of the children with APD, prior to FM use, documented significantly lower speech-perception scores, evidence of decreased academic performance, and psychosocial problems in comparison to an age- and gender-matched control group (who only wore the FM for the speech perception testing). Repeated measures during the school year demonstrated speech-perception improvement in noisy classroom environments as well as significant academic and psychosocial benefits. Compared with the control group,

the children with APD showed greater speech-perception advantage with FM technology. Sound-field systems are helpful in rooms that are not too reverberant; however personal FMs are better in reducing the effects of reverberation.

v. Dichotic Listening Training

This is a kind of listening training activities to improve auditory processing skills so as to stimulate the neural plasticity of the central nervous system. Dichotic listening training is used to demonstrate the dissociation of speech and non-speech perception (Gilbert & Wergner, 2011). With this structured training, students with APD would be trained to attend to different words, phrases or short sentences as they are presented simultaneously. The presentation would be presented with two different auditory stimuli (via speech) simultaneously. Then, the students would be asked to repeat aloud the words they heard in one ear, while different messages will be presented to the other ear. Thus, a dichotic good listening performance in one ear would be recognized as a good processing capacity. Dichotic listening training might be conducted so as to help students with APD out of difficulty in auditory processing of information via the use of binaural integration; and speech-in-noise training by adding noise while listening to a story or being given instructions. The louder the noise, the more similar the 'competing messages', and the more difficult the task, (e.g. noise from a music playing function) is less challenging than ignoring a speech signal or a song that one likes; sound localisation as in a situation where a sound is coming from (is it nearby or far away) and 'tracking' (locating a moving sound) training (in quiet and noise). When a sport is being played, we need to be able to follow moving sounds (other players calling to us and also the sound of a tennis ball being hit by a racket or hitting the ground (Bamiou, Campbell &

Sirimama, 2006). These evidences are supported by Bellis (2003) study.

vi. Auditory Closure Training

Auditory closure training could be referred to as a kind of training skill which emphasises the development of the ability to utilize intrinsic and extrinsic redundancy to fill in the distorted portions of the auditory signal and to recognize the whole message. This training exercise helps to build up the ability of persons with APD towards the understanding of message, and discriminating ability in students with APD- based on noise tolerance strategy. Auditory closure training helps students with APD to source for the missing syllables and phonemes while listening to instruction. Studies of Bellis (2003), Bamiou, Campbell and Sirimama (2006), and Bellis (2008) showed how effective auditory closure training is.

vii. Music Therapy

Music therapeutic exercise is known as a model or mechanism of using music and all of its facets to improve the cognitive functioning, motor skills, emotional and affective development, behavioural and social skills, and quality of life. Music activates a widespread bilateral network of brain regions (frontal, temporal, parietal and sub-cortical) and taxes timing skills, i.e. temporal processing which is necessary for the resolution of prosodic detail. Prosody (i.e. intonation contours of voice, stress patterns and rhythm) relies on the same neural systems as melodic pitch perception (order of music notes) (Schon, Magne & Besson, 2004). Chermak (2010) suggested that music can be used in basic auditory discrimination training using tones and tone glides, as well as contour, rhythm, meter and timbre. Different instruments and chords can be used for auditory discrimination training, and keyboard cadences

can be used for pattern, contour and rhythm discrimination, recognition and identification and also nursery rhymes and poetry. Games such as 'musical chairs' may help with vigilance and temporal resolution, while interhemispheric transfer may be enhanced by games such as 'name the tune' or dichotic melodies, singing extracting lyrics from songs and playing a musical instrument which requires bimanual coordination. The efficacy of musical training cannot be emphasized, as musical training has been shown to enhance the brain's ability to detect temporal novelty in sounds, as shown by enhanced brain activation on functional Magnetic Resonance Imaging (fMRI) in professional musicians vs. laypersons, and enhanced fMRI activation in musicians after a period of musical training, indicating that it is the musical training rather than genetic predisposition that is responsible for this difference (Herdener, Esposito, di Salle, Boller, Hilti, Habermeyer, Scheffler, Wetzel, Seifritz, & Cattapan-Ludewig, 2010).

According to Kraus and Chandrasekan (2010), music training leads to changes throughout the auditory system that prime musicians for listening challenges beyond music processing. This effect of music training suggests that, akin to physical exercise and its impact on body fitness, music is a resource that tones the brain for auditory fitness. Therefore, the role of music in shaping individual development, and in particular auditory processing, deserves consideration.

viii. Enhanced Auditory Attention (Listening) Skills

Listening is an active process involving self-regulation and monitoring whilst hearing is a passive process. For better auditory attention, students with APD must be evaluated to determine their listening behaviour, determination of challenging listening conditions, organization and evaluating practical strategies for improving listening. To achieve good listening ability,

different types of auditory attention models must be utilised. The auditory attention types include: preparatory attention choosing what to attend to; selective attention attending to target and blocking out competing stimuli; divided attention attending to two or more targets (attention shifting); vigilance attending to an intermittent target; and sustained attention maintaining attention to a target over time (Medwetsky, 2006).

ix. Enhanced Auditory Working Memory Training
Memory can be enhanced by using metacognitive strategies, such as selfregulation, organization skills (including writing things down and using a diary), problem solving, metamemory strategies (including mnemonics and mindmapping), chunking, analogies and acronyms, pictorial representation, and verbal rehearsal/reauditorization. With enhanced auditory working memory training, identification of key areas where auditory memory is impaired will be located. This could be done via task towards remembering single or more complex instructions, a story read, alphabetic principle (alphabet and whether a letter comes before or after another letter),days of week, months of year, timetables, homework, and or remembering names, directions, telephone numbers, instructions, etc). Computer training programmes can be used to enhance working memory which generalises to other skills such as fluid intelligence such as the ability to adapt our thinking to a new cognitive problem or situation (Jaeggi, Buschkuel, Jonides & Perig, 2008).

x. Metacognitve and Metalinguistic Strategies
Training in self-regulation, problem solving, metamemory strategies, chunking, use of analogies and acronyms, pictorial representation and verbal rehearsal/ reauditorization may also be helpful in managing the

listening abilities of children with APD. Training in the rules of language via metaliguistic listening and reading strategy to recognize and understand phonological codes in words remain vital in rehabilitating students with APD in any classroom setting. Also, the above mentioned strategies would help students with APD develop ability to become aware of linguistic forms, structures and functions (Beceren, 2010).

Essential Practical Tips for Teachers

It is noteworthy to stress here that successful management of students with APD requires an holistic rehabilitative protocol, in which all efforts must be geared towards stimulating auditory processing system through different modalities. To this end, in addition to the afore- discussed management models, the following tips would be helpful to classroom teachers in rehabilitating students with APD in the classroom setting:

i. Motor activities or plays in which most students exhibit during verbal presentations must be reduced or curtailed by the teachers. This must be achieved in order to afford the students with APD the opportunity of giving in their rapt attention and expected focus, so as to develop good receptive and understanding skills.

ii. Based on the Individualised Education Programme (IEP), teachers should adopt and use strategy that would satisfy the needs of each of the students. Hence, some might require the use of modeling in line with clear demonstration of expected performance; while some would prefer the strategy of identifying the keywords or phrases in the expressed messages, as some would expect both the written and verbal instructions to give them perfect understanding of the information.

iii. The teachers should design daily routine such as schedules of activities for each of the students with APD in his/her class, as these strategies would help them develop a sense of focus and organization. Also, this model of rehabilitation would encourage and fuel the

students to attend classes and participate actively in the classroom activities.

iv. Teachers should allow and encourage students with APD to seatwork in less- distracting corners within the classroom so as to minimize problems with discriminating foreground sound from background sound.

v. The teachers would need to assess the students with APD with the motive of identifying more challenging listening conditions and situations that might require attention. This identification must be done in addition to those regularly expressed situations/ conditions, as this would be beneficial towards the development of auditory perceptual skills in students with APD.

vi. Good and perfect listening behaviour should be adequately and promptly rewarded, as this would serve as reinforcement for continuous- positive verbal recognition and feedback.

vii. Preferential seating arrangement must be emphasized and adopted by teachers of students with APD in the classroom setting. This model would enable them to derive maximum benefit from both auditory and visual information cues available.

viii. The teachers should be sensitive and conscious to be speaking regularly in a clearly voiced pattern, even with a well modulated voice structure. This must be done distinctively to satisfy the comfortability level of each of the students.

ix. The teachers should try to encourage students with APD to be asking questions for clarification whenever the information or messages sounds unclear to them. Also, the teacher should try to be rephrasing or substituting some words so as to instill better understanding of the conveyed/ intended messages.

x. With the help of audiologist, the teachers would need to identify and encourage the students with APD to be making use of their better ear to source for information.

They would also need to be encouraged to use ear plugs whenever they are feeling distracted with background noise.

Hints for the School Administrators

For a successful management of students with APD in a classroom setting, it is important for the school administrators to consider the following rehabilitative services and strategies within the school environment:

i. The school environment must be acoustically structured and rich with a lot of printed and speech sounds facilities to build and strengthen good listening and comprehension abilities in students with APD.

ii. The curriculum of instructions must be rearranged to suit the slow and steady spirit of students with APD. This curriculum instruction should be adapted to accommodate the needs and peculiarities of students with APD.

iii. Emphasis must be given towards introduction and adoption of several services and programmes capable of improving the students' phonological awareness and auditory discrimination skills. This kind of arrangement must be executed as a strategy to facilitate reading acquisition and understanding speech sounds.

iv. Music training exercises should be included in the scheme of treatment to enhance and strengthen the students' brain to recognize and detect temporal novelty in sounds via enhanced brain activation. This protocol of management would help the students with APD to develop auditory fitness and listening for sustained cognitive control over distortion of sound signals and background noise.

v. Classroom accommodation must be well structured to enable both the teachers and students with APD to engage in multisensory connection or interaction. Such accommodation might include preferential seating arrangement, exhibition of speech – to- print facilities

and provision of services of resource rooms, itinerant gain skills, as well as individualized reach out arrangement.

vi. Auditory integration training, which seems to be the core of rehabilitative model for students with APD should be embraced and given, with all sense of commitment, required skills and competence.

vii. Teaching and learning strategies should be structured based on IEP, with total emphasis on individual needs and challenges. The outcome or progress of the students should be based on this arrangement and must be evaluated on a regular basis.

viii. Multi- disciplinary approach is practically needed to resolve issues relating to manifestations and effects of APD in students. With this, clinically structured psycho-therapeutic services are essentially necessary where varied professionals such as Audiologist, Speech-Language Pathologist, Social Worker, Psychologists and Medical Doctors, experts in ENT; mental health issues and other allied professional would be readily available.

ix. Provision and utilization of resource room strategy to discreetly ask the students with APD to repeat or write down what (s)he has been asked to do must be given a place. This type of arrangement would help build comprehension skills in them , and help to ascertain the level of understanding per information. Also, through this, students would receive individualized instructional help or advice on how to improve his/ her listening skills.

x. Considerations and the use of listening facilities and gadgets to lessen the stress of the teachers should be given a place. Such facilities include acoustic screens or computer gadgets to help the students with work organization, memory and planning.

xi. Auditory training programmes must be conducted as a rehabilitative strategy with utmost commitment and sense of purpose. In fact, this training activity would be

helpful in generalizing specific auditory skills to real-world experiences and school curriculum demands. Also, auditory training would enable the students with APD make use of dichotic listening. This strategy would help rehabilitate them via interhemispheric transfer of sound signals based on dichotic tasks strategy such as digits, consonant- vowel combination and dichotic sentences.

xii. Services of Note- taking assistants/ experts must be sought to give the required assistance to the students with APD. These experts, if employed would be saddled with the responsibility of helping the students take down their notes in their various classes. In addition to this, peer partners might be assigned to them, so as to assist them in paying attention in classes, getting assignments listed, or help them in participating in class discussions. One note-taking assistant/expert can comfortably handle three children with APD in a classroom setting.

Conclusion

To learn in any environment, one needs to listen, recognize, identify and understand the importance of needed auditory signals over all other competing noises, but underlying deficits in auditory processing may cause students with APD to experience learning and hearing difficulties, in spite of normal hearing sensitivity. Thus, students with APD are often distracted by, or may not hear clearly when background noise is present, and may find it difficult to follow spoken instructions and often misinterpret what is being said. Thus, to rehabilitate persons with APD in the school setting, such persons should be stimulated and encouraged to use multisensory models of attention to receive information and messages even from teachers and peers. In addition, for better management of students with APD in the classroom setting, emphasis must be placed on the improved acoustic clarity, speech sounds training skill, auditory closure activities, speech- to- print skills training, prosody exercise drills, sensory integration development

training, interhemispheric mechanism to strengthen readiness towards the reception and understanding of given messages or instruction. Combination of varied efforts of services and professionals is also essential in managing students with APD in classroom setting.

Also, as part of early intervention strategy, students with APD should be allowed and encouraged to subvocalize while reading and reauditorize messages and instructions, as this would help strengthen their memory trace and understanding. Teachers are advised to use clear speech and alter the pacing, emphasis and segmentation of their speech in order to highlight the key points. More importantly, the attention of the students might be gained better even faster, through the use of cueing system by making use of some readiness propelling- words such as 'hello', 'ready', 'listen to me', 'are you hearing me', 'can you remember' etc. Instructions must be given in a very concise and clear manner, so as to help them develop good listening skills and understanding.

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