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52

THE IMPORTANCE OF MUSIC AND ART TO DEVELOP COGNITION, SKILLS AND CREATIVITY- A CRITICAL STUDY IN THE CONTEXT OF MUSIC THERAPY

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ABSTRACT

Art and science in the context of education are equally important. Several research conducted in this area reveals that art education supports and enhances cognitive skills and creativity in different ways for the holistic development of students including differently abled population. This research paper is pointing out the physical, mental, cognitive and psychological benefits of music and art education based on my research in music therapy for differently abled. Music is such a subject in which both art and science incorporate to improve the biological and psychological performance of the individual. In music therapy, the biological responses of the body, emotional and psychological benefits of the individual are being measured to analyze the outcomes.

Keywords: Cognition, art education, multiple intelligence, creativity, skill development, Music therapy, art therapy

1. INTRODUCTION

Every subject in this universe is equally important, whether we categorize it as art, science or math. In ancient India, the art and science subjects were treated as equally important aspects but as the world has grown to modern traditions, the understanding and utilization of art to develop cognitive skills is hardly recognized.

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1.1 Background and context of the research problem.

- Considering science above arts and ignoring art subjects.

Recent research (Chiaki Ishiguro 2024) results in many countries, reflected from the ancient Indian system, prove that various types of art education develop cognitive skills in students, including students with special needs.

1.2 Research question

Does Music and art education contribute to the cognitive development of students with intellectual and learning challenges?

1.3 Importance or significance of the research.

- Music Therapy

Music therapy is the utilization of sound energy as sound patterns and musical interventions to heal and improve different psychological and brain related dysfunctions and disorders.

In western countries music therapy is a must to treat and teach differently abled populations. As per the research MR children are more responsive to rhythmic music and they love music patterns (Draper 2020). They show interest in learning, singing, dancing and performing. According to the multiple intelligence theory, even certain children show slowness in academics, they can be a sports person, singer, dancer, gamer, painter or a writer. To assess the child's interest, to train him/her accordingly is the best thing we can do for such children. Music therapy helps to assess a child's interest by opening their mind and making them social friendly. Music therapists after making a bond with the student or patient, make assessments and give counseling before starting therapy sessions. Only a certified music therapist is eligible to do music therapy.

Children have a natural interest towards arts. Hence in many cases parents as well as teachers did not promote or don't know the significance of art education. So many students did not get the opportunity for a holistic development including brain development and cognition.

1.4 Overview of the paper's structure.

In this paper I discuss the importance of music and art education and its utilization to improve the process of learning by developing cognitive skills of learners. Such an approach helps both teaching and learning process by developing cognition naturally to deliver and receive information. The skills gained from art education make the students perform better. In this paper I discuss science and art, various research findings as literature review and my research in music therapy with differently abled children.

2. Literature Review:

2.1 Review of relevant literature and previous research on the topic.

Various research reveals that art education and practice can influence neural circuitary. This affects a wide range of related activities and enhance important cognitive and social skills including language development, concentration, empathy, emotional intelligence and many other factors in multiple intelligence.

“Children's growth in art is a process of organizing thoughts and it represents understanding, and this is a way to understand the development of their thinking” (Lowen feld and Brittain 1975)

Piaget found that “drawing stages reflect a child's spatial understanding. A child's art has been found to have a strong positive relationship to 1.Q. and to skills in naming and classifying which develops through interaction with objects and events” (Piget 1967).

“Studies designed to identify art and art related experiences that enhance or reinforce cognitive development among kindergarten and first grade children. These studies focus on conceptual thinking through transfer of image, creating thinking through clay forming, oral language through painting experiences, and letter recognition and writing through manipulation of three-dimensional letterforms” (Louis, Barbara et al 1984).

"Preschool activities that exercise impulse control, sustained attention, and working memory are likely to promote the development of cognitive skills important for knowledge acquisition in the early elementary grades." (ERIC/ EECE report, Blair, 2003)

"Babies exposed to simple melodies in a social setting developed a greater sensitivity to the rhythms of spoken language" (T. Christina Zhao and Patricia Kuhl 2016). They also noted that "the processing of music was traced to the auditory cortex of the infants and to the prefrontal cortex as well. The prefrontal cortex is the seat of higher-order cognitive faculties like attention and self-regulation". They stated that "music is affecting executive function".

A 2019 study reached similar conclusions with professional musicians, finding that "executive attention is more efficient in musicians than non-musicians and improves as musical training progresses" (David Medina, Paulo Barraza 2019).

Another major study held in Texas over 10,000 students who participated in arts programs, concluded that "the students performed better on state writing tests; were better behaved; had more compassion for fellow students and were more engaged in school" (Bowen, Kisida 2019).

"Drawing had a dramatic effect on memory, writing, visualizing, and other retention techniques" (Fernandes, Wamms et al 2018).

Damasio's studies on 'the influence of emotion on logical reasoning' (1994; 1999), along with work in neuroscience on 'the ways in which learning alters the physical structure of the brain', focus on "the arts as an especially powerful setting for examining the ways in which the various regions of the brain influence each other".

There are many other similar studies conducted including American institutes for research study on arts.

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2.2 Summary of existing theories & methodologies, findings and gaps in literature

- Multiple Intelligences theory and art education

The subject of art education to develop cognitive skills is very much attributed to the theory of multiple intelligence.

Multiple Intelligence theory argue that the traditional idea of intelligence based on IQ testing did not fully and accurately depict a person's abilities. This theory was offered by Psychologist Louis L. Thurstone (1887–1955) and the developmental psychologist Howard Earl Gardner (1943).

According to **Multiple Intelligence theory** there are eight different intelligences based on skills and abilities and Musical intelligence is one among them. People who have strong **musical intelligence** are good at thinking in patterns, rhythms, and sounds; they have a strong appreciation for music and are often good at musical composition and performance. Math and Music are correlated. It is noted that people who are good at math tend to be good at music. The beats or rhythmic patterns, time concept and speed are similar in both subjects. Intelligences in this category also include Associative memory, Numerical ability, perceptual speed, Spatial visualization, Verbal comprehension, word fluency, bodly Kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, visual spatial intelligence etc.

- Summary of findings

Interpersonal intelligence is essential in understanding and interacting with others. Music and art therapy in the context of behavioral therapy with differently abled, produce best results. To assess emotions, identify motivations, recognize desires and intentions art practices helps a lot. Presentation of art forms in public enhance socialization. Music therapy group activity and performances give enough space to develop interpersonal intelligence, socialization, confidence, concentration and improved behavior patterns.

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Socio cultural benefits

Arts give ample choices to choose an art as per the talent and comfort of every individual. People with movement challenges can sit and sing. Singing need only pronunciation and voice clarity. Paraplegic people can select an instrument of their choice. There are musical instruments which operates with one hand, both hands, one leg and both legs. There are famous groups of 'Orchestra of differently abled' in many countries. Interaction with each other in a platform and social circles enhance socialization. They are contributing to the culture and societal development by empovering differently abled in a beautiful way.

"In early arts experiences in school, such as participation in concerts, plays, and art exhibitions, students find ways to entertain, educate, and inspire peers and adults. These are valued in their communities" (Heath et al., 1998). "They may also contribute to a young person's sense of belonging, an important component of identity development" (Noam, 1999).

Art is an alternative option for those who struggle with intellectual challenges and physio challenges to perform in academics and sports. It opens a new path of life for earning as well as living with dignity.

- Summary of Methodologies

The methodologies used by previous researchers in this subject are:

1. Providing a specific art education for a certain period of time and assessment before and after the art education.

2. Providing two or more art exercises for a particular period of time eg., drama, painting, music and dance according to the interests of the subjects and analysis of performance, comparison of performance between before and after art education.

3. Comparative study with control group and therapy group.

- Findings and gaps in the literature

The previous studies included specific age groups. Either kids in kindergarten level or primary school students. As music is a prime, general interest of the differently abled population, I wanted to assess the effect of music therapy on them to improve behavior and cognition. In my study, people from the vocational rehabilitation center (From Behavioral science department of Mahatma Gandhi University, Kottayam) were the subjects and they were of different age groups. They were not students, but people who had discontinued study. The reasons for stopping studies were the same viz., they were unable to read or write, comprehend or pronounce properly. Their other talents were unidentified. Ten persons out of thirty-five, were participating in activities like, stitching floor mat, making handicraft or making paper covers, with the help of the instructor.

2.3 Justification for the current study based on gaps identified.

- Observations

The main problem identified is the compulsory education of science subjects even for mentally challenged / children with learning challenges at school level. In the Indian school education system, children cannot choose between their subjects of interest. Among the 35 participants in my research, only one person was interested in Maths and Math was his only subject of interest apart from Music. All students showed interest in music.

- Effects of Compulsory Science Education on below average IQ students

Even for students with average IQ, science subjects are not easy. While formal basic education of science gives students information about discoveries, inventions and theories which are already developed by great scientists, art education gives them a space for creativity, originality and self expression which is unique for each and every one. For example, the theory of gravity cannot be written in either way because it is a fact which is proven. So, one must just learn and follow that, until a new theory comes against it. Even if a child wants to do such inventions or discoveries, it will take time until he reaches higher education. An exceptional branch is electronics in which children can do experimental studies.

Science is related to 'why' questions, collection of information, solve problems, test or research ideas etc. According to mentally challenged students, this formula hardly works. They need repetitive practice and easy understanding to learn something new. They hardly asks an intellectual question. So, Interest in the subject and performance-oriented activities are a must in their learning program.

- Science of art

Enhancement of creativity and academics are possible with art education. Methods of art naturally incorporate threads of self confidence, understanding, communication skills and cognition improvement. The aspects like, intelligence, creativity, memory, perception, problem solving, creative thinking, confidence, emotional intelligence including sympathy, empathy and many other psychological and physiological factors are naturally incorporated in art education which helps in building better cognition and better psychological states in individuals. On the whole, based on my research, art education is as important as science education for the holistic development of individuals. Art gives repetitive practice, time for understanding, group activities of the same kind and a room for performance-oriented learning.

- Science of dance in cognition

A successful dancer needs Bodily- Kinesthetic, Naturalistic and Visual- spatial intelligences and associative memory. Improved concentration, fine- gross motor coordination, group performance understanding and high rflex is needed for successful performances.

Learning dance is the most powerful exercise to develop gross and fine motor skills, left and right brain coordination, imagination, emotion, concept of space, courage to face crowds without stage fright, better self expression and body language. Classical dance forms give fine muscle exercises to each and every part of the body, attention, concentration, problem solving skills and leadership qualities. Many dancers are proved to have a successful career too, other than dance. Similarly, sculpture, drawings, paintings, craft work etc. also has a specific role in using and developing multiple intelligences.

- Cognitive spaces of drawing, painting and sculptures

Visual-spatial intelligence, Naturalistic intelligence, Perceptual speed and spatial visualization should be strong for creative art. **Eisner** points out that "experience, whether in reality or in imagination, is necessary. The making of an artistic product requires assimilation of information from the environment through a creative problem-solving process. Exploration with different media provides the child with opportunities for new symbolic input" (Eisner 1970). Symbolic activities such as drawing, describing, taking a photograph, or working with clay, provides different ways of knowing an object or event. The representations engaged by art forms may play in the stimulation, cultivation, and production of new conceptions and deeper understanding in other domains. People who are strong in visual-spatial intelligence are good at visualizing things. These individuals are often good with directions as well as maps, charts, videos, and pictures. Such individuals can become architects, artists or engineers.

According to Da Vinci, Einstein, Watson and Crick, visualization and drawing are important in scientific thought. Scholars such as Tufte show 'how artistically informed presentations of data can enhance understanding' (Tufte 1983, 1998).

For instance, in medical science, three dimensional models of different organs and internal body parts are needed for better understanding. An artist who makes it should also have a better understanding of it, to draw or to make it. Similarly a surgeon needs the efficiency of an artist to do surgery effectively with highly developed concentration, eye hand coordination, fine motor skills and patience. There are instances that doctors who are artistically skilled can perform better and those who are not struggle to find concentration, smart and spontaneous action in time and courage in risk taking.

- Effect of Music therapy for the betterment of behavior and cognition

To state the above said facts in relation to music, I would like to speak about a simple nursery rhyme; 'Twinkle twinkle little star'. The learning process of this simple rhyme gives an opportunity to the child to assess the theme, think about the star- diamond comparison, concept of beauty, the distance between Earth and sky, the concept of rhyming words and meter, etc., in a more easy and beautiful manner. Such learning evokes a child's imagination and

encourages him to create poetry or to sing something from his own creative skills. When he sings it in a particular tune, it also includes his musical sense. The musical sense includes the sense of pitch, sense of rhythm, sense of timing and coordination with group singing or orchestra.

The left brain controls musical sense and the right brain organizes language. When the child says and recognizes words the language part is working, when he sings it the left brain works along. Since the language and tune are assigned together, it helps the coordinated working of the left and right brains. It also makes his muscle movements viz: throat, vocal cords, tongue, facial muscles and body, with action singing. It makes pronunciation and expressions clearer. Finally the repetitive singing stores this simple rhyme in permanent memory storage and every one who has learned this poem in childhood can retrieve it from their memory anytime. If a simple rhyme can do such benefits, the benefits of learning classical music (which is programmed with complex pitch and rhythm patterns and momentary improvisations) and classical dances (which use complex body movements, postures, movement progressions) are unimaginably high. Research with music therapy and brain imaging states that learning vocal music as well as instrumental music improves brain capacity and cognition because many parts of the brain work simultaneously during the execution of music (Fischer, Churchill, et al 2021)

3. Research description

A study about 'how music therapy helps in developing cognitive skills and behavior ' was conducted at IUCSSM, MG University, Kottayam from May-2022 to April 2023.

Participants

The participants were 35 mentally challenged youth aged between 17 and 40 from Vocational rehabilitation center, Behavioral science department, Mahatma Gandhi University, Kottayam, Kerala, India.

Inclusion criteria

Participants who like to listen to music including classical music, film music or folk songs, who like singing, who like instrumental music.

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Exclusion criteria

Participants with unpredictable behavior changes like attacking others and who cannot tolerate group activities.

- Duration

Duration was weekly 4 sessions, (one and a half hour) for 11 months.

- Explanation of data collection methods

Interview

- Direct Interviews with each participant and interview with the special educator at VRC for collecting data about the participants (category of MR, medical issues, physical and behavioral issues)
- Phone Interview with parents of each student to know about their behavioral, educational, institutional and personal challenges, behavioral specialties and medications.
- Thematic analysis is done to make in depth observations about each participant with the collected data. Some of the data was matching while some other data was insufficient. Personal interview observations and parental observations were more helpful.

Number	Types of MR	IQ Range	Number of participants
1	Mild (Editable)	50-70	1
2	Moderate (Trainable)	35-50	7
3	Severe (Dependent retarded)	20-35	25
4	Profound (Life support)	<20	0
5	Hearing and speech impaired	50-70	2

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3.1 Methodology:

a) Assessments b) Music Therapy c) Clinical outcome measures

- Assessments

Writing, reading and speech assessments, assessments of Interest in music, behavior while listening to music and singing. Pre-assessments, Monthly assessments and post therapy assessments were taken to evaluate the changes.

Experimental design

- Music therapy

The modes of therapy were passive and active music therapy. Passive therapy is listening oriented activities. Active therapy includes singing and playing musical instruments (keyboard, drums, xylophone, shakers, drum set, chazoos).

1. Song based language study

Learning vocabulary with learning songs, Visual imageries of words and pictures with video songs, reading, compression, identification of similar words, identification of rhyming words, finding synonyms, recall words from the songs, pronunciation of words from the songs, writing words

2. Creative exercises

Recaling and saying theme-based words on a particular topic, singing poems, writing poems, writing self created songs, Writing poems/ songs as group activity by providing subject related words by each participant, presentation of songs before the class.

3. Active therapy

Vocal exercises to improve voice clarity, breathing exercises to improve lung capacity, With 15 various musical instruments, playing on instruments, group playing as orchestra and individual performance in the class., individual and group performance on stage for festival programs.

4. Behavioral training

As the class nurtures the participants showed love and trust towards the therapist which created a strong bond between the therapist and participants. They naturally started sharing their issues they face at home, institution and in society. The trainer could tell them remedies to manage the issues. Parents started sharing the issues they face with their ward, and parental counseling initiated which helped to resolve many issues between parents and participants.

Classroom practice about how to deal with the general public, how to face possible harassment or humiliations from the public, how to show respect to others, how to address specific situations in life, video presentations about public platforms and social behavior.

- Description of data analysis techniques (thematic analysis).

Cognitive assessments

With the help of a therapist, before and after the period of therapy, participants completed a questionnaire. Writing, reading and speech examinations before and after the therapy. MOCA i. e., Montreal Cognitive Assessment was the measure. Alternative verities also used to minimal practice effects. The screening tool MOCA identifies mild cognitive issues. MOCA constitute eight measures (Visuospatal and executive function, naming, attention, memory, delayed recall, language abstraction, orientation) (6).

3.2 Observations

In the pre assessment,

- The students showed less cooperation and coordination between them and others
- Restricted motor movements
- Lethargy
- Insecure and confused state of mind

- Lack of confidence to face people, interact with others, talk or perform something in the class
- 10 students were interested in reading and writing but they showed learning challenges to read, write and in cognition
- Speech was not clear in 30 participants
- Two participants were speech and hearing challenged.
- Frequent drooling found in 6 participants and careless drooling in others.
- IQ below average
- Conflicts between the students due to behavioral issues
- Exposure to music therapy for the First time.

Monthly Assessment

- All students showed notable changes since second month of the session
- Therapist Identified specific interest areas of each student by second month
- One student was identified with specific math ability. He was able to calculate one to two digit numbers easily in mind calculation
- Three students showed language brilliance with mother tongue, Malayalam
- All students showed interest in music either listening or singing and learning.
- Three students showed interest in keyboard playing
- 10 students showed immense interest in playing percussion instruments
- Speech and hearing challenged participants showed response to musical vibrations. They were able to calculate rhythmic movements of hand and by observing metronome needle speed, they could play strikers and shakers to support musical activities in the group.

- Participants who disagreed with learning language in the interview session started to participate in word games by themselves and were self motivated to learn new words, read and write after seeing the classroom activities and improvement of others, even though it was a heavy task for them.

4. Result (According to post assessment after one year)

- All students achieved confidence in their activities including, interaction with others, stage performance, better self expressions, eye-hand-finger-coordination, Good spirit to do group activities, Perform alone and in groups in class, perform alone as well as in group on stage in front of large crowd, showed positive attitude towards learning in general and attendance of class improved 100 percentage than past years.
- Their speech clarity, control of volume, language comprehension and way of talking has stunningly improved.
- Drooling has stopped completely in 30 students and attained notable control in 5 students.
- Four students are able to perform percussion instruments.
- Five students can perform on keyboard and xylophone.
- Four students can sing well with improved language clarity.
- Two students turned out to be poets, they wrote poems on their own. Among them one student has published a book of poems.
- Two students got jobs as office assistants after facing interviews successfully.
- Conflict between the students is almost zero besides minor issues which can be easily addressed.
- Hearing challenged participants became a part of the orchestra team who could give accurate timing with shakers.

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Type of disability	Pre-Assessment	Academic Result	Musical/ Activity Result
Hearing and speech impaired (case 1&2)	Both cannot identify written words of People, animals or objects, Zero exposure to music	Both learned essential words (after training with repeated pictorial memory (Names of vehicles, Pet Animals, Family Relations)	Understanding of rhythm with vibrations from drums, able to play musical instruments (Shakers, Xylophone) Case 2. Started performing Kathakali dance by self motivation by video observation.
MR Moderate with Shutter (Case A)	Shyness to speak before people, stage fright, no socialization	Better socialization, Control of shutter, Able to write and read Malayalam	No shutter while singing, Capable of singing on stage and in front of a large crowd.
MR Moderate (Case B)	No speech due to clarity issues, Minimal socialization	Can read certain words, Stopped drooling, Excellent socialization	Plays on hand Drum with much enthusiasm, Dedicated to perform on stage
MR moderate (Case C female)	Extremely shy, no interactions with others	Can write and read Malayalam, Identify and read numbers and English alphabets	Plays on xylophone, dance to music, and better socialization., performed on stage in group and single (dance)
MR moderate (Case D Female)	No eye contacts no interaction with new faces	Can write numbers in the correct order up to 1 to 1000, Can copy Malayalam words without mistakes.	Singing in correct pitch, improved pronunciation, volume control, performed on stage in a group.

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MR Mild (Case E Male)	Showed enthusiasm to learn, Able to write and read Malayalam basic alphabets	Learned Malayalam consonants and conjunct consonants (6 months) able to read and write without mistakes (8 months) Able to write poems by himself.	Interest in singing (no pitch clarity) Performed on stage in single and group performance.
MR Moderate (Case F of Muscular dystrophy with MR)	Showed interest in learning, Able to write English Alphabets, tiredness, immunity issues.	Learned to read and write two to four letter English words.	Learned to play the drum set, slowly overcoming muscular problems.
All other participants with severe MR including 4 Autism spectrum Disorder	Autism cases were silent, MR cases with Less speech or speech not clear, behavioral issues and fights in the class, difficult to manage them.	No academic progress, positive behavior changes, disciplined classroom activities, Interest to participate in art activities, drawing and painting	Participates in group singing, playing drums, keyboard, shakers, dance performance on stage. Friendliness, love for each other, better cooperation.

5. Discussion:

Interpretation of the results in relation to the research question or hypothesis.

- The science of music therapy based on the results

Music therapy can address learning and behavioral challenges. Learning challenges are seen in Mentally challenged students, children with learning disabilities (such as dyslexia/ dysgraphia, dyscalculia), slow learning, poor memory and children with psychological issues/trumas. Children with poor motor skills or poor verbal skills can also benefit from active music therapy. For such students, learning music itself is a therapy (Pisharady S M, 2021).

In music, practicing instrumental music helps to enhance physical as well as mental health. Playing an instrument with both hands requires the efforts of the left and right brain together. The brain and hand-eye coordination can be addressed in playing instruments like Piano, Violin, Flute, Guitar, harmonium, Tabla, Mridangam, Drums and any instrument which needs both hands for playing. Instruments like Mridangam, Tabla, Keyboard, flute violin, Guitar etc, need accurate fingering to produce correct musical notes. It requires an effort of concentration, timing, hand –eye- finger coordination, knowledge of pitch, rhythm, musical progression, memory, spontaneity, speed balance and presence of mind. The brain has to work on multiple programs at a time, to coordinate the mind and body of a performer. Such exercises enhance the overall development of both hemispheres of the brain. Even children with average IQ can develop a more active state of the brain by practicing music (Pisharady S M, 2021).

Mentally challenged children react to rhythm and music and show interest in music. Many children love listening to music and even try singing along. It helps them to become active, enhance communication skills, and helps to control excess saliva formation. Active music therapy such as singing class, vocalization, breathing exercises and playing instruments, help them to correct pronunciation, improve sound quality, control volume, master in motor coordination, left-right brain coordination, improve patience and to control emotions. Certain students show extraordinary talents in drums and vocalization. Such realizations would be a new opening to their life itself.

- Comparison of findings with previous research.

Available new measures and methods, advancement in cognitive sciences, neuro science, brain mapping etc., makes next level explorations in the art and cognition relation and its usage.

Every art form contribute its own specific cognitive, physical, motor skill based activities and emotional and mental dinamics in each individual. In my research activities like singing, learning new words and tunes, writing songs, acting out situational songs, composing music, group activities and coordination added positive inputs to the cognitive development of all participants. Art gives big platform to the overall development which is only art can mekeout.

- Explanation of implications of the results.

According to existing studies with arts and cognition, normal as well as differently abled population, children and adults and male and female can develop various cognitive skills through the application of art. Art provides alternative ways for the communication of ideas, feelings, emotions and understanding. Art helps to sharpen skills, maintain confidence, better socialization, better understanding of self and others emotions and provide emotional intelligence which is esential in societal front.

- Limitations of the study and suggestions for future research.

Limitations: Each MR case is different in their detailed analysis. Specific study of each case is needed for more authentic results.

6. Conclusion

- Summary of the key findings.

  With the application of Music therapy, differently abled population can improve cognition, motor skills, eye hand coordination, overall behavior, socialization and interest in general learning and performance.

- Importance of the findings in relation to the broader context.

In the broader context, according to the interest of the participant, either music, dance or any sort of art education or training will positively affect the behavior, energy levels, attitude, socialization and skills of individuals.

- Suggestions for practical applications or policy implications.

  Art therapy and Music therapy must be implemented in special schools, rehabilitation centers for differently abled, and in special education centers.

To conclude I would say that learning arts is as important as studying science. While formal education promotes student-teacher relationship, art education deepens master-disciple understanding, which makes more sensible, emotionally stable, courageous, and mentally and physically healthy human beings, who value humanity.

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