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USAGE OF PICTOGRAMS TO INTRODUCE MUSICAL INSTRUMENTS TO EDUCABLE MENTALLY RETARDED CHILDREN AS AN ALTERNATIVE METHOD*

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Abstract: *The purpose of this research is to examine and investigate the perception ability of musical instruments of educable mentally retarded children with the support of visual elements. The research is conducted for every children individually in a special education and rehabilitation centre. The problematic of this research is the level of perception ability of musical instruments with visual support on mild mentally retarded children. In this research, perception ability of defining pictograms by music is introduced as an alternative method. It is researched that how educable mentally retarded children perceive pictograms by music tools. In this case, it is aimed to introduce musical instruments to educable mentally retarded children by pictograms with music. The research is applied with a qualitative approach. Data were obtained with the recorder, then they were turned into texts and analyzed with content analysis method.*

Key words: *Mentally retarded children, pictogram, 2d character design, computer aided drawing, auditory perception, visual perception, music.*

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1.INTRODUCTION

In our country, various methods via materials are used for educable mentally retarded children's special education and rehabilitation services. Also in the academic sense, there has been several research conducted and researchers still have to develop new methods and approaches for mentally retarded children to increase their potentials. In this research area, specially, the emergence of specific data gains importance to comment and conclude on such students and children. It is said to be beneficial to the development process of educable mentally retarded children to improve their life skills they need and in these studies music and musical elements are necessarily useful. Perception is an interpretation process which is the interpretation of sensory information. When we pay attention to certain stimuli from sensory detection, there begins the recording process. The working memory (short term memory) to entering information from the sensory record of environmental stimuli, the learner is not only able to detect information. Therefore, perception has special importance in learning [1] .

Researchers conducted thus far have revealed that there is not just one specific "music center" in the brain, but on the contrary that music perception, performance and creativity is spread across many areas of the brain and that these areas, when compared to other areas, undergo structural development with music training. The area of the brain at the same time comprises to contraptions of perception. In recent years scientists have begun to have a firmer understanding of where and how music is processed in the brain [2] .

Brain Sections	**Functions**
Sensory Cortex	Controls tactile feedback while playing and instrument or dancing
Auditory Cortex	Listens to sounds. Perceives and analyzes tones.
Hippocampus	Involved in music memories, experiences and context

Visual Cortex	Involved in reading music or looking at your own dance moves
Cerebellum	Involved in movement while dancing or playing an instrument, as well as emotional reactions.
Nucleus Accumbens & Amygdala	Involved with the emotional reactions to music.
Prefrontal Cortex	Controls behavior, expression and decision making.
Motor Cortex	Involved in movement while dancing or playing an instrument.
Corpus Callosum	Connects both sides of the brain.

Table 1. Music and Brain Sections [3]

This is clearly indicated brain sections and musical perception.

Musical perception, musical sensations of sound frequencies that as a result of the interpretation is to be meaningfully processed by the brain. In the musical perception, the perception takes place in the sensation of the brain and there is a process with the result of bundling treatment and interpretation [4].

We need to use visual symbols to express our feelings. Through all our lives, we have conditioned emotional response with humans, evidences and their relations. Artistic experiences be interested of directly with the subjective and intuitive one and it offers greater [5]. Occasionally, it is important to reveal that keep thoughts and feelings in. Therefore, artistic experiences helps to improve people's level of cognitive and emotional perception.

As a symbol language, pictogram, is a shape of pictorial-writing which use symbols to convert visualize a concept or idea [6]. In other words, pictograms are stated to be clearly explained to understanding.

According to British Joint Committee on Mental Deficiency, the term mental retarded child is used in broader sense to include all those whose educational progress, from whatever cause, has been slower than that of an average child of the same chronological age [7]. American Assosation Mental Retardation (AAMR) was classified the individuals on mentally retarded in 1983 [8].

AAMR 1983 Classification	**IQ Range**	**Educational Classification**
Mild Mentally Retardation	50-55 to 70	Educable Mental Retardation
ModerateMental Retardation	35-40 to50-55	Trainable Mental Retardation
Severe Mental Retardation	20-25- to 35-40	Severely/MultiplyHandicapped
Profound Mental Retardation	Below 20 or 25	Severely/MultiplyHandicapped

Tablo 2. Classification of Mentally Retarded Individuals.

The process of perception for specially educable mentally children works on slower than normal children. Because of this, it is hard to difficult to transfer data from short term memory to long term memory. Consequently, it can be difficult to remember to transmitted the information. The same situation applies to musical perception.

Ozsoy says that one of the difficulties of mentally retarded children is learning and recalling the attention of one of the main condition that is intensifying and sustaining. It has been stated that mentally retarded children, who has distractibility and lack of attention, generally, have various problems to transfer data from short term memory to long term memory. Besides, he states that mentally retarded children have no problem on their long term memory and he also says that these children may remember for a long time thoroughly learned information [9].

Generally, mentally retarded children have problems to take environmental data which they transfer data from short term memory to long term memory. Forgetting is occured when they can not transfer to coming information or sensory stimulus. In addition, after learning, they have difficulties to remember data, recalling information from memory compated with nomal children [10].

Mentally retarded children can be classified as three different groups which are educable, trainable, severe mentally disability.

Educable mentally retarded children have variant of 45-75 IQ range. They are also calling mild mentally retarded children. These children needn't to take rehabilitation or special education needs all their life. But they can participate in the inclusive education. They can also take formal education with rehabilitation services or special education – assisted learning. They have 8-12 age range mentality and they can academic study level of sixth grade

Trainable mentally retarded children have variant of 25-44 IQ range. They are in the group of mentally retarded children which children collaborate with area health institution, rehabilitation services and special education. In academic study, their performance lower than educable mentally retarded children. In addition, these individuals can make limited and do monotonous work.

Severe mentally retarded children have variant of 0-25 IQ range. They can also calling intensely mentally retarded children. They have significant problems about self-care, adaptation, social and lots of skill and acquired to these skills. They need clinical services and clinical health care. Their development of intelligence level of 0-2 age range [11].

If mentally disabled child's perceptions compared with their own level in itself, it can be different from educable mentally retarded children to trainable mentally retarded children and severe retarded children. It is said that their learning situation show deficiency to differ from each other. Retardation in learning, which attest to educable mentally retarded children, lower than to show severely mentally retarded children. It is also the same to auditory and visual perception. Besides, mentally retarded child's auditory and visual perception is lower than normal children [12].

These classifications with the educable mentally retarded child's perception, auditory and visual perception on the level accordingly musical perception can be said to establish a relationship. For example, educable mentally retarded child's musical perception level can be higher than trainable mentally and severely mentally retarded child's musical perception. In other words, severe mentally handicapped children depending on their intelligence scores may display less performance compared with trainable and educable mentally retarded children on auditory and visual perception related with the music.

Music therapy is a profession which has emerged over the last fifty years from a variety of professional disciplines in different countries. Therefore, the process of defining music therapy can depend under various situations. In order to establish a more generic and all-embracing definition of music therapy, in 1996, the World Federation of Music Therapy (WFMT) produced the following definition:

Music therapy is the use of music and /or musical elements (sound, rhythm, melody and harmony) by a qualified music therapist to facilitate and promote communication, learning, relationships, expression and other relevant objectives [13].

It is also important to use music therapy methods for educable mentally retarded children. Because these methods can contribute to their mental, emotional and social development. In view of the usefulness, it can be expressed that music therapy and its aims have under five main headings. These aims, respectively, are fixing the social and emotional behavior, develop the skills motional, fix the communication, teaching skills pre-school and school-age and provide with leisure time activities [14].

2. METHOD OF THE RESEARCH

Many researches are conducted to obtain the relationship between music and perception. Two methods are mainly used in theese researches: collecting psychological data by brain imaging techniques (fMRI, PET, EEG) and observing attitudes and behaviors of test subject to indicate the relationship between music and perception [15].

As Wigram noted, the second method-behavior observation and data collection techniques- are used in this research. Research is based on natural observation with the dimension of practice. In this study, musical instruments wtih related music and pictograms are used in a special education and rehabilitation center in Istanbul Sancaktepe. Test subject is composed of three girls, three boys with a total of six educable mentally retarded students with the ages of 7 to 10. Through pictograms their ability to recognize musical instruments are studied[1].

[1] Students have no additional disability except educable mental disability.

In this study, educable mentally retarded children are observed one by one in their working environment. Research is programmed as two months involving an hour's work of two days a week and pictograms are used as the images of drum, snare drum, tambourine, harmonica, clarinet, trumpet, xylophone, piano and the guitar. In the first four weeks of the research, drum, snare and cymbals are played with students. School songs are singed together and students accompany rithmicly with related instruments. In the last four weeks, pictograms are intoduced to students. During the introduction of pictograms, music of these instruments are listened to students by audio media.

No	Music	Composer	Pictograms
1	Clarinet Concerto, K.622 Part 1	W.A. Mozart	Child Playing Clarnet
2	Vals, op.64	F. Chopin	Child Playing Piano
3	Trumpet Concerto, Part 1	J. N. Hummel	Child Playing Trumpet
4	Concertino for Xylophone, Part 1	T. Mayuzumi	Child Playing Xylophone
5	Harmonica-Working on The Railroad	Anonymus	Child Playing Harmonica
6	Overture of Baglama	C. Akdeniz	Child Playing Baglama
7	Vals a Rosenthal	G. Reinhardt	Child Playing Guitar
8	Snare Drum Etude, Heigh Hoo Drumroll	Anonymus	Drums, Snare and Tambourine Playing Children

Table 2. Music and Related Pictograms of the Research

Musical instruments that take place in the research has played an important role for selecting useful music. Music is used for educable mentally retarded children with related pictograms to facilitate detection, auditory and visual perception, and depending on the pictograms to facilitate musical perception in order to establish a relationship between pictograms and musical instruments.



Figure 1. Pictograms of some percussion instruments

During the process of drawing the pictograms, a child figure is created that educable mentally retarded students can internalize. Child figure is genial, curly hair, wearing eye-catching phosphoric green color long-sleeved shirt and dark blue trousers, playing different musical instruments. Musical instruments and tools in the pictograms are played in their suitable usage. Pictograms are designed to appeal students' visual perception and to provide musical instruments to be directed to the relevant.

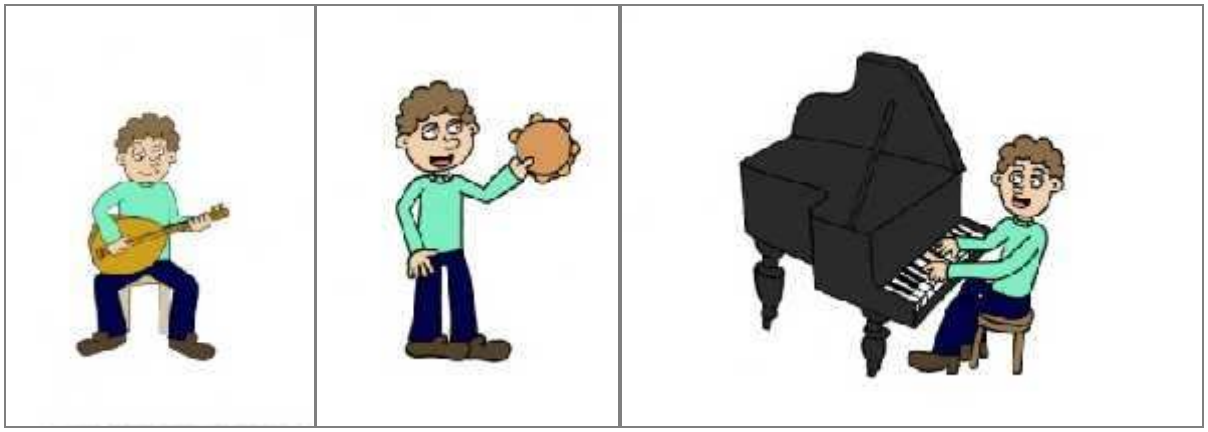


Figure 1. Pictograms of the other percussion instruments



Figure 2. Pictograms of wind instruments.

Pictograms are prepared on 2D virtual envoirement of computer and printed as digital images on A4 (21 cm x 29,7 cm) papers. Photoshop CS4 is used for digital drawing and coloring. Sketch of the pictograms are drawn by hand.

3. CONCLUSION

In the first four weeks of the research, drums, tambourine and snare drum has been practiced with educable mentally retarded children as an accompaniment. During the studies with mentally retarded children such as singing together, playing musical instruments, playing-singing practices, it is observed that children obey the given commands. In addition to playing at the same time, finishing the songs together under the leadership of the educator, positive feelings and behaviors of children as a result of mutual verbal dialogue, being in a safe and confident envoirenment, being a part of the activity are observed.

In the last four weeks of the research, only pictograms and musics of musical instruments drawn in pictograms are used. Pictograms are layed on a flat floor to be noticed easily and for every right choice of students, related music is played.

For each process, names of the music instruments are memorized and repeated frequently. Names of musical instruments are asked to students and it is examined that students have the capability to remember the musical instruments (drums, snare drums and cymbals) that are practiced together in the first four weeks and to select correct pictogram.

Throughout the researching period on six educable mentally retarded children, two boys and one girl make the right choices without hesitation. The other three children found the right pictograms after making two wrong pictogram selections. Selecting and identifying the musical instrument from various pictograms is an important sign of mentally retarded children's or students' visual and musical preception ability. Moreover, after the the first four weeks of application process with instruments in the last four weeks which is the process of working with pictograms, mentally retarded children's or students' ability to select desired pictogram and recognize the desired musical instrument shows their educable capacity.

To analyze the research over the past four weeks, the process of right pictogram selection out of multiple choices is to be considered. The process is contributed to students' permanent perception in visual and aurally by practising one by one based on identifying the musical instruments through pictograms.

Visual aided musical activities on educable mentally retarded children can be useful in children's education and it can increase their learning abilities. Nelson, Cummings and Boltman (1991) noted that disable students are incapable in learning as normal students and children if they are not systematically educated [16, 17].

The increase in such researches with systematic and repeatable methods, can contribute to improvement of disable students' aurally perception by visual support. These musical experiences are important on improving the leraning abilities of educable mentally retarded children and can develope their motivation, auditory, visual, cognitive and emotional perception.

In addition, it is so important the accurate answers without hesitation. Because, when educable mentally retarded children correctly give answers, they feel sense of achievement. It is clearly indicated that they are environmentally-conscious. There is another indication that when they listen to music, they relate musical instruments to pictograms resolutly.

During study, educable mentally retarded children have chosen some of musical instruments, which used within the first four weeks as drum, snare, tambourine. They have chosen pictograms to say the insturment's names. Thus, with these kind of studies, it can be learn musical instruments with visual elements to educable mentally retarded children. Present study, in the same time, it may contribute to their motor skills, ability to imitate, social skills and enunciative linguistic skill which are located within special education sevices.

It is an important role that these kind of investigations can prompt educable mentally retarded child's auditory perception stimulators with music, musical activities and methods. To identify a musical insturment with pictograms and to sense aurally with music by visual elements can accelerate this process.

In this research, it has been conducted various disciplines such as art education, music education, special education and mentally retarded child's special needs and music therapy. With these multidisciplinary investigations, it can be constituted various musical activities. Educable mentally retarded children can recognize music and several musical instruments with pictograms.

Accompanied by appropriate music, with this alternative method which is adopted with regular repetition can be contribued to positive learnability of students due to their auditory perception and visual perception improvements.

4. REFERENCES

[1] Senemoglu, N., "Development, Learning and Teaching, From Theory to Practice", Pegem Academy, Ed. 20th, Ankara, pp. 292-293, 2011. (in Turkish)

[2] Ayata, E., "Music and Brain" , PhD Thesis; Istanbul Technical University, Instıtute of Social Science, Istanbul, p.30, 2008.

[3] http://www.onlinecolleges.net/2012/06/20/music-learning, 05.02.2014.

[4] Sazak, N., (2008), "Basic Dimensions of Musical Perception", *Journal of International Human Sciences*, vol. 5, no. 1., p.11, 2008. (in Turkish)

[5] Ozsoy, V., "Visual Arts Education, Historical and Philosophical Foundations of Art Education", Gunduz Education and Pub., Ankara., pp. 42-43, 2003. (in Turkish)

[6] Baser, M. , "Pictograms and Symbols in Visual Communication Effects on Human", Thesis of Masters Degree, Anadolu University, Social Science Inst. Eskisehir., p. 13, 1994. (in Turkish)

[7] Sharma, M., "Special Education Music Therapy", APH Publishing Corporation, New Delhi, India, p.72, 2007.

[8] Turnbull, R., Turnbull, A., Shank, M., Smith, S., J., "Exceptional Lives, Special Education in

Today's Schools", Fouth Ed., Pearson, Merril Prentice Hall, USA, p.237, 2004.
[9] Ozsoy, Y., Ozyurek, M., Eripek , S., "Introduction to Children in Need of Special Education-Special Education", Karatepe Pub., Ankara, pp.164-165, 2001. (in Turkish)
[10] Bray, N., W., Fletcher, K., L., Turner, L.,A., "Cognitive Competencies and Strategy Use in ndividuals with Mental Reterdation", ed., W.W. Maclean Jr., Ellis' Handbook Ofmental Deficiency, Psychological Theory, and Research, Third ed., pp.197-212, 1997.
[11] Ozgur, I, "Education of Children with Disabilities and Special Education", Karahan Pub., Adana, pp.189-190, 2008. (in Turkish)
[12] Goksu, I., Cevik, T., "Introduction to Special Education" , Adana, 2004. (in Turkish)
[13] Wigram, T., Pedersen, I., N., Bonde, O., L., "A Comprehensive Guide to Music Therapy", Jessica Kingsley Pub., England, pp. 29-30, 2002.
[14]Coban, A., "Music Therapy, Musical Therapy for Pschological Health", Timas Pub., Istanbul, 2005. (in Turkish)
[15] Wigram, T., "The Psychological and Physiological Effects of Low Frequency Sound and Music", *Music Therapy Perspectives*, Vol 13(1), Special Issue: International Music Therapy, pp. 16-23, 1995.
[16] Iftar, K., G., Birkan, B., Uysal, A., "Teaching the Concept of Mind to Disabled Children" ,Ankara, p. 7, 2005. (in Turkish)
[17] Günsu YILMA, Bahadır UÇAN, "A study based on the perceptibility of musical enstruments of mentally handicapped children with visual support" (in Turkish) 2014 Volume 4 Issue 1