sciendo VISION REHABILITATION INTERNATIONAL

Issue 1 | Vol. 15 | DOI 10.2478/vri-2024-0006

Using a Computer Application to Teach Body Awareness through Music and Movement to Students with Visual

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Abstract

This study tested the effects of a computer application that used music and movement to teach body awareness to students with visual impairments and additional disabilities. A single-subject research design was used with two female students who attended public schools in the United States of America. The study demonstrated the effectiveness of the app in teaching concepts related to body awareness as reflected in the results for both participants. The first participant improved from a 76.8% mastery of the concepts at baseline to 100% at intervention, and 100% at post-intervention, and the second participant improved from mastery of 33% at baseline to 54.3% at intervention and 76% at post-intervention. These results imply that the app is an important resource that professionals may use to facilitate the mastery of concepts related to body awareness in students with visual impairments and additional disabilities

Keywords

Body-awareness, music and movement, Orientation and Mobility.

Introduction

Body awareness refers to the internal understanding of one's position in space. It is an aspect of orientation and mobility (O&M) that is influenced by proprioceptive processing, sensory information, and the forces of joints and muscles (North Shore Pediatric Therapy, 2019). O&M is a related service (Neal et al., 2004) through which people with visual impairments (VI) learn awareness and independent movement skills. The Individuals with Disabilities Education Act (IDEA, 2005) defined related services as the services required to assist children with disabilities to benefit from special education (Neal et al., 2004). IDEA mandates O&M specialists to train individuals with VI in the use of nonvisual skills (e.g., human-guide, cane travel, orientation, assistive technology, and public transportation) to navigate their environments (Neal et al., 2004). Body awareness includes

understanding the names, functions, and movements associated with an individual's body parts (Fazzi & Petersmeyer, 2001; Maloney, 2016) that typically developing children learn incidentally during interaction with their environments. Accurate body awareness requires an understanding of the spatial concepts necessary to determine the position of one's body in relation to the locations of objects and space within the environment. It includes spatial terminologies such as laterality and cardinal directions (Fazzi, 2014).

The visual, auditory, tactile, vestibular, and proprioceptive sensory systems work cooperatively to guide movements within a space (Fiehler & Rosler, 2010). However, a disability affecting any of the sensory systems or the central nervous system may impact the development of body awareness and spatial concepts (e.g., a VI may impact the use of visual information to check the accuracy of movements) (Toole et al., 1984).

VI is a low-incidence disability, and many general education teachers are not trained to serve these students. Additionally, more than half of the population have additional disabilities (Prickett & Welch 1998). For children with DeafBlindness or multiple disabilities, movement is an opportunity for them to obtain environmental information and to communicate needs (Gense & Gense, 2004). Therefore, instruction in O&M skills is a way to promote their independence. Martinez & Moss, (1998); Inman & Loge, (2000) all recommend training these children in mobility to address their limitations. Silberman (2000) observed that students with multiple impairments may respond to instructions through music, and the use of assistive technology (e.g., picture, tactile, or object symbols). Other effective strategies include repetition, consistent cues, and prompts (Erin, 2017). According to Erin (2017), routine provides a sense of control, and students with disabilities usually feel “comfortable when they can anticipate events” (p.331). In a new environment, a familiar song often helps to ease the discomfort, enabling the student to learn.

Studies have also identified music and movement as effective in teaching concepts to children with and without disabilities. Zachopoulou et al., (2004) posited that music and movement may help to improve the rhythmic ability in children, hence contributing to the development of locomotor skills. Likewise, Willings (2015) observed that musical activities may help children who are DeafBlind to develop listening skills, coordination improvement, and awareness of rhythm and space. They recommended choosing songs that enable practice with concepts (e.g., up/down, front/back) to identify the different parts of the body. To structure the situation in a musical activity, Willings (2015) and Coleman (2017) suggested demonstrating through prompting while modeling the action to the student to follow. These studies explained that the use of music improves students’ motivation for learning, increases memory recall and emotional involvement as well as enhancing their transfer skills into other areas of their personal life (Scripp, 2002; Campabello et al., 2002).

Prior to this study, the second author in collaboration with a team developed an application referred to as Body Awareness through Music and Movement (BAMM) (Depountis, et al., 2019). The BAMM app was designed to support children with VI and additional disabilities in the development of body awareness and spatial concepts. BAMM consists of an engaging character that models movements through music for the child to follow during lessons, and it has a video library with a variety of movements consisting of motions that are typically used in daily living, and are within the child’s range, motion, strength, and endurance (Depountis et al., 2019). Therefore, the purpose of this study was to test the effects of BAMM when used to teach body awareness to children with VI and additional disabilities.

Methodology

This study used a single-subject research design to test the effects of BAMM on teaching body awareness to children with VI and additional disabilities. The design focuses on single cases, hence applicable when evaluating the effects of intervention programs on individuals, and enables the researcher to document experimental control, thus lending scientific validity to the results (Horner et al., 2005).

I. Particpiants

Two female students with VI and additional disabilities in public schools in the United States participated in this study. For confidentiality, they were referred to as TEE and CECE. Prior to collecting data, the study was approved by the school district's Department of Research and

Evaluation, and Stephen F. Austin State University Institutional Review Board.

1. TEE was eight years old, in third grade, and received instructions in a general education setting. The ophthalmological examination and clinical low vision evaluation records showed congenital blindness due to Optic Nerve Hypoplasia and nystagmus. TEE had light perception in both eyes, temporal restrictions to 40 degrees, superior restrictions to 10 degrees, and inferior restrictions to 30 degrees for both eyes. Her learning media was braille, and she used a white cane for mobility. TEE also had speech impairment and often used echolalic speech. In her Individual Education Program (IEP), individual support was recommended to improve participation in classwork and to address personal needs (e.g., eating). TEE received direct services from a Teacher of the Visually Impaired (TVI), a Certified Orientation and Mobility Specialist (COMS), a speech therapist, and an occupational therapist. One of the IEP objectives for TEE was to develop O&M skills for social interaction with peers. She needed to engage in movement routines that reinforce concepts and support body balance and coordination. She also needed to learn travel concepts to enable participation in age-appropriate travel, hence her main O&M goal focused on improving body awareness.

2. CECE was 15 years old, in ninth grade, and received most of her instruction in a self-contained classroom at a public school. Her ophthalmological test records showed congenital retinal detachment in both eyes and microphthalmia. She was functionally blind, had autism, and had a speech impairment. One of the main objectives in CECE’s IEP was to develop skills in O&M and to engage in social and instructional activities. According to the teachers, CECE was highly tactually defensive. CECE's expressive language was echolalic and needed prompting to initiate conversation or answer questions. CECE’s present levels of academic and functional performance (PLAAFP) indicated that she was an auditory reader at the emergent level of comprehension. She could craft three-word sentences by making verbal choices. In science and social studies, her PLAAFP indicated that she demonstrated her knowledge verbally by choosing the correct answer in familiar activities in eight out of ten trials. CECE required repetition to gain and demonstrate understanding. CECE received direct and indirect services from COMS, TVI, and a speech therapist. In O&M, CECE’s IEP showed the ability to identify most of her body parts, and correctly use basic “left/right” positional language while standing in familiar locations. However, she confused laterality in unfamiliar areas. Her O&M needs included increased experience in moving her body in various ways in order to improve awareness of self in space and improve coordination. CECE's O&M goals needed to address improving body awareness and positional concepts.

II. Settings

TEE's classroom was adjacent to a resource room and included restrooms and water fountains. The resource room was about 30 feet from her classroom and TEE could travel to it independently using her cane. The resource room was spacious and had a large table where TEE could arrange her “props.”

CECE's self-contained classroom included a special education teacher, three paraprofessionals, and twelve students with multiple disabilities. There was a kitchen, a storage area, a learning center with large tables for group activities, and a classroom area with individual student desks. There was also a restroom, and a relaxation room at times of sensory overload.

III. Dependent Variables

These were the skills intended for the participants to learn. Learning would be demonstrated if the students responded appropriately to the instructions given when using the app. Specifically, learning would be demonstrated if the participants were able to identify their different body parts and perform movements using those body parts (e.g., raise your left hand, bend forward) as presented by the app. The performance (occurrence levels of the dependent variables) would be measured and recorded during the baseline and intervention phases (Cooper et al., 2020). The effectiveness of the app would be determined by comparing the performances at baseline and intervention levels, and any changes would be attributed to the experimental treatment administered.

IV. Data Collection

One instruction session was conducted per day and each session took about 15 minutes with instructions given for movement ranging from 17-35. The baseline for CECE had three sessions with a total of 63 instructions, and seven intervention sessions with 127 instructions. The baseline for TEE had two sessions with 69 instructions, and four intervention sessions with 136 instructions.

Multiple Baseline across Participants approach was used. In this approach, each participant receives experimental treatment at a different time, where several responses are identified and recorded over a period to provide the baseline conditions. The approach allows the researchers to establish the presence or absence of a functional relationship between the intervention and the dependent variables, hence recommended for intervention research that focuses on teaching developmental skills (Lieberman et al., 2010). The approach was also chosen because it is easy to use in educational settings where the environments favor the simultaneous comparison of multiple dependent variables (Richey & Wheeler, 2000).

Baseline data collection for the two participants started on the same dates but was terminated after two sessions for TEE because the responses were consistently the same. Therefore, intervention for TEE started while baseline for CECE was still ongoing. Baseline data for CECE was collected for three sessions followed by intervention after establishing consistency in the responses. Intervention for each participant was terminated after three months.

V. Materials and Devices used for Data Collection

The materials and devices used included: a rocking horse, a hand-fan, beads, flower, bean bag, scarf, and a ball were used in preference tests to establish possible reinforcements for the participants; A video camera to record sessions; Record sheets to record the responses (1=correct response, 0.5=correct response with prompt, and 0=incorrect response); a checklist to collect the treatment integrity data, and the BAMM app uploaded in an iPad.

VI. Procedure

The COMS and paraprofessional selected the playlist for CECE based on her functional level, needs, and prior O&M instruction. For TEE, the COMS, TVI, and paraprofessional selected the playlist based on her physical and conceptual functional levels.

VII. Preference Assesments

TEE was presented with a variety of items on the table and, asked to pick the one she liked most. She picked the “rocking horse”, followed by beads, and hand fan, but left the rest. On repeating the exercise, she picked the beads, rocking horse, and hand fan. TEE was asked to help arrange the items on the table, starting with the one she liked most, but she picked and retained the beads in her hands, implying that the beads were her most preferred.

According to CECE’s teacher, she was extremely tactually defensive. For preference assessment, she was presented with props, including a hand-fan, a scarf, beads, balls, and bean bags in a big bowl to see which items she would engage with the longest or she would return to touch. The bowl was presented three times for five minutes each time. She engaged for the longest with the fan and the scarf which were both made of silk fabric. Her teacher and the paraprofessional said that she also liked verbal praise and clapping.

VIII. Baseline Data Collection

Each participant was observed responding to the instructions given by the instructor to make movements with specific parts of the body (e.g., “hands together”). The instructions were given in no particular order, and some movements could be repeated in a session to ensure authenticity of the response, especially if the participant hesitated before responding or seemed unsure about the movement. No prompts were given, and the performances were recorded as either “yes” or “no”.

IX. Intervention

During the intervention, the instructor first demonstrated to the participants the movements she would ask them to make before the app was introduced to sing. The app had a playlist with lyrics consisting of language that would reinforce body and spatial awareness (e.g. “hands together, palms touching”). The instrumental aspects of the music reflected the targeted movement in terms of timing, force, and size. An individualized student playlist consisted of appropriate acts from the variety of movements incorporated in different positions (DePountis et al., 2019).

X. Interobserver Agreement

Interobserver Agreement (IOA) refers to the extent of agreement between two or more observers regarding the results reported after observing the same events (Cooper, et al., 2020). IOA is commonly used in Applied Behavior Analysis (ABA) to indicate quality measurement. IOA can be reported as exact count per interval or average count per interval. This study applied the average count per interval in which two graduate students were trained on what to observe in the videos and how to code the performances (0 = incorrect, 0.5 = correct with prompt, and 1 = correct). Cooper et.al., (2020) recommends that a 20% minimum of IOA be obtained for a study session, and preferably 25% - 33% of sessions. In this study, the first observer recorded results for all the 17 (100%) video clips while the second observer recorded results of 12 (70.6%) of the 17 (above the minimum recommended number) video clips. The two observers worked independently. The score sheets were then compared on an item-by-item basis. For each parameter scored, the number of agreements was divided by the sum of agreements plus disagreements, and the result was multiplied by 100. Agreement on participant performances (incorrect/correct with prompt/correct) was 100%.

Results

1. TEE

During baseline, TEE had two sessions and was instructed to make 35 and 34 movements respectively. Out of the 69 instructions, TEE made 53 (76.8 %) correctly and 16 (23.2%) incorrectly. She consistently performed the following correctly: “walk forward”, “stop”, “walk backward”, “put your arms out to each side”, “bring hands towards you”, “put your hands back out” “put your arms down”, “swing your arms”, “put your hands together”, “hands out in front”, “bend forward”, “swing to the right”, “swing to the left”, “stand up”, “put your arms up”, “get down on your hands and your knees”, “lie on your tummy”, “right leg down”, “left leg down”, “sit up”, “down” and “bend forward”, but had challenges performing “straighten your elbow”, “rock forward”, “rock backward”, “bend your right leg”, “bend your left leg”, “both legs up”, “bring your right arm up around your right ear” and “bring your left arm up around your left ear” (Figure 1A & 1B).

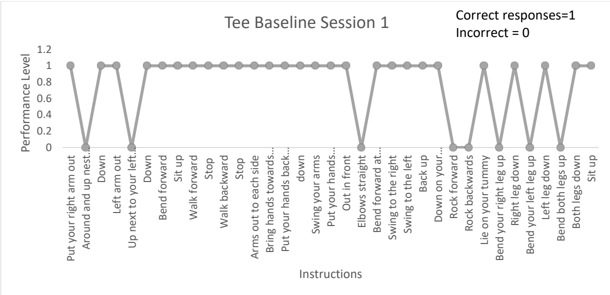

Fig. 1A shows TEE's baseline performance in session one. 35 instructions given, 27 performed correctly (performance level 1) and 8 incorrectly (performance level 0)

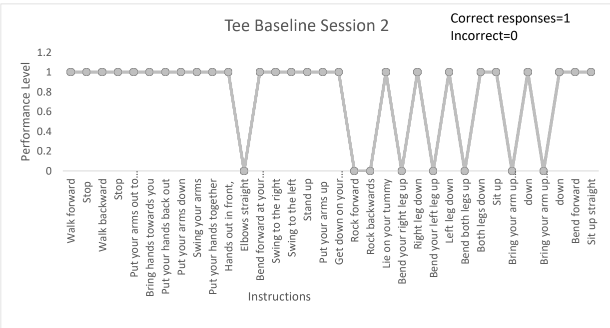

Fig.1B shows TEE's baseline performance in session two. 34 instructions given, 26 performed correctly (performance level 1) and 8 incorrectly (performance level 0).

The results above show that TEE specifically had problems with concepts of "bend", "rock", and "up". TEE could not "rock" forward or backward but could "walk" forward and backward, implying she understood "forward" or "backward". She could not "bend" the right or left leg but could "swing" to the right and to the left, meaning she understood the concepts of "right" and "left". She could not put both legs "up" but could put "right leg down" and "left leg down". The intervention would focus on teaching "bending", "rocking", and "up".

Intervention

TEE had four intervention sessions. In session one, she received instructions to make 35 movements, with each movement demonstrated before introducing the app. When the app sang, TEE was able to make 27 correct movements independently but needed verbal or physical prompts to perform the remaining 8 movements. In session two, TEE received instructions to make 31 movements. She was able to make 25 correct movements independently and needed assistance for 6 movements which she also had challenges with in session one. In session three, TEE received instructions to make 35 movements. She performed 27 correctly and needed assistance in 8 movements. In session four, TEE received instructions to perform 35 movements, and she performed all correctly without any prompt. TEE's intervention was terminated after session four when she demonstrated mastery of all the movements that had been identified for her. Figures 3A, 3B, 3C and 3D show how TEE performed during the intervention sessions.

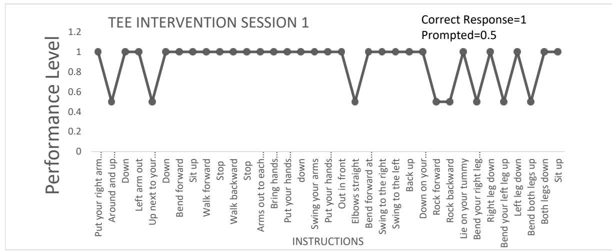

Fig. 3A shows TEE's Intervention performance in session 1. 35 instructions given, 27 performed independently (performance level 1), and 8 with prompts (performance level 0.5).

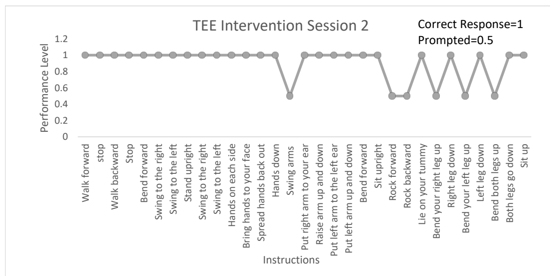

Fig. 3B shows TEE'S intervention performance in session two, 31 instructions given, 25 performed independently (performance level 1) and 6 with prompts (performance level 0.5)

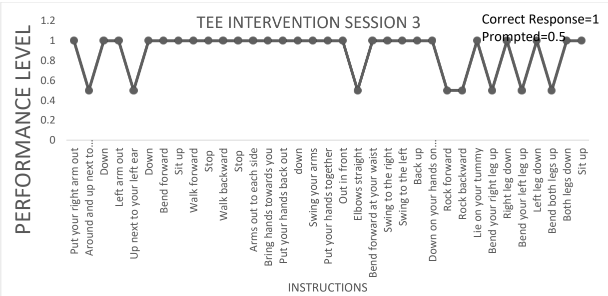

Fig. 3C shows TEE's intervention performance in session three. 35 instructions given, 27 performed independently (performance level 1), and 8 with prompts (performance level 0.5).

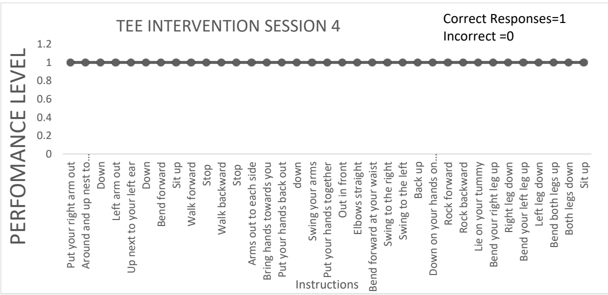

Fig. 3D shows TEE's intervention performance in session four. 35 instructions given, all performed independently (performance level 1).

The data above show that TEE tremendously improved during the intervention. When the BAMM, prompts, and demonstrations were used, she never recorded any incorrect performance but performed correctly either independently or with a prompt. Out of 136 instructions given in four sessions, she correctly performed 114 (83.8%) movements independently and 22 (16.2%) with prompts in sessions 1-3. She needed prompts to perform: "put your right arm up next to your left ear", "bend forward at your waist", "swing to the left", "rock forward", "rock backward" "bend your left leg up", "bend your right leg up", "bend both legs up", and "elbows straight"

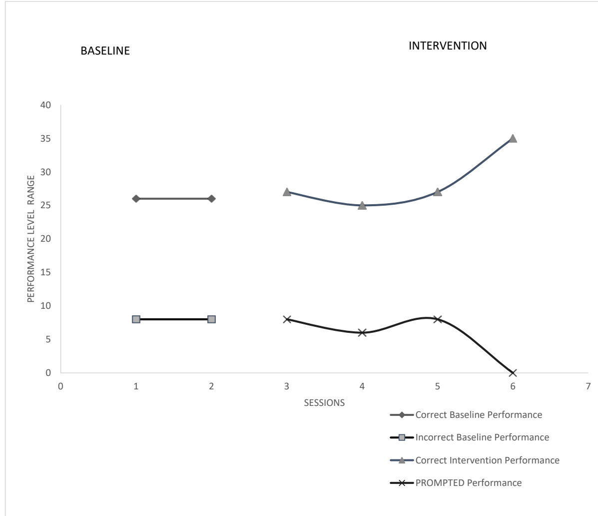

Fig. 7 shows the trend (direction) of the data points during baseline and during intervention. TEE's baseline were consistent across sessions, hence the straight line on the data points. At baseline, TEE made 27 and 26 correct responses in session 1 and 2 respectively, and 8 incorrect responses in both. During intervention, the correct responses data points tended to rise, hence the upward or increasing trend while the prompted responses tended to decrease, hence, the downward trend. The correct responses were 27, 25, 27, and 35 while the prompted responses were 8 ,6, 8, and 0.

Post-intervention: TEE was given verbal instructions to perform 29 different movements she had learned while using the BAMM. No BAMM, props, or prompts were used, and she performed all with 100% accuracy

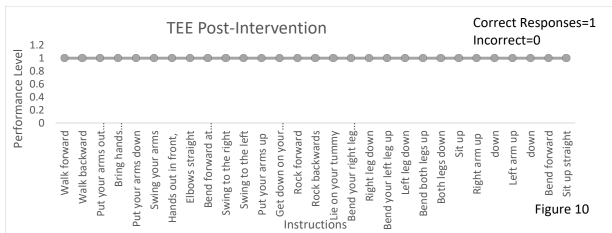

Fig. 4 shows TEE's post-intervention performance. 35 instructions given without the BAMM, all were performed correctly (performance level 1).

2. CECE

Baseline

CECE had three baseline sessions with 63 instructions (21, 21, and 21). She performed 5 correct movements in session one ("hands together", "lift your arms up", "arms up", "stop", "stop"), 8 in session two ("hands together", palms touching", "lift your arms up", "down", "arms high", "arms up", "stop", "stop"), and 9 in session three ("hands together", "palms touching", "lift your arms", “down”, “arms down”, “arms up”, “bend both knees”, “stop”, “stop”). The following instructions were repeated in sessions one, two, and three respectively: 1. “hands down”, “arms up”, “stop”. 2. “Arms up”, “stop”. 3. “Arms up”, “stop”. On average she performed “hands together”, “palms touching”, “arms up”, “arms down”, “knees straight”, “stop”, and “walk backward”. On average, CECE independently performed 7 (33%) movements correctly but had difficulty performing 52 (67%), including “hands around”, “arms straight out to each side”, “arms low”, “arms high”, “hands on hips”, “bend your right knee”, “bend your left knee”, “hands on your sides”, “bend both knees”, “shift right”, “shift left”, and “walk forward”

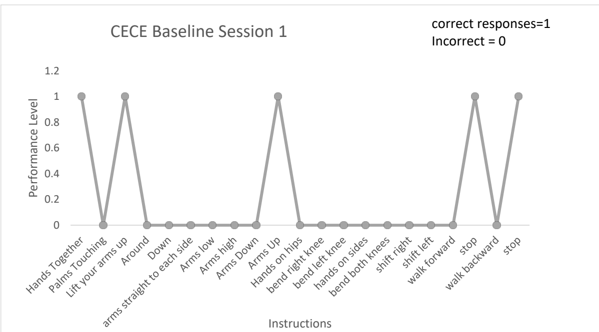

Fig.2A shows CECE’s baseline performance in session one. 21 instructions given, 5 performed correctly (performance level 1), and 16 incorrectly (performance level 0).

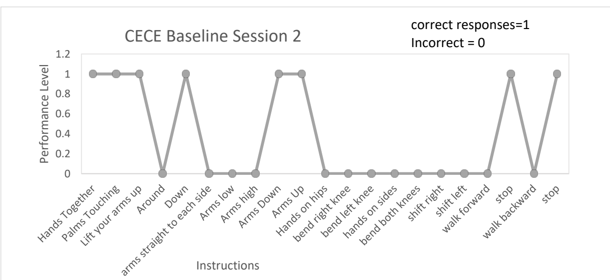

Fig. 2B shows CECE’s baseline performance in session two. 21 instructions given, 8 were preformed correctly (performance level 1) 13 incorrectly (performance level 0).

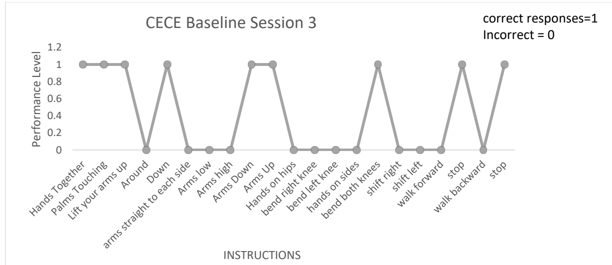

Fig. 2C shows CECE’s baseline performance in session three. 21 instructions given, 9 performed correctly (performance level 1) and 12 incorrectly (performance level 0).

Based on the results above, CECE seemed to have problems with the concepts, “around”, “low”, “straight”, “high”, “hips”, “sides”, “right”, and “left”. She performed, “arms up”, “arms down”, “lift arms”, but could not perform “arms around,” “arms straight”, “arms low”, and “arms high”, implying that she understood the concept “arms” but could not perform specific movements with the arms. CECE understood “hands”, and correctly performed “hands together” and “palms touching”, but not “hands on hips” or “hands on sides”, implying she did not understand “hips” and “sides”. She also had difficulty with “left”, “right”, “backward” and “forward” hence, could not bend “right knee” or “left knee”, but could “bend both knees”, implying she understood “bend” “both” and “knees”. This assumption was also confirmed by her inability to “shift left” or “shift right”. In addition, CECE could not walk “forward” or “backward”. Her intervention would focus on teaching the concepts: “around”, “straight”, “low”, “high”, “hips”, “sides”, “right”, “left”, “forward”, and “backward”.

Intervention

CECE had 7 intervention sessions. In session one, she received instructions to make 17 movements, with each movement demonstrated before introducing the app. When the app sang, CECE was able to make six correct movements independently, but needed verbal or physical prompts to perform the remaining 11. In session two, CECE received instructions to make 17 movements. She was able to make six correct movements independently and needed assistance for the same 11 movements she had challenges in session one. In session three, CECE received instructions to make 21 movements. She performed

11 correctly and needed assistance in 10. In session four, CECE received instructions to perform 21 movements, she performed 11 correctly and needed prompting for 10. In session five, CECE was instructed to make 21 movements, which she independently made 13 correctly, and eight prompted. In session six had 13 instructions, of which she made 12 correctly and one prompted. In session seven, 17 instructions were given. She made 11 correct movements and needed prompting in six. CECE's intervention was terminated in session seven after the lapse of the three month's study period. Figures 5A-5G show how CECE performed during the intervention sessions.

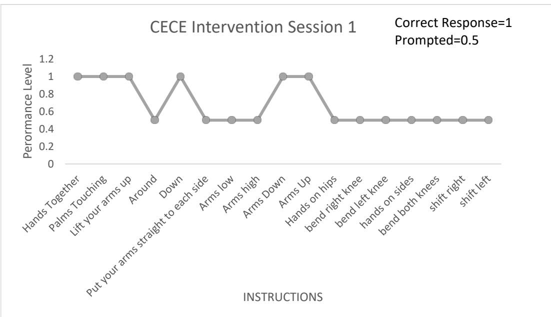

Fig. 5A shows CECE'S intervention performance in session one. 17 instructions given, 6 performed independently (performance level 1), and 11 with prompts (performance level 0.5).

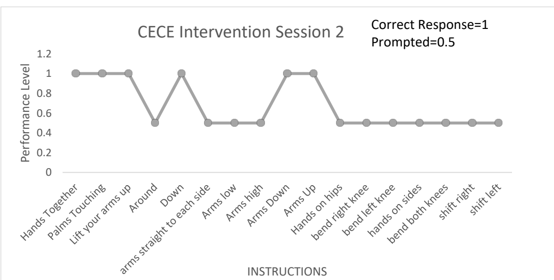

Fig. 5B shows CECE'S intervention performance in session two. 17 instructions given, 6 performed independently (performance level 1), and 11 with prompts (performance level 0.5).

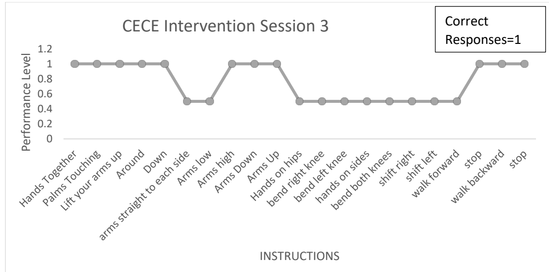

Fig. 5C shows CECE'S intervention performance in session three. 21 instructions given, 11 performed independently (performance level 1), and 10 with prompts (performance level 0.5).

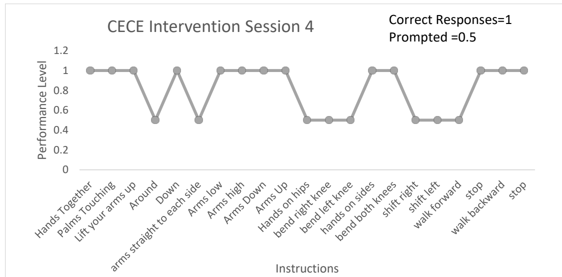

Fig. 5D shows CECE'S intervention performance in session four. 21 instructions given, 13 performed independently (performance level 1), and 8 with prompts (performance level 0.5).

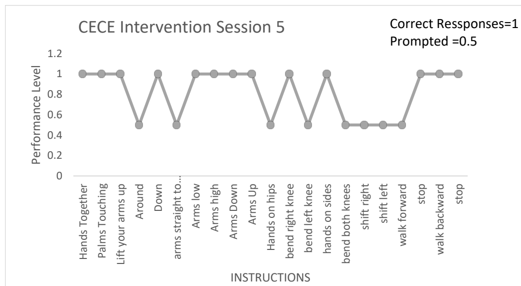

Fig. 5E shows CECE'S intervention performance in session five. 21 instructions given, 13 performed independently (performance level 1), and 8 with prompts (performance level 0.5).

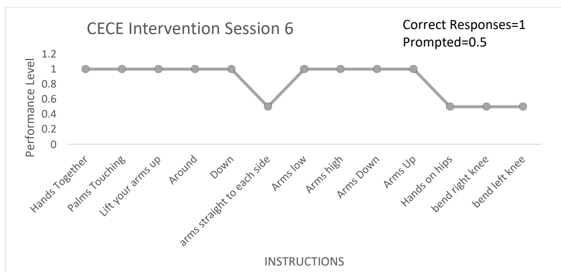

Fig. 5F shows CECE'S intervention performance in session six. 13 instructions given, 9 performed independently (performance level 1), and 4 with prompts (performance level 0.5).

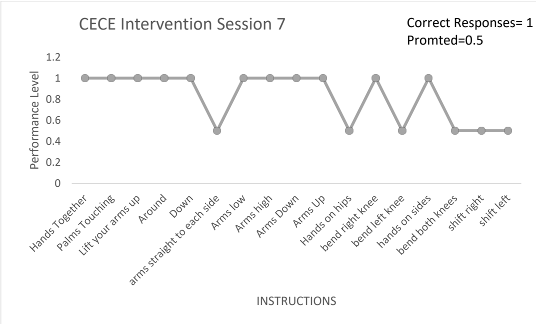

Fig. 5G shows CECE'S intervention performance in session seven. 17 instructions given, 11 performed independently (performance level 1), and 6 with prompts (performance level 0.5).

As reflected above, CECE recorded tremendous improvement after intervention. With the BAMM, prompts, and demonstrations, she performed all movements correctly. With instructions to make a total of 127 movements, CECE independently performed 69 (54.3%) movements and 58 (45.7%) with prompts. It was evident that after intervention CECE still needed support to perform, "arms straight to each side", "hands on hips", "bend right knee", "bend left knee", "bend both knees", "hands on sides", "shift right", "shift left", and "walk forward"

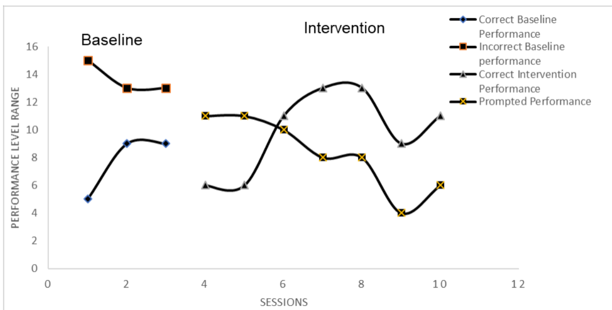

Fig. 8 shows the trend (direction) of the data points during CECE's baseline and during intervention. CECE's baseline condition shows a rising curve. Incorrect responses were 16, 13, and 12, while correct responses were 5, 8, and 9. The intervention data points show a rise in the correct responses and a fall on the prompted responses. Correct responses were 6, 6, 11, 13, 13, 9, and 11, and the prompted responses were 11, 11,10, 8, 8, 4, and 6.

Post-Intervention

CECE was randomly asked to make 20 movements, and she made 15 (75%) correct and 5 (25%) incorrect. She had mastered all the other movements except "hands on hips", "bend left knee", "shift right", "shift left" and "walk forward"

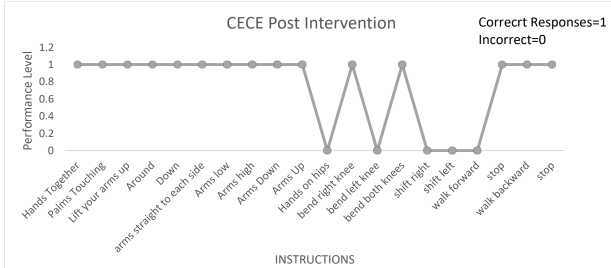

Fig. 6 shows CECE'S post-intervention performance. 20 instructions given without the BAMM, 15 were performed correctly (performance level 1), and 5 incorrectly (performance level 0).

Discussion

The purpose of this study was to test the effects of BAMM when used to teach body awareness to students with VI and additional disabilities. Both participants showed tremendous improvement in body awareness and spatial concepts during the intervention, and the mastery was still retained at post-intervention phases.

During the baseline sessions, both participants respectively recorded consistent results regarding the concepts and movements related to body awareness. Out of the 69 instructions given to TEE, she made 53 (76.8 %) correct and 16 (23.2%) incorrect performances, while CECE independently performed 7 (33%) movements but had difficulty performing 52 (67%). However,

after intervention with the BAAM, the participants showed great improvement. TEE performed all the 29 instructions given with 100% accuracy at post intervention and CECE performed 15 (75%) out of the 20 instructions given at post intervention. This result confirms Silberman's (2000) observation that students with multiple impairments may respond to instructions through music and assistive technology. Additionally, as applied in this study, Erin (2017) identified repetition, consistent cues, and prompts as effective strategies for the children, and observed that routine provides a sense of control, making students with disabilities to feel comfortable because they can anticipate what is coming. Therefore, a familiar song (e.g., as in the BAAM) may ease discomfort, and promote learning.

Similarly, Gense and Gense (2004) identified movement as an opportunity for children with disabilities to obtain environmental information and to communicate needs, hence this study used the BAAM to facilitate the acquisition of these developmental milestones through movement.

During the study, one participant was observed imitating the BAMM as it sang and moved, verbalizing each movement before correctly performing it (e.g., “hands together). This observation confirms the effectiveness of music and movement in teaching concepts to children with disabilities (Zachopoulou, et al., 2004) because they may help to improve rhythm and enhance the development of locomotor skills. This theory is promoted by Willings (2015) who observed that musical activities may help improve coordination in children, increasing awareness of rhythm and space. Willings (2015) and Coleman (2017) also suggested demonstrating through prompting while modeling the action for the student to follow along.

When the BAMM was used with the two participants, it should be noted that these were individuals who were different in age, levels of development, and functioning (e.g., intellectual, communication, and vision). These individual differences, results from the preference tests, and the baseline data informed the choice of the BAMM playlist that was used with each participant. TEE was younger, in elementary school, but was able to work with a playlist with more complex statements (e.g., “put your right arm up next to your left ear”, “bend forward at your waist”, “swing to the left”). On the other hand, CECE was older, in junior high school, but had challenges performing simple two or three-word instructions (e.g., “arms low”, “arms high”, “hands on hips”, “walk forward”, “walk backward”). Therefore, CECE’s playlist consisted of instructions of not more than three words. This observation confirms the finding by Willings (2015) who recommended choosing simple songs which allow students to follow instructions and then perform the specific actions. He also recommended using songs that enable practice with concepts such as “up/down”, “front/back”, especially with the identification of the different parts of the body.

Limitations

This study used two participants, as consistent with single-subject designs, and special education that emphasize individuals rather than group interventions. However, as much as the BAMM was effective with both participants, the results are not generalizable to a larger population because even the two participants in the study showed varied degrees of success. To address the issues of validity associated with this design, the authors suggest further testing of BAMM with a variety of individuals and in different settings (Horner et al., 2005). BAMM used English language, but this may not be generalizable to all intended international users. The authors suggest that users consider developing a playlist contingent to the student’s functional levels.

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