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Research Article

The Influence of Music Education on the Academic Behavior for Preschool Children with Autism

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This study combined the Holistic Music Educational Approach for Young Children (HMEAYC) and Figurenotes' music teaching methods. The venue was a nonprofit early intervention organization and private preschool. Purposive sampling was used to select six children with autism spectrum disorder (ASD) and six without ASD around the age of 40–63 months, and the course arrangement was a 40-minute class each week for 12 weeks. This study is based on ethical considerations, and all parents of children participating in the course fully understand and sign the informed consent. This study demonstrated that the Figurenotes teaching method could improve the learning habits and learning performance of without ASD children. In addition, the intervention of the HMEAYC teaching method can improve the academic behavior of both ASD and without ASD children, especially for ASD children, it has more significant benefits on learning habits.

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Introduction

Human languages and symbols originate from music and performance. Their universal and crosscultural features can arouse emotions, cause people to recall memories, and provide social experiences by way of music learning (Molnar–Szakacs & Overy, 2006). The Holistic Music Educational Approach for Young Children (HMEAYC) is a set of music curriculum models designed for preschool children in Taiwan. HMEAYC is a researcher, after learning experience in the United States and Taiwan, out of the structure of children's music Curriculum model, through nearly 20 years of practical teaching research to prove that the local children are positive help. The HMEAYC is a curriculum model of activity designed for normal young children and children with special needs that interdisciplinary learning, which the curriculum planning, meets for children of development level and capacity. The HMEAYC integrates localized music education and music therapy into a cross-domain integrated curriculum. It can be used to plan courses for children with general and special needs to meet their developmental capabilities, and it can also be applied to individual and group activities (Lee, 2016). Research on HMEAYC has revealed some positive effects on language communications, attention, body movement, and emotions in preschool children and children with special requirements (Lee & Ho, 2017; Lee & Li, 2016). The HMEAYC has also been proven to positively affect the language, emotions, and behaviors of children with autism spectrum disorder (ASD) (Lee & McCord, 2012). Researchers have not only demonstrated that music plays an essential positive role in helping preschool children and children with specific requirements adjust to education but also indicated that widespread application of the HMEAYC can upgrade and intensify children's learning capabilities. Figurenotes, a means of teaching music skills that originated recently in Finland, gives any individual the opportunity to demonstrate musical potential and facilitate co-learning within groups to enable musical performance and enhance social interactions (Ruokonen et al., 2012). Children having difficulty in music learning can benefit considerably by using Figurenotes, with which they can learn -through juxtaposing visual figures, colors, and musical notes-to exhibit their musical potential (Laes & Schmidt, 2016; Poutiainen et al., 2013). Researchers have discovered a clear difference between same-age children with and without ASD in their treatment of sensory feelings, such as overreactions and underresponsiveness (Ben-Sasson et al., 2009). Two major reasons for learning problems in children with ASD are restricted space and interactions with peers (Solish, Perry, & Minnes, 2010). Tomchek and Dunn (2007) observed that children aged 3-10 years with ASD have significantly different sensory underresponsiveness and sensation seeking compared to children without ASD. One reason may be the desire of children with ASD for multiorgan sensory input because they seek auditory, tactile, vestibular, and proprioceptive input (Tomchek & Dunn, 2007). According to practical findings, Figurenotes can help children with ASD to communicate and interact with others more smoothly (Sanderson, Sparkes, & Murray, 2013). The great majority of data relating to the learning experiences and sharing effects of Figurenotes have been detailed in workshops, conferences, and presentations (Hakomaki, 2013; Kaikkonen & Kivijarvi, 2013; Laes & Schmidt, 2016; Laes & Westerlund, 2017). Only a few studies have been reported in books (Verkasalo, 2012) and academic periodicals (Forsblom & Ala-Ruona, 2012; Laes & Westerlund, 2017; Ruokonen et al., 2012). Although Figurenotes obtains favorable results in practice, it has rarely been the subject of academic empirical research.

Therefore, Figurenotes-related research topics in Taiwan are an untapped resource, and more scrupulous research should be conducted to prove the effects of Figurenotes. Thus, the present study investigated the final outcome of incorporating Figurenotes into the HMEAYC and whether the merging of these techniques can improve children's academic behavior.

Based on the above, this research aims to determine the impact of the Figurenotes teaching method on children's academic behavior and to identify the different effects of the Figurenotes teaching method on the academic behavior of children without ASD and that of children with ASD.

Literature Review

The HMEAYC has been proven effective at improving both children's academic behavior and the realm of special education (Lee & McCord, 2012). When children learn music, Figurenotes serves as an interactive medium that improves their body movements and social communication (Poutiainen et al., 2013; Ruokonen et al., 2012). This study investigates the incorporation of Figurenotes into the HMEAYC and the effect of this integration on children's learning abilities.

History of the Figurenotes music teaching method and its current situation

Figurenotes was designed in 1996 by Kaarlo Uusitalo, a Finnish music educator, to provide an opportunity for those needing special musical participation and instructions (Poutiainen et al., 2013). The teaching method has been widely and formally applied in numerous music institutions in Finland as a new and simple way of visually learning music (Ruokonen et al., 2012). Resonaari, a special music school in Helsinki, offers music courses for individuals, groups, those interested in music, and those with special and comprehensive needs related to music, such as people with physical or cognitive disabilities (Laes & Schmidt, 2016; Laes & Westerlund, 2017). In Resonaari, all learning courses are adjustable and flexible according to the individual's unique needs (Kaikkonen & Kivijarvi, 2013; Kivijarvi, 2012; Laes & Westerlund, 2017). In Figurenotes, diverse colors and shapes represent different notes and octaves. Pianos, keyboard instruments, and other musical instruments can be played by following colored symbols (Verkasalo, 2012). The empirical research on Figurenotes has proven it to be positive (Forsblom & Ala-Ruona, 2012; Sanderson et al., 2013). Figurenotes is regarded as a simple and controllable teaching method that helps learners build their confidence and

motivation to continue studying (Poutiainen et al., 2013). Thus, while playing a musical instrument, learners can take advantage of this learning method to improve their learning skills and intuitive social interactions (Ruokonen et al., 2012). Figurenotes is Finland's local music teaching method which is a teaching method of visual graphics. Figurenotes advocates that everyone has access to music and extremely embraces the difference in children with special needs (including children and adults). The teaching method also advocates that learning content should be adjusted according to individual special needs. After more than ten years of verification, children can learn music and other abilities quickly, such as concentration, interpersonal interaction, emotional control, etc.

Teaching and learning achievements of the HMEAYC in Taiwan

Lee (2016) promoted the HMEAYC intending to benefit children's mental and physical development during teaching activities. Course arrangements employ traditional musical instruments, state-of-the-art instruments, and multisensory equipment. This theoretical and practical paradigm combination is an innovative mode of music education in Taiwan. The HMEAYC has four essential modes (Lee, 2016):

Holistic Children: the HMEAYC can be used with all children and children with disabilities and is theoretically similar to Inclusive Education.

Holistic Field: The HMEAYC can fit into interdisciplinary and theme-design courses. The course arrangements are multidimensional and multilayered developments. Additionally, the course arrangements are repeated to improve children's capabilities.

Holistic Method: On the basis of fully assimilated and wholly integrated ideas of education, the HMEAYC integrates the synchronized music activities of both technology and technique.

Holistic Faculty: The musical performance of an individual depends on his or her intrinsic and extrinsic characteristics; thus, interdisciplinary experts should construct a type of cooperative collaboration.

The HMEAYC enhances the learning experience on four dimensions: one of the dimensions that a few characteristics of the "Holistic Method" have received frequent application on HMEAYC. Researchers have discovered that the HMEAYC has positive effects on language and communication (Lee & Ho, 2017), attention, body movement, and human interaction (Lee, 2016). HAEAYC courses have other positive outcomes in multisensory environments (Lee & Lin, 2013;),

integrations with state-of-the-art instruments (Lee & McCord, 2012). The HMEAYC has also been helpful for children with ASD, improving their language, body movement, and attention (Lee, 2016). After the success of the HMEAYC and its integration with state-of-the-art instruments, this research attempted to employ Figurenotes in HMEAYC course arrangements to help preschool children as a form of curative and alternative education and planning.

Research on the academic behaviors of preschool children

Young children with ASD tend to have atypical sensory processing abilities (Hochhauser & Engel-Yeger, 2010). Sensory obstacles occur when these children deal with emotion, and the incidence of ASD is not dependent on age (Liss, Saulnier, Fein, & Kinsbourne, 2006; Pfeiffer, Kinnealey, Reed, & Herzberg, 2005; Tomchek & Dunn, 2007). The problem of atypical sensory processing abilities may lie in the fact that the individual does not respond to environmental stimulation, resulting in insufficient input of feelings, frequent low registration, or frequent sensory defensiveness when facing an unexpected situation and strong reaction. Studies have also found that the initial onset of ASD symptoms is closely related to extreme feelings (Ben-Sasson et al., 2007). Baranek et al. (2006) reported that young children with ASD suffer more frequent sensory overresponsiveness than children without ASD. For example, they tend to cover their ears or hide from bright light. They overfocus when they pay special attention to incidental or uncomfortable stimulation (Baranek, David, Poe, Stone, & Watson, 2006; Liss et al., 2006) or stereotypical behavior (Lord 2010; Srinivasan & Bhat, 2013).

Other researchers have found that young children with ASD are much more likely to react slowly than young children without ASD (Baranek et al., 2006). This may be because young children react slowly to insufficient or deficient sensory stimulation. Researchers have found that young children with ASD participate to a limited degree in recreational activities, and their social interactions, movement, and informal activities tend to be closely linked to atypical sensory processing abilities and involve a small degree of participation (Potvin, Snider, Prelock, Kehayia, & Wood-Dauphinee, 2013). Thus, to improve the sensory processing abilities of young children with ASD, they should be encouraged to participate in self-improvement activities. In addition, they gain a sense of competence when they concentrate on independent learning without cooperation or collaboration with others (Hochhauser & Engel-Yeger, 2010).

Methodology

This study investigated young children's academic behavior, and the design consisted of an experimental group and a control group. There were 12 children in this study, 6 in the experimental group and 6 in the control group. The experimental group included three children with ASD and three without ASD, and the control group was the same. The details are shown in Table 1. Both groups were instructed under the guidance of the HMEAYC. Only the experimental group employed Figurenotes, and the study objectives were to determine whether Figurenotes substantially affect children's learning behaviors. The learning effect of Figurenotes is also discussed.

Research Venue and Subjects

This study enrolled children with ASD children and without ASD, aged between 40 and 63 months, who attended a private kindergarten and nonprofit early intervention organization, respectively, in Taichung City in Taiwan. The researcher employed purposive sampling to select 12 children to participate in this study; the background of these children is detailed in Table 1. The two preschool organizations have similar schedules and classroom atmospheres (both are equipped with learning corners). The six individuals enrolled in the nonprofit early intervention organization received an ASD diagnosis and a diagnosis certificate. Their visual and auditory functions were found to be ordinary, with their only difficulties in social interaction (tactile defense) and communication (no eye contact). They had fixed and limited behavior patterns and interests.

Subject	Group	Number	Age- month	Motor	Sensory Perception	Social Interaction
Children without ASD (N=6)	Experimental	G1	44	Gross and fine motor skills are appropriate for the age	Willing to try various tactile experiences and willing to be touched	Willing to interact with others; lacks interactions with peers
		G2	56	Gross and fine motor skills are appropriate for the age	Willing to try various tactile experiences and willing to be touched	Willing to interact with others; enjoy helping younger children play games together
		G3	60	Gross and fine motor skills are appropriate for the age	Avoids eye contact but is willing to be touched	Shy toward unfamiliar persons; lacks interactions with others
	Control	G4	54	Gross and fine motor skills are appropriate for the age	Willing to try various tactile experiences and willing to be touched	Willing to interact with others; lacks interactions with peers
		trol G5		Gross and fine motor skills are appropriate for the age	Willing to try various tactile experiences and willing to be touched	Willing to interact with others; enjoy helping younger children play games together
		G6	40	Gross and fine motor skills are appropriate for the age	Willing to try various tactile experiences and willing to be touched	Active in talk, communication, and cooperative games
Children with ASD (N=6)	Experimental	S1	60	Insufficient lower limb strength. Weak right-side	Attention deficiency and distraction; avoid physical touch	Avoids eye contact

Subject	Group	Number	Age- month	Motor Sensory Perception		Social Interaction
				muscular endurance and balance		
		S2	60	Insufficient muscular endurance and balance in all limbs	Feels nervous about rocking and speedy movement; prone to screaming when being touched	Refuses eye contact
		S3	50	Poor ability to change position due to insufficient pelvis and spine movement	Resistant to auxiliary device and physical touch	Avoids eye contact
	Control	S4	55	Insufficient muscular endurance in lower limbs	Acceptable to be touched by various objects on upper limbs and sole of the foot; refuses to be touched on the body	Avoids eye contact
		S5	40	Poor ability to change position and insufficient muscular endurance in lower limbs	Enjoys visual and auditory toys; resistant to being under the weight of others and to physical touch	Refuses eye contact
		S6	48	Able to run and jump; poor balance	Prone to cover the ears in a noisy environment; tendency to move	Refuses eye contact

Subject	Group	Number	Age- month	Motor	Sensory Perception	Social Interaction
					backward when being touched	

Table 1. Personal information of the children

Note: Children's age is on pre-test time

Research Design

HMEAYC's teaching philosophy advocates the Multiple-Method curriculum design is more integrated with multiple teaching methods or technology-assisted instruction. Figurenotes is a notation system that is a teaching accessory appliance and a teaching method that makes it easy for learners to learn the technique through color visual graphics, mainly through shapes which the symbolic approach guides learners to operate musical instruments. Since both the experimental and control groups contain ASD and without ASD, the two groups of children were randomly assigned to the experimental group and the control group. Therefore, this study was a quasi-experimental nonequivalent-control-group study in which the independent variable was the use of Figurenotes, and the dependent variable was learning behavior. The ultimate goal of the study is not to improve musical performance. To help them learn, because these young children will enter public school in the future, so choose cognition as a research-dependent variable. The observation technique was employed to analyze the entire learning process. The collection of related subject information before the study took two weeks and was performed to understand the situations of the research subjects before designing the HMEAYC. The HMEAYC teaching process took 40 minutes per week for 12 weeks. The complete experimental teaching process is informed to all parents of young children, and all parents have signed the informed consent form.

It is not easy to find many ASD preschool children for research at one time, and the researchers happened to meet these children while serving in this institution. The institution also hopes to assist the children through professional research, so we also find without ASD preschool children of the same age to conduct the experimental study. Whether these preschool children are representative or inferential, we just try to state the background of the children as clearly as possible so that readers can understand how children with these conditions will improve after participating in these instructions in the experiment.

Two groups of preschool children in the control group only participated in the HMEAYC. However, the students in the experimental group employed both the HMEAYC and Figurenotes to determine whether there is a difference between the experimental and control groups because of the inclusion of Figurenotes. Although there are not many participants in this study, they all have the conditions of homogeneity and high representativeness, which promotes the high inherent validity of this study. In order to avoid Type I and II errors, the method of controlling errors is to use random assignment arrangements to control experimental errors.

The Social Behavior Assessment System for Preschool (SBASP) was used to obtain preintervention and postintervention behavior assessments. The preintervention scores were covariants, and the difference between the preintervention and postintervention scores served as this study's final result and effect (Table 2). The research group consisted of instructors, co-instructors, and observers. The instructor is a qualified music teacher and music therapist for children aged 0–6 in the United States. The co-instructors and observers were qualified professionals with degrees in kindergarten or special education and at least 6 months of professional training.

Subeject	group	pre-test	treatment	post-test	
childron without ASD	Experimental Group	01	v	02	
ciniuren without ASD	Control Group	03	Δ	04	
childron with ASD	Experimental Group	01	v	02	
children with ASD	Control Group	03	Α	04	

Table 2. Research Design

- 1. X refers to acceptance of experiment treatment
- 2. O₁ refers to experimental group, preintervention observation or measurement

- 3. O₂ refers to experimental group, postintervention observation or measurement
- 4. O₃ refers to control group, preintervention observation or measurement
- 5. O_{L} refers to control group, postintervention observation or measurement

Research instruments

The Social Behavior Assessment System for Preschool (SBASP) was implemented to collect quantitative data before and after the intervention to provide the instructors and observers with evaluation data. The HMEAYC Observation Scale was also a crucial qualitative tool used in this study. The present research group provided the required musical instruments and textbooks. The following is a detailed description of the three research tools employed.

HMEAYC

The HMEAYC is to guide young children to improve their mental and physical wellbeing. Trainees have already been educated in how to provide the specially designed course alongside main teachers. The content of the teaching comprises welcome songs, roll-call songs, singing activities, musical stories, rhythms, relaxation time, and goodbye songs. Multisensory musical apparatus, instruments, and related auxiliary teaching materials are incorporated to meet the goals of music activities.

Figurenotes

Figurenotes is a type of music teaching method; it employs simple shapes and colors that match with corresponding symbols. The goals of Figurenotes are to help learners perform a specific pitch and rhythm by linking corresponding shapes and colors and to make it possible for learners to play rhythms and sounds through a visual matching process. This auxiliary teaching tool can be used with piano, keyboard, and other musical instruments (Poutiainen et al., 2013; Verkasalo, 2012).

Social Behavior Assessment System for Preschool (SBASP)

The SBASP is a multidimensional standardized scale designed by Tsai and Wu (2016). It was specially designed for use with children aged 4–6 years. There are two editions: The Teacher-Rating Scale and Parent-Rating Scale. Two aspects of children's behavior are assessed: social capability and problem behaviors. The social capability part evaluates a child's self-control, social interactions, and learning behaviors. The problem behaviors part gauges a child's tendency toward distraction, hyperactivity, antiviolation, and anxious withdrawal. The reliability of the social capability dimension of the scale is

.57–.89, and that of the problem behaviors dimension is .38–.90 (Tsai, Wu, & Chuang, 2014; Tsai & Wu, 2016). This study employed the Teacher-Rating scale and focused on learning habits (8 items) and learning performance (8 items). Learning habits refer to the relevant skills, attitudes, and habits that young children can contribute to learning, such as high motivation to learn and willingness to try after failing an activity. Learning performance refers to children's learning achievements and performance in school, as indicated by, for example, language comprehension ability above the middle level (including middle level) of children of the same age and the completion of consistent homework or works with their ability.

Data analysis

This study collected preintervention and postintervention quantitative data regarding academic behavior, comprising learning habits and learning performance, and 16 weeks' worth of observation records in the form of HMEAYC video recordings. Because the sample was small, comprising six children, each with ASD and without ASD, and the sample was divided into the experimental and control groups, the nonparametric statistics method was employed for data analysis. Nonparametric statistics is used, which is a rigorous approach for small sample research and analysis. The statistical software was IBM SPSS Statistics 24.0. This study uses video recording throughout the entire process, hoping to view the real academic behaviour of preschool ASD children through video recording, to improve ecological validity.

To ensure the reliability of this study, the instructors and co-instructors discussed whether and how to adjust the content of the activities. Two observers paid attention to everything concerning the entire process and discussed the final results to achieve consensus. The observers had been strictly trained and had acquired data entry, and log-in technique skills before the study began to ensure a consistent coding standard (consistency of observers was 71%–96%). During the intervention, the active performance was recorded to provide the observers with multiple perspectives and photographs. This authentic representation of reality could increase the validity of the research (Lee, Arthur, & Morrone, 2017; Rosenstein, 2002). Additionally, high internal validity was ensured by collecting 16 weeks' worth of quantitative data.

Research Results and Discussion

The purpose of this study was to explore the impact of the Figurenotes teaching method combined with the HMEAYC concept in children with and without ASD.

Descriptive statistical analysis results for academic behavior

The results of descriptive statistical analysis of academic behavior in children with and without ASD are displayed in Table 3. The academic behavior discussed in this study are learning habits and learning performance. In the experimental group or control group, the mean scores after the HMEAYC intervention were slightly improved. The two experimental groups, who underwent HMEAYC and Figurenotes music instruction, also had slightly improved scores after the intervention. The significance of the difference in the children's performance is explained later.

variables		Young Children without ASD				Young Children with ASD			
		Experimental group (N=3)		Control group (N=3)		Experimental group (N=3)		Control group (N=3)	
		М	SD	М	SD	Μ	SD	М	SD
Loorning habits	Pre- test	17.00	1.00	15.33	2.66	12.33	2.08	8.67	1.15
	Post- test	22.33	1.53	15.67	6.35	19.67	2.89	10.67	1.52
Learning	Pre- test	18.67	3.21	20.00	4.36	9.00	1.00	8.00	1.00
performance	Post- test	22.67	1.15	20.00	4.36	14.67	3.21	8.33	1.53

Table 3. Descriptive statistical analysis of academic behavior for children

Differences between preintervention and

postintervention academic behavior in the two groups

The difference between pre- and post-intervention learning habits and learning performance scores were also explored. The Wilcoxon signed-rank test revealed that in the children with ASD (n=6), the Z was -1.826 (p = .034 < .05, one-tailed, Cohen's d=1.12) for learning habits and -1.604 (p = .055 > .05, one-tailed) for learning performance. The mean postintervention score was higher than the mean preintervention score, and the difference in learning habits between the two tests was significant. In the without ASD (n=6), the Z was -2.201 (p = .014 < .05, one-tailed, Cohen's d=0.6) for learning performance. The mean postintervention performance. The mean postintervention performance score for learning habits and learning performance was significantly higher than the mean preintervention score. According to the above statistical analysis results, Figurenotes and HMEAYC teaching methods affect the learning habits of children with ASD. Besides, The Figurenotes and HMEAYC teaching methods also significantly impact the learning performance and learning habits of children without ASD.

Differences in learning behavior between the experimental and control groups

The difference between the experimental and control groups was determined among the children with and without ASD. In the Mann–Whitney U test, no differences were discovered in the preintervention learning habit and learning performance scores between the experimental and control groups, regardless of whether the children had ASD (children without ASD: p = .072, p = .261; children with ASD: p = .513, p = .376). Therefore, the behavior of the experimental and control groups for the two ASD-related groups was the same before the intervention.

The experimental and control groups' mean post-intervention scores were compared for learning habits and performance. According to the Mann–Whitney U test, in terms of learning habits and learning performance, a difference existed after the intervention between the experimental and control groups for the children without ASD (learning habits: p = .023 < .05, Cohen's d=1.44; learning performance p = .025 < .05, Cohen's d=0.84). These results show that after the Figurenotes teaching method intervention, the children without ASD had made significant progress in their learning habits

(mean score increased from 17.00 to 22.33) and learning performance (mean score increased from 18.67 to 22.67). In the group of children with ASD, the difference was nonsignificant (learning habits: p = .134>.05, learning performance p = .244>.05), and the mean learning habits and performance scores were higher in the experimental group. However, the difference was nonsignificant, so we cannot assume they made significant progress. The success rate difference (SRD) (Cliff, 1993) is an effect size commonly used in nonparametric statistics, also known as Cliff's Delta. Kraemer and Kupfer (2006) tried to convert SRD and Cohen's d, and according to the standard of Cohen's d effect size (>0.8 is high; 0.5–0.8 is medium; 0.2–0.5 is low), it is suggested that SRD value>0.43 represents a significant change; 0.28–0.43 is moderate; 0.11–0.27 is small. According to this criterion, the results tested in this study all have a moderate to high effect size.

The strong effect on the auditory treatment and learning habits of children without ASD may be that after auditory sound stimulation through colors, shapes, and corresponding musical notes, the children's self-confidence and learning motivation are greatly increased (Poutiainen et al., 2013). Figurenotes emphasize flexibility in course arrangements to meet the needs of learners. The goal of Figurenotes is to be beneficial for every learner (Kaikkonen & Kivijarvi, 2013; Kivijarvi, 2012; Laes & Westerlund, 2017; Ruokonen et al., 2012). The course design in the HMEAYC focuses on flexible adjustment in accordance with young children's mental and physical development (Lee, 2008, 2012, 2016). Thus, similarities in teaching philosophy and activity designs between Figurenotes and HMEAYC are beneficial because the music course arrangement aids the holistic development of young children.

The Figurenotes music teaching method creates opportunities to participate in music activities for people with special needs (Poutiainen et al., 2013). We initially expected the Figurenotes teaching method to lead children with ASD to make significant progress in their learning behavior, but the experimental results revealed no apparent improvement in the quantitative data. Although the intervention comprised 40 minutes per week and was 12 weeks long, for children with ASD, this duration may not have been sufficient for the children to achieve considerable growth, and this aspect was supplemented by the qualitative data. From the observation records, we could observe the growth trajectory of the children with ASD.

Conclusion

This study discovered that in an analysis of the learning habits of children without ASD, their mean postintervention scores were significantly higher than their mean preintervention scores. This revealed that the Figurenotes intervention made a significant difference. A further discovery was that the postintervention scores of the children without ASD in the experimental group (Figurenotes intervention) were higher than those of the children without ASD in the control group, indicating a significant difference in their learning habits and performance. This study incorporated the HMEAYC and Figurenotes music teaching method to help preschool children improve their learning behavior. The final results show the positive effects of the intervention on the learning habits of young children without ASD.

The final result of using the HMEAYC incorporated with Figurenotes revealed positive effects on preschool children's academic behaviors. In the future, studies can further analyze preschool children of various ages and special needs to provide points of comparison between different data collections with the objective of improving understanding of the effects of holistic learning on preschool children. Furthermore, the inclusion of body movement and social behaviors in Figurenotes can offer some reference to related studies. Because of the few study subjects and control criteria in this study, it is also suggested that future studies can recruit more subjects and use interdisciplinary themes to probe the effects of Figurenotes. Finally, although this study is an experimental study with a small sample, it is hoped that such results can provide a reference for future researchers when conducting larger samples, as well as a reference for preschool teachers and parents to assist children with ASD. This study only provides quantitative analysis results, and it is recommended that future researchers could focus on qualitative analysis to obtain more individualized information.

Limitations of the Study

There are only six autistic and six non-autistic children were compared in this study. It is difficult to have a large number of samples in the study of children with special needs, but the experimental design of this study was carried out as thoughtfully as possible. Therefore, the results of this study hope to provide readers with another way of thinking and explore the impact of music therapy on children with autism.

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