Effects of Brain Gym for Sight Reading in Piano Learning

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ABSTRACT

The ability to sight read is essential for pianists to interpret and perform music accurately in real-time, involving rhythmic accuracy, note placement, and fluency. However, sight reading skills are not explicitly taught at the college level. This study aims to explore the potential influence of Brain Gym on improving pianists' sight-reading abilities. A pre-experimental, one-group pretest-posttest design was used to measure the impact of the intervention on participants' error rates before and after the intervention. Sixteen college music education students with at least six months of piano learning experience participated in this study. The sight-reading test was given on the first day, and the participant conducted a Brain Gym exercise for 14 days. On the 14th day, the participants took the sight-reading posttest. Findings from paired t-tests yielded significant improvements in missed notes, missed rhythms, repetitions, and pauses in the participants after intervention. The analysis demonstrated that Brain Gym yielded positive results in the sight-reading proficiency of pianists, as evidenced by the reduction in the frequency of errors observed after the implementation. Applying Brain Gym as a warm-up activity, specifically in piano class, is advantageous to reduce potential errors that may occur while learning. These results prove that implementing Brain Gym is an effective strategy for improving the sight-reading ability among pianists. Thus, it is recommended that piano teachers adopt the Brain Gym exercises in teaching to aid sight-reading ability.

Keywords: Brain Gym, Sight-Reading, Piano Learning

INTRODUCTION

Jakarta State University has a music education program that includes students from diverse backgrounds. Many students taking music classes are inexperienced with musical notation, while others have advanced skills in reading notes due to their early exposure to music. Additionally, some traditional musicians have never received formal instruction in musical notation before enrolling in the Music Education program. The curriculum requires the ability to read musical notation, and the piano course is mandated for every first-year student. Therefore, sight-reading skills are required among the piano students. Brain Gym is one of the many creative interventions intended to help facilitate cognitive learning and improve motor skills. The Brain Gym program comprises 26 exercises purported to result in swift and significant enhancements in concentration, memory, reading, writing, organization, listening, physical coordination, and others (Stephenson, 2009). McArthur (2002) asserts that reading words and music are equivalent. The Brain Gym exercises are thought to enhance musical notation reading skills in piano lessons among pianists, as they positively impact word reading

skills. This research examined the effectiveness of Brain Gym exercises in improving piano sight-reading abilities among students enrolled in the Music Education program at Jakarta State University, with a particular focus on those taking piano classes. The study compared the number of missed notes, missed rhythm, repetition, and pauses before and after the 14-day intervention.

LITERATURE REVIEW

Sloboda (1984) argued that sight reading is a form of musical perception and comprehension involving cognitive processes. It is crucial for pianists, especially those who want to become teachers and accompanists, to be able to sight-read music partiture artistically and accurately (Sorel & Diamond, 1968). Most piano students need help with reading notation and calculating musical rhythm. The duration of reading partiture takes most of the time in piano lessons. For example, when reading 8 bars of simple measure materials, a student can take over 2 weeks to comprehend the readings.

Jakarta State University has a music education program that includes students from diverse backgrounds. Only a few of them are classical music students who have learned traditional ways from a young age. This happened because this university is not a conservatory for music performance but for education. This is the reason why the students have diverse backgrounds as piano performers, traditional music performers, singers, new learners of music, and so on. Even though a piano course is mandated for every first-year student, some of the students cannot read musical notations despite the curriculum requiring the ability to read musical notation.

Sight-reading is typically not explicitly taught in college-level piano lessons. In a study by Kornicke (1995) and Zhukov (2004), 68% of advanced pianists said their lessons did not involve sight-reading. Sight-reading skills among advanced pianists are not taught because college-level piano lessons are time-limited or because sight-reading abilities are assumed to be natural (Kornicke, 1995; Zhukov, 2013). The developers of Brain Gym claim that Brain Gym exercises can assist in various areas, including fine motor control, concentration, memory, reading, listening, and physical coordination (Brain Gym International, 2011; Stephenson, 2009). These same skills are used in piano lessons, especially sight reading, which requires fine motor control, reading, listening, and physical coordination.

Hannaford (1995) defines Brain Gym, or Edu-K, as a comprehensive system of approaches designed to enhance cognitive and physical performance. Brain Gym increases in pupils' achievement in reading were likewise noted, providing evidence that using Brain Gym exercises may enhance pupils' reading abilities (Vizcarra-Cerezo & Prudente, 2018). Regarding reading music partiture, McArthur (2002), asserts that reading words and music are equivalent. Hyatt (2007) and Splauding et al. (2010) have found that the Brain Gym program lacks research evidence to support its effectiveness. Supporting Hyatt's viewpoint, Kroeze (2016) asserts that there is no need to invest time in implementing Brain Gym or other pseudoscientific approaches that purport to be miraculous solutions for student learning processes. He argues that it is more efficient to implement methods that have been substantiated by empirical research. Spaulding et al. (2019) claim that the Brain Gym exercise is based on theoretical assumptions that have been discredited for a long time. Furthermore, Watson and Kelso's paper published in 2014 found that engaging in Brain Gym activities twice a week for

a period of two months did not provide evidence to support the claims of notable enhancements in concentration and focus on children with developmental disabilities.

On the other hand, Moore and Hibbert (2005) conducted a study showing the beneficial impact of engaging in Brain Gym exercises on the students' performance. All participants experienced increased performance due to engaging in Brain Gym exercises.

The lack of agreement on the efficacy of Brain Gym calls for more rigorous empirical research studies that either support or dispute its claims.

METHODS

The research design for this study adopted a one-group pretest-posttest pre-experimental design. In this design, pre-tests and post-tests are administered to the same group, with no comparison or control group. In this study, the pre-tests and post-tests were in the form of standard evaluations already used by piano teachers on their students. Any change or difference between the two tests may be attributed to the intervention, which in this case is the Brain Gym exercises.

The study was cleared by the Ethics Review Board of the university. The research site's school principal then received a letter requesting information. Following the request's approval, a plan was established for the pretest and the 2-week intervention phase

Sampling

The population of this study are the piano students at Jakarta State University, Faculty of Language and Arts, Music Education Program. Snowball and convenience sampling methods were employed to recruit the study's sample group, which included 16 students in the 1st year piano class. During the duration of the study, they were in their 2nd semester and already had at least six months of music education in practical and theory.

Data Collection

Providing training materials with a constant degree of difficulty that all participants could handle contributed to restricting participation to higher skill levels, which is ABRSM (Associated Board of the Royal Schools of Music) Grade 1 Sight Reading materials. The sight-reading material would use ABRSM grade 1 sight playing numbers 1-4, considering those who were new sight readers.

After the researcher obtained permission from the head of the Jakarta State University and the piano teachers in the classes concerned, the researcher provided sight reading material after piano lessons so that this research could be conducted in the classroom. All performances were video-recorded.

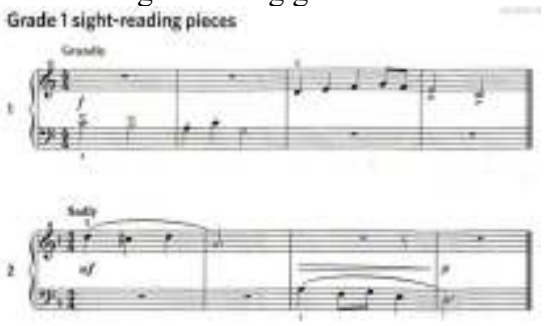
On day 1, the participants would play the pretest of sight reading both hands (ABRSM Grade 1 piano sight-reading material numbers 1 and 2). After the pretest, the participants will be introduced to the Brain Gym exercise so they can exercise it every day from day 2 until day 14. The participants would play the posttest after a 14-day treatment of 5 minutes of Brain Gym exercises.

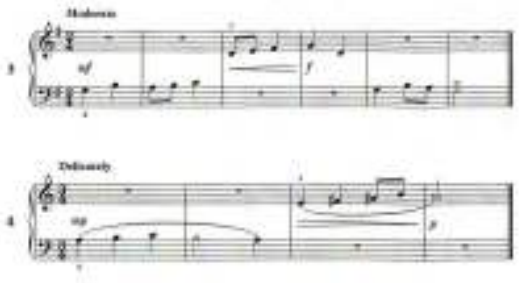
The video recording of the performances followed a certain order. The students were called to the front one by one to read the sheet music provided. Each participant was given 30 seconds to read the sheet music and prepare. After 30 seconds, the researcher played the

metronome: material 1, 86 bpm; material 2, 72 bpm, and participants were invited to play according to the tempo given. After participants played the two sight-reading materials, the video recording stopped. The videos of the daily Brain Gym exercise were uploaded on Google Drive.

The following table shows the data collection procedure from day 1 to day 14, the materials, and the activity.

Table 1
Data Collection Procedure

Day Number	Brain Gym Activity	Tools to be used
March 19, 2024	Pretest	Piano, Camera, Cam-holder, Metronome, ABRSM sight-reading grade 1 material. 
March 19, 2024-March 25, 2024	Drink Water Brain Buttons The Thinking Cap The Cross Crawl Hookups Part I Hookups Part II After the class, the participants will learn about Brain Gym and how to do it so they can repeat the Brain Gym set every day by sending videos to Google Drive. Video tutorial from Youtube	Handout: https://www.scribd.com/doc/204791891/Brain-Gym Video tutorial: https://youtu.be/FJ93d0OFNwM?feature=shared
March 26, 2024	1. Brain gym 2. Piano class	Google Drive
March 27, 2024-April 1, 2024	Repeat the brain gym together every day by	Handout:

	sending videos to Google Drive.	https://www.scribd.com/doc/204791891/Brain-Gym Video tutorial: https://youtu.be/FJ93d0OFNwM?feature=shared
April 2, 2024	1. Brain gym. 2. Posttest.	Piano, Camera, cam holder, metronome, ABRSM sight-reading grade 1 material. 

Source: Designed by Author

Variable Measurement

To evaluate the performance of each piano student, the researcher would count the missed notes, missed rhythm, repetition, and pauses of the test from the videos. The same assessment tool is used for both pretest and posttest in measuring the performance of piano students. The procedure of using the same materials for pretest and posttest had been adopted by previous sight-reading studies such as Betts and Cassidy (2000), Smith (2009), and Zhukov (2014).

It was anticipated that some participants in this study could stumble and stop during the tests before resuming playing. For this study, however, these interruptions are not counted against the performance. The criteria of good performance are correct to note, position, octaves, measure, fingering, and one-time play (without any replay). During the test, if a pianist missed a note, it would be counted as a missed note. If the pianist repeated the playing, it would be counted as repetition, and the mistakes before the repetition would not be counted. If the pianist played a wrong rhythm, it would be counted as a missed rhythm. The duration of this break was not measured, but the number of times it happened during the test was counted. All the missed notes, missed rhythm, repetition, and pauses were counted and the data was recorded in Microsoft Excel. The missed notes and missed rhythm were counted as a percentage of the whole song. The SR 1 (Sight read 1) has 16 beats, and if the participants made five wrong notes or rhythm, it would be counted as wrong notes or rhythm divided by 16 times 100%.

After the pretest, the researcher will introduce the Brain gym movement. There will be brain button (1 minute), ear roll (30 seconds), cross crawl (1 minute), hookups I (1 minute), and hookups II (1 minute). The guidance of the Brain Gym can be accessed on YouTube. The whole process of data collection was written in Table 1. The data before and after the intervention was compared to each other. Since the researcher counts the "mistake" of the test, the lower the score of the "mistake" is the better the score the participants get.

Data Analysis

Data gathered was analyzed using Jamovi v. 2.2 statistical software. The levels of the participants' reading comprehension before and after the intervention were described using the mean and standard deviation. The effectiveness of the intervention was tested using paired samples t-test.

RESULTS AND DISCUSSION

Table 2 and 3 shows the data obtained from 16 participants on each assessed criteria, namely missed notes, missed rhythms, repetitions, and pauses. There are two sight reading (SR) materials. SR 1 and 2 are used as materials for the Pretest. SR 3 and 4 are used as materials for the Posttest.

Table 2

Missed Rhythm and Missed Notes Data for Each Participants Pretest and Posttest

Name	***Missed Rhythm Before***		***Missed Rhythm After***		***Missed Notes Before***		***Missed Notes After***	
	SR1 (%)	SR2 (%)	SR3 (%)	SR4 (%)	SR1 (%)	SR2 (%)	SR3 (%)	SR4 (%)
Abraham Einstein Adriaansz	31,25	66,67	8,33	16,67	50,00	41,67	25,00	16,67
Anggie Margaret Sinaga	18,75	0,00	0,00	0,00	12,50	50,00	8,33	0,00
Askhandini Setiawan	37,50	75,00	20,83	25,00	50,00	100,00	25,00	16,67
Casya Intania Charis Lovy	0,00	0,00	0,00	16,67	50,00	100,00	0,00	33,33
Dwi Saviga	18,75	8,33	0,00	4,17	37,50	66,67	0,00	8,33
Fayza Khalisya Adhari	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Ferdi Eko Satrio	25,00	25,00	0,00	25,00	31,25	8,33	0,00	41,67
Fiyanto Dian Permana	100,00	25,00	25,00	8,33	87,50	41,67	16,67	8,33
Katherine Lydia ElsaUli Hutauruk	18,75	12,50	8,33	4,17	12,50	100,00	25,00	8,33
Lungguk Kartono Dolok Saribu	0,00	8,33	4,17	16,67	0,00	25,00	8,33	41,67
Miranda Renata Putri N.	0,00	12,50	0,00	0,00	0,00	16,67	33,33	0,00
Nindya Puspita A.	12,50	8,33	0,00	0,00	31,25	16,67	0,00	0,00
Oriana Aisha Fredlina	0,00	4,17	0,00	0,00	0,00	8,33	0,00	0,00
Rakha Putra Ramadhan	37,50	50,00	0,00	8,33	100,00	100,00	16,67	58,33
Raufanda Tegab Ardani	12,50	0,00	0,00	0,00	25,00	16,66	0,00	0,00
Risma Saraswati	12,50	16,67	0,00	0,00	12,50	8,33	8,33	0,00
Mean	**19,92**		**5,99**		**37,50**		**12,50**	

Source: Calculated by Authors

Table 2 shows SR 1 and SR 2 which are the Pretest materials and SR 3 and SR 4 which are the Posttest materials for each participant. Missed Rhythm and Missed Notes are calculated in percentage. In calculating the percentage of missed rhythm, the calculation used is the number of wrong rhythms/total number of rhythms multiplied by 100%. While in calculating the percentage of missed notes is the number of wrong note beats/total number of overall rhythms multiplied by 100%.

Table 3
Repetition, and Pauses Data for Each Participants Pretest and Posttest

NAME	REPITITION PRETEST		REPITITION POSTTEST		PAUSES PRETEST		PAUSES POSTTEST	
	SR1	SR2	SR3	SR4	SR1	SR2	SR3	SR4
Abraham Einstein Adriaansz	0	1	2	0	0	4	2	1
Anggie Margaret Sinaga	0	4	1	0	1	6	0	0
Askhandini Setiawan	1	1	0	0	2	1	1	1
Casya Intania Charis Lovy	2	2	0	0	0	2	0	0
Dwi Saviga	0	0	0	0	0	0	0	0
Fayza Khalisya Adhari	0	0	0	0	0	0	0	0
Ferdi Eko Satrio	1	3	2	1	4	2	0	1
Fiyanto Dian Permana	0	1	1	0	2	3	2	0
Katherine Lydia ElsaUli Hutauruk	0	1	0	0	1	3	0	0
Lungguk Kartono Dolok Saribu	1	0	0	0	0	1	0	1
Miranda Renata Putri N.	0	0	0	0	0	0	0	0
Nindya Puspita A.	2	4	0	0	0	3	0	0
Oriana Aisha Fredlina	0	0	0	0	0	0	0	0
Rakha Putra Ramadhan	4	4	2	0	3	4	3	0
Raufanda Tegab Ardani	1	2	0	0	1	0	0	0
Risma Saraswati	0	0	0	0	0	1	0	0
Mean	**1,09**		**0,28**		**1,38**		**0,38**	

Source: Calculated by Authors

Table 3 shows SR 1 and SR 2 which are the Pretest materials and SR 3 and SR 4 which are the Posttest materials for each participant. Unlike table 2, the categories calculated in table 3 are the number of repetitions and the number of pauses in the pretest and posttest so they are calculated in units.

Table 4 shows the mean, median, SD (Standard Deviation), and SE (standard error) from the pretest and post-test results of the 16 participants who participated in this research. The frequency and percentages of the participants who got the items incorrectly based on the missed notes, missed rhythm, repetition, and pauses.

Table 4

Levels of Missed Notes, Missed Rhythm, Repetition, and Pauses Before and After the Intervention

	N	Mean	Median	SD	SE
Missed Notes Pretest	16	37.500	27.604	30.140	7.535
Missed Notes Posttest	16	12.500	14.583	11.180	2.795
Missed Rhythm Pretest	16	19.922	11.979	20.964	5.241
Missed Rhythm Posttest	16	5.990	3.125	7.212	1.803
Repetition Pretest	16	1.094	0.500	1.214	0.304
Repetition Posttest	16	0.281	0.000	0.482	0.120
Pauses Pretest	16	1.375	1.250	1.258	0.315
Pauses Posttest	16	0.375	0.000	0.563	0.141

Source: Calculated by Authors

The pretest assesses the dependent variable before the intervention, while the posttest assesses the results after the group (N=16) received the intervention. As seen in the table, participant errors have decreased. Missed notes fell from a mean score of 37.5 (SD=30.140) to 12.5(SD=11.180). Missed cadences dropped from 19.92(SD=20.964) to 5.99 (SD=7.212). The pretest included at least one repetition (1.094), while the posttest had 0.00 repetition. The average pause also decreased from 1.375 to 0.375.

The following table compares the levels of comprehension before and after the Brain Gym intervention exercises. It gives the mean difference, the effect size equivalent on Cohen's d based on missed notes, missed rhythm, repetitions, and pauses.

Table 5

Comparison of Levels of Missed Notes, Missed Rhythm, Repetition, and Pauses Before and After the Intervention

	statistic Student's t	df	p	Mean difference	SE difference	Effect Size Cohen's d
Missed Notes Posttest	3.98	15.0	0.001	25.000	6.281	0.995
Missed Rhythm Posttest	3.42	15.0	0.004	13.932	4.071	0.856
Repetition Posttest	2.97	15.0	0.009	0.813	0.273	0.743
Pauses Posttest	3.76	15.0	0.002	1.000	0.266	0.939

Source: Calculated by Authors

As seen in the table 5, results of the paired sample t-test, there is a significant difference in the level of understanding after the intervention. For missed notes, the results show a mean difference of 25. In the analysis of the post-test missed notes, the learning effect was found to be 0.995 on Cohen's D (p-value of 0.001). In the missed rhythm calculation, with a mean difference of 13.932, it can be noted that the intervention effect is 0.856 on Cohen's (p-value of 0.004). Meanwhile, in the repetition, there was a mean difference of 0.813 with a SE

difference of 0.273 (p-value of 0.009), with an intervention effect of 0.743 on Cohen's D. Likewise, with calculating the number of pauses, there is a mean difference of 1,000 with an SE difference of 0.266 with an intervention effect of 0.939 on Cohen's D (p-value of 0.002). The magnitude of the effect size is considered large or strong (Cohen, 1988, 1992), and there is practical significance to the research results.

CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATION

Brain Gym effectively enhances students' sight-reading abilities in piano playing, as evidenced by decreased errors. The analysis demonstrated that the utilization of Brain Gym yielded positive results in improving the sight-reading proficiency of pianists, as evidenced by the reduction in the frequency of errors observed after implementation. This is evidenced by a significant decrease in the frequency of errors that occur, namely; decreased wrong notes, decreased wrong rhythms, decreased repetitions during the game, and according to him, pauses that occur during the piano playing by sight reading. Using Brain Gym exercises as a class opening activity, particularly in piano class, is a viable strategy to minimize errors that normally arise during the learning process. This is especially helpful when introducing musical pieces that demand proficient sight-reading skills, as it helps to minimize initial mistakes such as missed notes, rhythm errors, repetitions, and pauses.

The Implication of this study can be implied for music lecturers in the college level and also the student. For teachers, Brain Gym can be a fun way to start teaching and learning activities, especially in the field of piano. Not only is it fun, but it also has a positive effect on improving pianists' sight-reading skills. This also affects the use of teaching and learning time which will be more efficient because the mistakes that usually occur during the initial period of reading notation can be reduced. Meanwhile, for students, especially those studying music at university, Brain Gym can be one of the methods used, especially for students who are learning to read sheet music for the first time in order to minimize errors in reading sheet music so that the duration of each exercise will be shorter to achieve the same results.

Suggestions for further research so that Brain Gym can be used at the level or level of musical ability, especially for beginners, especially for children. Further research can also examine the effects of Brain Gym on other fields or musical instruments with more diverse samples. Subsequent studies can investigate the impact of movements in the Brain Gym on the precision of reading block notation on other musical instruments or in music theory.

This study was limited to a sample size of 16 participants who were pursuing music education in Jakarta. This study was exclusively conducted on college students who were beginners in piano and were currently learning the instrument. This study incorporated the use of Brain Gym exercises for a duration of 5 minutes per day over a period of 14 consecutive days.

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