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A Fresh Breath into Student Achievement: *Pranayamaand Educational Outcomes**

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ABSTRACT: *This paper explores using breathing techniques to boost the reading performance of students and describes how teachers can foster the technique in their classrooms. The innovative study examines the differential impact of therapeutic breathing exercises, called pranayama*, on students' reading skills and academic performance. The paper introduces approaches to therapeutic breathing exercises as an additional means for improving school performance as well as the self-regulatory behavior, the latter being known to correlate with academic performance. The two-pronged investigation includes a case study and a school-wide pranayama program, both of which showed positive outcomes. The intervention consisted of two breathing exercises, (1) deep breathing, and (2) alternate nostril breathing. Encouraged by the positive results, a one-year long quantitative study with about 100 third graders was conducted using daily breathing exercises to investigate the impact of pranayama on the academic performance. Significant cumulative gain-scores were found for students who practiced the approach.*

**Therapeutic breathing, central to most yogic meditation, originates in India with its Sanskrit name as Pranayama, or breathing exercises. The word pranayama comes from the roots prana (universal energy), and yama (to control). The literal meaning, is the "control of (or holding onto) the vital life force (prana)", via the breath. Briefly, it is the method of rhythmic breathing, which strengthens the lungs and increases blood circulation.*

I. INTRODUCTION

Guggu, the son of one of the authors of this paper, was a shy, introverted child who often had difficulty expressing his feelings in words. Socially, he had no friends until he reached the 8th grade. He did not do well in school as a child and was considered a low achiever. His parents noticed that he often switched around phonemes (minimal units of sounds) within a word while talking. For instance, there is a city named Muradnagar near New Delhi in India that he consistently referred to as 'Mudarnagar' instead (thus switching the sounds [r] and [d] in the second syllable); the word for salt in Hindi (his native tongue) is 'namak' and he would call it 'manak' or say 'chicken' for 'kitchen'. His mother also noticed that in writing he would often write [was] as [saw] and switch the order of digits within a number, for instance [89] in place of [98]. On the other hand, he could recall the intricate details of a movie, including the sequence of events, and the plot as well as the characters. Guggu struggled with reading, writing, and math skills in school, often receiving failing grades in tests. His parents were concerned. When Guggu was in 2nd grade, his mother shared her concerns with the teachers who slighted the topic, considering him a slow learner and hence a low achiever. The physicians and therapists identified the problem as a developmental delay with no recommended plan for follow-up action. There was little extra help in the suburban town they lived in (which is 31 miles northeast of the nation's capital city of New Delhi), with a minimal support at the private, English medium school he attended.

As a concerned mother (and an educator herself), his mother decided to be a proactive parent in her child's case, despite the unavailability of any external support. By then, Guggu had entered middle school (6th Grade). It was over a decade ago that, after watching a program on yoga and deep breathing exercises on a public channel on television, Guggu's mother decided to try the *pranayama* (Sanskrit word for a range of breathing exercises, an integral part of yoga routine, in this article, pranayama and breathing exercises have been used synonymously) as a potentially helpful activity to lessen her son's difficulties. She started her son on two breathing exercises for about five minutes each on every morning before breakfast (since it is recommended that pranayama be done on a light stomach). In a few weeks, she noticed a distinct improvement in him. His

behavior in school and attitude towards homework began to change for the better. His academic performance began to show slight gains, particularly in mathematics and reading. She also observed that his test anxiety started to go down as she would have him practice breathing exercises before the tests. Encouraged by these positive outcomes, the practice was continued. Once he started scoring better on tests, Guggu's self-confidence began to increase and he felt motivated to do better. By 10th grade, his reading and Math scores had improved. Guggu is a young man now. He has finished his bachelor's degree and is successfully employed. He still reverses numbers, letters, and sound segments on an occasional basis, but the frequency is significantly lower in comparison with when he was a child. Guggu's symptoms fall in the range of 'learning difficulty to learning disability', but he was never formally diagnosed in that regard.

Metathesis is the linguistic process of transposing sounds, letters or syllables within a word, in the manner that Guggu frequently demonstrated during his childhood. Evidence of metathesis does not necessarily indicate dyslexia, which is often associated with switching of letters and numbers. Dyslexia is a learning disability among children that affects a person's ability to process language, numbers, symbols, spelling, writing and words. It requires a formal medical diagnosis by a professional. The majority of schools in India, particularly in the rural and tribal areas, do not have programs for students with special needs or learning disabilities, and teachers have limited or no training regarding the issue. In early 1980s, the terms dyslexia, autism, and Asperger's syndrome were practically unknown by a majority of the parents. For many families learning disabilities remain a private issue, partly because of the stigma associated with any type of learning disability in the Indian society. Public awareness and acceptance of the issue has been slowly improving in urban areas due to education via mass media, but continues to be a challenge in the tribal and vast rural areas where the cases remain undiagnosed.

II. CONCEPTUAL FRAMEWORK: THERAPEUTIC BREATHING EXERCISES (PRANAYAMS)

Therapeutic breathing is a largely under-explored aspect of research in education. However, over the past decade yoga has developed from a less understood discipline to become a focus of considerable research. Specialized training programs now certify yoga instructors to lead sessions that meet the developmental needs of children. In this innovative study, we first examined the differential impact of specific pranayama techniques on the reading skills of two struggling readers. The positive outcomes encouraged us to pursue a follow-on, quantitative study wherein the same techniques were used with a larger population over the span of one year. Again, significant cumulative gains in the subjects of Hindi, English, and Math were observed among third graders, along with positive behavioral changes. In this paper, we commend integrating the breathing techniques into a daily class schedule to optimize the student performance and minimize any disruptive behavior issues.

In the yoga tradition, breath control exercises, *pranayama*, emphasize slow and deep breathing. Deep breathing benefits the body's overall circulation by releasing tension and increasing levels of blood and oxygen throughout the entire body. More oxygen and better circulation, in turn, affect the central and autonomic nervous systems (Brosnan, 1982; Lalvani, 1999). The autonomic nervous system – the body's regulatory system for involuntary activity, such as heartbeat and respiration – includes two subsystems that are known as the sympathetic and parasympathetic nervous systems. While the sympathetic system utilizes stored energy and prepares the body for "fight or flight" by increasing the heart rate and the blood sugar level (Carlson 1998; Seamon & Kenrick 1994), the parasympathetic division, in contrast, conserves energy and is active in relaxed situations. Deep breathing exercises influence these two systems by deactivating the sympathetic system and activating the parasympathetic system. The end result is a sense of calm, emotional balance, and increased concentration (Brosnan, 1982). With deep and rhythmic breathing practice, we expand our lung and cardiovascular capacity, thereby increasing the levels of oxygen carried by the bloodstream to the different parts of the body. Yoga is a mind-body practice that combines multiple mind-body techniques (Schure et al. 2008; Wolsko et al. 2004). The multidimensional aspects of yoga include physical postures, calm breathing, relaxation techniques and meditation.

The two breathing techniques, deep breathing and alternate nostril breathing (that were practiced by Guggu from the earlier anecdote), purport to provide therapeutic benefits for thememory and brain cells (Telles, et al 2007). The deep breathing exercise stimulates slow, deep and rhythmic breathing, which results in increasing the amount of oxygen in the blood stream, thereby improving blood circulation. Well-oxygenated and well-circulated blood invigorates all body cells, including the brain cells. The second technique, alternate nostril breathing, activates balance between the dominances of the brain's left and right hemispheres. The nasal passages are cross-connected with the two hemispheres of the brain; therefore, alternate nostril breathing not

only improves balance between the right and left brains, but also calms the mind by optimizing the analytical left brain and the creative right brain (Telles et al. 2007). In a 2005 meta-review of analysis based on several studies, Richard Brown, MD and Patricia Gerbarg, MD, reported that yogic deep breathing was extremely effective in addressing depression, anxiety and stress related disorders.

Prior Research Findings

Preliminary research on yoga and its impact on educational aspects is beginning to emerge, primarily in the field of special education. Breathing exercises have typically been associated with health and exercise programs. Pranayama has been shown to be a promising intervention for a variety of cognitive, social, emotional, behavioral, and academic difficulties (Nardo & Reynolds, 2002; Peck, Kehle, Bray, & Theodore, 2005). These breathing techniques involve conscious controlling of the breath. Pranayama also tends to promote self-control, attention and concentration, self-efficacy, body awareness, and stress reduction (Nardo & Reynolds, 2002). Yoga programs in elementary schools that incorporate balancing, bending, and stretching exercises have been a growing area of research (Berger, Silver, & Stein, 2009; Clance, Mitchell, & Engelman, 1980), but few have specifically looked at the impact of breathing exercises on emergent literacy skills and academic performance. Mind-body techniques teach children to improve their attention skills, which can help their performance in school (Steiner, et al. 2013, p. 816). Although there is some empirical evidence for the efficacy of breathing exercises on behavior modification (Peck, et al. 2005, Steiner, et al. 2013), there is an absence of research on the effect of breathing exercises on direct measures of literacy.

Intervention Framework

The two breathing techniques of deep breathing and alternate nostril breathing, respectively, were selected for the intervention (see Figure 1). In the first breathing technique, the participant breathes in and out of the nose deeply. It is exactly like normal breathing, except there is deep inhalation and prolonged exhalation. In the second technique involving alternate nostril breathing, the participant inhales through one nostril and releases the breath through the other nostril and vice-versa in an alternating pattern. One can find a sample video of alternate-nostril breathing in the video clip at <http://www.youtube.com/watch?v=MCK1jBfRVsE>

At the outset of intervention, the researchers demonstrated the techniques to the subjects by using specific guidelines as described in Figure 1. To ensure an accurate practice of the techniques, students practiced the two breathing techniques, first with the researchers and then independently. Breathing through the nose was emphasized during the entire process. The students kept their eyes open and preferred to use their fingers for counting during deep breathing. Alternate nostril breathing took a little longer to explain and practice. Initially, there was a tendency to do a unilateral breathing by the students, which meant just breathing in one direction from left nostril to right nostril repeatedly, but that was rectified following sufficient practice. One student preferred to switch hands, using right thumb for closing right nasal passage and left thumb for left one, which was acceptable. Once the techniques were attained, the students were asked to continue breathing in and out while counting from one to five mentally, or on fingers, for each ingoing and outgoing breath for 5 minutes using each technique. There are many online audio-visual and interactive applications, software, and free downloads available for iPhones, iTunes (Pranayama Universal Breathing), and Android devices that can individualized to varying breathing paces.

Working with individual students

Two students were selected for the comparative study, based on access and availability. The non-randomness of the selection process was a limitation of the case study component of this work. Student 1 was an 8-year-old female student studying in Grade 2 in India. Student 2 was a 7-year-old female student studying in Grade 1 in the United States. The primary reason was to look at the effects of the intervention techniques independently of geographic, linguistic, and socio-economic barriers; an additional reason was the convenience and accessibility of subjects to the authors. The data collection measures were appropriate to the grade levels of each student. Both students were shy in the beginning due to new surroundings and unfamiliarity with the researchers. However, after the initial sitting, where the researchers demonstrated the breathing exercise to the students, they became more conversant and at ease.

Given the age group of the students (7-8 years old) and their emergent literacy skills, we focused on the following two reading measures: (1) the *Visual Discrimination Test* and (2) the *Visual Memory Test*. The *Visual Discrimination Test* (Scott and McCleary 2003) is a 10- and 14-item picture test for Kindergarten and first grade, respectively. The purpose of the test is to assess the student's ability to distinguish likenesses and differences. Next, the *Visual Memory Test* (Scott & McCleary 2003) involves 10, 12, and 16 items for the Kindergarten, first grade, and Intermediate grade levels, respectively.

It consists of sequences of random letters and numbers, for instance, [7 2 4], [s m y]. The purpose of this test is to determine how well a student sequentially remembers what is seen and is able to reproduce the sequence in the original order.

For both students, the starting point for the two pre- and post-measures was the same: pre-primer level. Assessment moved on to higher levels until ‘frustration level’ was obtained in pre- and post-tests. Between pre- and post-tests, the 10-minute breathing intervention occurred. The two reading measures were given on two separate days. Students’ responses were recorded and scores were computed. The subscales of the *Visual Memory Test* for kindergarten consisted of 10 items. The primary level contained 12 items. The subscales for the *Visual Discrimination* tasks contained 10 and 14 items, respectively, for the kindergarten and the primary grade levels. Raw scores are reported in the results (see Table 2). Graphic representations of the impact of breathing exercises on the two measures are depicted in Figures 2 & 3.

Preliminary findings have been encouraging. Our study showed that there were significant gains in the visual discrimination task and visual memory scores after the intervention involving the breathing exercise. Student 1 showed significant gains in scores from pre-test to post-test in the visual discrimination test after the therapeutic breathing intervention. The gain in scores increased from 29% (pretest score 4/14) to 79% (post-test score 11/14) (Table 2& Figure 2). For Student 2, the gains were made at the visual memory test KG level, where the scores improved from 8.3% (pretest score 1/12) to 58% (posttest score 7/12) (see Table 2& Figure 3).

Working with an entire classroom

Encouraged by these preliminary findings, the researchers extended the scale of the intervention by using a school-wide program to increase the number of the participants. A suburban, private, English medium Junior Middle School (KG-8) near New Delhi was selected due to convenience.¹ The school had two third grade sections, with an average of 50 students each. For the intervention, one section was selected with fifty-four students (n=54) (Figure 4). Comparison data were collected from the other grade-3 section consisting of fifty-one students (n=51). We trained the teachers in pranayama techniques that were listed under the intervention section. Once the teachers became comfortable using the technique, they could implement it in the classroom. It took about a week to train the teachers prior to their introducing those techniques to the students. The experimental student group practiced the two breathing techniques for 5 minutes each daily in the morning for the entire year under the guidance of the teacher. The teacher, along with her assistant, supervised and monitored the students. Students met in the hall outside the classroom, where they sat on the floor, cross-legged. The teachers supervised by walking among the students. Initially, students had questions about the practice and some needed one-on-one guidance and demonstration. It took about a month to train the students (due to the many holidays in between). Sometimes, teachers had to hold a hand of a student to demonstrate the technique, specially in the case of alternate nostril breathing. Most common corrections in the technique related to slouching instead of upright back, unilateral breathing (in one direction only instead of alternate nostril breathing), twisting the nose with too much pressure instead of gently closing the nostril or switching between fingers. Some students needed a tissue or a handkerchief due to mucus issues. Teachers did the counting out loud since students couldn’t do breathing and counting. Some students were able to do the counting mentally. Students had to be told not to breathe from mouth. Academic performance data were collected on Hindi, English, and Math scores from the two groups at the start of the year and at the end of the year. The test scores at the end of the year, showed significant differences in the cumulative gain between the exposed and control group (at .0001). The exposed group did significantly better than the control group.

Quantitative Analysis

The grade level to receive the Yogic Breathing Intervention was randomly selected. As mentioned above, the chosen sample of exposed group consisted of Grade 3 students (n= 54); the control group used for comparison consisted of (n=51). Each third grade section averaged 50 students aged 7 and 8 years old. We utilized a pretest, posttest with intact control group experimental design. Data were collected on Hindi, English, and math scores from the two groups at the start of the year and at the end of the year. Due to missing pretest and/or posttest data, the analysis sample consists of 38 students in the intervention group with 51 students in the control group.

To determine if the intact treatment and control groups were balanced before the intervention, we compared pretest scores for the two groups. Prior to this examination, we determined that there were no outliers and that assumptions for parametric testing were not violated. The groups were not different on Hindi

¹ One of the authors is a principal at the school.

performance ($M_{\text{breathing}}=13.89$, $M_{\text{control}}=15.94$; $t(87)=-1.531$, $p=0.129$) and math ($M_{\text{breathing}}=14.24$, $M_{\text{control}}=15.65$; $t(87)=-1.208$, $p=0.230$). However, the two groups differed on English pretest performance with the control group starting at a higher level than the treatment group ($M_{\text{breathing}}=10.05$, $M_{\text{control}}=13.25$; $t(87)=-2.566$, $p=0.012$). Differences between the two groups on the English pretest are taken into account in the analytic procedures.

To compare the two groups, we utilized a type of general linear model called analysis of covariance (ANCOVA) with the covariate of English pretest scores. Because of the focus on multiple comparisons (Hindi, English, math and cumulative gains), we used the Bonferroni adjustment to conservatively guard against family-wise error. After adjusting for English pretest performance, students in the breathing group had a mean improvement of 11.50 points (Table 1) ($M=11.50$, $se=.1010$, [9.496-13.513]) whereas those in the control group only improved by 7.13 points on average ($M=7.13$, $se=0.867$, [5.410-8.858]). It may be noted that changes in math performance are largely driving the cumulative differences. The cumulative model only explains 22 percent of the variation in performance. The effect size of breathing intervention for the cumulative model (partial eta squared) is small (10.8 %).

Table 1: ANCOVA of Breathing on Cumulative Gains

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	995.204 ^a	2	497.602	13.386	.000	.237
Intercept	3115.067	1	3115.067	83.801	.000	.494
EnglishUnitTest1	344.879	1	344.879	9.278	.003	.097
Breathing	386.645	1	386.645	10.401	.002	.108
Error	3196.796	86	37.172			
Total	11401.000	89				
Corrected Total	4192.000	88				

a. R Squared = .237 (Adjusted R Squared = .220)

In addition to academic gains, teachers reported observing improved behavioral changes among students who practiced pranayama. Specifically, the students from treatment group showed increased attention span and attendance rates, stayed on task and paid greater attention to teacher directions with minimal referrals for behavioral issues. Teachers noted that students that did not previously raise their hand when the teacher posed a question to the classroom now started to respond by raising their hands. Parents said that those children had become more active. Teachers also observed that, if the practice of pranayama was skipped due to any reason such as a change in schedule, then the students would actually remind the teacher about it and were keen on performing the practice without any disruption. Teachers noted a general enthusiasm among students when they practiced pranayama. Encouraged by these positive outcomes, other teachers in the building indicated an interest in employing the practice in their classrooms as well.

Discussion

Yoga is a common practice throughout India with increasing popularity worldwide. However, popularity of a belief is not the same as the validity of the belief. Thus, clinical, experimental, experiential, and scientific studies are needed to explore the benefits and impact of the practice of yoga. There is growing use of yoga in the educational community due to observed gains in students’ self-regulated behaviors and performance in the school. In the USA, the National Health Statistics Report indicates that 6% of children practice yoga (Barnes et al. 2008). Children with a range of disabilities have been shown to benefit as yoga enables increased awareness through practical and well-rehearsed techniques (Carthy et al. 2010; Peck et al. 2005).

Many studies have reported positive results of improvement in academics and behavior among ADHD students after incorporating yoga and meditation as an intervention technique (Jensen & Kenny, 2004, Harrison et al. 2005, Peck et al. 2005, Powell et al. 2008). The approach can be extended to other academically and behaviorally challenged adolescents and youth. Therapeutic breathing builds self-regulation, which is the ability to monitor and manage one’s behavior, emotions, and thoughts. Instead of a thoughtless reaction to a test item or a situation, one begins to respond in a thoughtful manner. The move from knee-jerk reaction to a thoughtful

response is a major accomplishment by itself. According to Omizo (1980), inner control is an essential prerequisite to learning.

Yoga has been shown to be effective with behavior modification associated with test anxiety and mental stress (Telles et al. 1993). The increased use of high-stakes testing in American public schools has produced a corresponding increase in test anxiety among students (Black, 2005), intensified physiological responses (Vandenbos, 2007), negative emotional reactions (Paul, Elam, & Verhulst, 2007), and inappropriate behaviors (Cheek, Bradley, Reynolds, & Coy, 2002). In response, teachers and researchers have shown an interest in classroom-ready strategies for anxiety reduction (Berger, Silver, & Stein, 2009). A number of studies in yoga for children have found improvements in both gross motor skills (Telles et al. 1993) and fine motor skills (Dash and Telles 1999, 2001). Yoga has been found to promote relaxation, greater self-awareness, self-control, and concentration among children with a variety of physical diagnoses (Krusche 1999). Calm breathing is thought to help focus the mind and regulate the autonomic nervous system and, as a result, fosters relaxation (Steiner, 2013).

To our knowledge, the present study is the first of its kind to explore an alternative intervention through the use of therapeutic breathing exercises to improve reading skills and academic engagement, noting improvement in self-regulatory behavior among pre-adolescent third grade students. This study provides preliminary evidence for the feasibility and possible effectiveness of pranayama intervention to support struggling readers and improve academic performance. These results contribute to the literature on improving children's performance in an academic setting, more significantly in the present age of high-stakes testing and assessment. Considering budgetary and other pragmatic considerations, pranayama intervention provides a more cost-effective and minimally invasive approach to improving student performance, particularly in developing countries. We are enormously optimistic about the potential for improving the literacy outcomes for students via an effective use of breathing intervention techniques. Given adequate training and professional learning opportunities, teachers can lead the pranayama practice in their own classrooms. The findings of this study are in concert with other studies that have shown the benefits of yoga for children. The study also indicates potential for therapeutic breathing exercises as an intervention for the improvement of other early reading skills, in addition to visual discrimination and visual sequential memory.

Our study strongly suggests that pranayama practice is a promising alternative to other literacy interventions. Of particular significance was the fact that the practice of the intervention was done for only a few minutes each day unlike some other literacy interventions and can be easily implemented in small or large groups. For instance, the class could engage in brief intervention exercises to help them focus prior to a test or to settle into work after recess. In addition, the intervention requires no additional equipment or instructional materials. The intervention does require a teacher or another adult to be trained and knowledgeable about the practice of therapeutic breathing. Due to the young age of the participants, following the instructions given in the breathing exercise protocol took demonstration, practice, and training. Once trained, students showed high degree of consistency with the practice.

While our study is preliminary and the interpretation of the results of this study should be made with caution, it does provide some encouraging support for the efficacy of therapeutic breathing exercises on improved literacy skills and test performance. It is premature, however, to make any substantial conclusion regarding generalizing the results to a larger population. Wider acceptance of yoga in the Indian context could have factored into the effects of the intervention. Future studies could replicate the present effort with a larger numbers of students to investigate the effects on additional outcome measures of reading, such as auditory discrimination, phonemic segmentation and comprehension. Further research also needs to be done with a long-term follow-up to examine the sustainability of the effects of practicing pranayama.

We strongly recommend that a student's physical health be taken into account before conducting breathing exercises and a physician be consulted for those with health issues.

Figure 1: Researcher’s Narration for Breathing Techniques (conducted in Hindi language)

Technique 1: Deep Breathing	Technique 2: Alternate Nostril Breathing
<p>1. Relax, be comfortable and follow the directions. Remember to breathe in and out through your nose.</p> <p>2. Sit in upright position, with a straight back, keep your back-bone upright, so that your head, neck and chest fall in alignment in a straight line.</p> <p>3. Let your hands rest on your lap. You may close your eyes during this breathing exercise.</p> <p>4. Now take a deep, long breath in (counting mentally, or on your fingers, from one to five as you breathe in).</p> <p>5. When you finish counting, slowly start breathing out. And as you breathe out, slowly release and let go of your breath (counting mentally, or on your fingers, from one to five as you breathe in).</p> <p>6. While breathing, keep the focus on breath.</p> <p>7. Repeat for 3 to 5 minutes until I say stop.</p>	<p>1. Relax, be comfortable and follow the directions. Remember to breathe in and out through your nose.</p> <p>2. Sit in upright position, with a straight back, keep your back-bone upright, so that your head, neck and chest fall in alignment in a straight line.</p> <p>3. Let your hands rest on your lap. You may close your eyes during this breathing exercise.</p> <p>4. Bring your right hand near your nose, put your right thumb on the side of the right nostril and gently press the side of the right nostril to close the right nasal passage. (The position of the hand is like in ‘preparing to ‘pinch’ nose with thumb and index finger)</p> <p>5. While keeping the right nasal passage closed, take a deep, long breath in through the left nostril.</p> <p>6. Now, let go of the right thumb. Press the side of the left nostril gently to close the nasal passage with your fingers, closing the left nostril breathe out from the right nostril.</p> <p>7. Now, while keeping the left nostril closed, breathe in from the right nostril.</p> <p>8. Close the right nasal passage with the thumb and let go of the fingers to open the left nostril and release your breath. This completes one full round of alternate-nostril breathing.</p> <p>9. Switch sides and repeat the cycles.</p> <p>10. While breathing, keep the focus on breath (or count to five as you breathe in and count to five as you breathe out).</p> <p>11. Repeat for 3 to 5 minutes.</p>

Table 2: Pre- and Post-Test Scores on Three Measures of Reading Skills

	Visual Memory Pre-test	Visual Memory Post-test	Visual Discrimination Pre-test	Visual Discrimination Post-test
Student # 1 (India)	4/10 KG 4/12 P	3/10 6/12	10/10 KG 4/14 1st	10/10 11/14
Student # 2 (USA)	4/10 KG	9/10	9/10 KG 8/14 1st	10/10 7/14

Figure 2 :Pre- and Post-Test Scores on Visual Discrimination Measure for Student 1

Results for student 1

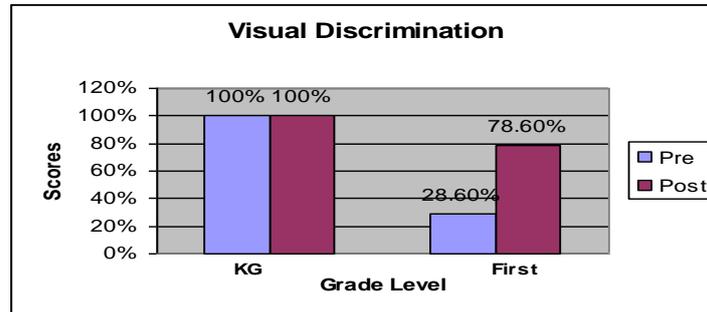


Figure 3 :Pre- and Post-Test Scores on Visual Memory for Student 2

Results for student 2

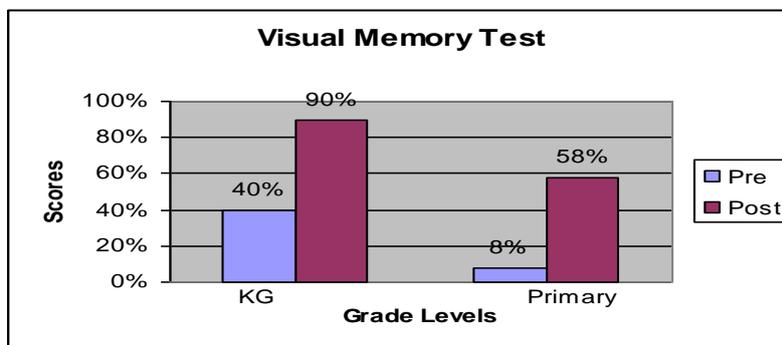


Figure 4 :Children practicing alternate-nostril breathing Pranayama



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