

Mindfulness in Education: Measuring the Short-term Effects of Anapanasati Meditation's Impact on Insight Learning in High School Students

Sridivya Modekrutti

Biomedical Sciences
The Apollo University

Abstract- This study measures the immediate effects of Anapanasati meditation on cognitive performance, specifically focusing on insight learning among high school students aged 14-18. The growing interest in meditation within Western cultures has prompted deeper exploration into its potential benefits for cognitive functions like concentration, awareness, and memory retention. Anapanasati meditation, a traditional Buddhist breathing technique, is known to cultivate mindfulness and improve mental focus. This research assesses how a 15-minute session of Anapanasati meditation can affect students' immediate insight learning, a critical skill for problem-solving and creative thinking. The study employs a single-group pretest-posttest design to measure the impact of Anapanasati meditation on cognitive performance. A cohort of 18 high school students participated in a 15-minute guided Anapanasati meditation session, after which they were assigned a series of insight-based problem-solving tasks to assess any changes in cognitive performance. The same tasks were administered before the meditation session for baseline comparison. The results showed a significant improvement in insight learning, with a 16% increase in overall problem-solving performance post-meditation, suggesting that even a brief session of Anapanasati meditation can have immediate positive effects on cognitive functions. These findings highlight the potential for integrating mindfulness practices into educational settings to enhance cognitive skills and stress resilience among high

Keywords- Anapanasati Meditation, Insight Learning, Cognitive Performance, Mindfulness, High School Students, Problem-Solving Skills, Concentration, Cognitive Enhancement, Pretest-Posttest Design, Educational Psychology.

I. Introduction

Meditation is essential in centering one's mind and coping with stress. Most meditators focus on their breathing, breath control, and heartbeat; however, some focus on other calming elements, such as the five great elements of Ayurveda, or pancha mahabhutas. These elements are space, air, fire, water, and earth, representing the most foundational aspects of nature. After researching various databases, the researcher has concluded that there are very few pre-existing studies conducted on Anapanasati meditation. Psychologists have predominantly focused on electromagnetic imaging and screening in Anapanasati meditation, but have not assessed the effects of such meditation



ISSN: 2584-2455

practices on cognitive performances. As a result, adolescents are unable to assess their understanding of how meditation could improve their cognitive abilities, creating a gap between their knowledge and potential experiences.

This study employed a mixed-methods approach, implementing both quantitative measures such as pre- and post-meditation insight learning assessments, and qualitative data obtained through a post-meditation survey through additional observations. The quantitative data was measured using a rubric that was formulated for all participants, whereas the qualitative data was individually assessed through the actions of each participant. Conducting the study within a high school setting provided accurate context for evaluating cognitive abilities with learning in adolescents and enabled the collection of more precise data. Since this paper explores the practical implications of incorporating meditation practices into conventional education, it is reasonable to infer that there is a significant positive correlation of 16% between the practice of meditation and the immediate effects of insight learning in adolescents.

II. Literature Review

1. Exploring Cognitive Dynamics in Anapanasati Meditation

The growing popularity of meditation among Western cultures has recognized its brought attention to lessen stress, illness, and depression. However, while understanding that meditation may not act as a replacement for traditional medical practices, it has been found to accompany treatment strategies by enhancing coping mechanisms, more specifically joint pain management.

This dual recognition highlights its malfunctioned role in promoting mental and physical well-being with contemporary healthcare issues. Meditation involves training the mind to achieve a state of enhanced awareness, focus, and a sense of inner peace. Some of the most common types of meditation practiced worldwide are Anapanasati, Chakra, Mantra, and Vipassana (Bronkhorst, 2014). Anapanasati, or breath awareness meditation, concentrates on one's breath control as a focus point and is particularly attributed to several benefits, including concentration, awareness, alertness, memory, and the willingness to perform an activity.

The term "Anapanasati" is derived from Pali, an ancient Indian language, where "ana" means in-breath, "apana" means out-breath, and "sati" means mindfulness or awareness (Greer, 2021). Because Pali was not a spoken language but rather only a written and sacred language, it was used to preserve and transmit ancient Buddhist scriptures. Anapanasati is rooted in Buddhist traditions and is associated with the teachings of Gautama Buddha. The fundamental aspect of Buddhist teachings is practiced through the constant awareness of change in the breath pattern and can lead to insights about the transient nature of all experiences (Divino, 2023).



ISSN: 2584-2455

Before proceeding to the next parts of this paper, one must understand the definitions of meditation and insight learning. Meditation refers to the practice of focusing one's mind and attention on a particular thought, object, or activity. However, more experienced practitioners focus on their breath and/or their heart rate. Insight learning, on the other hand, refers to a type of learning or problem-solving that brings about a sudden realization or understanding of a concept or solution and often diverts the need for a direct trial-and-error approach to learning.

2. Connecting the Differences

Insight learning and meditation, while being two distinct topics, connect through the mindfulness of an individual. Insight learning refers to a type of learning or problem-solving that brings about a sudden realization or understanding of a concept or solution, often bypassing the need for a direct trial-and-error approach to learning. The concept of the "lightbulb moment" was developed by Gestalt psychologist Karl Duncker, who illustrated this through his experiment known as "Duncker's Candle Problem" conducted on adolescents in 1945, as documented by (Fedor et al. in 2015). Functional fixedness has been described by Evangelia Chrysikou, Katharine Motyka, Cristina Nigro, Sharon Thompson-Schill, and Song-I Yang from the National Center for Biotechnology Information Center as a cognitive bias type when an individual is limited in the ability to perform a task and allow the individual to accomplish the task only how it is intended to be.

The researchers used the findings of Duncker to add to the general understanding of cognitive processes associated with creativity and issue resolution. The objective of Duncker's study was to explore the functional fixedness of a person, not only to seek new solutions but also to find a reason why the individual thinks in a specific manner. Participants were challenged to find solutions with the employment of creative thinking skills. In other words, Duncker describes functional fixedness as a "mental block" that limits an individual from crossing the barriers of their mind. For instance, if an individual was asked to tighten a screw without a screwdriver, they would have trouble thinking "outside the box" and finding a different conclusion due to functional fixedness.

3. Tracing the Origins

The earliest written material that mentions meditation is related to Vedantism, an Indian Hindu religion that dates back to approximately 1500 BCE (Sharma, 2015). Historians mainly agree that meditation has been practiced since the early 3000 BCE. Most early practitioners have used the 'Yoga' and 'Dhyana' techniques to understand the extent of "pure awareness" or "pure consciousness" by focusing on their breathing techniques. As a "more profound concentration of the mind" and "a refined meditative practice," Dhyana is practiced in most later Hindu yoga traditions that originate from Patanjali's Raja Yoga. It is initiated following the completion of earlier practices like Pranayama (breath control) and Dharana (mental focus).



ISSN: 2584-2455

However, meditation is not exclusive to Hinduism as many Jewish communities employ it extensively. The Torah describes the patriarch Isaac going to "Iasuach" in a field, a type of Jewish meditation likely performed circa 1000 BCE (Kaplan, 1985). While elements of meditation and contemplation can be found in Jewish traditions, the emphasis on formal meditation practices may not be as pronounced as in some Eastern traditions. The principal focus in Judaism tends to be on prayer, the study of sacred texts, ethical conduct, and communal worship. However, the presence and nature of meditative practices vary among different Jewish communities and denominations. While many different religions have been practicing meditation for centuries and historians are unsure of how it originally started, meditation is not a religious practice. After vast research, psychologist Kevin Ellerton has concluded that "meditation is a mental exercise, in the same way that jogging is a cardiovascular exercise." He discovered that meditation is a way to

"let go" of all entities and to "free the mind" by conducting several meditation sessions and understanding each participant in the process (Ellerton 2014). His sessions found that participants tend to counteract the cognitive bias by disregarding the potentially unsettling information and focusing primarily on breathing techniques they have learned he has taught his participants.

Effects on the Role of Meditation

A study done by Himanshu Kumar Sanju, a senior audiologist, and Prawn Kumar, a speech-language pathologist, found that meditation has a positive correlation with a significant reduction in stress concerning cognition and auditory skills (Sanju & Kumar, 2016). Another study done by Melissa Dahl, an Executive Director of Health and Wellness, has shown that physical and mental activity has a positive effect on cognitive performances due to the functions of the hippocampus (Dahl 2016). The hippocampus controls the ability to remember short-term episodic memory due to certain events in an individual's life. Both studies established similar implications, both of which show that the effects of meditation are long-lasting. A major setback in this research is that all studies done so far are measured quantitatively over qualitatively.

III. Research Gaps

Few preliminary studies have been conducted to assess the effectiveness of Anapanasati meditation on insight learning. Gaps in this research include the age restriction and research demographics.

One's age and understanding of meditation impact performance effectiveness because it allows for deeper comprehension and a more focused breathing cycle. Psychologist and researcher Sylvie Droit-Volet mentioned in her published book in 2019 to meditate the number of minutes an individual's age is (Droit-Volet, 2019). Droit-Volet found that through this correlation, there tends to be a significant increase in cognitive



ISSN: 2584-2455

performance as there tends to be a direct relation between the neurological and physiological levels of meditation. This correlation caused a slight inconsistency in the breakthrough of meditation.

Research Question

The inconsistencies analyzed in the body of literature led to the development of the research question: to what extent does Anapanasati meditation practice enhance insight learning in students between ages 14-18 at Jordan High?

IV. Methods

1. Study Design

This study collected quantitative and qualitative data through a mixed-method approach, consisting of an experiment and questionnaires in the form of a survey. The mixed-method procedure was necessary for completing this study to acquire the most accurate results as the experimental design initiated the changes being observed, and questionnaires gathered the data from the subjects. This research method was similar to that of Psychologists Philip Maymin and Ellen Langer's research study conducted in early 2021. Although they have not connected their research directly to meditation, they have explored different cognitive biases in the form of a pre-and post-assessment, utilizing the mixed-methods approach (Maymin et al., 2021).

Some unknown factors in this study were the thoughts revolving around an individual's mind when meditating, the long-term effects of Anapanasati meditation, and the specific neural mechanisms underlying insight learning during meditation. While it was possible to limit external activity that potentially causes a disturbance in meditation, such factors were not able to be addressed due to the natural environment of a school setting. However, these unknown thoughts were attempted to be addressed through the teaching of how to meditate by the instructor (the researcher).

2. Subjects

About 15-20 participants were needed for this study to ensure accurate findings. The demographics were limited to high school students between the ages of 14-18 at Jordan High School in Fulshear, Texas. To participate in the study, each participant was required to have good academic conduct and basic physical and mental health awareness. The study asked all participants to sit on the floor with their eyes closed and hands on their laps. However, participants with any particular physical ailments were asked to sit on a chair instead of sitting on the ground.

All participants were asked to complete the cognitive assessments and survey using a provided identification number to maintain participant anonymity and confidentiality. This ensured that each participant's pre-test and post-test responses could be connected with the survey after data collection.



ISSN: 2584-2455

The study did not assign a separate control group. Nevertheless, even if one had been established, comparing the control group's responses with the participants' post-test responses would not have been necessary. This redundancy arises because the pretest participant responses effectively function as a control group. These initial responses already showcase the participants' cognitive performance in insight learning without the stimulus, therefore, depicting the inclusion of a separate control group as unnecessary.

3. Experimental Procedure

As the research was conducted in a school setting, the 15-minute meditation session took place in a large closed classroom with dimmed lights. The audio playing through the meditation session was instrumental in nature sounds, which have been shown to reduce anxiety through one's body's natural fight-or-flight instinct, another type of cognitive bias. Even through a mediated or recorded form, nature sounds encourage a sense of connection with the natural world and environment. This connection is associated with well-being and can contribute to a more unified meditation experience.

Participants were asked to follow Anapanasati meditation, where they focused primarily on their breathing. To follow this concept, the students had to take one breath in and two breaths out. This counted as one cycle of breathing. Additionally, since the session was for 15 minutes, participants were asked to breathe relatively slower than taking their normal breaths. Additionally, the participants will be able to take their time and focus on their breathing if they take breaths in and out in the way taught to them before the session.

4. Instruments

The session was administered by the researcher who is a practitioner in training. This study incorporates both quantitative and qualitative questionnaires. An in-built timer in the questionnaires was used to ensure that the forms were completed with fairness. Participants were asked to dress in comfortable clothing to sit on the floor. It was also recommended that participants do not feel sleepy or nap within 30 minutes - 1 hour of participation to prevent any sleepiness during or post-meditation.

5. Questionnaire Analysis

The pre-test and post-test data were collected through 2 different Google Forms and were then inputted into Google Sheets and Microsoft Excel to analyze data.

The following rubric was used to analyze quantitative data: After the assessment of each participant's pre- and post-test results using the rubric above, the survey answers were taken into consideration. This was done by attempting to understand why each participant chose to answer the question the way they did. The purpose of the survey also served to gain new insights into how each participant personally felt about completing the meditation session and if they have felt an increased sense of insight



ISSN: 2584-2455

learning after meditating. As the survey gathered qualitative data, there was no set rubric for the analysis. Hypotheses

All assessments were individually scored. Points were given back as necessary.			
Insight Learning Assessment Rubric (applicable for both assessments)			
	Mastery (20)	Attempting (+/-20)	No Attempt (0)
Q1	Correct answer	Correct answer/incorrect process	Incorrect answer/left blank
Q2	Correct answer/same shape	Correct answer/incorrect process	Incorrect answer/left blank
Q3	Correct answer/correct format	Correct answer/incorrect process	Incorrect answer/left blank
Q4	Correct answer/correct format	Correct answer/incorrect process	Incorrect answer/left blank
Q5	Correct answer	Correct answer/incorrect process	Incorrect answer/left blank
Grade	/100 =		

Three hypotheses were generated through the study. The predominant hypothesis was that there is a significant positive correlation between the practice of meditation and the immediate effects of insight learning in adolescents as engaging in meditation is associated with improvements in cognitive functioning, which in turn, directly affects an individual's insight learning.

However, there was no expectation that all participants had prior experience of meditation practice and that they were all able to stay focused on their breathing.

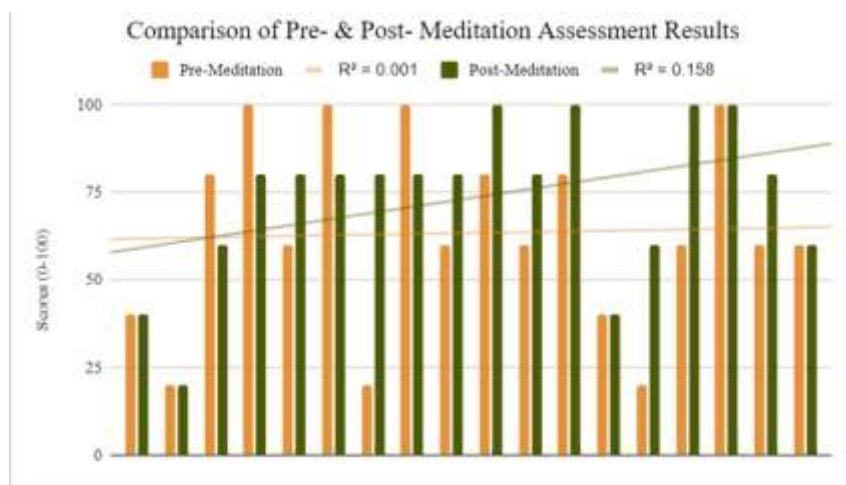
The null hypothesis (H0) was created to accompany the previously stated correlation hypothesis. The null hypothesis suggests that the age at which adolescents start practicing Anapanasati meditation does not have a significant correlation with the improvement in insight learning. If this hypothesis cannot be rejected, it implies that there is no meaningful relationship between the age of onset of meditation practice and the level of improvement in insight learning among adolescents in the context of the study.

The alternative hypothesis (H1) was determined by analyzing the specific goal of the study. This hypothesis states that adolescents who engage in Anapanasati meditation will demonstrate a significantly higher level of insight learning compared to those who do not practice this form of meditation

V. Findings

Participant Trends

This research assessed a total of 18 participant samples. All participants completed both pre-and post-meditation cognitive assessments, allowing the researcher to evaluate each assessment equally. The participants' pre-meditation and post-meditation insight learning assessments are shown below in Figure 1..



The graph above illustrates each participant's pre- and post-meditation insight learning assessment scores. As mentioned in the key above, the orange bars show the pre-meditation scores, and the green bars indicate the post-meditation scores. Each set of bars is attributed to one person (one orange and one green). However, the bars are not organized in any specific manner as the participants

The scores for each assessment range from 20-100, with 100 being the highest score possible, and 0 being the minimum. The trendline in the graphs below shows the linear growth in performance scores and the number of participants in each exam. In the pre-meditation insight learning assessment, shown in brown, the trendline shows a linear growth curve of $R=0.001$. The graph of the post-meditation assessment, shown in dark green, graph with a linear growth curve of $R=0.158$. This leaves the difference in the linear growth curve to be $R=0.157$, leaving the R^2 value to be 0.024.



ISSN: 2584-2455

Relation to Age Factor

8 of the students have shown an increase in their cognitive performances, 6 have shown no change in their scores, and 4 of them have shown a decrease in their cognitive performances. As represented above, there is a clear significant increase in scores after the participants have meditated, leading to the conclusion that Anapanasati meditation has immediate effects on insight learning in adolescents. 88.88% of participants were under 18 years of age, with 16 participants falling under the “minor” category. 11.12% of participants were 18 years of age, with only 2 participants falling under the “adult” category. This data set is significant because there was a correlation between the age and the scores participants received on their insight learning assessments. It was shown that participants above 16 years of age scored higher than the participants 16 years of age and under. Additionally, the participants under 16 years have received a mean score of 53.34 on their post-assessments, as opposed to participants of 16 and older. These participants have received a mean score of 66.67. While this set of data is significant to the results because it shows the better performance of participants older in age, the age factor is not the primary study.

Survey Responses

As the survey collected qualitative data based on the personal experiences of each participant, there was no possible way to get a definite “correct” or “incorrect” answer.

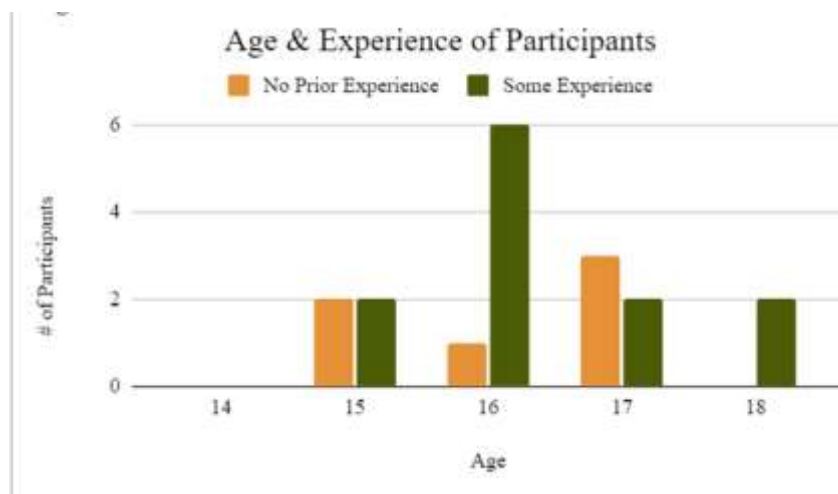


Figure 2 shows the results of the post-meditation insight learning assessment with one specific question asked in the post-meditation survey. Some other questions asked in the survey were: “How did you feel after meditating?”, “Do you think meditation has impacted your insight-learning skills?”, “Did you ever feel uncomfortable when meditating?”, “Did you fall asleep while meditating?”, “How was the first cognitive assessment?”, and “How was the second cognitive assessment?”. The survey asked all participants to be honest as it was important to acquire real and reliable data.



ISSN: 2584-2455

As shown below in Figure 2, the 12 participants had prior meditation experience, causing their post-meditation insight learning assessment scores to be greater on average than participants who had no prior meditation experience. This trend is shown with the age of each participant. As shown below, 6 participants had not previously meditated, which after data analysis, has come to show that these participants did slightly worse than participants who did have experience.

The last question in the survey asked if the participants had any questions, comments, concerns, or any additional information they would like the researcher to know regarding the session. Only 2 participants responded to this question and they said “I can’t sit in the same position for a long time so my legs tend to cramp up after a while” and “The music was very soothing and calm.” As both these responses contradict each other, there was no direct comparison between the participants’ responses; the only comparison was within each participant’s results and responses. The questions, “How was the first cognitive assessment?” and “How was the second cognitive assessment?” asked the participants to answer based on a scale provided from 1-5, with 1 being “easy” and 5 being the most “difficult”. The following scale was used for both questions.

1	2	3	4	5
Easy				Difficult

According to the analyzed data, 8 participants felt the pre-meditation insight learning assessment was easier than the post-meditation insight learning assessment, resulting in 10 participants feeling vice versa. Although this portion of the survey is completely opinionated and subjective, these 2 questions were essential in understanding and possibly assessing why each participant has scored what they have.

Statistical Analysis

Figure 3 below shows the statistical analysis of the quantitative data collected. When calculated using the percent change formula, the difference of means turned out to be 5.78% more than the hypothesized difference. The hypothesized difference was 10%. The percent

change formula is

$$\frac{(V_2 - V_1)}{|V_1|}$$

× 100, which provides a resultant of 15.78%, rounding to about



ISSN: 2584-2455

16%. This product shows the percent change between the pre-meditation insight learning assessment and the post-meditation insight learning assessment. While the range, minimum value, and maximum value stayed the same between both assessments, the median and the mode increased from 60 to 80, with a percent change of 33.34% each. The quartiles and interquartile ranges were determined by using the original sets of data taken from the pre- and post-meditation insight learning assessments.

	Pre-Test			Post-Test		
Mean	63.34			73.34		
Median	60			80		
Mode	60			80		
Range	20-100			20-100		
Min.	20			20		
Max.	100			100		
Count <i>n</i>	18			18		
Sum	1149			1320		
Quartiles	Q1: 40	Q2: 60	Q3: 80	Q1: 60	Q2: 80	Q3: 80
Interquart	40			20		
Outliers	-			20		

Additionally, Figure 3 shows the quartiles and interquartile ranges. The Q1 shows an increase of 33.34%, resulting in the post-meditation insight learning assessment having a resulting quartile 1 from 40 to 60. Quartile 2 shows an increase from 60 to 80, also showing a 33.34% increase from both the insight learning assessments. Quartile 3 stayed the same from both the pre-meditation insight learning assessment and the post-meditation insight learning assessment. Furthermore, the interquartile range shows a decrease in percent change by 50%, from 40 being the pre-meditation insight learning assessment and 20 being the post-meditation insight learning assessment. Although one might address this statistical data in a slightly different approach, such as in a generalistic sense and how it has affected the broader view instead of individual datasets, individual data sets are equally as important, if not more.

VI. Discussion

The principal finding was that guided meditation practice does have an impact on the insight learning of adolescents. There was a more prominent increase in the overall impact of the meditation session, which was determined by the test results participants received.



ISSN: 2584-2455

Once both the insight learning assessments were completed, participants were asked to fill out a feedback form asking general questions about their performance during the meditation. 8 of the 18 participants reported that the post-meditation insight learning assessment was easier than the pre-meditation insight learning assessment. These 8 participants have shown an overall improvement in their performance scores. The remaining 9 participants reported that the post-meditation insight learning was harder than the pre-meditation insight learning assessment. 5 of the 9 participants have shown no improvement in the second exam. 4 of the 9 participants have shown a significant decrease in test performance, resulting in their post-meditation insight learning assessment scores being lower than the pre-meditation insight learning assessment.

These values support the primary hypothesis: There is a significant positive correlation between the practice of meditation and insight learning in adolescents. Engaging in meditation is associated with improvements in cognitive functioning, which in turn, directly affects a person's insight learning.

These findings led to the understanding that meditation indicates an increase in insight learning in high school students around the Jordan High School area. The mean for the pre-meditation insight learning assessment was 62.35. The mean for the post-meditation insight learning assessment was 74.18 showing that there was about a 16% increase in post-meditation insight learning assessment scores from the pre-meditation insight learning assessment.

The post-meditation insight learning assessment was shown to have a more based impact on the effectiveness of insight learning than the pre-meditation insight learning assessment. The researcher has asked the participants to fill out a post-meditation survey for further insight and analysis as to why each participant has scored what they got. One of the questions asked if the participants had meditated before. Although the number of participants was 18 and the researcher expected all 18 of them to provide some sort of data, only 5 participants answered all the questions. Of the 5, only 4 had experience in meditating. It is shown in this project that adolescents have a great impact on insight learning after meditation. One specific individual had reported that they were not able to sit still for so long, resulting in deviated scores from before and after. Another participant who has completed all parts of the study has reported that they have "got PTSD from that heinous, blasphemous music" because they "(were) not able to focus as intended."

All five participants who have completed all significant parts of the study have reported that they felt an overall increase in the insight learning assessment as well as the time it took for them to complete it. They said, "More at ease & calm, slightly lethargic immediately after but energetic later", "I felt calm and relaxed", "I felt highly refreshed after meditating because I gave my mind time to relax", "I felt okay", "I felt



ISSN: 2584-2455

relaxed and at peace. I felt refreshed and that I was more calm and able to concentrate.” These participants have shown repetitive easygoing situations in class, and they would not be interested in giving her to the 100-balance audience.

The 5 participants have shown that despite going through multiple hardships, they still committed to this study and its completion.

Limitations

The limitations of this study could be addressed in future research. This study focused on the immediate effects of insight learning after meditation through a defined age group and required only one session. However, if one were to precisely measure the effects of insight learning on meditation in adolescents, with a broader timeline and longer meditation sessions, the findings of the research study would be more accurate. Obtaining a longer timeframe as well as longer sessions would allow for a possible increase in the findings of the study as this study has only found a small amount of improvement in pre- and post-meditation assessment results.

This study would’ve been more accurate/beneficial to the greater society if these limitations were previously addressed. Additionally, while the age range within adolescents, such as 14 and 18, does not have much of a direct impact on the results of this study, the findings have shown that an 18-year-old on average has scored significantly higher than a 14-year-old.

For this reason, having a balanced age group would allow for such limitations to be less impactful on the data. Another limitation that must be addressed in this study was the number of questions the study asked participants to answer. With such a small sample collection size, it is highly unlikely to acquire accurate results, especially considering the various amounts of limitations and future directions that must be addressed.

Finally, this study only focused on the effects of insight learning and did not focus on any other cognitive biases such as the Halo Effect, the Framing Effect, or even the Confirmation Bias. Future research will be able to address these gaps.

The effects of meditation are hence proven to be beneficial to the average adolescent in Jordan High School and can be used to find improvements in insight learning. Further research and directions of this research will allow for a better understanding of insight learning’s effects

on meditation. Moreover, this could pave the way for personalized meditation strategies tailored to individual learning styles, fostering enhanced cognitive development and creativity in educational settings.



ISSN: 2584-2455

Future Directions

Future research would be the best solution to address the limitations and implications of this research. This may include different cognitive biases and the evaluation of various types of meditation. As mentioned previously, different cognitive biases include the Halo Effect, the Framing Effect, the Confirmation Bias, etc., and different types of meditation include Mantra, Chakra, and Vipassana. Although this may create a different topic as a whole, it focuses on the general idea of the effects of meditation on cognitive performance in adolescents.

VII. Conclusion

The study's findings indicate that a single 15-minute Anapanasati meditation session can lead to a noticeable improvement in insight learning among high school students. This suggests that even short-term meditation practices may significantly impact cognitive performance, offering a simple yet effective tool to enhance problem-solving skills and creativity. Given the increasing pressures on adolescents in educational settings, these results underscore the potential benefits of integrating meditation into school routines for the general effects of enhanced focus, reduced stress, and improved cognitive outcomes.

Further research is needed to explore the long-term effects of meditation and its scalability across different student populations. Understanding how meditational practices impact cognitive functions can lead to more tailored educational approaches. Additionally, examining the role of mindfulness in exhibiting a more supportive and conducive learning environment may have broader implications for student well-being and academic success. By demonstrating that

meditation has substantial benefits for adolescents, this study opens the door to innovative educational practices that prioritize mental health and cognitive development. Ultimately, these findings serve as a foundation for incorporating meditation into mainstream education to create a more comprehensive and balanced learning experience.

Word Count: 4717.

References

1. Bronkhorst, J. (2014). Can there be a cultural history of meditation? With special reference to India. In H. Eifring (Ed.) *Hindu, Buddhist and Daoist meditation. Cultural histories* (pp. 27–40). Hermes.
2. Chrysikou, E. G., Motyka, K., Nigro, C., Yang, I., & Thompson-Schill, S. L. (2016). Functional Fixedness in Creative Thinking Tasks Depends on Stimulus Modality. *Psychology of Aesthetics, Creativity, and the Arts*, 10(4), 425. <https://doi.org/10.1037/aca0000050>



ISSN: 2584-2455

3. Divino, F. (2023). Mindful Apocalypse: Contemplative Anthropology Investigating Experiences of World-Loss in Deep Meditation. *Religions*, 14(7), NA.
<https://link.gale.com/apps/doc/A759223031/AONE?u=j101914014&sid=bookmark-AONE&xid=d8bc2af3>
4. Droit-Volet, S., Chaulet, M., Dutheil, F., & Dambrun, M. (2019). Mindfulness meditation, time judgment and time experience: Importance of the time scale considered (seconds or minutes). *PLoS ONE*, 14(10).
<https://doi.org/10.1371/journal.pone.0223567>
5. Fedor, A., Szathmáry, E., & Öllinger, M. (2015). Problem solving stages in the five square problem. *Frontiers in Psychology*, 6(1050).
<http://dx.doi.org/10.3389/fpsyg.2015.01050>
6. Greer, J. M. (2021). *The Druidry handbook: Spiritual practice rooted in the living earth*. Weiser Classics.
7. Hall, P. D. (1999). The Effect of Meditation on the Academic Performance of African American College Students. *Journal of Black Studies*, 29(3), 408–415. <http://www.jstor.org/stable/2668066>.
8. How Running and Meditation Change the Brains of the Depressed. (2016, March 24). *Science of Us*.
9. <https://link.gale.com/apps/doc/A508704555/GPS?u=j101914014&sid=bookmark-GPS&xid=dd1ee3c3>.
10. Kaplan, A. (1985). *Jewish meditation*. Schocken Books.
11. Matko, K., & Sedlmeier, P. (2019). What Is Meditation? Proposing an Empirically Derived Classification System. *Frontiers in Psychology*, 10.
<https://doi.org/10.3389/fpsyg.2019.02276>
12. Maymin, P. Z., & Langer, E. J. (2021). Cognitive biases and mindfulness. *Humanities and Social Sciences Communications*, 8(1), 1-11.
<https://doi.org/10.1057/s41599-021-00712-1>
13. Peoples, H. C., Duda, P., & Marlowe, F. W. (2016). Hunter–gatherers and the origins of religion. *Human Nature*, 27(3), 26–282.
14. Russell, P. (1977). *The TM technique: An introduction to Transcendental Meditation and the teachings of Maharishi Mahesh Yogi*. Routledge.
15. Sanju, H. K., & Kumar, P. (2016, May). Research suggests enhanced auditory and cognitive skills for meditators: more evidence for the mind-body-ear connection. *The Hearing Review*, 23(5), 32+.
16. <https://link.gale.com/apps/doc/A453296234/GPS?u=j101914014&sid=bookmark-GPS&xid=51cdaa86>.
17. Schopen, A., & Freeman, B. (1991). Meditation: The forgotten Western tradition. *Counseling and Values*, 36(2), 123–134.



ISSN: 2584-2455

19. Sharma, H. (2015). Meditation: Process and effects. *Ayu*, 36, 233–237.
20. Ustinova, Y. (2020). Alteration of consciousness in Ancient Greece: Divine mania. *History of Psychiatry*, 31(3), 257–273.
21. West, M. (2016). *The psychology of meditation: Research and practice*. Oxford University Press..