

EFFECT OF MINDFULNESS SKILLS TRAINING ON ACADEMIC PERFORMANCE AND RETENTION IN MATHEMATICS AMONG SECONDARY SCHOOL STUDENTS IN KATSINA STATE, NIGERIA

¹JIMOH MUKHTAR, ²DR UMAR MAMMAN & ³PROF. BAGUDU ALHAJI ADAMU

^{1, 2 & 3} Department of Educational Psychology and Counselling,
Faculty of Education,
Federal University Dutsin-Ma, Katsina State
mukhtarjimoh2018@gmail.com

Abstract

This study investigated the Effect of Mindfulness Skills Training on Academic Performance and Retention in Mathematics among Secondary School Students in Katsina State, Nigeria. Two objectives, Research objectives and null hypotheses guided the study. Quasi-experimental designs using pre-test, post-test, post-post-test, non-randomized control group design were adopted for the study. The population consists of 17,257 students; the sample size of this study consists of 115 SSS II Science inter-class Students which were drawn from two public co-educational schools in Katsina Education Quality Assurance Zone Katsina State, Nigeria. A multi-stage sampling technique was adopted for the study; the purposive sampling technique was used to select two schools for the study. The experimental group was taught using the Mindfulness Skills Training while the control group was taught using Conventional Teaching Method. The instruments are two test-items were adopted Mathematics Academic Performance Test (MAPT) and Mathematics Retention Test (MRT). The reliability co-efficient of MAPT and MRT are 0.78 and 0.81 respectively. ANCOVA was used to test the hypotheses at 0.05 level of significance. The finding revealed that there was significant difference between the students taught using mindfulness training and those taught using conventional strategies in mathematics academic performance { $F(1,112) = 6.259; p < .05$ }, there was significant difference between the students taught using mindfulness training and those taught using conventional strategies in mathematics retention { $F(1,112) = 45.012; p < .05$ }. The study concluded that mindfulness skills' training was more effective in enhancing students' academic performance and retention when teaching trigonometry in mathematics. It was recommended that Mathematics Teachers should make effective use of Mindfulness skills training in the teaching of mathematics as it improves students' learning performance and retention.

Keywords: Mindfulness Skills Training, Academic Performance, Retention and Secondary School Students.

Introduction

Mathematics is a mandatory subject in all schools and also the basic foundation for all science courses. Mathematics is the science that deals with the logic of shape, quantity and arrangement. The knowledge of mathematics has contributed to individual chosen career as its performance determine individual life career's progress. However, Sant et al. (2023) opined that the knowledge of mathematics is a strong foundation for a student's future academic performance and also plays an important part in the educational development of youths. Senior Secondary Students' academic performance in mathematics varies across different nations due to the difference in the adopted teaching strategy. There is a need for teachers and others in the education sector to pay proper attention to the teaching

and learning of Mathematics (Onoshakpokaiye, 2021). In the context of Senior Secondary Schools in Katsina State, the major factors that influence students' environment, family and cultural contexts in learning of Mathematics need to be addressed by the best method(s) of teaching used by the teachers. For this reason, students should be well guided in order to excel in mathematics through use of mindfulness skills training in order to better improve learning process.

In the context of psychological constructs, mindfulness is paying attention to a particular target, such as a breathing feeling or maintaining a non-judgmental attitude and accepting oneself in the present moments of thoughts and emotions can be considered as mindfulness (Fereshteh & Vida, 2020). Mindfulness is a state of inner peace that can be achieved by focusing on breathing, proper meditation and clearing the mind of any external influences. By consistently practicing mindfulness skills training on a regular basis, students are reported to acquire higher characteristic levels of awareness (Van Dam et al., 2018).

Mindfulness skills training requires the practice of orienting one's attention to the present moment and monitoring any thoughts, sensations, and emotions that arise in real-time experience (Tang et al., 2015). Mindfulness skills training aims at cultivating self-awareness, the ability to effectively modulate one's behaviour (self-regulation), and a positive relationship between self and others (Zaidi et al., 2022). From a cognitive standpoint, mindfulness skills training can be seen as a form of attention training, by directing attention to the present moment, individuals who practice mindfulness can enhance their concentration and cognitive processing in learning process. In the study of Zou et al. (2020) proposed that mindfulness skills training has the potential to improve individuals' capacity to identify and adjust their automatic reactions, enabling them to adaptively and adeptly respond to present situations. This study provides further support for the notion that mindfulness skills training have the potential to improve cognitive flexibility, promoting effective learning, academic performance and retention.

When individual student can recall information they have learned, it is likely to be related to their retention. Retention is an academic performance task majorly used as an assessment in the field of psychology as a measure of memory capacity of learners at all level of educational programme. Retention is a widely used measure for the assessment of working memory functions (Sant et al., 2023). According to Bichi (2015) retention is the outcome of an effective and meaningful teaching and learning. Retention is the ability to remember things learned by an individual at a particular time. It is directly related to working memory which is one of the core executive functions and is responsible for holding information in mind and mentally working with it. The importance of students' retention is reflected in the vast amount of related research focusing on the teaching and learning process (Pantziara & Philippou, 2015). However, students who have a problem in retention may have difficulty in remembering class lessons (Irene et al., 2020). Students may have troubles in solving mathematical problems that involve series of steps. In order to solve those problems, they need to access information about mathematics facts from long-term memory while remembering what they have just finished and what they need to do.

Mindfulness skills training strategies are appropriate for metacognitive skills training in mathematical education with the implementation of various mindfulness strategies in teaching difference topics in mathematics

The following are mindfulness skills training

Students breathe in and out through their nose and if they will close their eyes or keep they open to stretching at the start of each day

Students learn the connection between their physical body sensations, feelings, thoughts, and mental

state for refocus attention

Students are guided on the effectiveness of using mindfulness thought and mnemonics to aid their working memory in term of retention and learning process.

Encourage students to shift from being self-oriented to task-oriented and present-focused in order to be mindful of self-confidence in solving practical problems.

Through guided meditations, students will recall recent learning experienced they have learnt.

Students reflect on their reactions and responses to the present learning through body attention to mindfulness.

Students are guide to name their inner critic as they care deeply about learning and strengths the growth of academic performance and retention.

Students are guided in using deep processing techniques that focus understands future processing in long term memory.

The study of various researchers indicates the effectiveness of mindfulness skill training in learning. The study conducted by Sant et al. (2023) suggests that mindfulness skill training increase task performance and mathematical achievement. Therefore, mindfulness practices may be provided in schools, increasing the likelihood that they will be integrated into educational environments. The study of Huanjie and Fan (2021) Mindfulness skills training has a lot of benefits including a positive influence on brain regions relate to emotion control and it also helps to cope with negative feelings so that people could focus on present events better. Parrish (2020) Mindfulness skills interventions help students be more successful in school by improving their attention, academic engagement, academic performance. Camila et al. (2019) Mindfulness as associated with better academic achievement. Eleni et al. (2022) see the efficacy of mindfulness interventions which accelerates positive outcomes in mental alert, academic performance. Peter et al. (2021) mindfulness practice improves short-term retention in a science course. Also, Parsons (2020) mindfulness meditation increase in student retention. The study of Irene et al. (2020) mindfulness skills training was contributory factors to memory retention affecting the academic performance in Mathematics.

Statement of the Problem

This evidence shows that students' academic performance in Mathematics needs modern teaching methods that would improve students' achievement in Mathematics. The bottleneck of academic performance in external examination confirmed by the May/June West African Examination Council (WAEC) (2020-2024) results scored by students in Katsina state shows that at least five credits Mathematics inclusive, this shown the level of students' achievement rate which revealed the performance is fluctuating based on percentage in the following statistical figures are 48.4%, 40.2%, 54.5%, 17.8% and 21.5% respectively. The increasing rate of low academic performance in Mathematics among students raised immense concern to the teachers, parents, psychologists and educationists. Several efforts have been made by the government in order to enhance academic performance in Mathematics in-collaboration with Katsina State Mathematics Improvement Project (KSMIP).

In addition, several factors have been identified to influence low retention among students and these include poor mathematics skills, lack of interest, passive engagement, ineffective classroom instructions, anxiety, phobia subjects, teachers influence (Usman et al 2023). But yet poor retention is still recorded in secondary schools in Katsina State due outcome of academic performance. Due to the role of retention in learning process, Abbas and Habu (2014) maintained that, if the learner cannot retain previous learning experiences, there could be no progress from one practice period to another. Guwam and Gwandum (2017) opined that learning should enhance retention, factors that lead to

increase retention need to be speed and efficiency in learning; effective training on students' performance and retention in mathematics, better comprehension and retain more knowledge of mathematics concepts. Therefore, Educational stakeholders should enhance ways of improving teaching and learning of mathematics in Katsina state due to its advantages to individual and to the society as a whole. Therefore, the study investigated the effect of Mindfulness Skills Training on academic performance and retention in Mathematics among Secondary School Students in Katsina State, Nigeria.

Objectives of the Study

The objectives of the study are:

1. To examine the effect of Mindfulness skills training in academics performance among secondary school students in Katsina state.
2. To examine the effect Mindfulness skills training in improving retention in mathematics among secondary school students in Katsina.

Research Question

The following research questions formulated for the research:

1. What is the effect of academic performance scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching?
2. What is the effect retention scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching?

Hypotheses

The following hypotheses were formulated for the research:

HO1: There is no significant effect in the mean of academic performance scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching.

HO2: There is no significant effect in the mean of retention scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching.

Methodology

The study adopted a quasi- experimental research design of pre-test, post-test and post-post-test, non-randomized control group. The experimental group (EG) taught using the Mindfulness training while the control group (CG) was taught by using the conventional method where the teacher delivered the teaching and led the students in understanding the lessons in the classroom. The choice of the design is because the researcher does not intend to distort the normal academic activities of the sampled schools. The population of the study is the entire students of senior secondary school students in Katsina Zonal Education Quality Assurance, (KZEQA) Katsina state which comprising the total of 17,257 students.

The multi-stage sampling technique was adopted to draw twenty-two (22) secondary schools sample across four stages. At stage one, schools in the zone were adequate coverage. At stage two, purposive sampling technique was used to select two mixed senior secondary school for the study. Purposive sampling technique was used to select two schools of which they are (SSS II) Science inter-class from the total number of schools in the zone. The justification for the selection of these two senior secondary schools was to enable the researchers to carry out their research for effective and efficient result. At stage three, two mixed senior secondary school were assigned to the groups. At final stage, the participants were identified as inter-class of SSS II science students. The sample size of this study consists of 115 SSS II Mathematics students which were drawn from two intact classes in two selected

from two different co-educational senior secondary schools in KZEQA. The experimental group (EG) has a total number of 76 students exposed to training while the control group (CG) has a total number of 39 students.

Experimental Procedure

These diagrams illustrate the design on Students’ academic performance and retention as represented in the following figures:



Key:

- EG= Experimental Group - exposed to MST, X1= Mindfulness skills training (MST)
- CG = Control Group - exposed to CTM, X0= Conventional Teaching Method (CTM)
- O1 = Pre-test O2 = Post-test
- O3 = Post-post-test (Retention)

Three research instruments were used for this study. The instrument, were tagged Mathematics Academic Performance Test (MAPT) and Mathematics Retention Test (MAT).The MAPT consists of 25-item multiple choice questions with four options adapted from West African Senior School Certificate Examination (WASSCE) to serve as pretest to ascertain equivalence of ability of subject and as post-test to determine the effect of the treatment on students’ performance based on trigonometry. Mathematics Retention Test (MRT) was used to determine the retention level of the students towards the Mathematic, the instrument was administered after two week of post-test to serve as post-post-test to see whether there is significant difference in students’ retention towards the Mathematics as a result of intervention.

The test items were given two expert from the Department of Science Education (Mathematics Lecturer) and Department Educational Psychology and Counselling, Federal University, Dutsin-ma, Katsina state, to establish the face and content validity of instrument, also to correctness of questions and options. They evaluated the instrument for its validity for accuracy and clarity of the test items for the study. To ascertain the reliability of instrument, it was administered a group of 25 SSS II students of intact (Science) class of in a school outside the scope of the study. The scores were subjected to Split-half Statistical Analysis, the reliability co-efficient of MAPT and MRT are 0.78 and 0.81 respectively.

The study involved two groups a pre-test was administered to two classes were assigned to groups (Experimental group and Control group). This enabled the researcher determine the performance status of the subjects before treatment. The study was conducted in three phases: pre-experimental activities, experiment proper and post-experimental activities: The first phase consists of administering the pretests on the topics included in the study and the test/exam anxiety questionnaire after securing permission from the school principal. In the second phase, the experimental group was exposed to Trigonometry using mindfulness skills training and the control group to the conventional teaching method. The semi-final phase of the study was the administration of the post-tests. The final phase of the study was the administration of the post-post-tests. The same assessment procedure was used for both groups and ensures objectivity in the conduct of the study.

Both groups were taught using appropriate lesson plan. Post tests were administered to both groups after the completion of treatment. Post-post tests were administered to both groups after two week of post test to ascertain the level of students’ retention and how the treatment is effective and the whole exercise lasted for eight weeks.

The instruments for data collection for this study were administered to the students before the

treatment. Scores obtained at this stage served as pre-test scores. After treatment, a post-test MAPT was administered to all the subjects in both groups. After two weeks of post-test, MRT was administered to all the subjects in both groups as post-post test. Data for the tests were recorded separately for each of the groups. To determine if significant difference exists between the pre-test, post-test and post-post test mean scores of each group, the Analysis of Covariance (ANCOVA) was employed for the research study. All the hypotheses were tested at 0.5 level of significance.\

Results

Research One: What is the effect of academic performance scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching?

Table 1: Mean and Standard Deviation of Academic performance on Experimental Group and Control Group

Group	N	Pretest		Posttest		Mean Gain
		M	SD	M	SD	
Experimental Group	76	8.11	2.03	16.28	2.66	8.17
Control Group	39	8.17	2.33	11.41	3.44	3.24

Table 1 shows the mean and standard deviation of pre-test and post-test motivation of students in experimental group has a pre-test (M = 8.11; SD = 2.03), while the control group has a pre-test mean score of (M = 8.17; SD = 2.33), At post-test, experimental group has academic performance score (M = 16.28; SD = 2.66) with mean difference of 8.11, while the control group has academic performance score (M = 11.41; SD = 3.44), with mean difference of 3.24. The mean score of academic performance score of experimental group is greater than academic performance score of the control group in both pre-test and post-test. The mean gain of experimental group (8.17) is greater than mean gain of control group (3.24), this implies that the treatment of had an effect in favour of Mindfulness skills training.

Research Two: What is the effect retention score of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching?

Table 2: Mean and Standard Deviation of Retention on Experimental Group and Control Group

Group	N	Posttest		Post-Posttest		Mean Gain
		M	SD	M	SD	
Experimental Group	76	16.28	2.66	18.93	2.33	2.65
Control Group	39	11.41	3.44	11.90	2.05	0.49

Table 2 shows the mean and standard deviation of pre-test and post-test retention of students in experimental group has a post-test (M = 16.28; SD = 2.66), while the control group has a post-test mean score of (M = 11.41; SD = 3.44), at post-posttest, experimental group has retention score (M = 18.93; SD = 2.33) with mean difference of 2.65, while the control group has retention score (M = 11.90; SD = 2.05), with mean difference of 0.49. The mean score of the retention score of experimental group is greater than retention score of the control group in both pre-test and post-test. The mean gain of experimental group (2.65) is greater than mean gain of control group (0.49), this implies that the treatment of had an effect in favour of exposed to Mindfulness skills training.

Testing of Hypotheses

Hypothesis One: There is no significant effect in the mean of academic performance scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching.

Table 3: ANCOVA of Academic performance scores of Experimental Group and Control Group

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	2171.655a	2	1085.828	21.642	.000
Intercept	1509.910	1	1509.910	45.142	.000
Academic PerPretest	966.493	1	966.493	34.892	.000
Treatment	418.671	1	418.671	6.259	.003
Error	3746.176	112	33.448		
Total	359664.000	115			
Corrected Total	4479.562	114			

a. R Squared = .861 (Adjusted R Squared = .690)

Table 3, shows the ANOVA analysis of pre-test score of experimental group and control group, F-value obtained is {F (1,112) = 6.259; p < .05}. Since the p-value of .003 is less than the alpha level of .05; it also revealed that (R2 = .861) 86.1% of variance in post-tests scores can be explained by the treatment. The Adjusted R2 = .690, indicating a high and indicates a strong explanatory power of the intervention and other factors. Therefore, the null hypothesis was rejected; this indicates that there was a significant effect of academic performance on students taught Mathematics using Mindfulness skills training than those taught using Conventional teaching method.

Hypothesis Two: There is no significant effect in the mean of retention scores of students taught Mathematics using the Mindfulness skills training and those taught using the conventional method of teaching.

Table 4: ANCOVA of Retention scores of Experimental Group and Control Group

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	23037.067a	2	11518.533	143.465	.000
Intercept	692.876	1	692.876	23.522	.000
Retention Posttest	10021.678	1	10021.678	340.222	.000
Treatment	1274.450	1	1274.450	45.012	.002
Error	6944.448	112	62.004		
Total	873637.000	115			
Corrected Total	68330.430	114			

a. R Squared = .966 (Adjusted R Squared = .931)

Table 4, shows the ANOVA analysis of post-test score of experimental group and control group, F-value obtained is {F (1,112) = 45.012; p < .05}. Since the p-value of .002 is less than the alpha level of .05; it also revealed that (R2 = .966) 96.6% of variance in post-post-test scores can be explained by the treatment. The Adjusted R2 = .931, indicating a high and indicates a strong explanatory power of the intervention and other factors. Therefore, the null hypothesis was rejected; this indicates that there was a significant effect of retention on students taught Mathematics using Mindfulness skills training than those taught using Conventional teaching method.

Discussion of the Findings

The study shows that Mindfulness skills training had greater improvement in academic performance compared to the control group, the findings of the study corroborated earlier assertions of Wolfe (2023) which reveals that there was a significant difference in pretest-posttest scores in favour of the Mindfulness skills training when comparing academic performance using conventional classroom students in Mathematics. The study revealed that Mindfulness skills training have significantly effect to enhanced students’ retention in Mathematics. The finding is in line with finding of Enikanolaye

(2021) who study found that there was a mean difference between the pre-test and post-test scores of student taught mathematics have retention than those taught mathematics using conventional method. From hypothesis one, the finding shows that, there was significant difference in academic performance scores of Students taught Mathematics using Mindfulness skills training and those taught using conventional teaching method. It can therefore revealed, that to a large extent, MST was effective in improving the academic performance of students toward learning Mathematics. The finding of this study was in line with the views of Lucy et al. (2023) findings from the study indicated that there was a significant positive difference between mindfulness training and student academic performance. In addition, the finding of this study agree with the views of Yang et al. (2021) who found that mindfulness training and academic performance are significantly different in promoting the development and improving student academic performance. In contrary, the finding of this study was not in line with the views of Huanjie and Fan (2021) whose studies lamented that mindfulness training has no significant effects on different kinds of mindfulness training need to be found in the study.

The hypothesis two analyses revealed that, there was significant difference in retention scores of Students taught Mathematics using mindfulness skills training and those taught using conventional teaching method. It can therefore revealed, that to a large extent, MST was effective in improving the retention of students toward learning Mathematics. The finding of this study was in line with the views of Parsons (2020) who found that study the applications of mindfulness meditation in various settings increases better student retention. The finding also agree with that of Oladunmoye et al. (2023) who results revealed that study skill training had a significant effect on academic performance in mathematics. In contrary, the finding of this study was in disagree with the views of Ashton-Hay and Doncaster (2021) whom finding indicated that students who attended study skills training performed better than those who did not attend study skills training. The findings of the study contradict with that of Peter et al. (2021) agree that there was no significant difference in the average score; intervention has effect on students' retention.

Conclusion

Based on the findings, it was concluded that Mindfulness skills training was more effective than conventional method of teaching in enhancing students' academic performance and retention when teaching trigonometry concept of mathematics. However, Mindfulness training of teaching was found effective in enhancing students' academic performance for better retention.

Recommendations

Based on the findings and the conclusions reached, the following recommendations were made:

1. Mathematics Teachers should make effective use of Mindfulness skills training in the teaching of mathematics as it improves students' learning performance and retention.
2. Curriculum planners are encouraged to include mindfulness skills training in the instructional processes in classrooms to enhance retention and achievement of students.
3. The Ministry of Education should organize seminars, workshops, and conferences to equip serving Mathematics teachers with requisite knowledge, skills and competences on the use of mindfulness skills training as instructional strategies for teaching and learning for better academic performance.

References

- Abbas, M. G. & Habu, G. (2014). Effect of Gender-Related Differences in Academic Achievement and Retention of Senior Secondary School Students Taught Geometry Using Problem Solving Approach. *International Conference on Education in Mathematics, Science & Technology*. 1, 484-488

- Ashton-Hay, K. & Doncaster, M. (2021). Study Skills, Student Success and Retention among Higher Education Students. *Asian Journal of Distance Education*, 16(2), 101-114.
- Bichi, S. S. (2015). Effects of problem-solving strategy and enriched curriculum on students' achievement in evaluation concept among secondary school students. Unpublished Ph.D Dissertation. Ahmadu Bello University, Zaria, Nigeria
- Camila, C., Ethan, S., Martin, R. W., Michael, D. M., Christopher F. O. G., & John D. E. G. (2019). Greater Mindfulness is Associated with Better Academic Achievement in Middle School. *International Mind, Brain, and Education*. Society and Wiley Periodicals, Inc.
- Eleni, M., Athanasios, D., & Charalampos, S. (2022). Mindfulness Strategies for Metacognitive Skills Training In Special Education: The Role of Virtual Reality. *Technium Social Sciences Journal*, 35, 232-262. ISSN: 2668-7798 www.techniumscience.com
- Enikanolaye, A. J. (2021). Effects of multimedia instructional strategy on senior school students' performance and retention in mathematics. *Anatolian Journal of Education*, 6(2), 193-206. <https://doi.org/10.29333/aje.2021.6214a>
- Fereshteh, A. & Vida, A. (2020). The comparison of mindfulness techniques teaching effects on improving teachers' occupational and students' academic performance. *Journal Educational Management Studies*. 10(1): 08-21.
- Guwam, B. & Gwandum, G. S. (2017). Effect of elaboration strategy on students' performance and anxiety in bearings and distances at senior secondary two levels in Plateau State. *The Journal of Mathematical Association of Nigeria*, Abacus, 42(2), 8-15.
- Huanjie, X. & Fan, Z. (2021). The Effectiveness of Mindfulness Training on Academic Achievement and Related Factors. *Advances in Social Science, Education and Humanities Research*, Proceedings of the 2021 2nd International Conference on Mental Health and Humanities Education, 561.
- Irene, A. P., Maria, C. Z. F. & Sheena, M. T. C., (2020). Factors on Memory Retention: Effect to Students' Academic Performance. *International Journal for Research in Mathematics and Statistics*, 6 (4), 1-24
- Lucky, W. M. Kisilu, K. & Nyabuto, E. (2023). Relationship between Self-Motivation and Student Academic Performance in Public Secondary Schools in Nyeri County. *Global Scientific Journal*, 11(3), Online: ISSN 2320-9186. www.globalscientificjournal.com
- Oladunmoye, E. O., Adegunle, S. O., Oyeniran, G. Yekinni, L. O., Olajumoke, R. & Adegunle, O. R. (2023). Effectiveness of Study Skill Training on Academic Achievement in Mathematics among Secondary School Students in Oyo State, Nigeria. *Al-Hikmah Journal of Arts & Social Sciences Education*, 5, (2), 176-186.
- Onoshakpokaiye, E. O. (2021). The Learning skills: an educational implication on students' performance in secondary school mathematics. *Mathematics Education Journals*, 5(2), 115-124. ISSN: 2579-5724 ISSN: 2579-5260.
- Pantziara, M., & Philippou, G. N. (2015). Students' motivation in the mathematics classroom. Revealing causes and consequences. *International Journal of Science and Mathematics Education*, 13(2), 385-411.
- Parrish, K. J. (2020). The Effects of Mindfulness on Students Academic Performance and Behaviours. Master Thesis, Bethel University. Spark Repository.
- Parsons, C. E., Nielsen, T. H., Vermillet, A. Q., Lykke, H. I., & Mitkidis, P. (2020). The impact of mindfulness training on performance in a group decision-making task: evidence from an experimental study. *Quarterly Journal of Experimental Psychology*, 73(12), 2236–2245.
- Peter, R., Rob, S., & Valerie, W. (2021). Can Mindfulness Practice Improve Short-term Retention in

- a Science Course? *Journal of the Human Anatomy and Physiology Society* 25 (1), 6-11.
- Sant, P. S, Sona A., & Shivani, A. (2023). Effect of Four Week Mindfulness on n-Back Task Performance and Mathematical Performance of Adolescents. *Multi Disciplinary and Bilingual International Research Journal* 6(4), 1513 – 1519.
- Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, 16(4), 213-225.
- Usman, T., Olaoye, A. E. & Audu, H. (2023). Effect of Constructivism Based Blended Learning Approach on Senior Secondary School Student Mathematics Academic Performance and Retention of in Katsina State. *Central Asian Journal of Mathematical Theory and Computer Sciences*. 4 (2), 46- 58. ISSN: 2660-5309.
- Van-Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A & Meyer, D. E. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, 13(1), 36–61. <https://doi.org/10.1177/1745691617709589>.
- Wolfe, L. (2023). The Impact of Mindfulness on Perceived Stress and Academic Performance among English Language Students in Central Asia. *Dissertations, Theses, and Projects*. 893. <https://red.mnstate.edu/thesis/893>.
- Yang, L., Yuqing, L., & Chaoyu, W. (2021). The Effect of Mindfulness Meditation on Academic Performance of Students. *Advances in Social Science, Education and Humanities Research*, 638, 56-61.
- Zaidi, F. Z., Ming, L. M., & Jumaat, A. (2022). Stop running away from stress; practice mindfulness instead. *International Conference on Technology and Innovation Management*, (297–306). Atlantis Press.
- Zou, Y., Li, P., Hofmann, S. G., & Liu, X. (2020). The mediating role of non-reactivity in mindfulness training and cognitive flexibility: A randomized controlled trial. *Frontiers in Psychology*, 11, 1053.
- Petersen, P. E. (2003). *The World Oral Health Report 2003: Continuous improvement of oral health in the 21st century—approaches to action*. World Health Organization.
- Samuel, Sally, Peter ,Okorie, Bright, Chikanma, Chidinma, Amuneke (2020) Assessment of Oral Hygiene Knowledge and Practice among Secondary School Students, in Owerri Municipal Area, Imo State, Nigeria.
- World Health Organization (2019). *Regional office for Africa. Promoting Oral Health in Africa: Prevention and control of oral diseases and noma as part of essential non-communicable disease interventions*. Brazzaville: World Health Organization. Regional Office for Africa; (2016) [cited 2022 Aug 4]. Available from: <https://apps.who.int/iris/handle/10665/205886> [Google Scholar]
- Yodeled, Y., et al. (2024). Oral health knowledge and practices among adolescents. *_Journal of Pediatric Dentistry_, _46_(2), 123-129.*