ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

The Impact of Integrating Sports Pedagogy in Teaching of English, Environmental Studies and Mathematics - An Assessment Based on D.El.Ed Trainee of DIET, Mon

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Publication Date: 2025/09/15

Abstract: Sport has always played a special role in society today. Sports offer a perfect opportunity to explore different concepts in English, Environmental Studies (EVS) and Mathematics. So this study focus on how English, Environmental studies and Mathematics can be learned through sports pedagogy. The objective for this study is to assess the learning outcomes based on knowledge about the sports and to assess whether there is any relation on teaching the concept in English, Environmental Studies and Mathematics with that of sport activities. The data is collected from 32 first year trainee of DIET, Mon, Nagaland. A paired sample t-test was performed to test the significance based on Likert scale. The results reveals that mean value in the post test for positive response is higher than the pre test while the standard deviation in the post test is less (8.17) compared to the pre test (25.53). The positive values between the pre and post test shows that they are negatively correlated between them (-010) significant at 95%. The mean value in the pre- test for negative response is higher (12.86) than the post test (4.00) while the standard deviation in the post test is less (5.12) compared to the pre test (8.83). The positive vales between the pre and post test shows that they are positively correlated between them (.060) significant at 95%. Hence, there is a positive change in learning outcomes based on this study.

Keywords: *Sport, Mean, Significant, Pre-Test, Post Test.*

How to Cite: Tongdi Jamir (2025) The Impact of Integrating Sports Pedagogy in Teaching of English, Environmental Studies and Mathematics - An Assessment Based on D.El.Ed Trainee of DIET, Mon. *International Journal of Innovative Science and Research Technology,* 10(9), 527-536. https://doi.org/10.38124/ijisrt/25sep323

I. INTRODUCTION

Sports have always played a crucial role in our society having an impact on individual's social, economic, political, cultural and educational perspectives. Since ancient times, exercise and sport have served various purposes. Since, then, physical and cultural knowledge, including sports, have been integral and inseparable to human life. Sport activities have played a vital role in human development till now. For many students, school-organized sports which play a significant role in their academic and social life. While sports are embedded in school curricula in the recent era to promote physical health and activity, their potential as learning tool is often underutilized.

By using sports as the medium through which scientific principles can be explored, not only are students in the school learn the underlying principles of science but they learn in an atmosphere that enhances physical health in relation to learning. For e.g.; in their everyday lives students learn how to ride a cycle, throw a ball, or jump rope in an environment. However, the scientific principles underlying these activities may not be realized. However, by connecting scientific concepts to real-world experiences, sports can bridge the gap between academic and everyday learning. Due to the abstract nature of the concepts in mathematics, many school children find learning very difficult. Concepts on shape, space, distance and volume can be visualized everyday life easily which can be used as in examples in the schools. Sports provide children with real life opportunities to explore develop and apply their mathematical skills and understanding which support curiosity and questioning. By watching the games and sports, students can use the writing skills through short stories and poems. Through this, the students can develop speaking skills by acting as a sports journalist.

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Sports education integration in NEP 2020 has emerged as an innovative strategy to address the challenges in teaching complex subjects. By utilizing sports activities teacher educators can capture students' interest, facilitate the understanding of theoretical concepts, and promote a more dynamic and participatory learning environment. Hence, learning will be easier and faster when one incorporate sports examples in teaching environmental, mathematical and language concepts in the schools.

II. LITERATURE REVIEW

The significance of sport teaching in physical education is investigated [10, 27, 28] and promoting teachers' education curriculum and pedagogical innovation [29]. Further, it investigates the development of scientific concepts by participants in learning though sports as the context through which scientific principles can be explored [12]. Moreover, studies on Physical activity and Environmental Education and between Physical activity and sustainability are investigated [4, 5, 6, 13, 15, 16, 20, 22, 30, 41, 42, 43].

In India, the Government recognized the importance of adopting sports as part of National Sports Policy which made sports and physical education an integral part of the school curriculum. [23] Recognized the importance of sports and physical education in developing human capital, increasing productivity, and in fostering social harmony [35]**.** In Primary school level gymnastics lessons were taught through basic movements such as forward and backward rolls, handstands, headstands and cartwheels, before moving on to combining sequences [21]. Teacher provides the children with novel experience them to use gravity to learn to roll [34]. [3] Investigate fine or gross motor activities to Math lessons that could improve children's Math performance and showed a temporary improvement in their mathematical abilities. [17] Incorporate mathematical concepts into the motor education segment - such as addition, subtraction, multiplication, division, decimal numbers, and counting jumping jacks. [2] Investigate the impact of educational games that combine physical education and Math's exercises on cognitive ability which yielded positive results. [32] Indicates that the use of mathematics exercises, combined with didactic games and the interdisciplinary teaching model, has a positive impact on the development of general mental abilities. [8, 26] Investigate Mathematics and Physical Education and significantly improved their ability to perform mathematical calculation. Physical education improves children's academic achievement [1]. [9] Applied "pushing and rolling a rubber wheel, throwing with one hand, taking side steps to learn mathematical concepts [9]. Studies by [1, 9, 40] incorporate exercises to achieve mathematical goals. Mathematics and sports [7, 18] found that basketball and baseball can be used for application of mathematical concepts and practices. [31], baseball statistics is used for teaching concepts like ratios, percentages, and probability. A study by [24] found that peer collaboration in sports-related activities helped students develop a deeper understanding of mathematical concepts through shared problem-solving and discussion. Mathematics learning using sports [19].

Four major large-scale research studies have been dedicated to testing the impact of physical activity on school achievement [36, 37, 38, 39, 38]. An analysis of these studies and careful comparison by [14] shows that three of these studies reported significant improvements in students' academic achievement when physical activity was increased [1, 11, 33], Increasing physical activity at school is essential to reduce sedentary rates and improve academic performance and behavior.

Sports Education is not just about performing a set routine repeatedly or a fun recreational activity; it is also about learning concepts that are otherwise hard to teach in theory. Academic institutions in India have faced scenarios where sports are not taught properly. Moreover, students often receive limited support from parents when it comes to playing sports at home. In a rigid society where high percentages are a measure of intellectual capability, one can hardly blame them. The real culprit is the country's rigid education system. Although sports are part of the curriculum, with most state and national boards offering it as a major subject for Class X, its importance ends there. The inclusion of sports seems more like a formality. Sports are often viewed as a part-time recreational activity, and students excelling in sports are seen as distracted. Until recently, India's education system prioritized students' mental development over physical growth.

At D.I.E.T, Mon, it is observed that most of the teacher trainees lack knowledge about games and sports rules, as reflected by their response and performance. They only engage in sports during the annual sports week, while theoretical classes dominate the rest of the year. The D. El. Ed curriculum does not emphasize sports, leading to a lack of awareness about their importance. This issue originates from the school curriculum, where sports are underemphasized, with limited opportunities for play. By the time trainee reach D. El. Ed level, they are unfamiliar with sports. Although the internet provides some knowledge, it is insufficient. Students often learn through informal play without proper guidance on rules and regulations. Many schools lack playgrounds, and sports are neglected in favor of theoretical subjects and rote learning. The National Education Policy [25] promotes sports pedagogy, integrating subjects like English, Environmental Studies, Science, and Mathematics with sports activities. This approach enables experiential learning, making complex concepts more accessible. Certain topics are better taught through sports, enhancing student understanding and engagement. This study aims to assess the knowledge of 1st year D. El. Ed trainees at DIET (Plate 1), Mon, Nagaland, regarding sports pedagogy in teaching these subjects.

- To assess the learning outcomes based on physical characteristics of the sports
- To assess whether there is any relation on teaching of the concept in English, Environmental Studies and Mathematics with that of sport activities.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

III. METHODOLOGY

To evaluate the success of this study's aims and objectives, an assessment was conducted on teaching English, Environmental Studies, and Mathematics using sports pedagogy. This work is based on National Education Policy (NEP), 2020. Data was collected from 32 first year trainees of DIET, Môn. The research investigation consisted of three stages.

Fig 1 First Year D.El.Ed Trainees

In the **first stage,** observations were made among trainees during the sports week conducted (March, 2025).Random oral interviews were conducted to assess trainee participation. The observation was taken for three days and the investigators identified the problems. In the **second stage**, based on the identified problems, a questionnaire was developed focusing on physical and cognitive development through games and sports, as well as knowledge of sports. A pre-test questionnaire, consisting of 15 questions (see Table 1) was administered to 32 first-year D. El. Ed trainees in March. The questionnaire used a Likert scale (Strongly disagree, disagree, neither agree nor disagree, agree and strongly agree) to assess their understanding of sports and games. In the **third stage**, intervention was conducted with the help of Flash Card and video clip based on the lesson (Geometry, Measuring distances, Concepts such as addition, multiplication, and fractions, ratios and proportions, percentages, motion (e.g., speed, velocity, acceleration), muscles, bones, and joints, Concept of energy (kinetic, potential, and mechanical energy), weather, altitude, or temperature, Concept of aerodynamics, speaking and writing skills). In the **fourth stage**, post-test questionnaires were administered to 32 trainee based on **Likert scale** (see Table 1).

Table 1 Pre - Test Questionnaire

1	A standard volleyball court is 18 meters (59 feet) long and 9 meters (29.5 feet) wide.
2	The badminton court is 13 m long and 6 m wide. For singles the court is marked 5.18m wide. The lines are 40 mm wide.
3	A futsal court's length ranges from 25 to 42 meters (82 to 138 feet), and its width ranges from 16 to 25 meters (52.5 to 82 feet).
4	The sport's venue for high jump is semicircular runway allowing an approach run of at least 16 meters from any angle within its 180° arc.
5	The runway where athletic sprint for long jump before taking off measure 40 meters in length and at the end of the runway lies the take off board which is 20 cm wide.
6	The length of Table Tennis is 2.70 m long and 1.520 m wide
7	A standard, full-sized basketball court, measures 28.65 meters long and 15.24 meters wide.
8	A standard cricket pitch is 20 meters long and 3 meters wide.
9	A standard field hockey field is 91.4 meters long and 55 meters wide
10	A standard lawn tennis court is 23 meters long and 8 meters wide for singles
11	Mansukh Mandaviyai is the Minister of Youth Affairs and Sports, Government of Pakistan
12	Indigenous games and sports is not at all relevant in this era as compared to modern sports
13	The Olympics are staged every five years.
14	The current president of the International Olympic Committee (IOC) is Marks Hopkin
15	P.T Usha is the president of Kerala Olympic association

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

Table 2 Post Test Questionnaire

A	Geometry is applied to understand angles and trajectories in sports like basketball, soccer, or golf
2	Measuring distances (e.g., running times, track lengths, or basketball shot distances) can't teach concepts like measurement, units, and conversion
3	Concepts such as addition, multiplication, and ratios scoring systems can be learned easily though sports (e.g., tennis, football or gymnastics)
4	Goal difference in soccer is not appropriate for the topics like fractions, ratios, and proportions
5	Sports events (e.g., equipment costs, travel expenses) is related to finance, addition, subtraction, and percentages
6	Physics of motion (e.g., speed, velocity, acceleration) can be demonstrated through sports activities like running, cycling, or basketball?
7	Human anatomy and physiology like muscles, bones, and joints can be taught through sports
8	Concept of energy (kinetic, potential, and mechanical energy) can't be explained through actions like jumping, throwing, or hitting a ball in sports
9	Environmental factors like weather, altitude, or temperature does not influence in sports performance or conducting.
10	Concept of aerodynamics is too difficult to teach through sports like cycling, swimming, or soccer to demonstrate how forces affect movement through air and water
11	Assigning students to be commentators during sports events in schools/colleges can help students developed their communications skills
12	Sports -based language learning activities hinder student's motivation and engagement
13	To teach grammar vocabulary and creative writing can be learned through sports journalism
14	Teachers and students do not need training and support in sports –based language learning methodologies
15	Writing skills can be developed through writing tasks, such as sports reports or game reviews

After the demonstration/lecture was executed, the data were collected, tabulated using **MS Excel**, and analyzed by simple statistical methods. A **paired sample t-test** was performed to test the significance of the given variables based on **Likert Scale** responses.

IV. RESULTS AND DISCUSSION

Based on the aims and objectives outlined in the previous section, this section will discuss the results based on the analysis above. The results will be presented using percentages, and paired t-test.

- *Comparison within the Likert scales in pre test based on percentage:*

The questionnaires for pre-test are based on positive and negative statement. The questionnaire from 1 to 10 is based on physical characteristics of the sports (Table 3) while from 11 to 15 is based on general knowledge based on sports personal.

Table 3 Percentage within the Pre Tests Likert Scale

Strongly Disagree	**Disagree**	**Neither Agree nor Disagree**	**Agree**	**Strongly Agree**
3	6	19	38	34
0	22	9	53	16
9	12	13	66	0
11	41	16	24	8
3	16	20	45	16
0	12	22	63	3
0	9	16	72	3
0	9	16	72	3
0	6	44	47	3
3	16	25	53	3
0	12	47	41	0
3	59	13	19	6
3	6	0	75	16
0	13	25	59	3
0	16	31	44	9

The above Table (3) reveals that there is oscillation between the types of questions irrespective of positive or negative statement. However, higher values are reported in Agree (44%) as compared to Neither agree nor disagree (31%), followed by Disagree (16%) and strongly disagree (9%). The analyzed data further reveals that there is a mixed response. The positive responses are indicated in bold while it is vice versa for negative response. The data are further classified between the positive outcome and negative outcome and neither agree nor disagree which are tabulated below (Table 4) and shown in Fig 1.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

Table 4 Classified values based on positive/negative response and neither agree nor disagree (NAND)

SN	Positive	Negative	NAND
1	72	9	19
2	22	69	9
3	66	22	12
4	46	36	18
5	62	19	19
6	12	66	22
7	75	9	16
8	9	75	16
9	50	6	44
10	19	56	25
11	12	41	47
12	62	25	13
13	9	91	0
14	12	63	25
15	53	16	31
Total	**39**	**40**	**21**

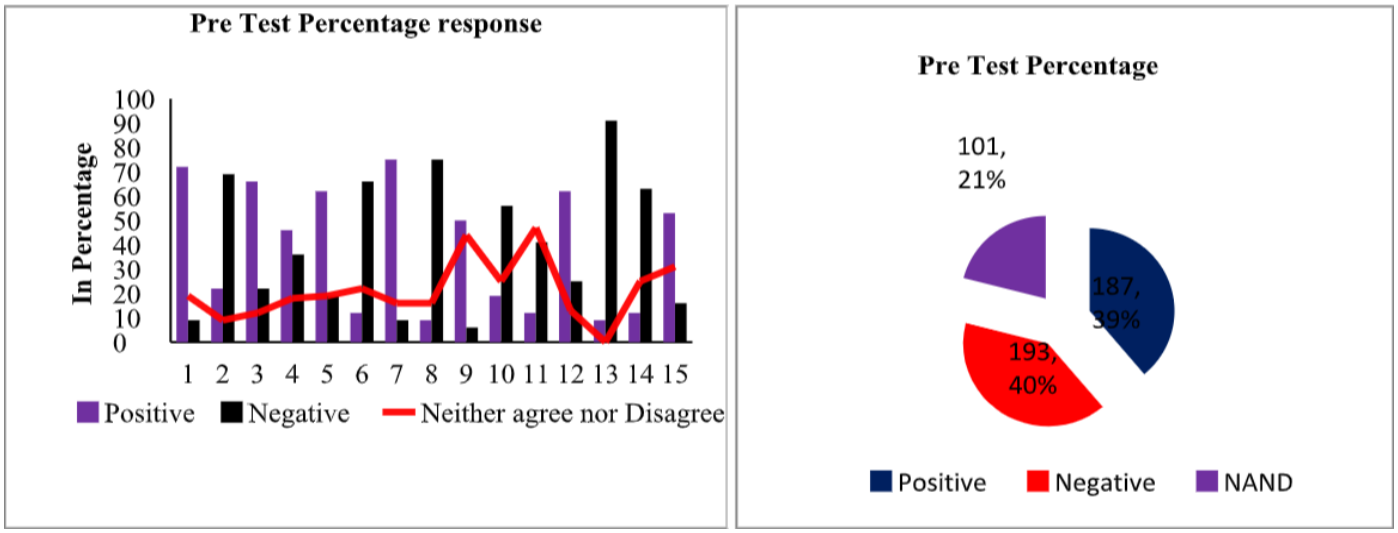

Fig 2 Bar Graph and Pie Chart in Pre Test

Fig 2; shows the patterns of positive and negative response and neither agree nor disagree. Within the three variables there is also variation which can be easily identified within the graph. The above Table (4) reveals there in the pre test, there is a mixed result between the positive (39%) and negative response (40%) whereas for neither agree nor disagree it is 21%. This reflects that the trainee are not much clear about the physical characteristics of games and sports and also general knowledge based on sports personals.

➢ *Comparison within the Likert Scales in Post Test Based on Percentage:*

Table 5 Percentage Between the Post Tests Likert Scale

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
0	0	0	53	47
25	56	3	3	13
3	0	3	60	34
3	63	28	6	0
3	0	0	72	25
3	0	0	53	44
3	13	9	50	25
25	59	3	13	0
12	69	16	3	0
10	31	28	25	6
0	6	0	47	47

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

12	19	6	41	22
3	3	3	56	35
3	69	13	9	6
0	3	3	47	47

After the pre-test, the data was analyzed and it was found out that majority of them have not understood about the physical characteristics of games and sports. Therefore, intervention was taken though discussion and by lecture. The table (5) clearly reflects that higher percentage values can be easily identified in all the sectors of Likert scale. The values range from 0 to 47 in strongly agree, 0-72 in Agree, 0- 28 in neither agree nor disagree, 0- 69 in Disagree and 0- 25 in strongly agree.

It is observed that higher values are reported in all the sectors of Likert scale. Further, in order to understand the clear picture of the response the data are classified into three group's positive, negative and neither agree nor disagree. The classified data are shown in Table 6.

Table 6 Classified Values Based on Positive/Negative Response and Neither Agree nor Disagree (NAND)

SN	Positive	Negative	NAND
1	100	0	0
2	81	16	3
3	94	3	3
4	66	6	28
5	97	1	0
6	7	1	0
7	75	16	3
8	84	13	3
9	81	16	3
10	41	31	28
11	94	6	0
12	31	63	6
13	91	6	3
14	72	16	12
15	94	3	3
Total	**80**	**12**	**8**

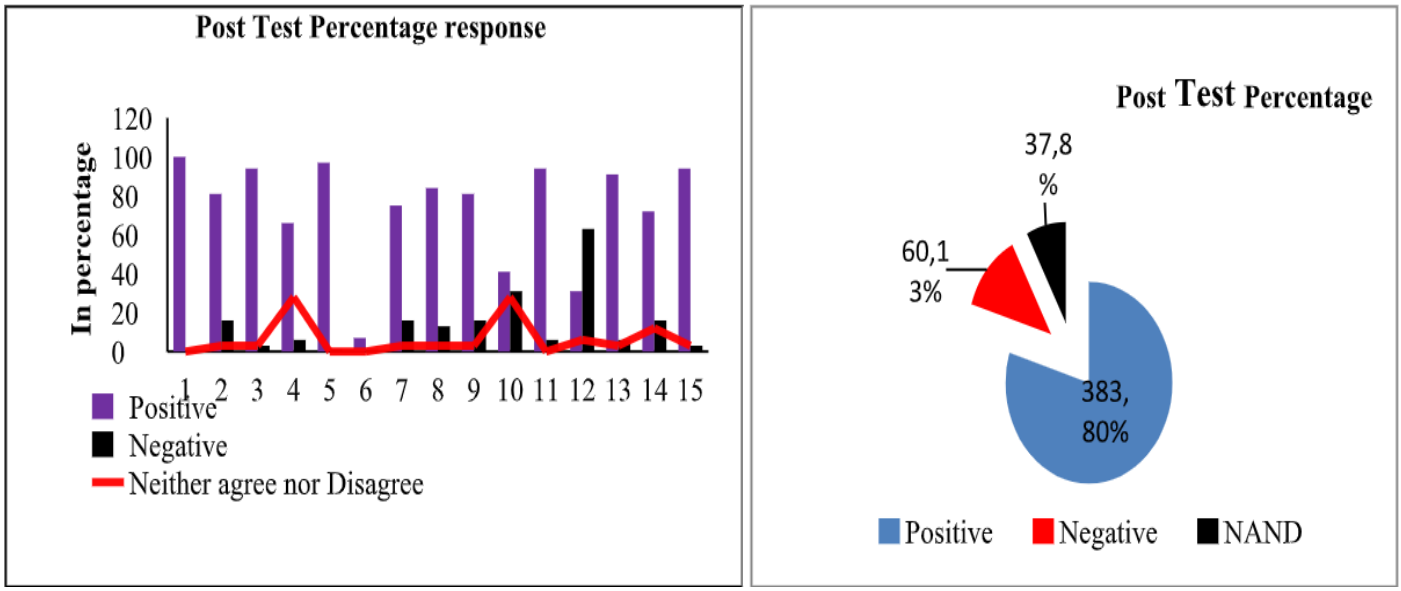

Fig 3 Bar Graph and Pie Chart in Post Test

The Table 6 indicates that positive values are higher than the negative values however the values for neither agree nor disagree are very less. This shows that after intervention there is a change in understanding of the concept. Positive values covered 80% while negative values covers 12 % while neither agree nor disagree is very less 8%. The figure also shows that within the positive and negative as well as neither agree nor disagree there are variation in the values. Oscillation can be easily identified. The Figure (3) also reveals that there is a positive learning outcome among the students.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

➢ *Comparison Between the Pre and Post Test Based on Positive Response (Paired T-Test)*

Table 7 Paired Sample Test for Positive Statement

Paired Samples Statistics					
		Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	VAR00001	12.4667	15	8.17546	2.11089
	VAR00002	25.5333	15	6.56687	1.69556

Paired Samples Correlations				
		N	**Correlation**	**Sig.**
Pair 1	VAR00001 VAR00002	15	-.010	.971

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	**Std. Deviation**	**Std. Error Mean**	**Lower**	**Upper**	**t**	**df**	**Sig. (2-tailed)**
Pair 1	VAR00001 - VAR00002	-13.06667	10.53882	2.72111	-18.90287	-7.23046	-4.802	14	.000

The mean value in the post test is higher than the pre test while the standard deviation in the post test is less (8.17) compared to the pre-test (25.53). The positive vales between the pre and post test shows that they are negatively correlated between them (-010). Further, there is a negatively correlation between the pre and post-test significant at 95%.

➢ *Comparison Between the Pre and Post Test Based on Negative Response (Paired T-Test)*

Table 8 Paired Sample Test for Negative Statement

Paired Samples Statistics					
		Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	VAR00001	12.8667	15	8.83068	2.28007
	VAR00002	4.0000	15	5.12696	1.32378

Paired Samples Correlations				
		N	**Correlation**	**Sig.**
Pair 1	VAR00001 VAR00002	15	.060	.832

Paired Samples test									
		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	**Std. Deviation**	**Std. Error Mean**	**Lower**	**Upper**	**t**	**df**	**Sig. (2-tailed)**
Pair 1	VAR00001 - VAR00002	8.86667	9.94174	2.56694	3.36112	14.37222	3.454	14	.004

The mean value in the pre- test is higher (12.86) than the post-test (4.00) while the standard deviation in the post test is less (5.12) compared to the post test (8.83). The positive values between the pre and post-test shows that they are positively correlated between them (.060). Further, there is a positively correlation between the pre and post-test significant at 95%.

➢ *Comparison Between the Pre and Post Test Based on Neither Agree nor Disagree Response (Paired T-Test)*

Table 9 Paired Sample Test for Neither Agree nor Disagree Statement

Paired Samples Statistics					
		Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Pair 1	VAR00001	6.8000	15	4.09180	1.05650
	VAR00002	2.4667	15	3.04412	.78599

Paired Samples Correlations				
		N	**Correlation**	**Sig.**
Pair 1	VAR00001 VAR00002	15	.123	.663

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

Paired Samples test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	VAR00001 - VAR00002	4.33333	4.79086	1.23700	1.68024	6.98643	3.503	14	.004

The mean value in the pre-test is higher (6.80) than the post-test (2.46) while the standard deviation in the pre and post-test is almost same. The values between the pre and post-test shows that they are positively correlated between them. Further, there is a negatively correlation between the pre and post-test significant at 95%.

V. CONCLUSION

➢ *Based on the Discussions in the Earlier Paragraphs, the Following Significant Points can be Highlighted:*

- The questionnaire in pre-test is based on physical characteristics of the sports and general knowledge of the sports personals while in the post-test the questionnaire are based on learning outcomes.
- There is oscillation between the types of questions irrespective of positive or negative response. However, higher values are reported in Agree (44%) as compared to Neither agree nor disagree (31%), followed by Disagree (16%) and strongly disagree (9%). The analyzed data further reveals mixed response.
- In the pre-test, there is a mixed result viz., positive (39%) and negative response (40%) whereas for neither agree nor disagree it is 21%. This reflects that the trainees are not much clear about the physical characteristics of games/sports as well the general knowledge.
- Higher percentage values in post-test can be easily identified in all the sectors of Likert scale. The values range from 0 to 47 in strongly agree, 0-72 in Agree, 0- 28 in neither agree nor disagree, 0- 69 in Disagree and 0- 25 in strongly agree. It is observed that higher values are reported in all the sectors of Likert scale.
- The results indicate that positive values are higher than the negative values however neither agree nor disagree are very less. This shows that after intervention that is a change in the understanding of the concept. Positive values covered 80% while negative values cover 12 % while neither agree nor disagree is very less 8%. Variation is reported in Positive/negative response and neither agrees nor disagrees. The study reveals that there is a positive learning outcome among the students.
- The mean value in the post test for positive response is higher than the pre-test while the standard deviation in the post test is less (8.17) compared to the pre-test (25.53). The positive vales between the pre and post-test shows that they are negatively correlated between them (-010). Further, there is a negatively correlation between the pre and post-test significant at 95%.
- The mean value in the pre- test for negative response is higher (12.86) than the post-test (4.00) while the standard deviation in the post test is less (5.12) compared to the pre test (8.83). The positive vales between the pre and post-test shows that they are positively correlated between them (.060). Further, there is a positively correlation between the pre and post-test significant at 95%.
- The mean value in the pre-test for neither agree nor disagree is higher (6.80) than the post-tests (2.46) while the standard deviation in the pre and post-test is almost same. The vales between the pre and post-test shows that they are positively correlated between them. Further, there is a negatively correlation between the pre and post-test significant at 95%.

Learning the lesson on English, Environmental Studies (EVS) and Mathematics through games and sports will be easier. Through the vehicle of sports, not only are trainee learning the underlying principles of English, EVS and Math's concepts but embraces the psycho-social-creative-emotional connection to learning. Nowadays, schools and colleges in India are slowly but steadily starting to realize the value of sports in the overall development of children. This is reflected in the deliberate inclusions of sports an essential part of the present-day education system. This is particularly relevant in the Indian context where the focus has entirely on been on academics based on memorization for a long time. And also this is the right time to learn the concepts through traditional games also in the modern age of technology. Due to the arrival of the computers, games are played on computer so the life has become idle and become a storehouse of various diseases.

Even though, sports are played hardly in the institute by the trainee. But after the intervention is taken, the trainee knows the relevance of games and sports. Now they know that lesson on all the subjects can be learned through games and sports. NEP, 2020, focuses on learning about English, EVS, Science, Social Science and Mathematics through sports pedagogy. The mean value in the post test for positive response is higher than the pre-test while the standard deviation in the post test is less compared to the pre-test. The positive values between the pre and post-test shows that they are negatively correlated between them. Hence, this study reveals that there is a positive impact among the trainee.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

REFERENCES

[1]. Álvarez-Bueno, C., Pesce, C., Cavero-Redondo, I., Sánchez- López, M., Garrido-Miguel, M., & Martínez-Vizcaíno, V. (2017). Academic Achievement and Physical Activity: A Meta-analysis. Pediatrics, 140 (6) , e20171498. https://doi.org/10.1542/peds.2017-1498

[2]. Boz, B., & Kiremitci, O. (2020). Effect of maths-integrated PE games on cognitive ability. *South African Journal for Research in Sport, Physical Education and Recreation*, 42(2), 1–1, 4.https://www.ajol.info/index.php/sajrs/article/view/200104

[3]. Beck, M., Lind, R., Geertsen, S.S., Ritz, C., Jesper Lundbye-Jensen, & Wienecke. J. (2016), Motor-Enriched Learning Activities Can Improve Mathematical Performance in Preadolescent Children, *Frontiers in Human Neuroscience*, December, 10, DOI:10.3389/fnhum.2016.00645

[4]. Baena-Morales, S., Ferriz-Valero, A., Campillo-Sánchez, J. & González-Víllora, S. (2021a) Sustainability Awareness of In-Service Physical Education Teachers. *Education Sciences*, 11.

[5]. Baena-Morales, S., Merma-Molina, G. & Gavilán-Martín, D. (2021b). What Do Physical Education Teachers Know About The Sustainable Development Goals? A Qualitative-Exploratory Study. *Retos*, 42, 452-463.

[6]. Baena-Morales, S. & González-Víllora, S.(2022). Physical Education For Sustainable Development Goals: Reflections And Comments For Contribution In The Educational Framework. Sport, Education And Society, *Sport, Education and Society*, 28(6), 697–713. https://doi.org/10.1080/13573322.2022.2045483

[7]. Casey, A., & Quennerstedt, M. (2015). "Between ideals and reality": learning situations and student identity in physical education, Physical Education & Sport Pedagogy, 20, 565–578.

[8]. Cecchini J.A., & Carriedo, A., (2020). Effects of an Interdisciplinary Approach Integrating Mathematics and Physical Education on Mathematical Learning and Physical Activity Levels, Journal of Teaching in Physical Education, 39(1):121-125, DOI:10.1123/jtpe.2018-02744

[9]. Capio, C. M., Cheung, S. K., Fung, S. S. W., & Hu, X. (2024). Integrating Fundamental Movement Skills and Mathematics in Early Childhood: A Pilot Study. *Children*, 11(4), 457. https://doi.org/10.3390/children11040457

[10]. Drummond, M., & Pill, S. (2011). The role of physical education in promoting sport participation in school and beyond. In S. Georgakis & K. Russell (Eds.), *Youth sport in Australia: History and culture* (pp. 165-178). Sydney, NSW: Sydney University Press.

[11]. Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., Lambourne, K., & Szabo-Reed, A. N. (2016). Physical Activity, Fitness, Cognitive Function, and Academic Achievement in Children: A Systematic Review. *Medicine & Science in Sports & Exercise*, 48(6), 1197–1222. https://doi.org/10.1249/MSS.0000000000000901

[12]. Donaldsona, J.P & Hammrich, P.L. (2016) Sports as a Creative Way to Teach Science, *International Journal of Curriculum and Instruction*, 8(2), 64–72

[13]. Dudley, D. & Cairney, J. (2021). Physical Literacy: Answering The Call For Quality Education And Sustainable Development. *Prospects*. 50, 5-11.

[14]. Fedewa, A. L., & Ahn, S. (2011). The Effects of Physical Activity and Physical Fitness on Children's Achievement and Cognitive Outcomes: A Meta-Analysis. *Research Quarterly for Exercise and Sport*, 82(3), 521–535. https://doi.org/10.1080/02701367.2011.10599785

[15]. Fröberg, A. & Lundvall, S. (2021). The distinct role of physical education inthe context of agenda 2030 and sustainable development goals: An explorative review and suggestions for future work. *Sustainability*, (Switzerland), 13.

[16]. García-Rico, L., Martínez-Muñoz, L.F., Santos-Pastor, M.L., & Chiva- Bartoll, O. (2021). Service-learning in physical education teacher education: a pedagogical model towards sustainable development goals. International Journal of Sustainability in Higher Education, 2 July, 22 (4): 747–765. https://doi.org/10.1108/IJSHE-09-2020-0325

[17]. Hodges, (2015) in Griffo, J. M., Kulinna, P., Hicks, L., & Pangrazi, C. (2018). Becoming One in the Fitness Segment: Physical Education and Mathematics,*The Physical Educator*, 75(4), 647–660. https://doi.org/10.18666/TPE-2018-V75-I4-8199

[18]. Kirk, D., & Kinchin, G. (2003). Situated learning as a theoretical framework for sport education, European Physical Education Review. 9, 221–235. doi: 10.1177/1356336X030093002

[19]. Kautz, N.L., & Kowalsky, M.A., (2021). Using Sports to Motivate Math Learners: Examples for Teaching Mathematical Literacy, In book: *Disciplinary Literacy Connections to Popular Culture in K-12 Settings*, (pp.313-340), DOI:10.4018/978-1-7998-4721-2.ch015

[20]. Lohmann, J., Breithecker, J., Ohl, U., Giess-Stueber, P. & Brandl-Bredenbeck, H. P. (2021). Teachers' Professional Action Competence In Education For Sustainable Development: A Systematic Review From The Perspective Of Physical Education, *Sustainability*. 13. Doi:10.3390/Su132313343.

[21]. Metzler, M. (2017). *Instructional Models in Physical Education* (3rd ed.). Routledge. https://doi.org/10.4324/9781315213521

[22]. Macassa, G. (2021). Can Sustainable health behavior contribute to ensure healthy lives and wellbeing for all at all ages (Sdg 3)? A Viewpoint, *Journal of Public Health Research*, 10. April 19, 10(3), 2051. doi: 10.4081/jphr.2021.2051.

[23]. National Sports Policy. (2011). https://yas.nic.in/sites/default/files/File918.compressed.pdf

[24]. Nasir, N. S. (2012). *Racialized identities: Race and achievement among African American youth* . Redwood City, CA: Stanford University Press.

[25]. NEP (2020) https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25sep323

[26]. Otero, M. A., & Lafuente Fernández, J. C. (2022). Análisis del trabajo de contenidosmatemáticosdesdeelárea de EducaciónFísicaenEducación Primaria (Analysis of the work of mathematical contents from the area of Physical Education in Primary Education). Retos, 45, 224–232. https://doi.org/10.47197/retos.v45i0.92365

[27]. Pill, S. (2009). *Sport teaching in physical education: Considering sport literacy*. Paper presented at the 26th ACHPER International Conference, July 3-5, Brisbane.

[28]. Pill, S. (2010). Sport literacy - It's not just about learning to play sport via 'textbook techniques'. *Journal of Student Wellbeing,* 4(2), 32-42.

[29]. Pill, S, Dawn, P & Karen, S. (2012) "Rethinking Sport Teaching in Physical Education: A Case Study of Research Based Innovation in Teacher Education," Australian *Journal of Teacher Education*, 37; 8, 8. Available at: http://ro.ecu.edu.au/ajte/vol37/iss8/8

[30]. Posso Pacheco, R. J., Cóndor Chicaiza, M.G., Cóndor Chicaiza, J.R. & Núñez Sotomayor, L.F.X. (2022). Sustainable Environmental Development: A New Approach To Physical Education For Post-Pandemic In Ecuador, *Revista Venezolana De Gerencia,* 27, 464-478.

[31]. Quinn, R. (1996). Having fun with baseball statistics. Mathematics Teaching in the Middle School, *National Council of Teachers of Mathematics*. 1, 10, 780–785. doi: 10.5951/MTMS.1.10.0780

[32]. Raven, J., Raven, J. C., & Court, J. H. (1998). Manual for Raven's progressive matrices and vocabulary scales. Section 3: Standard progressive matrices. San Antonio: Harcourt. https://www.researchgate.net/profile/John-

[33]. Rasberry, C. N., Lee, S. M., Robin, L., Laris, B. A., Russell, L. A., Coyle, K. K., & Nihiser, A. J. (2011). The association between school-based physical activity, including physical education, and academic performance: A systematic review of the literature. *Preventive Medicine*, 52 Supplement, 1, S10-20. https://doi.org/10.1016/j.ypmed.2011.01.027

[34]. Rudd, J. R., C. Pesce, B. W. Strafford, & K. Davids. (2020). "Physical Literacy-A Journey of Individual Enrichment: An Ecological Dynamics Rationale for Enhancing Performance and Physical Activity in all." *Frontiers in Psychology*, 11: 1904. doi:10.3389/fpsyg.2020.01904.

[35]. Rani S and Bhalla. S. (2021). Sports education in India: A contemporary perspective, International Journal of Yogic, *Human Movement and Sports Sciences*, 6, (1): 98-102

[36]. Shephard, R. J., Lavallée, H., Voile, M., LaBarre, R., & Beaucage, C. (1994). Academic Skills and Required Physical Education: The Trios Rivieres Experience, *CAHPER Research Supplement,* 1, 1–12.

[37]. Shephard, R. J. (1997). Curricular Physical Activity and Academic Performance, *Pediatric Exercise Science*, 9(2), 113– 126. https://doi.org/10.1123/pes.9.2.113

[38]. Sallis, J. F., McKenzie, T. L., Kolody, B., Lewis, M., Marshall, S., & Rosengard, P. (1999). Effects of Health-Related Physical Education on Academic Achievement: Project SPARK. *Research Quarterly for Exercise and Sport,* 70(2), 127–134.https://doi.org/10.1080/02701367.1999.10608030

[39]. Sibley, B. A., & Etnier, J. L. (2003). The Relationship between Physical Activity and Cognition in Children: A Meta-Analysis. *Pediatric Exercise Science*, 15(3), 243–256.

[40]. Sneck, S., Viholainen, H., Syväoja, H., Kankaapää, A., Hakonen, H., Poikkeus, A.-M., &Tammelin, T. (2019). Effects of school-based physical activity on mathematics performance

[41]. in children: A systematic review, *International Journal of Behavioral Nutrition and Physical Activity*, 16(1), 109. https://doi.org/10.1186/s12966-019-0866-6

[42]. Savelyeva, I. P., Danilova, I. V., Karpushkina, A. V. & Kilina, I. P. (2021). Physical Activity, Health And Environment Among The Priorities Of Sustainable Development Of The Regions, *Human Sport Medicine*, 21, 141-152.

[43]. Santos-Pastor, M. L., Ruiz-Montero, P. J., Chiva-Bartoll, O., Baena-Extremera, A. & Martínez-Muñoz, L. F. (2022). Environmental Education In Initial Training: Effects Of A Physical Activities And Sports In The Natural Environment Program For Sustainable Development, Frontiers in Psychology, 13:867899.

[44]. Yermilova, V. V.& Murtazina, G.H. (2019). Outreach Of Sustainable Development Principles In Physical Culture And Sports, *Asia Life Sciences1,* 39-157.