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EFFECT OF STRUCTURED PHYSICAL EDUCATION INTERVENTION ON SCIENCE PROCESS SKILLS BY GEN Z STUDENTS: A QUASI EXPERIMENTAL STUDY

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Abstract:

Physical education being a faculty having its bearing on many academic disciplines the present study aims at studying the impact of physical education activities on the acquisition of science process skills. The study has investigated the effectiveness of selected physical education activities among class IX students under the Government administration. A quasi experimental design was adopted involving class IX students (N=80) with existed class splits was taken as control and experimental (n=40 each)as such. The investigator has developed physical education activities that are practiced at the school on daily basis for a period of 21 days leaving no interval. At the end of 21st day of intervention a specifically designed science process skills test was administered on the experimental group having exposure of the physical education activities and the control group having no exposure to the physical education activities. Neither the group were taught about science process skills and the test for measuring the acquisition of science process. The Science process skills test was administered to both the control and experimental group. Data analysis with SPSS through t test (t value 6.55 $p<0.05$) shows the enhancement of the acquisition of science process skills among the experimental group. The results are imperative to the students, teachers and all other stakeholders of science education to suggest the physical education competencies can be effectively transformed into Cognitive Science skills. The study highlights the importance of integrating physical education into academic curriculum to promote holistic learning outcomes in qualitative manner at the cost of having a proven effect on the acquisition of science process skills.

Key Words: Physical Education Competencies, Science Process Skills, Genz and Digital Integration and Cognitive Development

Introduction:

As the Gen Z Kids digital divide is significantly differ from their predecessors, their mobile dependability on e-world causes to seek attention of the educational stakeholders to engage them with physical activities and exercises. Being tech-bloomers the contemporary students sports and games also witnesses some transition (Francis, T., & Hoefel, F.2018). Interestingly the Gen Z are prioritizing the physical education in resurging way by adopting hybrid approach integrating physical education sessions with digital applications such as digital applications, wearables and influencer-led workouts.

The GenZ physical education aptitude and interest are tech-dependent and interestingly shaped by influencers and social media. The key drivers of physical education activities for GenZ are social media, influencers, flexibility and variety. The Gen Z are recognising the corroboration of physical activity and mental wellness.

Digital First Approach:

The profound available to and accessibility of internet, Gen Z expects integration of digital Spheres in all walks of lives. Digital first mind set of Gen Z drives a demand from all service providing sectors including education covering physical education too. The mobile application feeding of Gen Z's learning inputs are inevitable as they demand and synchronises such app followers. The screen time and occular health is a word of caution to be informed of on their health concerns (Francis, T., & Hoefel, F. 2018).

Principles of Physical Education Activities Intervention:

The investigator has developed some physical education activities as intervention to investigate its effect on the acquisition of science process skills. They aptitude of GenZ have been kept in mind for tailoring the selected physical education activities.

For harnessing the maximum potential from the interventional strategy the key trends of Gen Z towards physical fitness have been taken care of. The considered core criteria are,

- Hybrid model of flexibility and convenience. It is achieved by integrating live classes, on-demand digital workouts and trainings on app based.
- Digital integration at maximum touch points. Data tracking social connectivity and personalised scheduling are the means to achieve this end. The participants are encouraged to investigate the popular wearables and free fitness apps. Participants also made familiar to comparable mobile apps that provide personalized workout plans, progress tracking with feedback offers.

- Social fitness through group fitness dominance

The Gen Z are more attenuate to the social skills from fitting into sociable means to be a part of a group. The investigator has made significant proportion of selected activities constituted by group events and activities.

- Strength and functional training

The recent trend shows the resurgence of strength and functional training activity by GenZ. The generation is influenced by the influencers of strength and functional training resulting in muscle building.

Development of Intervention Physical Education Activities:

The investigator has developed physical education activities that are synchronising the above criteria that are prioritised by Gen Z. Activities were designed to be of a 50 minutes time requirement with time slot for initial stretching activities and final warm down cycle. The activities were designed and tailored by the investigator based on the ground experience of the investigator and performance of the participants in real ground settings for a period of 6 weeks. The interventional strategy was developed and piloted for usability, practicability and hurdle freeness. From the reflections of piloting stage necessited alterations were done tovarrive interventional strategy. The final version of the strategy arrived with the consultation of experts. The developed interventional physical education activities strategy addressed the objectives, materials required, physical skills to be developed, safety precautions and resting period requirements (Khan, B., & Vanaja, M. 2019).

Implementation of Interventional Strategy:

The interventional package of physical education activities consisting of 50 minutes time duration were administered on the experimental sample for 21 days. The participants were taken care of their physical and mental comforts during the interventional period (Francis, T., & Hoefel, F. 2018). The participants were encouraged to keep digital record of the progress during the period of investigation (Francis, T., & Hoefel, F. 2018). The possible threats to internal and external validity of the research design have been adequately taken care of. The intervention was after schooling hours to ensure the internal validity to research design.

- Gamified High Intensity Interval Training
- Warm-up (8-10min); Main set 20 min-30-60 high intensity bouts: active recovery, cool down (5-8 min).
- Gamification layer: Real time feedback through Strava; Performance points and ranking.

Design of the Study:

The study was of quasi experimental in nature. The intact classes of standard IX were taken as such having equal number of participants. The sample selection is simple random sampling consisting of 40 students in experimental group and 40 students in control group. The designation of the groups into control and experimental was randomly done.

Data set and Analysis:

The data collected were in the interval scale. The collected data were tabulated and analysed using SPSS for 't' test. The hypothesis was tested on light of statistical significance of the computed results.

Hypothesis:

There is no significant difference in transforming the Physical Education competencies into Cognitive science process skills among the class IX students.

Science Process Skills and Their Acquisition:

The science process skills are set of skills that serves as vehicles of thought that can be transfer ably acquired and applied across the discipline. The science process skills deemphasize content and promote the processing aspect of mental faculties to gain expertise on processing aspect from product aspects such as scores, rank, percentile, content base achievement test of science processes that emphasize product aspect of constructing knowledge (Keil, C., Haney, J., & Zoffel, J. 2009).

Physical Education Activities Versus Science Process Skills:

Education activities generally focus on developing motor skills while signs process skills focus on the development of cognitive skills (Hofstein, A., & Lunetta, V.N. 2003).

Table 1: Comparison between physical education activities and Science process skills

S.No	Parameter	Physical Education Competencies	Science Process Skills
1	Focus	Physical Mastery	Mental / Cognitive
2	Methods	Physical Traits, Competencies	Inquiry, Investigation
3	Outputs	Fitness, Motor Skills	Data, Conclusions.

Connecting the Physical Education Activities with Science Process Skills:

Having striking differences on key aspects between the physical education activities and Science process skills (Khan, B., & Vanaja, M. 2019), the present study intent to investigate the impact of former on later. The key insights are the transferability of skills across the faculties and scientific nature of extended delivery of physical education activities (Felt, L. J., & Robb, M. B. 2016).Deemphasizing on content has inspired the investigator to believe and effect of physical education activities could impact on the acquisition of science process skills (Callaghan, P. 2004). The tool to measure the science process skills were tailored with the experts on the subjects with satisfactory level of norms of reliability, validity and feasibility.

Administration of Science Process Skills Test:

The investigator made Science process skills test was administer to both the control and experimental groups extempore. The groups were never taught the science process skills and their acquisition. The test tool for measuring science process skills contain 50 items that include objective type question covering simple science process skills and integrated Science process skills (Balanay, C.A.S., & Roa, E.C.C. 2013). The tool was at refined by subjecting to the objectivity, reliability, validity and feasibility. The test was administered to both the groups for a duration of 90 minutes.

The Homogeneity of the Groups:

In order to equate the groups before the intervention the investigator has decided to consider the previous school examination science subject marks as baseline. As there is no scope for separate teaching learning of science process skills other

than that of teaching the Science as a subject, the investigator has not paid any attempt to establish the homogeneity between the groups in terms of science process skills. The inter-group equality has been established in terms of science achievement alone.

Table 2: Status of control and experimental group in terms of achievement in science test

Group	N	Mean	Std Deduction	Std Error Mean	df	t Value
Control	40	45.60	11.12	1.759	39	1.61 (ns)
Experimental		48.75	8.24	1.304		

Not significant at 0.05 level
't' table value 2.042

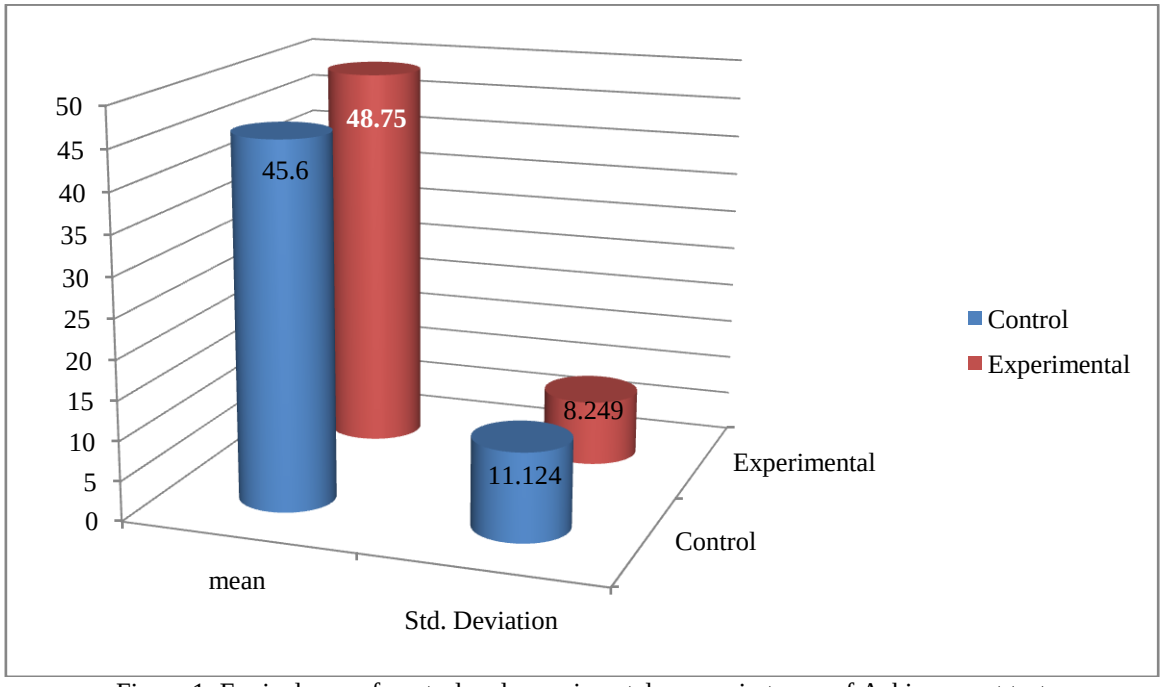

Figure 1: Equivalence of control and experimental groups in terms of Achievement test

Table shows the groups are equivalent in terms of their achievement level in science subject measured by the achievement test in science test before the intervention of selected physical education activities.

Table 3: Status of control and experimental groups in the science process skills test

Group	N	Mean	Std Deduction	Std Error Mean	df	t Value
Control	40	57.45	8.00	1.26	39	6.55 *
Experimental		68.90	8.33	1.31		

Significant at 0.05 level
't' table value 2.042

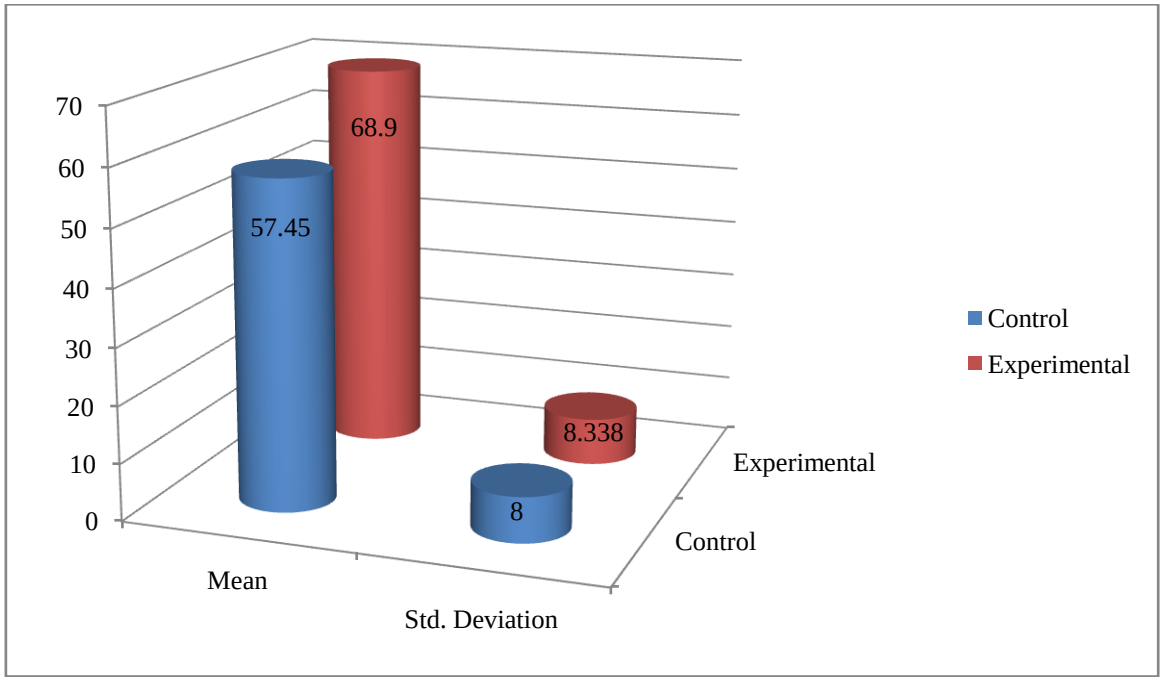

Figure 2: Status of acquisition off science process skills of control and experimental groups

Discussion:

To know the efficacy of interventional strategy to exert some tangible impact that is statistically significant on the acquisition of science process skills, test of science process skills was administered on both the group of the students in control

and experimental groups. The scores were subjected to 't' test (Huppert, J., Lomask, S.M., & Lazarowitz, R. (2002). The 't' test values of science process skills reveal that value 6.55 is significant at 0.05 level to infer there exists a significant difference between the groups. The significant difference favored the experimental group with 11.45 higher mean value. The mean difference and significant 't' value concludes that the interventional strategy has effectively exerted a positive impact on the acquisition of science process skills(Dunne, J., Mahdi, A.E., & O'Reilly, J. 2013). Imperatively it reaffirms the transformation of the trained competencies of physical education into Cognitive science process skills acquisition (Abungu, H.E., Okere, M.I.O., & Wachanga, S.W. 2014).

Conclusion:

The present study concluded with the rejection of null hypothesis as to its statistical significance. The alternative hypothesis is accepted at 0.05 level of significance. The acceptance of alternative hypothesis stands to exhibit the positive impact of the physical education competencies on the acquisition of science process skills. Thus, the content area of physical education competencies and science are least correlated to each other(Abd-El-Khalick, F., & Lederman, N.G.2000).To strengthen the visionary of the investigator, it is proven from this empirical study that the physical education competencies can be transformed into science process skills (Guszkowska, M. 2004).In other words it can be stated that the competencies acquired can be transformed across the faculties and inturn on acquisition of science process skills the achievement level in the science content also enhanced. The aim of acquiring science process skills is to make the learners as independent thinkers over the science content rather than to produce rote memorizing individuals(Chou,T.-J.,&Ting,C.-C.2003).The ultimate objective of attainment of content is enhanced and as such the quality of science learning becomes refined and relatively more permanent. Hence the various stakeholders of science curriculum planners should find tangible means to give adequate importance to physical education competencies as it is an insightful way to leverage on the content area of other academic subjects.

Implications:

- Physical education should be integrated into academic curriculum as cognitive enhancer.
- Curriculum planners should rethink about bringing reforms in implementing the physical education activities in school.
- Learning the physical education activities promote independent thinking and deeper understanding of concepts. Empowering the learners through physical Education promotes the independent thinking and design novel science explorations.

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