Influence of Physical Activities to Science Performance

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Abstract - *This study explored the physical activities of fifth and sixth graders that projected correlations to science performance and how these physical activities may be utilized for classroom purposes in the context of science-related play activities. Descriptive survey correlational design directed the data collection and analysis of the physical activities of purposively selected 133 fifth and sixth graders. Primarily, the study used a researcher-developed and validated instrument (Physical Activity Questionnaire [PAQ]), and standard instruments: Philippine National Physical Activity Guide (PNPAG) and General Physical Activity Questionnaire (GPAQ). The latter classified the physical activities into five domains which directed the interpretation of the participants' responses. The Pearson-r Moment of Correlation described the level of correlation of the frequency of engagement to physical activities (limited to local and localized activities) and the science grade of the respondents. Results show that each of the physical activity domains showed specific correlations to science performance of the respondents. For further research, enrichment of the relationship of the physical activities and the science performance may focus on possible moderating variables like economic status, and time allotment for physical activities.*

Keywords - *physical activities, physical activity domain, science performance, science-related play activities*

INTRODUCTION

Classrooms of today are different from what they were in previous generations. Students assume more responsibilities for learning as they become communities of learners [1]. Consequently, the roles of teachers have changed - from giving ideas to creating, facilitating, guiding and nurturing the talents and abilities of the students. Thus, the teaching and learning process with the environmental component transcended to a wide-area reality, rather than being confined to the four walls of the classroom—a paradigm shift which the 21st century learning caters [2].

In schools, students no longer engage in traditional ways of learning where teachers' spoon feed them with information. Twenty-first century learners are more creative when it comes to forms of learning [3]. Students have gone away from being the listener type of learners to focus on experimental learning where things can be applied in real world situations [4].Learning cognitive knowledge is said to be a unique experience for learners. Constructivist learning theories have been part of many curriculum development including its delivery. The knowledge gained by the learners has been actively constructed within the physical and social environment. Likewise, the quality of learning experience and achievement can be determined by the social interactions in the learning process [5].Apparently, this constructivist point of view emphasizes that learning should be undertaken through constructing meanings and by experientially forming links between the existing knowledge and the new situations [6].

In the current Philippine educational curriculum (K-12), the formation of links between the existing knowledge and experiential conditions can be stimulated because it capitalizes on contextual and localized learning. In fact, the curriculum is made relevant to the learners where classroom discussions on songs, stories and activities are based on local culture, history and reality with a thrust to strengthen languages, mathematics and sciences to meet good academic performance [7]. Observations of Filipino students, however, revealed that they are poor in academic performances in all core subjects specifically in science[8]. In the World Economic

Forum Global Competitiveness Report on Science Education of 2010-2011, the Philippines only ranked 112th out of 129 countries and 115th out of 142 countries in 2011-2012 [9].

Apparently, the 21st century learning and the new K-12 curriculum offer large scale intervention to address this low performance in science. In this framework, teachers focus on academics and use research-based strategies for instruction [10]which elucidates the importance of research-founded techniques in teaching supported by the outcome-based education paradigm. Teaching and learning activities enable students to achieve the Intended Learning Outcomes (ILO) designed by teachers [11]. Moreover, the aforementioned intends to help increase the performance of students in science, but the advent of the internet and the widespread technology today hamper the envisioned success. Additionally, these technologies may also hinder individuals from engaging in physical activities and cages them to the four corners of a room— a scheme very evident among teenagers today who are exposed to the cyber world leading them to sedentary activities. As described, sedentary lifestyle refers to an undue amount of daily sitting [12]. Consequently, Firger [13]reported that sedentary behavior may decrease the size of the human brain and increase cognitive deterioration.

With the aforementioned accounts in sedentary activities, physical activities are vital to everyone. In fact, the National Association for Sports and Physical Education [14]revealed that students who engage in physical activities in addition to regular activities help them build strong bones and muscles, and help control weight and cholesterol levels. Similarly, Castelli et al. [15]reported that physical activity evidently enhances cognitive functions. Additionally, research with adolescent students also indicates that students who play physical games for at least 20 minutes three times a week had higher grades [16].

Other than physical activities, play in the form of game is vital to the student's social, personal, and cognitive behavior [17]. He even reiterated the affirmative side of computer games to enhance the cognitive skills of students. Apparently, when obesity became a serious problem in the 21st century, the Dietary Guidelines for Americans reported that students need to engage in an average of a 60 minute physical activity. Wittman[18]responded to this call and introduced the exergames to patients of age range 10-17. Seemingly, this new video game (Nintendo Wii), which promotes physical movements may have enriched the child's bodily-kinesthetic, much the same as how outdoor physical play does to enrich the child's naturalist intelligence [19].

With the aforementioned premises on physical activities and even play activities correlated to the cognitive well-being of a student, this study investigated the influence of childhood play experiences to science education. Specifically, the study sought answers to the following: describe the frequency of engagement of physical activities of the respondents in terms of: active daily tasks; programmed physical activities; high impact activities; activities for muscle strengthening, endurance, and flexibility; and sedentary activities; and correlate the participants' physical activities and science performance.

LITERATURE REVIEW

The K-12 Science Curriculum

With the desire to be at par with our global counterparts, the new Philippine basic education curriculum aims to help the new breed of graduates to be equipped with the basic competencies and emotional maturity for the world of work [20]. Categorically, among the 155 UNESCO member-states, the Philippines is said to be one of the three countries that maintain a ten-year pre-university education system. In an attempt to address several curricular issues: low achievement, inadequate preparation of high school students for work and academic growth, the new curricular program has formulated structures on how to address the aforementioned issues through contextualization and localization of the core content in the elementary level [7].

In some countries like Canada, their K to12 curriculum comprises several key concepts that serve as functional guidelines to physical activity as: 1) active living as a program that emphasizes the integration of physical activities to its value in everyday living which creates an opportunity to participate and places physical activity in the context of fitness that involves the physical, mental, emotional and social dimensions of life; 2) outcomes-based approach where it assists teachers to modify the program based on the needs of the students in terms of the physical activities they need; and 3) knowledge, skills and attitudes that are interrelated and interdependent where cognitive, psychomotor, and affective domains do not work in isolation, but

describes the physical activity in a broader manner [21]. In view of contextual and localized learning, such physical activities may be among the relevant activities of the students to their experiences, resources, and the environment.

Apparently, Perin [22] reported that facilitating learning through contextualization helped the low-skilled students learn effectively and deeply through the relevant basic skills instruction. He even defined contextualization as a diverse instructional strategy designed to link learning to foundational skills and academic content through learning the concrete applications in a specific context interesting to students. This definition reiterates the value of using relevant figures, events, and localized materials present in the environment of the learners, which are of great interest to them.

Critically, learning science in the K to12 basic education program is a core to the curriculum. In fact, the program promotes student awareness of the relevance of science to life and develops academic performance as well as skills in problem solving through cooperative learning and teaching of science in an outdoor environment [7]. Although the country expects a positive outlook on the effects of the new curriculum to teaching and learning process and to the performance of Filipino students, the current status of learning and the perennially low performance of Filipino students in science may bring researchers to look for additional ways to improve such status. In fact, Batomalaque [8] reported the same observation that Filipino students are specially performing quite low in core subjects specifically in math and science.

Physical Activities and Science Performance

The low performance of students in science may be attributed to factors which may have influenced their physical activities in the past. Apparently, The National Academies [23] revealed the important connection that physical activity plays in health, growth, and cognitive well-being of a child. In their report, they emphasized that modern-day lifestyle seems to be inhibiting children from having enough physical activity. Consequently, Krakow [24] agreed that since active lifestyles start at an early age, physical inactivity might hinder children's health, social development and cognitive function. Additionally, he reported that play activities are important factors in the physical, emotional, and intellectual development of a child, which supports the initial findings of Bergen [25]emphasizing the importance of play activities in the child's cognitive development and academic success. Accordingly, play activities have their own advantages such as improving the academic performance of the child. Similarly, Kirkendall [26]found the same effects of physical activity on the intellectual development and academic performance of student-athletes compared to non-student athletes. Seemingly, the level of intelligence and academic performance are both high for student-athletes compared to the nonstudent-athletes. Admittedly, there are several physical activities such as daily physical activities, games with rules and exercises for strengthening body and agility and active computer games that give accounts on their role in improving the poor performance of students in science. However, the quest for finding support to the claim of the relationship of academic performance and physical activity need further study.

Currently, the advent of technology provided more emphasis to sedentary activities and decreased the level of engagement to physical activities. This scenario led researchers like Khan [27]to find ways to increase the frequency of engagement to physical activities. Khan used interventions such as point-of-decision and community-wide campaign as effective approaches in increasing the physical activity of the respondents. Likewise, school-based physical education, social support in community settings, and individually health-adapted health behavior change brought the same result of effectiveness. Lastly, the creation of enhanced access to places for physical activity combined with informational outreach activities under the environmental and policy intervention was utilized. Similarly, Shannonhouse [28] used Interactive Physical Activity Center (IPAC) — hands-on physical activity program as an intervention to increase the physical activity of kindergartens consequently improving their academic performance.

In sum, literature provides the aims and goals of K-12 science curriculum of improving the science performance of learners. Apart from the aims are some factors which may contribute to the total enhancement of science performance of learners which includes the role of physical activities in the cognitive development of the learners. Aforecited researches provided a direct link of physical and play activities to improved cognitive levels and science performance of students. However, most literature emphasizes foreign origin and may not holistically address concerns of play and physical activities of

Filipino learners. Thus, this study explores the influence of the physical and play activities of Filipino learners on their science performance.

METHODS

The study adopted the descriptive design to determine the physical activity engagement of participant, their science performance, and how their physical and play activities correlate to their science performance. The study utilized both qualitative and quantitative data collection approaches congruent to the peculiarities of this study specified as descriptive survey correlational design.

Participants

Purposive sampling determined the133 participants in the elementary level which belongs to the 2 sections of grade 5 and 2 sections of grade 6. The number of males 61 (45.87%) and females 72 (54.13%) were almost equivalent with age ranges as: 11 to 12 (61, 45.87%) and 9 to 10 (72, 54.13%). Categorically, their science performance included: very satisfactory (22, 16.64%), satisfactory (87, 65.41%), and fairly satisfactory (24, 18.05%)

Instrumen*t*

Physical Activity Questionnaire (PAQ) – This is a researcher-made, 65-item instrument composed of two parts: 1) the personal profile of the respondents, i.e. like age, gender and grade level; and 2) physical activities. Specifically, the second part consists of five sub-parts: active daily tasks programmed physical activities; high impact activities; activities for muscle strengthening endurance, and flexibility; and sedentary activities.

The active daily tasks refer to their everyday chores in and out of the school of the respondent. These tasks include scrubbing, mopping floors, active travel, etc. Programmed physical activities refer to the physical activity that last for at least 30 to 40 minutes and includes rhythmic or sports activities. High impact activities refer to 20 minutes of sustained vigorous activities resulting in increased breathing. The activities for muscle strengthening, endurance, and flexibility are physical activities done two to three times a week that may build muscle and bone strengthening, endurance, and flexibility introducing weight-lifting activities involving major muscle groups [29].

Data Collection

Researchers developed the PAQ based on GPAQ and PNGPA. Experts from the Institute of Physical Education, Health, Recreation, Dance and Sports of the National Center for Teacher Education validated the 65-item instrument. Pilot run of the validated instrument to 50 elementary students yielded 0.78 reliability index interpreted as good for classroom and research use [30].

Survey procedure

One of the proponents sought permission to retrieve the science grades of the participants from the records of their previous school year adviser. Following this process, the group also submitted a formal letter of request to the school head to allow the conduct of the survey. Ethical considerations before, during and after the survey included preparing the questionnaire with an optional section for the participants' name and providing letters of consent to the prospective participants; explaining the intended research to the participants and maintaining anonymity of the participants after deducing all data from the questionnaire.

One of the proponents personally administered the PAQ to the respondents and made a thorough focus interview (recorded) to purposively selected students using a guided interview protocol. Utmost confidentiality of the data gathered was reiterated to the respondents and supported by a letter of consent by the respondents themselves. The use of the interview helped verify or refute the impressions gained during the observations.

Data Analysis

Interpreting the extent of participants' responses corresponding to the frequency of their physical activities used a five point scale: 5-always, 4-oftentimes, 3-sometimes, 2-seldom, and 1-never with the following range:4.50-5.00: Always *(Palagi);* 3.50-4.49: Often *(Madalas);* 2.50-3.49: Sometimes *(Minsan);* 1.50-2.49: Seldom *(Bihira); and 1.00*-1.49: Never *(Hindi Minsan)*. The verbal interpretation described how often the respondents are engaged in their physical activities. The verbal description *always* describes the physical activity of the respondent done in the most frequent time, s*ometimes* as halfway in terms of the frequency, and *never* as the physical activity to none experience. The parameters set by the Philippine National Guideline on Physical Activity of the Department of Health (DOH) checked the frequency of engagement to physical activities of the respondents if they are within the prescribed

frequency. Thus, implications can be drawn from the PNGPA criteria supported by related studies.

Data analysis of the extracted data from the participants' responses to the survey questionnaire included frequency distribution, percentage, and mean. Pearson-r Moment of correlation established the influence of frequency of physical activities engagement to science performance of the participants.

The major objective of the study is to correlate the student's physical activities to the science performance of the students. The foregoing tables present the correlation of physical activities to science performance measured by their GPA in science. Pilot run of the validated instrument to 50 elementary students yielded 0.78 reliability index interpreted as good for classroom and research use.

RESULTS AND DISCUSSION

Table 1. *Weighted Mean of Engagement to Physical Activities Correlated to Science Performance*

Physical Activity Domains	X	SD	Description	R		
				General	Male	Female
Active Daily Tasks	**3.43**	**0.77**	**Sometimes**	**.006**	**.110**	**-.051**
Pagwawalis (sweeping)	4.25	0.90	Often	.061	-.076	**0.254*(WC)**
Pagma-mop o paglalampaso ng sahig (mopping)	3.18	1.21	Sometimes	.033	.037	-.117
Pagpupunas ng bintana (wiping the window)	3.49	1.15	Sometimes	-.110	.077	.104
Pagtatanim ng halaman sa paso o bakuran at pagga-garden (planting trees/gardening)	2.78	1.31	Sometimes	-.105	-.030	**-.248(WC)**
Paglalaba ng damit (doing the laundry)	2.81	1.35	Sometimes	-.010	-.160	**.229(WC)**
Pagluluto (cooking)	3.01	1.41	Sometimes	.070	-.073	-.022
Pamamalengke (marketing)	3.21	1.39	Sometimes	-.162	-.115	-.100
Pag-aalaga ng pamangkin o nakababatang kapatid (taking care of siblings)	3.21	1.52	Sometimes	.084	.201	-.050
Pag-papakain ng alagang hayop (ibon, bibe, aso, rabbit, manok, atbp) (feeding the pets)	3.46	1.58	Sometimes	-.085	-.086	.009
Pagliligpit ng higaan (fixing the bed)	4.12	1.13	Often	.109	-.025	**.266*(WC)**
Paghahanda at pagliligpit ng kinainan (preparing and cleaning the dishes)	4.23	1.07	Sometimes	.138	.036	.176
Papo-floorwax ng sahig (waxing the floor)	2.54	1.27	Sometimes	**-.22**(WC)**	-.322*	-.163
Pagbubunot ng sahig (shining the floor)	2.47	1.24	Seldom	-.093	-.185	-.135
Paglalakad papunta sa tindahan kung mautusang bumili ng mga bagay-bagay (walking to variety store when asked to buy stuff)	4.56	0.93	Always	.168	**-.319(MC)**	-.087
Pagliligpit ng mga ginamit na laruan (placing toys in proper place after use)	3.82	1.39	Often	-.002	-.174	-.102
Pagtatapon ng basura (disposing the garbage)	3.84	1.40	Often	-.058	-.123	.038
Pagba-bike papunta sa paaralan at pauwi (biking going to school and going home)	1.79	1.36	Seldom	-.269**(WC)**	**-.279*(WC)**	-.189
Paglilinis ng banyo (cleaning the bathroom)	2.91	1.40	Sometimes	.051	**-.340**(MC)**	.247**(WC)**
Pagbubura ng sulat sa pisara (erasing the writings on the board)	3.51	1.28	Often	-.042	-.061	.139
Pag-aayos ng upuan (rearranging the chair)	4.41	0.88	Often	.169	.059	.228**(WC)**
Programmed Physical Activities	**2.80**	**0.51**	**Sometimes**	**-.197**	**-.474*(SC)**	**-.033**
Team and Racket Sports						
• Badminton	3.42	1.32	Sometimes	.132	.161	.246 **(WC)**
• Table tennis	2.12	1.32	Sometimes	.040	.008	.143
• Basketball	2.75	1.55	Sometimes	-.21* (WC)	-.199	-.111
• Volleyball	3.21	1.42	Sometimes	-.028	-.135	-.103
• Baseball	2.06	1.31	Seldom	-.156	.048	-.193

Table 1. (Cont) *Weighted Mean of Engagement to Physical Activities Correlated to Science Performance*

Traditional/Indigenous Games						
• Piko	2.66	1.27	Sometimes	-.056	**-.259* (WC)**	.046
• Sipa	2.28	1.29	Seldom	-.165	-.069	-.084
• Patintero	3.00	1.30	Sometimes	-.078	-.022**(WC)**	.125
• Chinese Garter	2.73	1.55	Sometimes	.103	-.208**(WC)**	.120
• Luksong Baka (jump over the cow)	2.76	1.39	Sometimes	**-.21*(WC)**	-.149	-.220**(WC)**
• Tumbang Preso	3.24	1.36	Sometimes	.134	-.083	.126
• Langit Lupa	3.35	1.37	Sometimes	-.032	-.033	.003
• Kampo-Kampo	3.56	1.32	Often	-.044	.081	-.168
• Lusong Tinik	2.76	1.43	Sometimes	**-.170***	-.096	-.194
• Ice, Ice water	3.63	1.43	Sometimes	.014	.204**(WC)**	**-.271*(WC)**
• Lutu-Lutuan	2.48	1.46	Seldom	-.165	-.151	.076
• Sack Race	2.33	1.38	Seldom	-.114	-.056	.073
• Pukulang bola (dodge ball)	3.28	1.23	Often	.099	.113	.047
Exergames						
• Just Dance	2.35	1.40	Seldom	-.122	.021	.023
• Dance Revolution	2.03	1.24	Seldom	-.123	.104	-.058
High Impact Activities	**3.53**	**0.70**	**Sometimes**	**.009**	**-.094**	**-.074**
Pagtakbo (running)	4.07	1.17	Often	.122	.079	.207
Paglalakad ng mabilis (brisk walking)	4.15	0.98	Often	.083	.119	.104
Pagja-jogging (jogging)	3.50	1.20	Often	.021	.092	.125
Paglangoy (swimming)	2.88	1.21	Sometimes	-.061	**-.313*(WC)**	.202**(WC)**
Paja-jumping rope (jumping rope)	2.61	1.28	Sometimes	.038	-.196	.095
Paghahabulan (chasing game)	4.26	1.07	Often	.021	.059	.046
Pagsasayaw (dancing)	3.3	1.24	Sometimes	-.052	-.023	.032
Activities for Muscle Strengthening, Endurance and Flexibility	**3.33**	**0.89**	**Sometimes**	**.003**	**-.064**	**-.095**
Pag-iigib ng tubig (fencing water)	2.67	1.39	Sometimes	**-.225**(WC)**	**-.275*(WC)**	-.077
Pagbubuhat ng timba ng tubig (carrying a pail of water)	2.88	1.39	Sometimes	**-.203*(WC)**	**.327*(WC)**	.024
Pagsasampay at pagsisilong ng mga damit	3.13	1.40	Sometimes	.079	.102	.006
Pagdadala ng bag papunta sa paaralan(Laman nito ang mga aklat at notebook) (carrying bag with books and notebooks)	4.64	0.95	Always	**.329**(MC)**	**.403**(SC)**	.112
Sedentary Activities *(Palaupong Gawain)*	**3.98**	**0.68**	**Often**	**.038**	**-.062**	**.066**
Pag – upo (seating)	4.67	0.76	Always	.102	-.254***(WC)**	-.237***(WC)**
Paghilata (sprawling)	3.82	1.19	Often	.306****(MC)**	.269***(WC)**	.023
Pagte – text (texting)	2.97	1.48	Sometimes	.194*	.167	.294***(WC)**
Paglalaro ng baraha (ungguy – ungguyan, pares – pares atbp.)(playing card games)	2.52	1.49	Sometimes	-.122	-.019	-.043
Panunuod ng TV (telenovela/iba pang panuorin) (watching telenovela/other TV program)	4.51	0.93	Always	.243**	.299***(WC)**	.139
Pagyu – youtube (using youtube)	3.99	1.35	Often	.053	.123	.131
Paggamit ng social media (facebook, twitter, instagram) (using social media such as facebook, twitter or instagram)	3.87	1.35	Often	.183*	.084	.297***(WC)**
Pakikipagkwentuhan (having conversations with others)	4.43	0.95	Often	.263**	.351****(MC)**	.275***(WC)**
Paggu – google sa internet (browsing the internet)	4.09	1.22	Often	.084	.052	.108
Paglalaro ng computer games (playing computer games)	3.14	1.65	Sometimes	.199*	.205**(WC)**	.112
Pagbabasa (reading)	4.32	0.95	Often	.195*	.123	0.34**
Pagsusuklay (combing hair)	4.73	0.81	Always	.196*	.045	.290 **(WC)**
Pagsusulat sa notebook (writing in notebook)	4.72	0.87	Always	.185*	-.402****(WC)**	.190
Pagdo-drawing (sketching)	3.90	1.22	Often	.082	.211**(WC)**	-.079

* Significant at 0.05 (2 – tailed) **Significant at 0.01 (2 – tailed); *SC (Strong Correlation); MC (Moderate Correlation), WC (Weak Correlation)), NC (Negligible Correlation)*

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As gleaned from Table 1, the participants labeled the active daily tasks (everyday chores in and out of school), programmed physical activities, high-impact activities, and activities for muscle strengthening, endurance, and flexibility as "*sometimes*" while they described sedentary activities as *"often."* All of the five general physical activity domains are found to have no correlation to science performance. This result may be attributed to the frequency of engagement to physical activities of the participants where they described the over-all commitment to physical activities of the five domains as "sometimes." Apparently, the results contradict the recommendations of Health Enhancing Physical Activity [31]that the level of engagement to active daily tasks, programmed physical activities, and activities for muscle strengthening, endurance, and flexibility should be on a daily. Moreover, sedentary activities described as often on the over-all mean do not cohere with the recommended frequency of engagement. Although Lizandra et al. [32] reported that the academic performance of students predicts the frequency of engagement on sedentary behavior of the students where students who have better standing in class tend to pursue sedentary activities, data provided in Table 1 present otherwise.

Seemingly, though the study projected no correlation to any of the physical activity domain to science performance, each physical activity domain identified localized activities linked to science performance. In active daily tasks, *pagwawalis* (sweeping), and *pagliligpit ng higaan* (fixing the bed), *paglilinis ng banyo* (cleaning the comfort room), and *pag-aayos ng upuan* (fixing the chair) projected positive correlation for female. These results may imply that females find it valuable and motivating to learn if they have comfortable and clean learning environment achieved through the aforecited physical activities. Similarly, Phillips [33]and Reinisch [34]found the same motivating effect of clean learning environment to students especially the young learners. On the other hand, pagflo-*floorwax ng sahig* (waxing the floor), *paglalakad papunta sa tindahan kung mautusang bumili ng mga bagay bagay* (walking to variety store when asked to buy stuff), and *paglilinis ng banyo* (cleaning the bathroom) negatively correlated to science performance of male students. Most of the participants replied that active daily tasks were repetitive activities which exhaust their physical energy everyday. One male participant shared, "*nakakapagod pong maglinis ng banyo. Ok lang po sana kung magpapahinga kami pagkatapos po eh balik na sa klase at balik na sa aral po eh*" (It is tiring to clean the comfort rooms. It would have been okay to do this task if we get to have some rest afterwards. But, in our case, we go straight to class and start our lessons). This result may imply that students expend excessive energy in doing all the repetitive daily household chores which may have utilized their energy and cut their attention to school activities, especially if they don't get to rest before shifting to other tasks such as learning lessons in class. Apparently, the energy to be utilized in school was consumed in daily household chores which cut their attention to school activities. This result similarly deduced negative correlation of *pagpo-floorwax* (putting wax on the floor) and *pagba-bike papunta at pauwi sa paaralan* (biking going to school and going back home) to science performance for the general (male/female), which may be sourced from the learners' state of exhaustion and fatigue that leads to log cognition and motivation to learn [35],[36].

In general, male participants identified the programmed physical activities to negatively correlate (negative strong correlation) to science performance, while the females and the general sample identified no correlation. For specific team sports, only basketball negatively correlated to science performance as identified by the general participants. Male and female participants projected team sports as not correlated to science performance. Specific traditional/indigenous games such as: *paglalaro ng luksong baka* (playing jump over the cow), and *paglalaro ng luksong tinik* (playing jump over the thorns) negatively correlated to the general participants (male/female). Additionally, *paglalaro ng piko* for male, and *paglalaro ng Ice Ice Water* for female, both negatively correlated to science performance. One of the respondents shared, *"ok na ok po maglaro ng basketball o mga iba pang mga nilalaro, kasi nakakapaglibang kami ng mga kalaro ko sa iskinita, kahit minsan po nagkakasakitan kami eh ok lang, masaya naman po* (Basketball and other games are okay for us to play, We have time to bond with my playmates though sometimes we get hurt while playing the game, but, still it is ok with me because I had fun)." The student's response and the aforecited results may imply that programmed physical activity though might be good for the physical body of the students allow themselves to the possibility of experiencing physical injuries such as sprain, cramps, and fractured bones [37]. It may be that the negative feeling or emotion deduced from

these activities invoked low motivation leading to low cognition and performance [38], [39], [40].

For high impact activities, only swimming activity negatively correlated to males. No correlations were found for the general and the female participants. One of the male paricipants shared, *"malapit po kami sa ilog pero di po ayaw ko pong magswimming doon, yung mga kapitbahay po namin eh palaging nagtatapon ng mga basura nila pati ung mga mismis po ng ulam nila eh iniitcha nalang nila sa ilog mismo. Napakarumi na po ng ilog namin. Kahit po si papa eh pumapalaot kasi nangingisda posya, di ko po makuhang ni lumusong sa ilog* (We live near a river but I do not want to swim there because our neighbors directly throw garbage to the river including their mess after eating. Although my father used to catch fish, I do not have the courage to go to the river and swim)." This finding may mean that there are other factors that affect the physical activities of the respondent in which the environment may contribute [41]. Similarly, the activity may be accentuating the negative feeling or emotion leading to low cognition of the affected participants like the males [38], [39], [40]. The females may have not experienced a negative emotion brought about by such activity because of their refusal to do be involved, or to indulge in swimming, thus, non-correlation.

Significantly, in the physical activity domain for activities for muscle strengthening, endurance, and flexibility, both groups (males/females), specifically the males showed both positive and negative correlations to science performance. For the general respondents, specifically the males, p*ag-iigib ng tubig* (fetching water), and *pagbubuhat ng timbang tubig* (carrying a pail of water) negatively correlated to science performance. The study found no correlation between the aforecited physical activities to science performance for females. It may be that females find these activities as exhausting and do not indulge into them and are also bounded by cultural intricacies that define the roles of males and females [42]. In fact, one male participant shared, "*Madalas pinag-iigib ng tubig and mga lalaki panlinis ng bintana o pandilig ng halaman sa TLE class at nakakapagod po ito lalu na may kalayuan po ang piniagkukunan ng tubig."* (More often than not, males are asked to fetch the water for cleaning the windows and for watering of plants in our TLE classes and this task is very tiring because water source is too far from our room). Apparently, *pagdadala ng bag papunta sa paaralan laman nito ang mga aklat at notebook* (carrying bag going to school with books and notebooks) positively correlated to science performance for the general participants (male/female), specifically for male participants. The study deduced no correlation for female participants. These results may imply that the act of carrying learning materials may have motivated these students to perform better in their subjects such as in science. In fact, one male participants shared, *"Araw araw ko po dala yung bag ko, medyo maraming aklat kasi isa po ako sa nabigyan ng maraming aklat nung nagpalabunutan kung sino magkakaroon nung pasukan, kaya kahit po mabigat eh dindala kop o araw araw, pero sulit po kasi kapag kailangan ko ng libro eh meron po ako at hindi na nanghihiram sa ibang kaklase."* (I bring my bag everyday to school filled with lots of books. I was one of those lucky in the draw lots to determine who will have the books borrowed. Although, carrying the load everyday is tiresome, I feel good because in school I don' have to borrow books from my classmates when needed in school for learning).

Contrastingly, the study showed several positive correlations of sedentary activities to science performance. The female participants identified *pag-upo* (seating) as negatively correlated to science performance, while sedentary activities such as *pagbabasa* (reading), *pag-tetext* (texting), *paggamit ng social media (Facebook, twitter, o instagram)* (using social media such as Facebook, Twitter, or Instagram), *paglalaro ng baraha* (playing cards) and *pakikipagkwentuhan* (having conversations with other) positively correlated to science performance. It may be that females augment what they have learned in the classrooms with information they derive from the aforementioned sedentary activities. Furthermore, females identified pagsusuklay as positively correlated to science performance and one among the female participants shared, "*Madalas po akong magsuklay lalo na at mahaba ang buhok ko. Minsan nga po 'di ko namamalayan na ang tagal ko na palang sinusuklay ang buhok ko, narerelax din po kasi ako lalo na po kapag bagong paligo ako. Mas nakaapga-focus din po ako kapag nasuklay kong mabuti yung buhok ko kasi po pakiramdan ko po na malinis at maayos and buhok ko po.*" (I usually comb my hair especially since my hair is long. Sometimes, I almost forgot that I spent a lot of time combing my hair especially when I just took a bath. I tend to be more focused when I comb my hair because I know that before doing anything else, my hair is in good condition and that it is clean.). It may be inferred that

some girls find this sedentary activity as beneficial to attaining focus and better concentration which is attained by losing themselves in something they enjoy [43]. Apparently, these female participants attribute "feeling concentrated" to better cognition leading to better science performance [44]. For males, activities detected to positively correlate to science performance include *paghilata* (sprawling), *panunuod ng TV* (watching TV),*pagdradrawing* (sketching) and *pakikipagkwentuhan* (telling stories to friends). Similarly, these sedentary activities that provide positive correlates to science performance of the male participants and the general participants may have lead the participants to a state of relaxation that may induce better concentration leading to better cognition. However, activities detected to negatively correlate to science performance include *pag-upo* (seating) and *pagsusulat sa notebook* (writing notes in the notebook). Although students share that they are able to read and understand the lesson while they write notes about the lesson in their notebooks, such positive outcome is overcome by being exhausted and negative feeling probably in the arm and hand portion of their body that induces low cognition [38]-[40].

IMPLICATIONS, CONCLUSIONS AND RECOMMENDATIONS

The study underscores several important findings in regard the success in science performance of elementary students as correlated to the physical activities they encounter, experience and embark on. Seemingly, statistical comparison of the correlations of the physical activities with sedentary activities to science performance of the participants were drawn.

The differences in the correlation of the physical activities exist when compared to correlations in sedentary activities, the majority (3 out of 4) of the physical activities do not significantly differ, except with programmed physical activities. Apparently, though differences in correlation to sedentary are not significant, the findings suggest that more sedentary activities correlate (positive/negative) to science performance. One probable reason for such an immense correlation is how digital learners spend their time per day on technology. In fact, Morrison [45] reported that the meantime spent on technology per day is about 17.3 hours, specifically, 6.3 hours on smartphones. The high amount of time spent on sedentary activities primarily using technology contributed to the perennially low science performance of students. Stereotypically, some physical activities are seen to be positively correlated to females but negatively correlated to the males or the reverse, which may be due to state of gender-sensitivity of science classrooms of today and culture related activities, mores and traditions.

This observed high engagement of digital learners to sedentary activities may have brought in sedentary behavior and behavioral patterns in the learners' brains that correlated to low cognition among them leading to low performance. They do not view daily tasks, programmed physical activities, and high impact activities as activities that induce being active and providing balance with their cognitive activities in school emphasizing balance of developing the psychomotor, the affective and eventually cognitive skills. Instead, these activities are viewed as exhaustive activities exuding a negative feeling or emotion after their encounters with these physical activities exacerbating their perspective of physical activities leading to low cognition. Apparently, to improve the physical activity engagement of our learners, schools and community may work cooperatively to provide means and ways for learners to engage in physical activities and for them to have an enjoyable perspective of physical activities to activate their neural networks and perceive these with positive feelings inducing better cognition leading to better science performance. It may be possible that proper training and plans for engagement will help learners perceive physical activities as agents of neural activities for better cognition and the high cognition may be enhanced through engagement to sedentary activities. Learners may be oriented to see the sequence as physical activity inducing high cognition and providing positive feelings when engaging in sedentary activities and not the other way around. It may also be emphasized that a balance of physical and sedentary activities may be beneficial to learners [32].

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