# The Correlation Study of University Preliminary Students'' Interests in Calculations, Academic Performances and some Physiological Parameters of Nutritional and Health Importance

Oketayo Oyebamiji Oyedele[1*], Akindola Rufus B. [2], Adeyemi Fredrick Olukayode[3], Afolalu Victor Adebayo[4] and Famous John Beloved[4]

[1]Department of Physics, Federal University Oye-Ekiti, Ekiti State, Nigeria.

[2]Department of Sociology, Federal University Oye-Ekiti, Ekiti State, Nigeria.

[3] Department of Physical Sciences, Ondo State University of Science and Technology, Okitipupa, Ondo State, Nigeria.

[4] Directorate of Pre-degree, Federal University Oye-Ekiti, Ekiti State, Nigeria.

**Abstract**

In this study, the correlation among the academic performances of 50 Nigerian university preliminary students with either little or no interest I ($< 50$ %) and positive inclination or interest (I $\geq 50$ %) towards this aspect of physics and some physiological parameters such as Body Mass Index (BMI), Systolic Blood Pressure (SPB), diastolic Blood Pressure (DPB), pulse rate, PR (before, during and after the examination) were found. The academic performance of students ranged from 20-51 and 50 -75% for the two groups respectively. Using SPSS 17, significant differences exist between the performances of the two groups (p $< 0.05$, t = 0.005) and the physiological parameters (t = 0.014 - 0.043) except weight for the group with I $<$ 50% (t = 0.45), DPB and PR for the group with I $\geq 50$ % (t = 0.055-0.061 respectively). For students with I $< 50$ %, the academic performance negatively correlated with pulse rate during the examination (r = -0.676) with r-values between -0.298 and 0.067. This suggests that students' academic performances could be influenced by their interest, pulse rates and some of these important parameters of nutritional importance at that level.

**Keywords:** Correlation study, students' interest, academic performances, physiological parameters

**Introduction**

Physics is one of the lessons considered important as the basic for knowledge and technology acquisition [1] and also one of the challenging subjects for science students. This could be due to lack of expertise required to handle preliminary topics and practicals needed to provide solid foundation and preliminary

students, most especially when it comes to the areas of calculation. A study on the effect of body weight, percentage body fat and body mass index on adolescent academic performance (using students cumulative grade point average) was conducted by Jennifer *et al* [2] and Oketayo *et al* [3] on the basis of nutritional status, where positive significant correlation was obtained between body fat, weight and academic performance for overweight subject and negative significant correlation for obese/obesity. As an improvement in 2014, the influence of blood pressure and some physiological parameters of health importance on adolescents' academic performance in modern physics which is a 200L undergraduate course was studied owing to poor performances of the students in the course [4]. In this study, significant correlations were obtained between students' academic performance in the course and pulse rate ($r = 0.235$), height ($r = -0.310$), systolic blood pressure ($r = -0.804$) as well as diastolic blood pressure ($r = -0.478$) 0.05 level. When the subjects were stratified on the basis of their BP during the examination (Hyper-, Normal and Hypo-), significant differences occurred at 0.05 level from ANOVA and post-hoc test ($f = 115.063$, $p < 0.0001$) conducted. This indicated that the adolescents' academic performances can be influenced by some of these parameters of both health and nutritional importance but there is a need to consider other important factors such as student background, interest/disposition to this calculation-based subject at foundation or university preliminary level with a view to addressing the problem from the grass root and suggesting means of boosting their morale for enhanced academic performances. However, students' background knowledge in mathematics is also paramount. The Correlation Study of Interest at Physics and Knowledge of Mathematics Basic Concepts towards the Ability to Solve Physics Problems of 7th Grade Students at Junior High School in Indonesia has been studied by Izaak [1]. The results showed that there is a positive relation between students' interests at Physics and knowledge of Mathematics basic concepts with students' ability to solve Physics problems. In this study, the information on students' interests in calculations in Physics are obtained, their

SPB, DBP and PR are also measured and monitored before, during and after the test administration (calculation-based) and correlate them with their performances as well as other parameters of health importance.

**Materials and Methods**

Ethical approval was obtained from the University Health Centre and verbal consent was obtained for 61 subjects concerned (male = 36, female = 25) aged 16 to 22 years, before commencing the research.  The subjects were preliminary students at Federal University Oye-Ekiti with no history of any neurological disease/axis psychiatric diagnosis/drug abuse and not on medications or drugs such as antihypertensive medication. Subjects who met the criteria were eventually recruited into the study after exposing the scope and content of the research to them. This category also included those who have eaten, emotionally stable and not under the influence of any physical activity that could lead to increase in blood pressure. For each subject, the height was measured to the nearest 0.1 cm by having the subject stand erect, looking straight ahead, against a calibrated wall. Their body weight (using a beam balance scale), and with minimal clothing and without foot wears was obtained to the nearest 0.1 kg. The systolic and diastolic blood pressure SBP & DBP) as well as the pulse rates (PR) of the students were measured (before, during and after administration of test which was basically calculation questions in Physics) using a well calibrated digital TM sphygmomanometer. All readings were taken in triplicates by trained field assistants and the BMI was determined from the weight (kg) and height (meters) of the subjects. The student's performance was determined by finding the percentage score for each student in the modern physics course. Subjects were asked questions on their educational background, health history, family, romantic relationships, pregnancy status, level of interest and disposition to calculations in physics as a subject, pear group, dietary pattern, neighborhoods and sexual relationship to cater for potential biases caused by unmeasured heterogeneity through an administered questionnaire.

## Results and discussion

The subjects/students were divided into two groups. Those who had less than 50% interest in calculations in Physics (owing to poor background) with negative inclination towards calculations or solving mathematical problems and those who have positive inclination with over 50% interest and good background in mathematics. Table 1 shows the descriptive statistics of the students' performances based on these two groups while table 2 depicts the students' nutritional status using BMI and on the basis of interest.

Table 1: Descriptive statistics of the Subjects' Performances and other physiological parameters on the basis of interest

| Group/ Parameters | Group A (I<50% Interest) | | Group B (I ≥ 50% Interest) | |
|---|---|---|---|---|
| | Range | Mean ± SD | Range | Mean ± SD |
| Age (yrs) | 16-22 | 18.83 ±7.69 | 16-22 | 59.33 ±5.68 |
| Weight (Kg) | 42.-67 | 55.09 ±7.67 | 41-105 | 58.80 ± 16.27 |
| Height (m) | 1.52-1.90 | 1.69 ± 0.09 | 1.52 – 1.80 | 1.67 ± 0.08 |
| BMI (Kg/m$^2$) | 14.40 – 23.62 | 19.17 ± 2.29 | 14.19 – 38.56 | 21.96 ± 4.86 |
| Systolic BP (before) mmHg | 90 – 145 | 115.96 ± 12.64 | 104-149 | 119.40 ±10.98 |
| Diastolic BP (before) mmHg | 54-89 | 68.48 ± 8.05 | 58 – 85 | 56.13 ± 10.74 |
| Systolic BP (during) mmHg | 110-147 | 110 ±7.60 | 97-153 | 120.3 ± 8.27 |
| Diastolic BP (during) mmHg | 60-98 | 60.00 ± 9.46 | 52-95 | 72.06 ±9.32 |
| Systolic BP (after) | 110-130 | 120 ± 10.01 | 112-130 | 121.10 ±9.05 |
| Diastolic BP (after) mmHg | 65-85 | 75.6 ± 10.40 | 56-86 | 75.15 ± 11.05 |
| Pulse rate (before) | 57 – 100 | 79.41± 12.45 | 57 – 88 | 70.86 ± 9.56 |
| Pulse rate (during) | 68-115 | 88.00 ±14.02 | 59-88 | 72.03 ±7.53 |
| Pulse rate (after) | 59-112 | 57.00 ±13.41 | 57-86 | 73.0 ±8.20 |
| Examination Score (%) | 20 – 51 | 38.22 ± 7.69 | 50 – 75 | 59.33 ± 5.68 |

Note: SD = standard deviation

Table 2: Students' nutritional status using BMI and on the basis of interest.

| BMI groups | Students with < 50 % interest (n = 31) | Students with ≥ 50 % interest (n=30) | Remark |
|---|---|---|---|
| <18.5 | 10 | 6 | Underweight |
| 18.5-24.9 | 21 | 19 | Normal |
| 25.0-24.9 | 0 | 4 | Overweight |
| >30 | 0 | 1 | Obese |

Table 3: Pulse rate (per minute) classification on the basis of students' interest

| Classification | Pulse rate (<50 interest) n=31 | | | Pulse rate ( ≥ 50 % interest) n=30 | | |
|---|---|---|---|---|---|---|
| | Before the exam | During the exam | After the exam | Before the exam | During the exam | After the exam |
| Below (<60) | 2 | 1 | 0 | 2 | 1 | 0 |
| Normal (60-100) | 29 | 29 | 31 | 28 | 29 | 30 |
| Above (>100) | 0 | 1 | 0 | 0 | 0 | 0 |

The age range cuts across the two groups and no significant difference exist (16-22 years for the groups)

On the basis of body mass index, no significant difference exists in the two groups. Among those who had

less than 50 % interest in calculation, none of them was either overweight or obese. Thirty-two percent of

the students with little or no interest had normal BMI (18.5-24.8). The remaining subjects were underweight

compared with the other group where more than 50 percent had their BMI within the normal range and

above (with just 20% being overweight (Table 2). The poor or low mean academic performance/score in

the examination obtained by this group could be attributed to not just lack of interest but also low BMI or

poor feeding habit. This actually established / showed the relevance of nutritional status in knowledge

acquisition or level of academic performances [6]. Pulse rate is the number of times the heart beats per

minute. It varies from person to person and usually lower at rest but increases when we do exercise. For

adults (> 18 years), the normal beats per minute is 60-100.  Table 3 shows the Pulse rate status of the

students on the basis of the interest before, during and after the examination. In this study, the mean pulse

rate of students with less than 50% interest (79.414 ± 12.45) was relatively higher than their counterparts

who had more than 50 % interest (70.86 ± 9.56). The SBP, DBP and PR were in the high normal range for majority of the students with little or no interest in calculations in physics in the first thirty minutes of the exam but fell within the normal before the examination. The same trend was followed during the examination (Table 1). Significant differences (at 0.05 level) existed in the academic performances of students in the two groups ($p<0.0.05$, $t = 0.052$) and the two sets of values were not correlated ($r=0.107$). This indicates that students' interest or perspective or preconceived idea about the subject can either positively or negatively affect their output/ academic performances in the subject. This result is in agreement with the result obtained by Izaak[1,7]. Generally, the average systolic (SPB) and diastolic blood pressure (DBP) were higher before the examination and during the examination than after. This could also contribute to the low performance recorded in this study as reported by Brent *et al* (2011). The mean values of SBP and DPB were also higher in group A than group B while other parameters such as age, weight and height fell within the same range for the two groups.  Using t test (at $p < 0.05$), significant differences exist between students' academic performances in the two groups and other parameters except weight ($t = 0.450$) for the group with interest ($I < 50$ %,) DBP during the examination ($t = 0.055$) and pulse rate before the examination ($t – 0.061$). Significant difference also exists between BMI and important parameters such as weight, SPB and DPB ($p < 0.05$, $t = 0.010 – 0045$) before, during and after the examination. However, it is also worthy to be noted that no significant differences exist between SBP in the two groups during the exam ($t = 0.064$ and $0.360$ respectively) while reverse is the case in DPB ($t = 0.031$ and $0.032$).  the result also showed that no significant difference exits between the pulse rates before and after but before and during t $= 0.028$) the examination for group A ($I < 50$ %) but not so in group B ($t = 0.300$). Only few students had their pulse rates below and above normal as indicated in Table 3.   The correlational study also revealed that either low positive or negative relationship ($r = -0.298 -0.250$) between academic performances of the two groups and all the parameters observed in this study except in the case where academic performance correlated with the pulse rate during the examination ($r = -0.676$) for group A ($I < 50$ %). This actually affirms that students with little or no interest in calculations in physics tend to be nervous during the examination which may eventually have negative influence in their academics. No correlation was obtained

between pulse rates before and during the examination and students' academic performances of the two groups.

**Conclusion**

This study looked into the effect of some physiological parameters of nutritional importance on the university preliminary students' performance on the basis of their background or interest in calculation using physics as a case study. The results indicated that the mean performance ($38.22 \pm 7.69$) of student in group A (with interest, $I < 50\%$) significantly differed ($t = 0.055$) from their counterparts or colleagues ($59.33 \pm 5.68$) within the same age brackets 16-22 years, with interest in calculation and no correlation existed between the two data. In terms of nutritional status using BMI classifications, the larger percentage of students in group B were underweight which could also be attributed to their low or poor performance (Table 2). Using t test ($p < 0.05$), significant differences exist between students' academic performances in the two groups and other parameters except weight ($t = 0.450$) for the group with interest ($I < 50\%$,), DBP during the examination ($t = 0.055$) and pulse rate before the examination ($t - 0.061$). Significant difference also exists between BMI and important parameters such as weight, SPB and DPB ($p < 0.05$, $t = 0.010 - 0045$) before, during and after the examination. The results obtained clearly indicated that students' interest or perspective or preconceived idea about the subject can either positively or negatively affect their output/ academic performances in the subject. Other relevant factors that could affect academic performance of students in this category includes BMI and pulse rates during the examination. Nutritional quality of the diet is also an essential factor to be considered for adolescent in this category for an improved academic performance. However, for further studies, this work did not put into consideration other important factors such as the dietary intake pattern which may go along to affect both cognitive and affective domain as well as diurnal cycle and ethnicity that could also influence blood pressure.

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