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Influence of Dietary Practices on Class Participation and Learning Outcomes of Boarding Students: A Case of Winneba Senior High School

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Abstract

This study investigated influence of dietary practices on class participation and learning outcomes of boarding students at Winneba Senior High School (SHS) in the Effutu Municipality of the Central Region of Ghana. Descriptive survey design was adopted for the study. Population composed of all students in the school. Purposive, stratified and simple random sampling techniques were used to select 264 students. Data were collected using questionnaire. Data were analyzed using percentages, means and standard deviation. Findings revealed that majority of the students($\overline{X}$ =3.03; SD=2.60) indicated they had poor concentration in class due to their dietary practices while only few students ($\overline{X}$ =1.99; SD= 1.64) agreed that their dietary practices influenced their memory negatively and for decreased absorption and accuracy rate. The study thus concluded that the students had poor concentration and low interest in class activities due to their dietary practices and recommended that educating the students on the importance of adopting positive dietary practices such as regular breakfast intake and moderate snacking in order to maintain general wellbeing, remain active in class and achieve higher test scores throughout their course period.

Keywords: Adolescence, Dietary, Practices, Class, Participation, Learning, Outcomes

Introduction

Dietary practice is one of the essential elements to healthy lifestyle and longevity or otherwise. Amoako-Kwakye (2010) described a dietary practice as the typical behaviour of specific groups of persons or an individual in relation to food intake. Similarly, Nana and Zema (2018) defined dietary practice as a repetitive action or behaviour relating to diet or eating habit which is noticeable and can be positive or negative depending on the impact it has on one's state of health. Pamplona-Roger (2009) opined that positive dietary practice promotes

good health and involves the eating of balanced meals prepared, served and eaten in a hygienic environment with regular drinking of safe or potable water. Positive dietary practice also involves the eating of more complex carbohydrates, fruits and vegetables but less high fatty, salty and sugary foods. Pamplona-Roger further stressed that, negative dietary practice is detrimental to good health because it predisposes a person to diet related diseases such as cardiovascular diseases, anemia, periodontal diseases, metabolic disorders, obesity, etc. Smith and Smith (2016), reports that United States has nearly one-third of children and adolescents being obese or overweight due to poor diet and sedentary lifestyle.

Demory-Luce and Motil (2020) are of the opinion that adolescence is a stage of life with nutritional vulnerability. This may be attributed to dietary choices independent of parental influence. Essentially, poor eating habits formed at this stage may lead to diet related diseases in later years. Man, *et. al*. (2020) reported that adolescents form dietary habits that will persist into adulthood. Healthy dietary behaviour is therefore essential for proper growth and development of every individual as far as adolescence is concerned. Waugh and Grant (2010) reports that most adolescents often obtain about 50% to 70% of all their calories and major nutrients from junk and snacks mostly pastries, cakes, candies, ice cream and carbonated fizzy drinks which used not to be same in their childhood days. Latter part of adolescence through to early adulthood has been noted to be a phase or stage of life which is characterized by dramatic lifestyle changes which may influence dietary behaviour either negatively or positively. In view of this, there is the need to cultivate an appreciation for the dietary pathways of adolescence in order to generate and implement appropriate interventions which is targeted at curbing the menace (Winpenny *et. al.* 2017). Dietary changes usually occur during students' initial years in college or high school as they gradually transition from adolescence to young adulthood. This may be partly due to changes in the quality of diet, style of cooking and servings in the dining halls and canteens as many students have access to same meals; resulting in students not meeting the recommended dietary guidelines (Wardlaw, 2002). The diet of most students is typically lacking in fruit, vegetable, and dairy consumption but is high in fat, sodium, and sugar. Students also have limited food variety, high snacking frequency, high incidence of meal skipping, and a high consumption of fast foods. Poor consumption of fruit, vegetables, and dairy products, diets lacking in nutrient quality, and sporadic meal patterns increase nutritional risk which has the tendencies of affecting learning outcomes (Wardlaw & Smith, 2009).

Studies suggest that diets, high in trans and saturated fats such as baked foods like cakes, pastries, frozen pizzas and cookies; French fries, fried

chicken, margarine etc., can negatively impact the brain function; influence learning and memory as well as heart health (Chen, 2020; Jenkins & Campbell, 2015; Gómez-Pinilla, 2008).One study (Florence, Asbridge&Veugelers, 2008) found that 5th grade students with less nutritious diets performed worse on a standardized literary assessment. These seem to suggest that nutrition affects students' thinking skills, behaviour, and health, all factors that impact learning outcomes.

A study (Li & O'Connell, 2012), that analyzed a healthy eating campaign, that banned junk food from schools and introduced freshly prepared healthier school meals, found that participants scored higher in English and Science tests; than students who did not take part in the campaign. Poor nutrition can leave students' susceptible to illnesses like anaemia, diarrhoea, constipation, headaches, stomach ulcers and stomachaches, resulting in school absenteeism which may in turn lead to poor academic performance(Brown, Beardslee, &Prothrow-Stith, 2008). Access to nutrition that incorporates protein, carbohydrates, and glucose has shown to improve students' cognition, concentration, and energy levels (Bellisle, 2004; Sorhaindo& Feinstein, 2006). In contrast, nutritional deficiencies (particularly protein, zinc, B vitamins, and Omega-3 fatty acids which abound in fruits, vegetables and fish) early in life can affect the cognitive development of school-aged children (Chen, 2020; Sorhaindo& Feinstein, 2006). The above discourse suggests that poor dietary practice is an ugly phenomenon among adolescent students and Winneba Senior High School (SHS) students may not be an exception.

There may be a consensus that food is essential to learning, yet there has not been much empirical research in Ghana that examines the exact relationship between learners' overall diet and academic achievement. Though scores of studies attempted to examine the above, neither of the former have proven results quite definite in determining the exact nature and degree of the food-learning relationship (Hollar et al., 2010; Gomez-Pinilla, 2008). For instance, Burrows, Whatnall, Patterson, and Hutchesson, (2017) reviewed three hundred and forty-four (344) published studies on the relationship between diet and academic achievement in college/university students but only five (5) of these studies reported a definite associations between diet and academic achievement. It is therefore imperative to have a second look at this area of research.

Negative dietary lifestyle and consumption patterns are seemingly common among the population of boarding students in Winneba SHS and this may have implications on learning activities and outcomes in the long run if not checked over time. From observation, most boarding students of Winneba SHS adopt dietary habits and practices, most especially consumption of convenience

foods, snacking, and skipping of meals just as other adolescents elsewhere(Larson, Miller, Watts, Story, &Neumark-Sztainer, 2016). Irregular meal patterns and the consumption of high calorie snacks reported by Virtanen, Kivimäki, Ervasti, Oksanen, Pentti, Kouvonen, and Vahtera, (2015) are becoming common among the population of boarding students in Winneba SHS as well. Dining hall meals have low patronage by students while the school canteen and 'petty shop' have high patronage. This dietary lifestyle and consumption patterns of the students may have future implications on learning activities and outcomes. It is against this backdrop that the study inclined itself to identifying how the dietary practice of students influence their learning activities such as school or class attendance (punctuality and regularity), improved cognition and concentration as well as their learning outcomes.

Objectives of the study: The general objective was to investigate influence of dietary practice on class participation and learning outcomes of boarding students at Winneba Senior High School (SHS) in the Effutu Municipality of the Central Region of Ghana. Specifically, the study determined the expressed ways dietary practices influence the students':

1. participation in class.
2. learning outcome.

Research questions

1. In what ways do the students' dietary practices influence their participation in class?
2. How do the students' dietary practices influence their learning outcome of the students?

Methodology

***Design of the study*:** Design of the study was a descriptive survey. It was considered most appropriate for this study because the data collection was broader in scope and involved relatively larger group. It also presented the researcher the opportunity to describe existing conditions more explicitly and investigate as well as explore relationships between the variables: dietary practices, class participation and learning outcomes of boarding students in Winneba Senior High School.

***Study area*:** The area of the study was Effutu Municipality of the Central Region of Ghana

***Population for the study*:** The study was conducted at Winneba S.H.S. in the Effutu Municipality of the Central Region of Ghana. The population was made up of all the boarding students in the school constituting 1600 (2015/16 academic year) boarding students of Winneba SHS. These students came from diverse backgrounds in terms of religion, culture, family and financial status but with their ages ranging from 14 to 19 years. The population represented a homogeneous group of adolescents

who share similar characteristics such as: the experiencing of growth spurt, mood swings, and self-awareness as experienced by all adolescents as part of their physiological development. The school is a mixed-sex school. Hence it has both boys and girls in the boarding houses.

***Sample for the study*:** The sample was made up of 264 students. That was 16.5 percent of the total boarding student population. Stratified sampling was used to select male and female boarding students by gender and by form. Thus, Forms 1, 2 and 3. The Forms 1, 2 and 3 students were included in the sample because of their varying ages and experiences on campus. Eighty-eight students each were selected from each of the forms while 44 students of the form sample were selected for each gender stratum. After the number of males and females for each class were determined, a type of randomization; fish bowl was employed to select the individual students. The lists of first year students were obtained from the class registers with permission from the Assistant Headmaster in charge of academic affairs in the school. This was done in the following manner; pieces of papers were numbered for each to correspond to a name on the list. The papers were put in a basket and mixed well. A paper was removed at a time till the desired sample (264) was reached. The number on the paper was traced to the corresponding name and recorded.

Instrument for data collection: The data for the study was collected using structured questionnaire. It was constructed on the bases of literature reviewed and objectives of the study. It was validated by two senior lecturers from the Home Economics Department and two others from the Psychology and Education Department in the University of Education, Winneba before administering for subsequent analysis. The instrument was pilot tested for reliability on 30 first, second and third year students from Apam SHS; a public school in the Gomoa West District in the Central Region. Reliability measure of 0.82 using the Cronbach's Alpha reliability coefficient was achieved.

The questionnaire was divided into sections: 'A' to 'D' for all respondents. The section 'A' for finding out the students' socio demographic data, while section 'B' to 'D' sought the views of respondents on their perceived dietary practices and their implications on class participation and learning outcomes. On the Likert-scale used, a scale of 4 to 1 were used where Strongly Agree=4, Agree=3, Disagree=2 and Strongly Disagree=1 were used to rate students' responses for analyses.

Data collection procedure: The researcher obtained permission and on an agreed date; during the lunch break, the respondents were made to wait for briefing on the purpose of the study which was clearly communicated to them before the commencement of the exercise. The questionnaire was hand-delivered by the researcher and was administered

to the respondents immediately after their supper at the assembly hall of the school on the same day. After giving them the questionnaire, they were asked to fill and return them to the researcher. Two hundred and sixty-four (264) questionnaires were administered and same were retrieved at the end of the exercise which was completed within 20 to 25 minutes.

Data analysis techniques: The data for this study were analyzed using frequencies, percentages and means. The average means of total agreed responses were used to make decisions on the first research question.

Findings of the study

Influence of students' dietary practices on their participation in class.

The first research question examined the influence of students' dietary practices on their participation in class. The students were asked to indicate their experiences in class, and generally with learning after meals. Their responses are presented in Table 1.

Table 1: Mean Responses on expressed ways students' dietary practices influence their Learning Activities or Class Participation

	Response	SA =4 F (%)	A =3 F (%)	D =2 F (%)	SD =1 F (%)	Mean $\overline{X}$	SDV ±
1.	Poor concentration in class	76(29)	124(47)	61(23)	3(1)	**3.03**	**2.60**
2.	Sleepiness in class	138(52)	59(22)	31(12)	36(14)	**3.13**	**2.80**
3.	Dull attitude /low interest in class	148(56)	45(17)	43(16)	28(11)	**3.19**	**2.84**
4.	Poor class attendance due to illness	93(35)	74(28)	46(18)	51(19)	**2.79**	**2.50**
5.	Lateness to class	99(38)	68(26)	62(23)	35(13)	**2.88**	**2.55**
6.	Low participation in class activities	133(51)	75(28)	32(12)	24(9)	**3.20**	**2.83**
7.	Poor memory	34(13)	44(17)	27(10)	159(60)	**1.82**	**1.66**
8.	Decreased absorption & accuracy rate	20(8)	34(13)	133(50)	77(29)	**1.99**	**1.64**

***Key: SA** – Strongly Agree; **A** = Agree; **D** = Disagree; **SD** = Strongly Disagree; $\overline{X}$ **=** Mean; SDV(**±**) Standard Deviation*

Table 1 shows the mean responses on expressed ways students' dietary practices influence their learning activities or class participation from $\overline{X}$=1.82; SD=1.64 to $\overline{X}$=3.20; SD=2.84.The results in Table 1 shows students that most of the students agreed ($\overline{X}$=3.03; SD=2.60) they had poor concentration in class. A Mean of 3.13 and a Standard Deviation of 2.80 indicates most respondents strongly agreed that they felt sleepy in class due to their dietary practices. Dull attitude/low interest in class had most respondents strongly agreeing ($\overline{X}$=3.19; SD=2.84). Similarly, most respondents agreed ($\overline{X}$= 2.79; SD=2.50) to the poor class attendance

due to illness as a result of their dietary practices. On the contrary, regarding poor memory, the students strongly disagreed ($\bar{X}$=1.82; SD=1.66). Similarly, decreased absorption and accuracy rate also had 21% responding in the affirmative while the remaining 79% opposed it. Thus, majority of the students did not attribute poor memory and accuracy rate to their dietary practices and therefore disagreed ($\bar{X}$=1.99; SD= 1.64).

Influence of dietary practices on students' learning outcomes

Research question was posed as "How do the students' dietary practices influence their learning outcome?" To answer this, information on the average performance of the students was computed by asking the students to indicate their end of term average marks for the two previous terms in Mathematics, English, Integrated Science and Social Studies (Core subjects) in addition to their four elective subjects. The results are presented in Table 2. Students' learning outcomes was cross-tabulated with their dietary practices (meal skipping, fruits intake and snacking).

Table 2: Average performance of the students based on meal skipping

Average Score	Performance	Skip meals		Did not skip meals	
		Freq.	%	Freq.	%
76-100	Above average	42	33.9	59	42.1
50-75	Average	33	26.6	64	45.7
Below 50	Below average	49	39.5	17	12.1
Total		**124**	**100**	**140**	**100**

Table 2 shows that students who skipped meals had their learning outcomes affected baring all other factors that influence academic performance. This was seen in the performance of students as a greater number of students who skipped meals performed below average. The Table also shows that 42.1% of the students who did not skip meals performed better than those who skipped meals (33.9%). Similarly, 26.6% of those who skipped meals and 45.7% of those who did not skip meals obtained between 50% and 75% average score which indicates that they were average students. Also, 39.5% of the students who skipped meals and 21.1% of those who did not skip meals scored below 50%. The result shows that a slightly higher percentage of students who did not skip meals (37%) performed better than those who skipped meals (32%).

Table 3: Average performance of the students based on fruit intake

Average score	Performance	Daily		Weekly		Seldom	
		Freq.	%	Freq.	%	Freq.	%
76-100	Above average	78	50	11	19.6	10	19.2
50-75	Average	54	34.6	13	23.2	13	25
Below	Below average	24	15.4	32	57.1	29	55.8
Total		**156**	**100**	**56**	**100**	**52**	**100**

Table 3, indicates that students who eats fruits daily (156) performed well with 84.6% scoring averagely and above. On the contrary, students who seldom take in fruits (52), a whopping 55.8% of them scored below average.

Table 4: Average performance of the students based on snacking

Average score	Performance	Snack		Did not snack	
		Freq.	%	Freq.	%
76-100	Above average	103	40.4	5	55.6
50-75	Average	111	43.5	3	33.3
Below 50	Below average	41	16.1	1	11.1
Total		**255**	**100**	**9**	**100**

Table 4 shows that 16.1% of the students who snacked performed below average, 43.5% performed averagely and 40.4% performed above average. Concerning the students who did not snack, 11.1% performed below average, 33.3% performed averagely and 55.6% performed above average.

Discussion

The first research question examined the influence of students' dietary practices on their class participation. Hence, the students were asked to indicate their experiences in class with regards to learning after eating the foods which they indicated they ate every day. The results in Table 1 showed data on the impact of dietary practices on the students' participation in learning activities in the class. The results explicitly indicated that most of the students agreed ($\overline{X}$=3.03; SD=2.60) that they had poor concentration in class. A Mean of 3.1 and a Standard Deviation of 2.80 indicates most respondents strongly agreed that they felt sleepy in class due to their dietary practices. Dull attitude /low interest in class had most respondents strongly agreeing ($\overline{X}$=3.19; SD= 2.84). These experiences may affect their learning activities negatively. This is supported by learning theorists such as Kim, Frongillo, Han, Oh, Kim, Jang and Kim, (2003); who postulate that concentration in class is the first step in understanding what is taught in class. Consequently, Bartali, Frongillo, Bandinelli, Lauretani, Semba, Fried and Ferrucci (2006) associates poor nutrition (dietary practice) to frailty which obviously cannot support any productive academic work.

The results also relate to Wardlaw (2002) who indicated that the type of meal, portion per serving (quantity) and the time of the day the meal is eaten had influence on human characteristics such as concentration, efficiency and effectiveness. Wardlaw and Smith (2009) explained further that, the feeling of drowsiness or dullness shortly after a meal is as a result of more blood cells needed in the digestion and assimilation process than in the brain. They opined that it is a natural body process called the Specific Dynamic Action (SDA), the thermo-dynamic or Thermic Effect of Food (TEF) or Dietary Induced Thermo genesis (DIT) which is the amount of energy required by the body to digest ingested food, absorb nutrients and excrete waste above the basal metabolic rate. From the foregoing discourse, it can be deduced that, the dull, drowsy and sleepy feeling experienced by the students after meals were founded.

The results also depict the students agreed that they frequently stayed out of class because of ill health; attended classes late and participated poorly in class activities. The findings showed that dietary practice had implications on cognitive abilities, behaviours, attitude and health of the students. Hence, good dietary practice might contribute to improved alertness and concentration; regular school attendance, positive attitudes to school and learning as well as high test scores (Wardlaw & Smith, 2009).

The result from Table 2 shows that only 12.1 percent of students who did not skip meals performed below average as compared to 39.5 percent of their counterparts who skipped meal and performed below average. Considering above average performance as lightly higher percentage of students who did not skip meals (37%) performed better than those who skipped meals (32%).

This implies that the cognitive process of students is affected as students skipped meals baring all other factors. The results as indicated in this occurrence directly have impact on nutritional statuses of students and confirms Kim, *et.al* (2003)who assert that whether or not a child eats breakfast may have an effect on nutrient intake and nutritional status, which in turn could affect cognition. Nutrition which is directly traced to one's dietary practice is among the essential variable environmental factors that are most likely to have an impact on brain development, and for that matter cognitive abilities and academic performance (Nyaradi, Hickling, Foster, Oddy, 2013)Wardlaw and Smith (2009) also postulate that people who exhibit nutritional deficiencies as a result of their dietary practices are especially vulnerable to changes in metabolism that impact greatly upon cognitive ability and performance of the brain.

Florence *et al.* (2008) established that more specifically, increased fruit and vegetable consumption and reduced dietary fat intake have been significantly linked to improved learning outcomes; this thus clearly showed from Table 3 that a high

number of students who take in fruits on daily basis performed better as compared to their counterparts who seldom eat fruits.

It is evident from Table 5 that the number of students who snacked and performed above average is less as compare to the number of students who did not snack and performed above average. It has similarly been found by Bloom (2009) that snacking has a direct and significant negative impact on learning outcomes. Kristjánsson, Sigfúsdóttir and John, (2010) related lower academic performance in adolescents with poor dietary habits and higher academic performance in adolescents with positive dietary habits. Similarly, negative dietary practice is regarded as a risk factor for poorer academic performance during adolescence(Nyaradi, Li, Hickling, Foster, Jacques, Ambrosini, &Oddy, 2015).

Conclusion

From the findings, it can be concluded students' dietary practices had negative effects on learning activities and outcomes during the instructional process. Majority had poor concentration and low interest in class due to the negative dietary practices they exhibited.

Some of the students were ignorant of some of the effects of their dietary practices on the scores they obtained during class activities. The poor dietary practices exhibited by the students had negative influence on their learning outcomes. Most students who performed below average had poor dietary practices.

The findings from the study were a confirmation of previous researches in so far as eating habits of adolescents were concerned. The findings supported the empirical studies conducted on adolescent eating habits.

Recommendations

1. It is imperative that the school authorities in collaboration with Home Economics teachers, dieticians and nutritionists regularly review the dining hall menu to ensure that students are taking the right meals and nutrients which has the possibility of influencing their academic work positively.
2. Professionals like the Home Economics teachers, dieticians and nutritionists can be regularly invited to the school to organize seminars and symposia for students in effort to guide students on how to live and enjoy proper eating habits to promote their health and improve on their learning outcomes.
3. The school counsellor in collaboration with Home Economics teachers should counsel students on positive dietary practices and its influence on their learning outcomes. They should as well offer students with alternatives that will improve dietary practices. This will create awareness of the role diet play in academic successes.
4. There is the need for the school to provide students with good nutritional guidelines which may counteract the influence of their

peers. This can be done by displaying attractive posters that carry nutritional and healthy eating guidelines at vantage points in the school such as notice boards, classrooms, dormitories to serve as a constant reminder. As students consistently read this information, they may begin to live their lives in accordance with the knowledge they acquire from such notices.

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