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THE EFFECT OF PHYSICAL ENVIRONMENT ON THE ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN KHARTOUM STATE, SUDAN

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ABSTRACT

The purpose of this paper was to examine the effect of physical resources on the academic achievement of secondary schools students in Ombada locality, Khartoum state, Sudan. The researcher has adopted descriptive analytical method via questionnaire, interview and observation as main tools for gathering the data concerning the study. The sample of the questionnaire study is composed of 120 English language teachers, teaching at different secondary schools in Ombada locality, Khartoum state, Sudan. The sample of the interview is five experts and 4 schools were chosen for observation. The data obtained from the questionnaire have been processed computationally with SPSS program to examine the correctness of the hypothesis of this study. The results from these tools have shown that physical resources affect student's performance.

Key words: Effect – physical environment – academic Achievement.

Introduction

In determining the effectiveness of a national system of Education, secondary education is Universally acknowledged as a fundamental stage- developed countries such the United States and many of the European countries are focusing their concentration on research to explore better solutions to the escalating and emerging problems faced by youth at secondary school level – Most of the people who compose the skilled man power of a nation, are trained before the end of their high school tears. The quality of higher education depends upon the quality achieved at this level. The formation of character and foundations of future leader ship are laid at this level, which comes at a time when the youth is in his formative adolescent stage (AIOU - 1998). It means that secondary education is the foundation stone for further studies and also for the development of a nation. Therefore, it is imperative to pay proper attention towards secondary education and revolutionary steps should be taken to make it more effective, successful and productive.

Physical environment or resources refer to physical classroom resources is a combination of different things i.e. lighting, temperature ventilation system, size of the room, floor, walls, desks, chairs, rugs, white boards, computers etc. teachers and students are considered the main element of the classroom environment favorable physical environment has a significant positive effect on the efficiency of any organization and acts as catalyzing agent to provide a straight way for achieving pre-determined objectives of an organization. But

unfortunately, physical environment in our classroom is not conductive for smooth teaching learning process resulting fatque and frustration among the students. According to Hal steed (1974), physical environment is designed in such a way that obstructs the learning process although researcher have established close correlation between the amount of work individual do and its environment it stands to reason that a student sitting in an insufferably hot, airless room listening to a lecture on cryogenics would not learn as much as he would in a cod, comfortable space. Unfortunately school buildings are designed to abstract people from outside but they failed to provide a safe and comfortable internal atmosphere for students.

The curried paper was specially designed to examine the effects of physical environment on the academic performance of secondary school students. The findings of the study will bring a constructive revolution in classroom setting to ensure effective teaching learning process.

Further-more, the findings of that study will be beneficial for teachers, policy makers, ministry of education because it will explore the effectiveness of classroom physical environment on the student's academic performance at secondary school level.

Aims and scope of the Study:

This study aims to explore the effectiveness of physical environment on academic performance of secondary school students. The scope of the study is limited to English language teachers who teach at different Sudanese secondary schools in Khartoum state, Ombada locality, Sudan in the academic team 2018 – 2019. The subject of these study 120 teachers.

Literature review:

Physical resources and Academic Performance:

Various studies done on effect of school environment on academic performance affects to the fact for learning may lead to under performance (Chimobe, 2011).

Provision of adequate learning facilities at all levels including equipment and human resources enhances the quality and relevance of imported skills of learners (Lumuli, 2009).

Learning involves interaction of students with the environment. Teaching and learning resources include classrooms, laboratories, libraries, playing fields, text book, among others.

Indeed physical resources go a long way in creating conductive environment that promote effective teaching and learning. It is with his mind that the draft report on cost and financing of education in that (Rok , 1995) identifies text book ratio and school facilities as some ….. sicks to be used to …… the quality of secondary school education.

(Junna, 2011) Links the performance in examination to state of teaching and learning resources in of teaching and learning resources in schools.He notes that students from poor backgrounds perform poorly in the examination because the poor are often in areas where schools are seriously deprived of vital facilities an attitude of helplessness may be included early into children making them feel that being in school is a waste of time.

Physical materials in terms of adequacy and quality have been noted to have a great impact on performance of students in the examination (Husen, Saha, & Noonan, 1978). A school that has adequate instructional materials is likely to post better quality grades than a school which has poor quality physical resources. A school with inadequate classrooms will be forced to accommodate more students than recommended. This will exert a lot of pressure on resources such as teachers who may compromise their methodology as part of adaptive mechanism (Nafukho, 1991; Pscharapolous & Woodhall, 1985). The lack of basic facilities like laboratories has compromised the teaching of science subjects. Topics that are meant to be taught practically are taught theoretically as part of adaptive mechanism by teachers due to inadequate resources to enable effective teaching of the same. This ends up affecting negatively students' performance reducing their competitiveness for opportunities whose placement is pegged on performance in such subjects

(Mayama 2012; Lumuli, 2009). This study proposes to establish the state of physical facilities in public secondary school in Nigeria in order to evaluate how it is impacting on academic performance of public secondary schools. In order to evaluate how it is impacting on academic performance of learners.

Learning techniques and Academic Performance:

In Britain, teachers emerging from programmers are only slightly better equipped for the demands that will confront them than their predecessors thirty years go. This reflects the static teacher training force itself out of touch to some degree with recent developments in schools. In Britain the return of adult learner to the classroom meant that schools were dealing with more sophisticated clientele than in the past. Staff development meant is essential for the school to meet the wider responsibilities it is now expected to fulfill (Wilson, 2002).

Teachers are essential players in promoting quality education in schools because they are catalysts of change. Teachers at all levels of education system should have access to training and ongoing professional development so that they can be able to participate locally and internationally in decisions affecting their teaching environments (UNESCO, 2000).

Educational management has no choice as to whether to train teachers and other employees or not. This is because the competence of employees will never last forever due to such factors such as curriculum change, technological change transfers and promotions (Okumbe, 1998).

Education reforms processes tend to maintain the classical scheme of incorporating teachers when the proposal has already been defined, counting teachers only as potential trainees and implementers, thus ignoring the importance of teachers' knowledge, experience and active participation in the reform process (Mbatia, 2004). The shortage of well-trained teacher was identified in the 1964 – 70 development plans as a major obstacle to achieving education for all. The plan emphasized the need of expanding teacher – training facilities in order to reduce the number of untrained teachers and meet the demand of a rapidly expanding primary education system.

It is necessary to develop a system of providing opportunities to teachers to undergo in-service courses on a continuous basis. Apart from increased enrolment, more children from different backgrounds will be going to school, thus more special needs and over-age children. In rural areas more children from poor home who may have been exposed to baby sitting and herding are likely to go to school. As a result, students' needs have increased and teachers will require new skills and knowledge (TSC Kenya, 2003). This study seeks to find out challenges experienced by selected public secondary schools.

Building Age and Student Achievement

Such studies regarding differences in student performance based upon building condition have focused on many factors of facility quality. With the average American school building maturing to 45 years old (Dewees, 1999), facility age is a common discrepancy of building condition that is studied in correlation with student achievement.

Bowers and Burkett (1989) studied differences in achievement between secondary students in two buildings, one built in 1939 and one built in 1983. In this study, all other building variables were consistent between the two schools. Bowers and Burkett's (1989) study revealed that the students in the modern building scored significantly higher in reading, language and mathematics than their counterparts in the older building.

The age of a building can influence many of the individual factors used in evaluating the condition of an educational facility (Earthman & Lemasters, 1996).

Earthman and Lemasters (1996) noted that in each case of their study, age of the building had significant impact on student achievement and behavior. Furthermore, the study indicated that age was a surrogate for other variables of building condition such as lighting, temperature control, proper lighting, sound control, support facilities, laboratory condition and aesthetic values (Earthman & Lemasters, 1996).

The development of curriculum or instructional strategies can exaggerate the differences in building age. Chan (1996) found that many building had become obsolete despite their structural soundness. Chan's (1996) study found an impact of building age similar to that of the aforementioned studies. However, his key conclusion was that many of these facilities have become obsolete because their failure to adjust to or accommodate innovations in curriculum development, instructional strategies and content development (Chan, 1996). For instance, new instructional models call for accommodations such as modular furniture, flexible floor plans, mobile technology, electronic chalkboards and expandable networking (Lyons, 2002).

Cornell University joined forces with the Council of Educational Facility Planners International to conduct a study of the renovation of Syracuse City Schools and how that renovation impacted student achievement (Moore & Warner, 1998). Rather than the typical correlation study, the Cornell study provided a valuable before-and-after look at achievement in schools that were renovated. Significant impact was found in student achievement after facilities in these Syracuse schools were refurbished. Most significant was the improvement in mathematics scores of sixth grade students (Moore & Warner, 1998).

The correlation between building age and student achievement has been found to be significant in Texas studies. O'Neill and Oates (2001) report that building age had the highest correlation with student achievement of all building factors investigated in a1999 study of middle schools in Central Texas. The study indicated that the strongest relationship between building age and student achievement existed in the area of eighth grade students passing reading. O'Neill and Oates (2001) found this correlation to be consistent with numerous other studies that linked building age with factors establishing student achievement, such as the research conducted by Bower and Burkett (1989).

As school buildings age, they not only provide hurdles for teachers and students. Older buildings have been found to actually cause the loss of instructional time (Stricherz, 2000). In his *Education Week* article, Stricherz (2000) notes that a Floridastudy found that 96 teaching days were lost in Virginia schools in 1998 due to poor building conditions complicated by age. The Virginia study found that half of the teaching days lost was due to air conditioning failures.

School Size and Student Academic performance:

Knowing that building age can contribute to the deterioration of facility conditions does not, in itself, assist practitioners in the improvement of student achievement. Many other factors of facility design have been linked to academic success of students. As enrollment numbers climb, the issue of school size becomes relevant to the task of improving student performance. School size questions came to the forefront after the Columbine disaster, where two students designed and carried out a violent plan undetected by the adults in the school (Kennedy, 2003a). Kennedy (2003a) notes that educators have been battling this disconnectedness that seems more prevalent at larger schools. Smaller schools have shown a greater capacity to develop personal connections among students and staffs that tend to prevent violent or antisocial behavior (Yaunches,2002).

An issue related to school size is the ability for students and staff to establish personal links with one another and with the physical environment. This notion has been adopted by school designers as they design entire campuses or as they lay out classroom plans that allow for small-group or individualized instruction (Cook, 2002). Bryk (1994) found that students in smaller learning environments achieved at higher levels than their cohorts in larger schools. This University of Chicago study (Bryk, 1994) supported suggestions that smaller high schools not only provided a safer environment than their large counterparts but they also promoted advanced academic achievement. In an examination of hundreds of such studies, the Educational Research Information Clearinghouse commissioned a report that supported the assumption that smaller schools provide more attention to and support for individual student success (Raywid, 1999).

Despite the wealth of research espousing the benefit of smaller schools, statistics indicate that districts continue to erect larger campuses (Viadero, 2001). Education Week reports that a majority of our nation's students attend schools with enrollments of 750 or more, while seven states report average high school sizes of more than 1,000 students(Viadero, 2001). Hofstra University's Mary Anne Raywid (1999) reports that educational leaders continue to ignore the impact of school size on student achievement.

Raywid (1999) suggests that policy makers and scholars have turned a deaf ear to the debate of school size, favoring a focus on curriculum and pedagogy. This trend seems to follow suit with parents and teachers. A recent New York City survey indicates that less than half of teachers and parents would favor dividing large high schools into those with enrollments of less than 500 (Viadero, 2001).

Why would educators, school board members and politicians continue to promote the construction of larger schools? Much of the research suggests that there are financial motives. American School and University magazine reports that restricted funding and lack of available land encourage districts to continue to trend of constructing larger school facilities (Kennedy, 2001b). The ability to serve more students with common facilities such as cafeterias, libraries and other physical plant features makes the larger school appear much more cost efficient on a cost-per-pupil basis (Nathan, 2002).

However, studies based upon cost-per-graduate instead of cost-per-pupil indicate that smaller schools are as efficient financially as their larger counterparts (Nathan, 2002a). School systems promoting smaller campuses have also found that the sharing of student-support facilities such as libraries and gymnasiums have lowered the construction and operating costs of decreasing school size (Nathan, 2002b). Supplemental funding for the construction and maintenance of smaller schools has also become available in the wake of school size research. The Gates Foundation, along with the Carnegie Foundation, provided more than $38 million in support of building smaller schools (Kennedy, 2001b). Under the Clinton Administration, the United States Department of Education established the Smaller Learning Communities program with $45 million in grants for program participants.

Arguments other than cost efficiency exist in reluctance to build smaller schools. Some of this resistance finds its roots in more affluent communities, where research indicates that the link between school size and student achievement is not as strong(Howley & Bickel, 2002).

Support for larger schools is also based upon the premise of student choice. Proponents of large schools, especially large high schools, base their position upon the assumption that larger schools provide a wide range of curricular choices such as advanced classes and fine arts. (Viadero, 2001).

The size and variety of course offerings also affords larger schools the luxury of employing more specialized and diverse staff members (Stevenson & Pellicer, 1998). Similar arguments for larger schools espouse the ability of large schools to support extracurricular programs such as athletic teams, theatrical productions student clubs and competitions (Viadero, 2001).

The small-school movement is an issue that is not solely addressed by building more schools in attempts to keep campus enrollment down. The high school setting in particular has provided a number of alternative design methods that aid is establishing smaller learning communities. One such method is the schools-within-schools, where larger campuses are broken up into smaller groups of student and teachers assigned to interdisciplinary teams (Raywid, 2002). Modern schools are being designed by architects in attempts to accommodate small groups such as “houses,” “families,” “clusters” and other small learning communities (Cook, 2002). Some high schools are allowing students to attend schools-within-schools arranged to fit a particular curriculum theme (Gewertz, 2001).

Gewertz (2001) reports that these smaller themed learning communities utilize the original campus layout with renovations allowing for specialized laboratories in each smaller sub-school.

As the research builds in support of smaller schools, states and local governments are carefully considering this issue as a way to address educational reform and academic achievement. Private foundations and governmental entities are providing financial incentives for the construction of smaller learning communities in an attempt to offset any disadvantage of economy of scale that may occur with smaller schools (Krysiak & DiBella, 2002). Some state governments are rescinding policies that had, in the past, encouraged or mandated the consolidation of smaller schools (Cutshall, 2003). While policies and funding are assisting districts in creating smaller learning communities, educational leaders are still faced with the task of identifying physical environmental factors that impact academic achievement of their students. Within any size of school setting, it is important that students are given a clean and bright surrounding so that learning can take place in an optimal setting.

Lighting and Student Achievement:

Just as empirical research exists linking school size and age with student performance, a growing list of studies is finding a relationship between classroom lighting and academic achievement. Our reactions, motivations, moods and sense of well-being are greatly impacted from the illumination of our surrounding environment (Ruck, 1989). Ruck (1989) noted that the issue of illumination has driven building design for centuries as evidenced by ancient architecture and its attention to natural lighting. Differing degrees of illumination, namely natural lighting, can be used to stimulate productivity and increase creativity in offices and schools (Ruck, 1989).

An Orange County, California study showed a significant correlation between natural lighting and student success (Hale, 2002). Hale (2002) reports that students in the Capistrano Unified School District with natural lighting provided by windows or skylights scored 19 to 26 points higher on standardized tests than their cohorts with little or no natural lighting in their classrooms. This study (Hale, 2002) does not clearly assign whether the improvement in student performance was due to increased light, quality of light or the physiological effect of natural lighting.

In a middle school study, student performance was compared across three campuses. The study found that students in classrooms with large or high amounts of windows and skylights outperformed other students by five to 14 points on end-of course tests (Rouk, 1997). Ruck (1989) stated that windowless environments generate a great amount of tension, especially when coupled with restricted spaces and monotonous tasks. Lackney (1994) found that windowless spaces contribute to negative attitudes on the part of students and teachers.

Natural lighting, or daylight, has shown to be effective in improving the quality and quantity of lighting in instructional areas. Daylight has been and is still the standard by which artificial light is measured (Fielding, 2000). Fielding (2000) reports that studies by Kuller and Lindsten (1992) and the Heschong Mahone Group (1999), indicate a positive correlation between day lighting and academic performance. In Texas, districts have realized the academic benefit of natural lighting. The Austin Independent School District initiated a lighting program that increased natural lighting in instructional areas in order to increase student comfort, which would likely improve academic performance across all subject areas (Clanton, 1999).

While the issue of lighting cannot singularly address all academic success variables, it is important to note that quality lighting increases the comfort of students and that comfort often translates into higher scores and increased performance (Rodgers, 1998). Design experts also promote the consideration of the developmental stages of students when establishing lighting systems (Bushweller, 1998). This effort on establishing comfort is more than an exercise in providing luxury to children. Design factors such as lighting can create an atmosphere where students are physically supported to concentrate on academic endeavors. Recently, the focus on effective learning environments has shone on healthy physical surroundings.

Materials and methods:

This study was carried out at Sudan University of science and Technology with English language teachers who teach at different secondary schools in Khartoum state, Ombada locality. A purposive sample used for this study includes (120) teachers.

Tools of the study:

The researcher used the questionnaire, interview and observation as main tools to gather the data as to this study. The questionnaire was administrated to (120) English language teachers, the interview was designed for experts and then four schools were chosen for the observation. The researcher used a descriptive analytical method in conducting this study.

Results and Discussion:

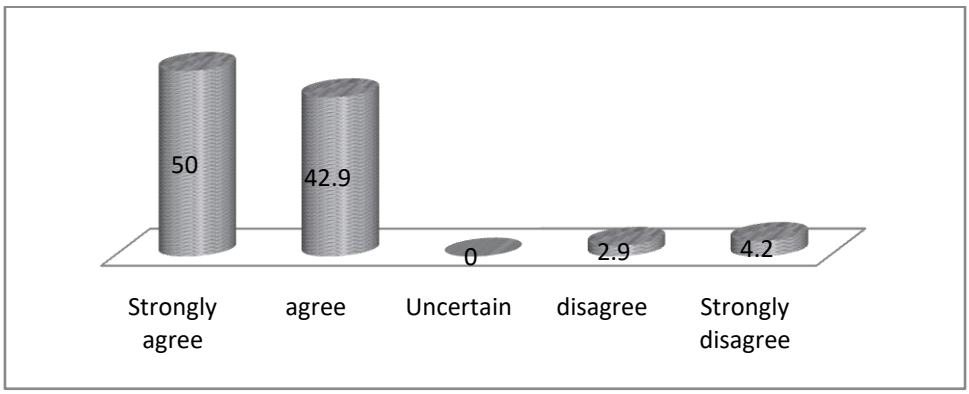
The researcher used the questionnaire as the main tool for collecting the data related to this study. They researcher has designed a questionnaire to find out English language teachers opinions towards the effect of physical resources on academic performance at secondary schools. The tables and percentages below will illustrate what has been stated above.

The analysis of the questionnaire in relation to the hypothesis of physical environment.

The influence of physical resources on student's academic performance:

Table No (1) The Frequency Distribution for the Respondents' Answers of Question No.().

Valid	Frequency	Percentage
Strongly agree	35	50
agree	30	42.9
Uncertain	0	0
disagree	2	2.9
Strongly disagree	3	4.2
Total	**70**	**100**

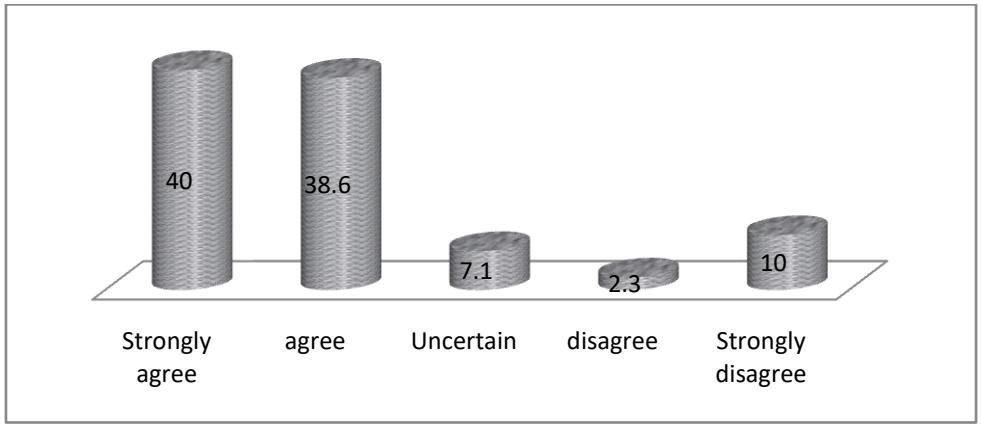


It is clear from the above table No.(1) and figure No (1) that there are (35) participants in the study's sample with percentage (50.0%) strongly agree with " Class room too cold or too hot negatively affect students' academic performance. "There are (30) participants with percentage (42.9%) agree with that, and (0) participants with percentage (00.0%) were not sure that, and (2) participants with percentage (2.9%) disagree. and (3) participants with 4.2% are strongly disagree

Statement No. (2): Lack of students further negatively affects student's academic performance

Table No (2) The Frequency Distribution for the Respondent's Answers of Question No.().

Valid	Frequency	Percentage
Strongly agree	28	40
agree	27	38.6
Uncertain	5	7.1
disagree	3	2.3
Strongly disagree	7	10
Total	**70**	**100**

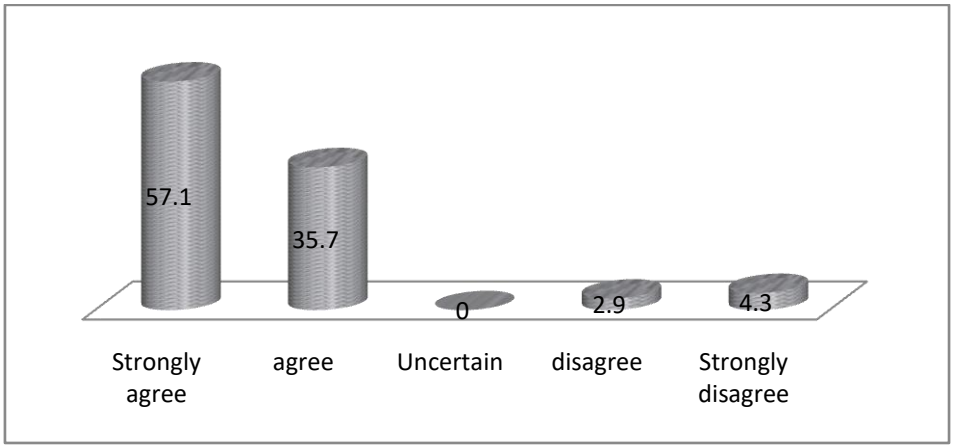


It is clear from the above table No.(2) and figure No (2) that there are (28) participants in the study's sample with percentage (40.0%) strongly agree with "Lack of students further negatively affect student's academic performance."(27) participants with percentage (38.6%) agree with (5)participantswith percentage (7.2%) are not sure (3) participants with percentage (2.3%) disagree. and (7) participants with 10.0% are strongly disagree.

Statement No. (3): Poor class environment makes it uncomfortable for secondary school students to actively practice in learning.

Table No (3) The Frequency Distribution for the Respondent's Answers of Question No().

Valid	**Frequency**	**Percentage**
Strongly agree	40	57.1
agree	25	35.7
Uncertain	0	0
disagree	2	2.9
Strongly disagree	3	4.3
Total	**70**	**100**

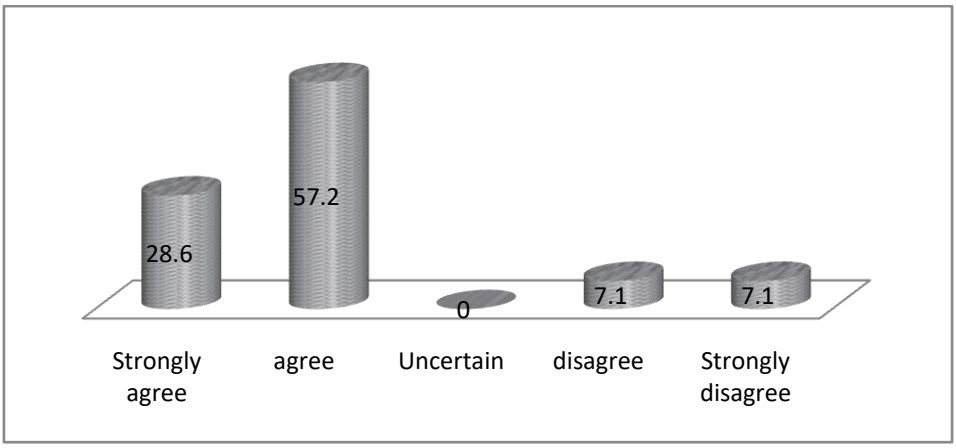


It is clear from the above table No.(3) and figure No (3) that there are (40) participants in the study's sample with percentage (57.1%) strongly agree with "Poor class environment make it uncomfortable for secondary school students to actively practice in learning."(25) participants with percentage (35.7%) agree with (0) participants with percentage (0.00%) are not sure (2) participants with percentage (2.9%) disagree, and (3) participants with 3.4% are strongly disagree

Statement No. (4): Students achievement is highest in modern learning environment.

Table No (4) The Frequency Distribution for the Respondent's Answers of Question No().

Valid	**Frequency**	**Percentage**
Strongly agree	20	28.6
agree	40	57.2
Uncertain	0	0
disagree	5	7.1
Strongly disagree	5	7.1
Total	**70**	**100**

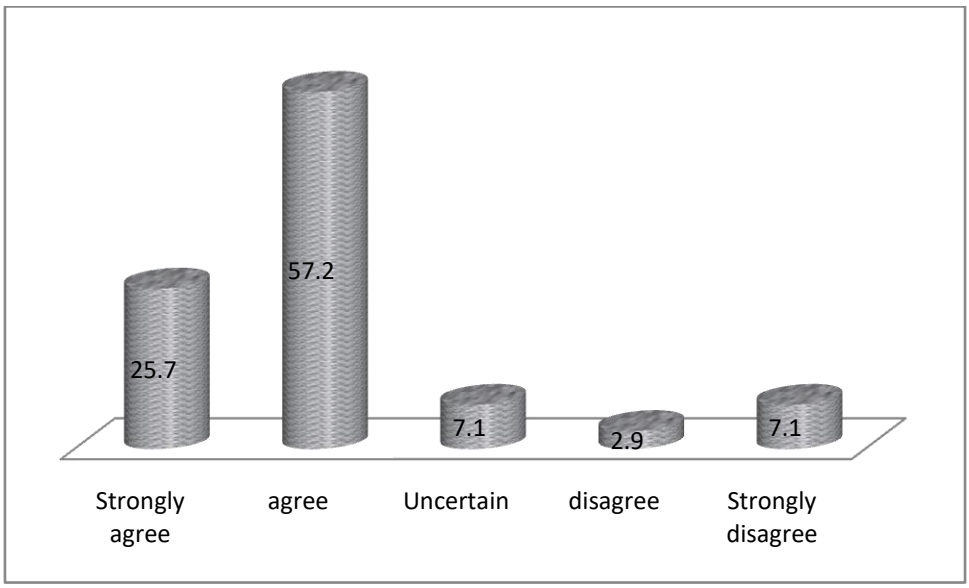


It is clear from the above table No.(4) and figure No (4) that there are (20) participants in the study's sample with percentage (28.6%) strongly agree with "Students achievement is highest in modern learning environment."(40) participants with percentage (57.2%) agree with (0) participants with percentage (0.00%) are not sure that (5) participants with percentage (7.1%) disagree. and (5) participants with 7.1% are strongly disagree.

Statement No.(5): Natural lighting or daylight has indicated appositive effect on academic performance.

Table No (5) The Frequency Distribution for the Respondent's Answers of Question No.()

Valid	**Frequency**	**Percentage**
Strongly agree	18	25.7
agree	40	57.2
Uncertain	5	7.1
disagree	2	2.9
Strongly disagree	5	7.1
Total	**70**	**100**

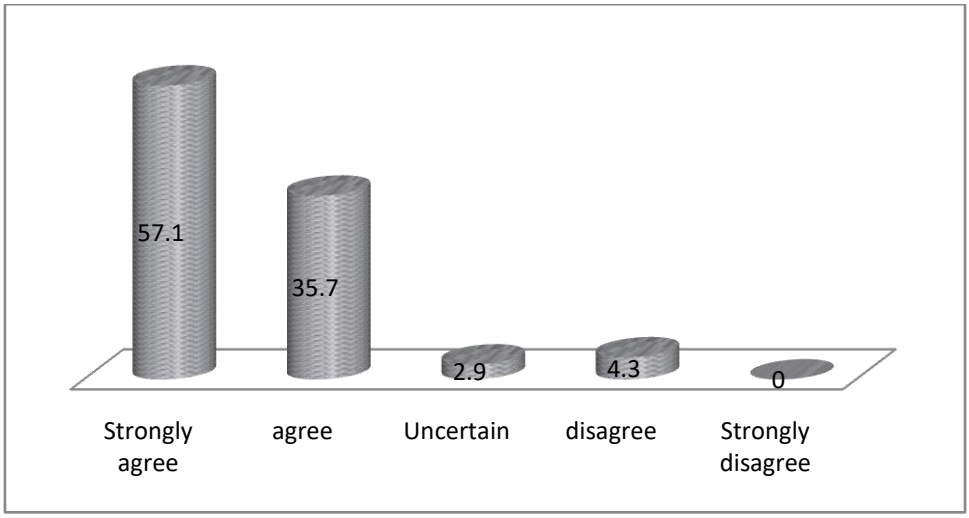


The above table No.(5) and figure No (5) show that (18) participants in the study's sample with percentage (25.7%) strongly agree with "Natural lighting or daylight has indicate appositive effect on academic performance "(40) participants with percentage (57.2%) agree with (5) participants with percentage (7.1%) are not sure that, and (2) participants with percentage (2.9%) disagree, and (5) participants with 7.1% are strongly disagree.

Statement No.(6): Building age has highest correlation to students' academic achievement.

Table No (6) The Frequency Distribution for the Respondent's Answers of Question No.( ).

Valid	Frequency	Percentage
Strongly agree	40	57.1
agree	25	35.7
Uncertain	2	2.9
disagree	3	4.3
Strongly disagree	0	0
Total	**70**	**100**

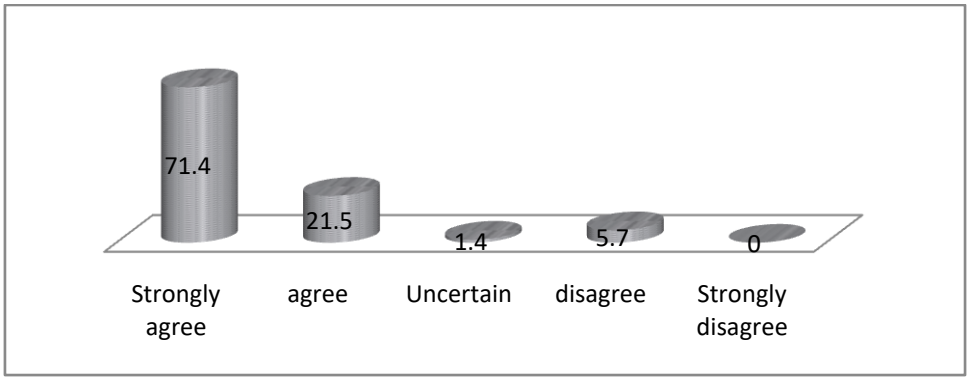


The frequencies and percentages of the above table No.(6) and figure No (6) show that (40) participants in the study's sample with percentage (57.1%) strongly agree with "Building age has highest correlation student's academic achievement**.**"(25) participants with percentage (35.7%) agree with (2) participants with percentage (2.9%) are not sure that, and (3) participants with percentage (3.4%) disagree (0) participants with 0.0% are strongly disagree.

Statement No.(7): Harsh weather and school size disturbs the smooth running of school, there for negatively affect student's academic performance.

Table No (7) The Frequency Distribution for the Respondent's Answers of Question No.().

Valid	Frequency	Percentage
Strongly agree	50	71.4
agree	15	21.5
Uncertain	1	1.4
disagree	4	5.7
Strongly disagree	0	0
Total	**70**	**100**

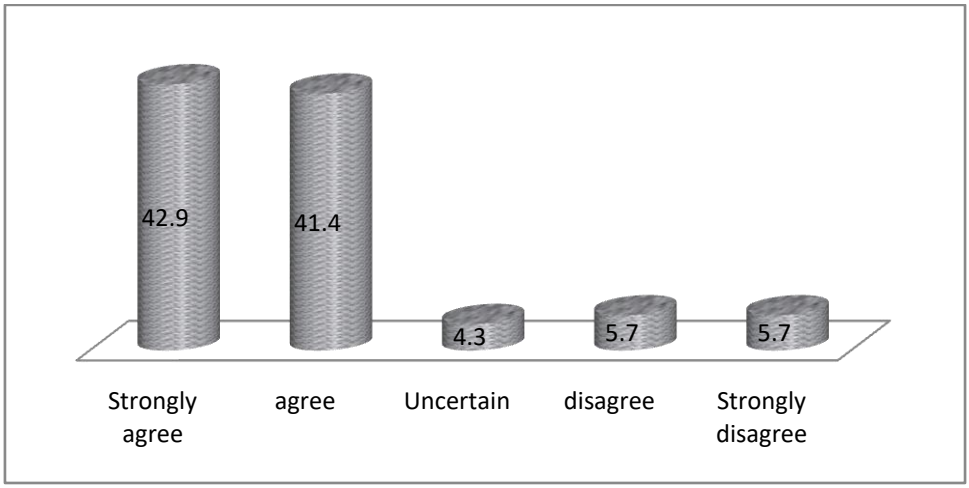


It is clear from the above table No.(7) and figure No (7) that there are (50)participants in the study's sample with percentage (71.4%) strongly agree with "Harsh weather in school size disturbs the smooth running of school, there for negatively affect student's academic performance."(15) participants with percentage (21.5%) agree with that, and (1)participants with percentage (1.4%) are not sure (4) participants with percentage (5.7%) disagree, and (0) participants with 0.0% are strongly disagree.

Statement No. (8): Classroom physical environment play a crucial role in strengthening student's academic performance

Table No (8) The Frequency Distribution for the Respondent's Answers of Question No.().

Valid	**Frequency**	**Percentage**
Strongly agree	30	42.9
agree	29	41.4
Uncertain	3	4.3
disagree	4	5.7
Strongly disagree	4	5.7
Total	**70**	**100**

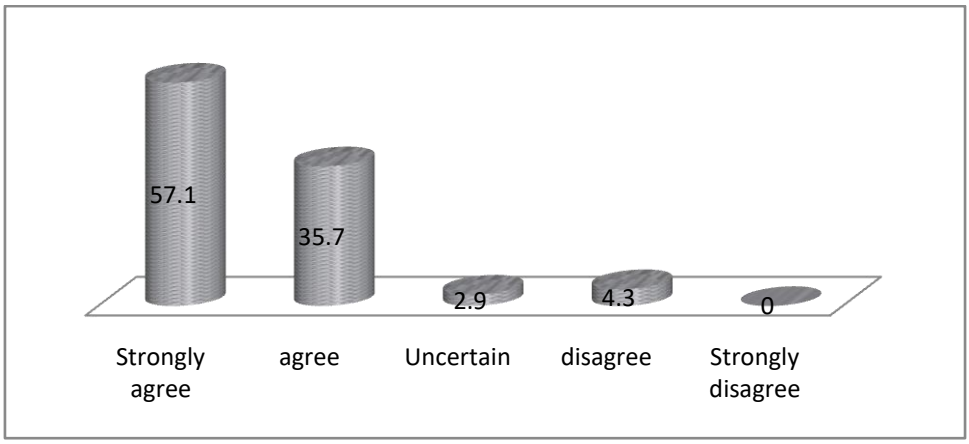


According to the above table No.(8) and figure No (8) it's noted that there are (30) participants in the study's sample with percentage (42.9%) strongly agree with "Classroom physical environment play a crucial role in strengthening student's academic performance"(29)participants with percentage (41.4%) agree with (3) participants with percentage (4.5%) are not sure (4) participants with percentage (5.7%) disagree, and (4) participants with 5.7% are strongly disagree.

Statement No.(9): School size affects student's academic performance.

Table No (9) The Frequency Distribution for the Respondent's Answers of Question No.()

Valid	**Frequency**	**Percentage**
Strongly agree	40	57.1
agree	25	35.7
Uncertain	2	2.9
disagree	3	4.3
Strongly disagree	0	0
Total	**70**	**100**



It is clear from the above table No.(9) and figure No (9) that there are (40) participants in the study's sample with percentage (57.1%) strongly agree with "School size affect student's academic performance"(25) participants with percentage (35.7%) agree with that, and (2) participants with percentage (2.9%) are not sure (3) participants with percentage (4.3%) disagree, and (0) participants with 0.0% are strongly disagree

Discussion

The data was collected and analyzed in relation to the hypothesis of the study. The data was collected via questionnaire which had been administrated to English language teachers who teach at secondary schools in Khartoum State Ombada locality Sudan.

Having analyzed and compared the results with the main hypothesis the results have shown that physical resources affect academic performance of secondary school students'.

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