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Influence of parental involvement and student achievement in biology

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Abstract

Parental involvement has become a priority on school campuses nationwide because of the positive effect on student academic performance suggested by some researchers and the legal mandate of the No Child Left behind (NCLB) Act of 2001 to implement parent participation strategies. This study investigated influence of parental involvement and student achievement in biology. The objectives were to find out how parenting is related to students' academic performance, to find out the extent to which parenting is related to students' academic performance, and how parenting influences student's scientific skills. The study concluded that Parent involvement has a positive effect on students learning outcome hence parents should not relent in giving moral, emotional and financial support to their children's education. It was therefore recommended that Parents should visit their children's school and Biology teacher routinely to find out how they are faring in the subject. Parents should supervise children's study time in the study of Biology.

Keywords: Students' achievement; biology; parental involvement; academic performance; learning outcome

1. Introduction

Biology is one of the basic science subjects learnt in senior secondary schools. It is a natural science that studies living things, how they interact with each other and their environment. Living things are basically categorized into plants and animals which are of great use to man. Plants are of use to man for feeding (production of various food crops like rice, beans, tomatoes), medicine (various kinds of herbs are used for one curative function or the other), shelter (for roofing and furniture), air purification (plants make use of carbon dioxide which humans and other animals produce as by-product of respiration-a compound that damages human health etc. Even when dead, the study of fossils like coal and mineral oil from decomposed plants are key to industrial prosperity (Oluode, 2010)

The study of humans and other animals has resulted in a better understanding of the structures, functions, growth, origin, evolution and distribution of living organisms. According to Yclefyve (2008), the study of other animals is very important as the values of many species cannot be predicted and the extinction of any species can disturb the equilibrium in an ecosystem. Solution to problems and the cures of diseases could also lie in organisms not yet discovered (Frank 2012). More benefits from the study of biology include advancements made in medications which has increased life expectancy of humans with the help of new medications and treatments and technological advancements like the turning of waste to manure and biogas which are of immense benefit to man to mention but a few. Biology also investigates the environmental factors that surround living things in a bid to manage natural resources (conservation) whose condition can threaten the existence of livings on the planet earth. The knowledge of genetic engineering, biodiversity, greenhouse emissions and even environmental pollution and global warming are key not only to understanding the world in which we live but also an answer to living organisms' welfare.

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The senior secondary school is the starting point for the preparation of the biologist and biology is usually the most highly enrolled science subject at this level (WAEC Annual report 2007). The senior secondary school biology curriculum lists the different topics to be learnt (content), provides parts to be played by the teachers and students, instructional materials required for the teaching-learning process and even ways of evaluating what is learnt so as to achieve its laudable objectives and goals. These laudable goals include that; learners are equipped with the knowledge of the structure and function of living organisms, are given the opportunities to interact with their environment, acquire scientific skills to carry out experiments and projects in biology, equipped with relevant knowledge needed for future advanced studies in biological sciences and develop ability to apply biological principles in life matters that affect personal, social, environmental, community, health and economic problems. (Biology curriculum-NERDC).

In order to achieve these objectives, learners are expected to exhibit specific learning outcomes in the three domains of learning. In the cognitive domain, achievement tests are conducted from time to time in form of quiz, class work, tests, and end of term examination. In the psychomotor domain, learners are given the opportunity to interact with the environment (e.g. visit nearby slow running streams or anthills), carry out laboratory experiments and field work. A science practical exposes learners to materials and equipment and serves as a concrete bridge towards abstract learning levels. Unfortunately, it is common knowledge that contrary to the spirit of science, many science teachers still teach without necessary activities needed for proper understanding of concepts (Nworgu, 1995). Even when excursions and field trip are organized, transportation cost, time and finance pose yet another constraint. (Ajaja 2010)

In the affective domain, as students carry out laboratory experiments, interact with nature and go on field trips they interact with each other, compare and share experiences and results and in the process exhibit different attitudes. Ogunkola (2002) opines that the attitude of learners towards science (Biology inclusive) determines the measure of the learner's or aversion to the subject. This interest Odinko and Adeyemi (1999) state invariably influence the learners' choice and even achievement in the subject. It is therefore important that students have a positive attitude towards biology as a subject.

However, despite the laudable objectives and spelt out roles of students and teachers in the curriculum, records have shown a decline in performance of senior Secondary Schools students in biology. Table 1.1 shows the student's performance in Nigeria senior secondary school biology in the past ten years.

Table 1 Percentage distribution of students' performance in May/June Senior Secondary Certificate (SSCE) in Biology in Nigeria: 2003-2012

Year	Total entry No of candidates	Total SAT No of Candidate	Credit passes No of candidate	Percentage passes of candidate
2003	1006831	909101	392249	44.15
2004	1005553	1027938	253487	24.69
2005	1080162	1072607	375850	35.04
2006	1170522	1152045	559854	48.60
2007	1270137	1238163	413211	33.37
2008	1292910	1259964	427644	33.94
2009	1372567	1340206	453928	33.87
2010	1331381	1300418	427644	33.90
2011	1540141	1505199	579432	38.50
2012	1695878	1672224	649156	38.82

Source: Statistics section, West African examination council (WAEC) National office, Onipanu, Lagos Nigeria.

Table 1.1 shows that in the past ten years, the number of candidates that pass Biology at credit level fall below 50%. This decline in performance is a threat to the continuity of knowledge as the knowledge of Biology acquired at the senior secondary school level is needed for future advanced studies in the biological sciences and therefore future professionals. Several factors have been identified by researchers as being responsible for this poor performance. Nnaïke (2011) while citing from WAEC chief Examiners report May/June 2011 attributes poor performance of students to shallow knowledge of the subject matter. Disregard for rubrics and incorrect interpretations of questions. In recent

years the focus of much research has been directed towards discovering ways of increasing student performance. Advances have also been made in several areas including special education, test preparation and assessment strategy and teaching methodologies. Stahl (2000) however suggests that one of the most effective areas of increased student motivation lies not in the schools at all but in the homes of the students. Oloruntegbe (2009) also reported that the home influence is a very important variable that have potential for promoting directly or indirectly student academic achievement. In this work therefore, the researcher wishes to look away from methods and strategies of teaching to the part played by two major stakeholders – parents and students in order to improve learning outcomes in senior secondary school biology. According to Liu, Black, Algina, Cavanaugh & Dawson (2010), parental involvement has been recognized as an important factor for students' achievement in traditional school setting and it is time researchers began to focus on how parental involvement affects students' achievement. Parcel (2012) in his paper also observed that parents need to be more aware of how importantly they are and invest time in their children

According to Oluwatelore and Oloruntegbe (2009), research has shown that sometimes unconsciously, parents transfer their fears, likes and dislikes to children and this can affect their attitude and performance in science. Little wonder many science oriented professionals such as doctors or engineers expect and encourage their children to do science related subjects. The involvement of parents in the parents-teachers' association and their contributions may also go a long way to provide material and financial resources for their children's educational e.g. field trips.

Parental involvement has been defined as "having an awareness of an involvement in school work, understanding of the interaction between parenting skills and students' success in schooling and a commitment to consistent communication with educators about students' progress" (NMSA-2006). The following are suggested ways by which parents can support the effort (be involved) of their children to achieve academic success:

- Getting their children to school on time and to bed early on the nights before school.
- Talking regularly to both children and teachers about what is going on in school
- Keeping in close contact and staying actively involved with their children's school.
- Making every effort to understand the learning expectations for their children.
- Asking routinely about children's home work and helping to ensure that they complete all assignments
- Communicating with teachers and administrators about any special needs concerning their children.
- Providing support and resources (such as transportation)
- Demonstrating that they value education and the professional expertise of a teacher.

2. California Department of Education Publication – Document library-2001

In addition, students are at the Centre of learning and have a role to play if there must be an improved performance in Biology. According to Levin (2000) students are the producers of learning outcomes and therefore their involvement is fundamental to all improvement. Students need to be accountable i.e. be willing to accept responsibility for their action. Accountability connotes answerability and responsibility. Being responsible is a learned behaviour and not an accident which requires care and effort. Such action he says leads learners towards their educational goals and academic success.

The following are suggested ways or roles that should be played by the students in order to ensure academic success:

- Coming to school prepared to learn.
- Taking responsibility for their own learning.
- Staying informed about assignment and their progress towards standards, as well as understanding what is expected of them.
- Asking for clarification, assistance or extra help whenever they need it.
- Completing all classroom and homework assignments on time.
- Putting forth their best efforts in their learning experiences and assessment
- Taking printed information from school home to parents

2.1. California Department of Education – 2001 – Document library

In this work, the researcher thinks that if parents are involved in their children's academic pursuit and students are accountable taking on their responsibility, there is likelihood that learners will do better in the learning outcomes (achievement in Biology, attitude in Biology and practical skills in Biology) and ultimately better performance in the West African School Certificate Examination (WASSCE).

2.1.1. Parental Involvement and Student Achievement

Generally, parents want their children to succeed in school learning and this is usually the basis of being involved in their work. According to Drake (2000), the challenges that student face can be dealt with by focusing on more collaboration between the school and home. Studies carried out by McNeal (1999) show that parent involvement is associated with increased student achievement. Mangal (2012) also reported a significant relationship of academic achievement in relation to parental involvement among higher secondary government school. According to Olatoye and Agbatogun (2009), the home and parental involvement is one of the major factors responsible for poor achievement in science hence children whose parents show high level of involvement perform better in their academic tasks than those children whose parents are not involved in school matters. Fan and Chen (2001) also reported a moderate and practically meaningful relationship between parent involvement and academic achievement.

However, although Mc Neal (1999) observed that parents were associated with increased student achievement, his findings also showed that specific parent-teacher contact and interaction did not significantly improve achievement or reduce behavioral problems among students. Fan & Chen (2001) discovered that demographic factors such as socioeconomic status and ethnicity are associated with achievement outcomes. However, Olatoye and Agbatogun (2009) reported that while research acknowledges a strong direct relationship between socio economic status of parents, motivated families regardless of their socio economic status can and do help their children improve in school performance. [Wang, Oates and Weishen and Nancy (1997)] observed that teachers outreach to parents of low performing students was consistently related to improve student achievement. However, there may be need to inform parents on how to help their children at home (Sanders, Epstein and Connors (1999). According to Harris & Janet (2007) some parents are 'hard to reach' but if school successfully engage them in learning, they reinforce the fact that parents matter and this could have a great effect on their children's academic performance. Other barriers he says include language barrier and literacy issue.

Redding, Langhon, Meyer and Shelly (2004) stated that the answer to the question do more involvement by parents correlate with greater achievement of children at school depends upon a multitude of factors including general parenting styles, the nature and subject of the homework, interest and attitude of the parent towards education in general and beliefs in the value of schooling. The above he says have been found to be more important than the actual material circumstances of homes.

Parental involvement and student attitude

The Webster Dictionary defines attitude as a mental position or feeling with regard to a fact or state. An individual can therefore show a positive or negative attitude towards a subject, an object or an idea. An attitude makes one judge an object or an idea as good or bad, beneficial or irrelevant, pleasant or unpleasant, important or unimportant. According to Jeynes (2005), children who are academically successful hold positive attitude to school and are well adjusted emotionally and socially. Olatoye and Ogunkoya (2008) also opined that the type of attitude towards science subject is a function of the level of parent involvement. According to Oluwatclure and Oloruntegbe (2009) it was discovered that sometimes unconsciously, parents and guardians through nonverbal communication transfer likes and dislikes to children not only by word of mouth but also via bodily movement and facial expression. Little wonder a parent who is a medical doctor wants one or two of his children in the same profession and parents who have missed an opportunity of being in a particular profession wish *to be* fulfilled by having one or more of their children in that profession hence parents sometimes encourage their children to take interest in the subjects associated with the profession. This encouragement according to Mangal (2012) is shown by helping, guiding the child and coaxing him not to feel disheartened at a point of difficulty. In his work Stahl (2000) observed that parents and families are the leading models and motivators for secondary education students. He however associated the decline in parental involvement with changes in attitudes of children as they turn teenagers. He observed that as the children approach the teen years, many parents find it difficult to strike a balance between "letting go and being there". The children on their own part are filled with growing peer pressure. Dramatic physical changes and an awakening for more independence hence parental involvement decreases.

Parental involvement and student's scientific skills

Biology practical is a major part of the West African Secondary School Certificate Examination (WASSCE) and preparation towards this examination includes Biology practical in schools, field trips, outdoor study and fieldwork. According to Ajaja (2010), Biology practical like field trips give experiences that enhance students understanding of process of science, improve students' attitude towards Biology and significantly influence their Biology achievement. Sometimes such practical experiences require the financial support of parents. In addition, Science (including Biology) is a particular way of investigating the world and of forming general rules. This process of science which may take place

in laboratories or field work require a number of skills as students are expected to gather information by applying their senses (sight, touch, smell, hearing and sometimes taste). For this reason, care and concentration is required and this is enhanced when the student is emotionally stable and not distracted within. According to USSP (2005), a child who is bothered by quarrelling parents for example could lag behind and lose concentration in studies and this may affect accurate or careful observation skills. The attitude and value parents attach to learning science process may also affect students' interest and acquisition of scientific skills. For instance, sometimes parents may need to guide and encourage their children in the collection of specimens like cockroaches, earthworm or rats when and if the children are asked to. This can be facilitated by interaction and discussion of school issues between parents and students as referred to by Olatoye and Agbatogun (2009).

However, according to Taylor (2000) one of the stresses parents face in supporting their children is poverty which makes it difficult or sometimes impossible for parents to pay for excursion or outdoor learning when required. In addition, Kohl (2006) reported that a more limited educational experience meant that some parents lacked the relevant skills to get involved hence when the parent's profession is not science related, they may not find it easy to get involved or monitor the acquisition of their children's scientific skills.

Student Accountability

The dictionary defines accountability as the state of being liable or answerable. The goal of student accountability therefore is for students to be answerable and to take responsibility of their own behavior. Unfortunately, many students constantly make excuses blaming away poor grades on parents, teachers or fellow students. Interestingly, many researchers have said that it is not easy to make students accountable (Linson 2010, Kirsanow 2003, Regi Reg 2010). Linson (2010) describes accountability as an attitude hence no matter the input of parents, teachers and friends, learners he says should be made accountable as no one can study for them or write examinations for them Wolpert (2010) in his work suggests the following ways a student can be accountable.

“Be your own advocate, ask questions, communicate your struggle to your teacher, think of school as an office of training, put in your effort, sweat a little- school is your brain gym. Be in class, participate and surround yourself with students that can help you”. Some researchers have also suggested and practiced ways of making a student accountable. Cohen (2012) in his work reported that few teachers' strategies like walking around the room during class work, identifying and calling students who complete their homework by name, use of eye contact during interactions, having grand rules in class, use of written and oral questioning and using guiding questions resulted in a dramatic increase in meaningful student's participation and 95% daily homework completion.

According to Kirsanow (2003), student's accountability is not easy but may start with something as simple as the students turning off the television (TV) and doing his homework. Regular attendance of class, spending more time on homework and taking notes in class has also been discovered to boost academic performance (Douglary 2004, Vasagan, 2012).

Student's Accountability and Achievement

A student that is accountable simply plays an active role in learning by being involved in various activities like attending school, participating in class, taking notes, taking time to study and doing homework. According to Kisanow (2003), kids who spend a lot of time on homework uninterrupted by television for example, tend to do better than those that don't. Cooper Robinson and Patall (2006) also discovered that homework can improve students' scores on the class tests that come at the end of a topic. This they said is because the process of carrying out homework has many beneficial effects like helping students develop good study habits. Fostering independent learning and ultimately improve academic achievement. Gottfried (2010) in his findings reported a consistently positive and statistically significant relationship between student attendance and academic achievement. Study, an aspect of student accountability has also been described by Mace (2002) as a systematic acquisition of knowledge and understanding of facts and principles that call for retention and application and ultimately lead to academic success. Note taking is another very important part of student accountability as the process aids learning, remembering and consequently academic success (Kirsanow, 2003, Mace 2002). Douglary (2004) also observed that student participation in class may have a prominent and crucial influence on the relationship between students' perception of what is being learnt and achievement of student.

3. Student Accountability and Attitude

According to Pophan (2005) student effect is a key component of an appropriate education since affective dispositions are powerful predictors of students' subsequent behavior. The way science is taught also plays a major role in shaping students attitude towards science. Zadeh (2011) therefore suggests that instructors should recognize that attitude

formation is one of the important aspects of instruction. According to Massighan & Herrigton (2006), Non-attendance of classes and tutorials may be due to changing attitudes of students. Such changing attitude they say could be as a result of the value of the knowledge as perceived by the learner. It is therefore important that students know the value of knowledge to be acquired.

In an article by the Carnegie foundation, Shaffer(2012) cited John Marrow as having reported that 57% of students name the chief benefit of a college education as increased earning and 37% of them said that they would drop out of college if they didn't think it would influence their job chances. In this scenario college becomes a means to an end instead of education for competence, excellence and success in a future job. Hawthorne (2004) also observed that people's beliefs about their abilities in particular domains are thought to be important in motivating them to what they can do. It is therefore important that students believe in their abilities and are ready to put it to use. In the process of learning science, students' attitudes improve as they have to interact and according to Wong (2001) this interaction results in growth of tolerance, ability to listen to others and respect for each other's view. An interest in Biology therefore should increase the tendency of being committed to learning.

4. Conclusion

Parent involvement has a positive effect on students learning outcome hence parents should not relent in giving moral, emotional and financial support to their children's education. In addition, students who are at the Centre of learning must be ready to participate in the process of learning in order to ensure a greater achievement and better performance in the WAEC examination. Lastly, no single component or practice can account for improvement in learning rather it is a holistic approach that considers the needs of the student.

Recommendations

- Parents should visit their children's school and Biology teacher routinely to find out how they are faring in the subject.
- Parents should supervise children's study time in the study of Biology.
- Parents should make conscious effort to improve their level of education and family in order to be able to get involved in their children's education.

Students should become more accountable in the process of their education by participating in class and working hard at their home work in order to improve students learning outcomes.

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