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[Re-visiting Secondary School Science Teachers Motivation Strategies to face the Challenges in the 21st Century](#)

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Introduction

Education is considered as the most valuable tool for human building. FRN (2004) make it clear that government recognizes education as the greatest investment that the nation can make to bring about civilization, modernization, development and socio-economic progress.

The 21st century is characterized by advancement in science and technology (Okebukola, 1996). In this, every nation is striving to achieve scientific and technological break through with their environment. Thus, the teaching of science and technology is becoming more demand and activity oriented than before. The youths are taught science in relation to their environment for the improvement of their conditions of living and for economic growth. Achievement of the development and growth through science and technology requires qualitative science and technology. In other words, for Nigeria to realize accelerated development in the 21st century, she needs qualitative science and technology education. The realization of the above development and growth depend on the quality and quantity of science and technology education received by the future leaders of the nation. It is clear evidence that achieving quality science and technology education depends largely on the effectiveness and efficiency of the science teacher in the secondary school (Ezeliora, 2005).

Secondary education is planned for human resource development. it is a preparatory ground for human development, where career abilities are groomed, and potential and talents discovered and energized (FGN, 2004). The quality and quantity of science education received by the students gear towards developing scientists, technologies, engineers (Ejiofor, 1999). In spite of the efforts to develop scientific knowledge of our youths, reviewed literatures in the past decades were characterized by poor performance and low enrolment of students in science (Rosier, 1992; Adeyegbe, 1992, Offiah, 1987). West African Examination Council (WAEC) reports on students' performance in sciences are clear evidence not only poor performance but also low enrolment. Students being the backbone for national development, looking at their performances in sciences, Nigeria cannot hope to make any reasonable headway in technology revolution of the 21st century. One of the major challenges science teachers in secondary schools are facing today is: improving students' performance in science and winning more students to science, technology and mathematics (Ikeobi, 1997 and Okebukola, 1998). To tackle the problem of students' performance and enrolment in science, teaching of science requires scholarly and experienced science teachers who would lay solid foundation for science in both primary and secondary level.

Good foundation of science education is laid as early as in the primary school. From received literature, the state of inputs and outputs in primary science in the country is below expectation (Okebukola, 1997; FGN/UNICEF, 1992). Okebukola (1997) pointed out that for the 41,000 primary schools in the country, there were not up to 15% professional qualified science teachers teaching in the schools. The way and method of teaching science in the primary school cannot develop in the pupils the scientific knowledge required of them at that level (Ezeliora, 2005). Science is talked to the pupils instead of doing. Thus Okebukola (1996) rightly put it:

The typical primary science lesson begins with the teacher scribbling the topic of the lesson on the chalk board...proceeds to feed the pupils with facts (right or wrong)...the teacher reads from the science textbook, interspersed with a few explanation...the pupils copy as the teacher 'dubs' textbook or an old note.

Most of the time science teaching remains a telling instruction rather than doing. Science is talked to the pupils using descriptive or lecture method instead of hands-on approach. The position of science education in primary was evidenced in 1992 when Nigerian pupils took last position in the International Primary Science Quiz (Rosier, 1992). A good number of Nigeria pupils left the primary education loaded with misconception and wrong scientific facts (Maduabum, 1991). They carry the confusion into secondary school. For majority of pupils in the primary good foundation of science education was not laid at that stage. This posed its own challenge to the science teacher in the secondary school in their attempt to bring these pupils to the expected standard for onward move towards achieving functional science education.

In addition to all these challenges, the science teachers are faced with poor conditions of service. Their salary were not paid regularly, poor facilities and dearth of science teacher characterized the service. Furthermore, the science teacher were not motivated, they were not giving opportunity for developmental programmes nor were they granted fund for innovations and creativity. Mullins (2000) posited that the underlying concept of motivation in some driving forces within individuals by which they attempt to achieve some goal inn other to fulfill some need. Down the memory lane, secondary school science education is laden with a lot of problems which adversely affect the outputs in that level. Mbakwem (2000:108) maintained that "it is necessary to encourage greater warmth on the part of the teachers' morale". Morale is quite salient in determining performance. If teachers are to perform at their optimum they must be adequately motivated to boost their morale. To lhebereme (2006), high morale among teachers correlates with high productivity and high students' achievement. The effects of high morale among teachers include:

1. Willing cooperation toward the school objectives.
2. Loyalty to the school authority and its leadership
3. Good discipline and voluntary compliance to rules, regulations and order.
4. A high degree of interest in the teaching job
5. A reasonable display of initiative and pride in the profession.
6. Involving in the laboratory activities with the student.

Contributing, Dibia (2008) opines that teachers' job satisfaction is an index for quality assurance in education. Apparently, motivation strategies such as conferences, seminars and workshop in-service training programme, welfare packages (housing and car loans) prompt payment of salaries and other remunerations and pertinent to improve teachers' proficiency.

Leaving the problems as they are, for Nigeria to cope with the 21st century technology revolution something positive has to be done to rescue the situation. Nyong (1997) urged the government to encourage science teachers through payment of enhanced allowances and pointed out that lack of interest and low performance of students and teachers in the learning/teaching of science were due to the neglect of the science teachers' welfare. This paper therefore addressed the many ways to motivate secondary school science teachers and strengthen them to face the challenges in the teaching of science in the 21st century.

Research Question

This one research question was asked to guide the study:

What types of incentives are open to science teachers in Nigeria?

Method

The study was an evaluative study that involved the investigation of an existing phenomena which has not been influenced in any way by the researcher. The study was restricted to secondary school science teachers and students in the South-South Zone. 200 science teachers teaching in the secondary schools and 200 Senior Secondary School Science students from five (5) states in the zone were randomly picked with 40 teachers and 40 students each from each state. These were given questionnaire to fill. Two questionnaires were developed by the researcher: Evaluation of Science Teachers Activities in the Class (ESTACS) consisting of ten items was given to students to evaluate their science teachers' activities in the classroom. The other questionnaire: Science Teachers Motivating Factors (STMF) was also developed by the researcher. ESTAC and STMF were face validated by three (3) science education lecturers at Department of Curriculum Studies and Educational Technology, University of Port Harcourt. The questionnaire was developed using Likert 4-point scale where the opinion of the respondents were indicated on the issue raised in the questionnaire. The response patterns of these scales were: Strongly Agreed (SA); Agreed (A); Strongly Disagreed (SD) and Disagreed (D). STMF and ESTACS were administered to science teachers and science students respectively irrespective of whether state or private schools and were collected on the spot. The points were weighted as follows SA = 4; A = 3; SD = 2, D = 1. Data collected was analyzed using descriptive statistics of mean. Any item with mean 2.50 and above was accepted while item with mean below 2.50 was rejected.

Table 1: Evaluation of Science Teachers Activities in the Class by Students (ESTACS)

	ITEMS	SA	A	SD	D	<input type="checkbox"/>

1.	Teachers engage students in hands-on activities	10	20	30	140	1.5
2.	Frequency of practical is enough	30	60	40	70	2.25
3.	Teachers do not begin practical on time	41	82	29	48	2.6
4.	Science teachers do not prepare for lesson well	53	47	44	56	2.4
5.	Science teachers engage in creative projects	3	7	102	88	1.4
6.	Teachers use various methods	11	9	85	95	1.7
7.	Teachers engage in business	40	79	23	58	2.6
8.	They do not take students to excursion	93	95	45	7	3.4
9.	They relate science to daily life	10	20	60	110	1.2
10.	Test is the only assessment	20	82	10	88	2.2

Table 1 showed students' evaluation of their teachers' activities in the classroom. The results showed that majority of the science teachers did not begin science practical on time, nor had enough practical activities with the students before WAEC examination. The students also indicated that science teacher did not engage them in much hands-on activities nor expose them to creative project. The responses on table 1 also showed that science teachers engaged in business and did not take the student to excursion.

Table 2: Science Teachers Motivating Factors (STMF)

	ITEMS	SA	A	SD	D	
1.	Science teachers are allowed study leave with pay	2	3	30	165	1.2
2.	They are allowed study leave without	112	81	2	5	3.5

	pay					
3.	They are given scholarship for further studies	7	21	33	139	1.5
4.	They are sponsored to seminars/workshops	13	9	55	123	1.6
5.	They are paid hazard allowance	0	7	49	114	1.3
6.	They are paid science allowance	8	5	6	181	1.2
7.	They are offered grants of innovations	0	3	30	177	1.2
8.	They are given award for executive performance	0	0	5	195	1.02
9.	Promoted for class performance	3	2	7	193	1.1
10.	Given financial assistance as incentive	0	0	3	197	1.0

Table 2 showed science teachers reactions to incentives available for them for effective and efficient class work. The mean of the item responses are below 2.5 except to item 2 with mean value 3.5. The responses indicated that science teachers enjoyed no incentives in their profession.

Discussion

The students' responses showed that many of the science teachers enter the class room unprepared. Some of them engaged in business other than teaching, as result most of the experiences the students were supposed to be exposed to were not made available to them such as practical, excursion and projects. The above findings supported Iwori, Okebukola, Oludotun and Akpan (1992) assertion which stated that teachers' teaching approach was one of the factors responsible for students' poor performance and low enrolment in science. On the other hand, the teachers' response showed that science teachers do not enjoy any of in-service programmes nor have enough incentives in their profession. Most time their salary was not paid in time. The responses of table 2 have helped to reinforce students' response to the science teachers inability to use various methods in the teaching of science. The teachers were handicapped by limited knowledge since they were not sponsored to academic programmes where they could be up dated. The findings laid credence to Otuka, Okebukola and Jegede's (1994) claim that science teachers' academic qualification form one of the factors responsible for poor students' performance in the sciences. This implies that both the teacher and students were ill equipped for the challenges of the 3rd millennium.

Science is dynamic, new scientific discoveries are evolved everyday. The science teachers need to attend workshops and conferences to up date their skills. They also need further studies to be abreast with new scientific ideas and developments. The level of instruction of the teacher has relationship with his/her level of understanding (Diffy, 2002). Nothing can substitute for the science teacher's education (Bajah, 1997). Money should be invested to up-date the science teachers' education. Money spent in the retraining of science teachers academically is not a waste. Furthermore, the science teachers' salary should be paid on time to reduce teachers' divided attention in their profession. This has led many of the science teachers to engage in other businesses to earn a living to the detriment of the teachers' profession.

Teachers' dedication to duty as observed by the students in study; thus, Okebukola, (1996) warned that good and real science teachers were increasingly becoming an endangered species and might be extinct by the year 2020. Science teaching calls for dedication and commitment and required a well qualified, well informed and educated science teacher. To get good and real science teachers that can face the challenges of the 21st century, the standard and morale of the science teachers must be uplifted. Their conditions of service need to be improved (Ekpenyong, 1996 and Nyong, 1997). They should be free psycho-economic difficulties by having their financial problems taken care of through reasonable salary, and loan forgiveness (NSTA Report, 2005). This will prevent the divided attention of the science teachers between their work and financial needs of the families.

Science teaching is a scholarly exercise. A scholarly science teacher is one who is interested in learning more and should be able to use new information to progress (Laing, 1997). Without excellence in scholarship, there can be no excellent teaching (Omari, 1997). In order to give the science teachers the scholarly spirit with which to lead the nation through the 21st century, they must be sponsored to higher education, conferences, workshops and seminars, motivated and also challenged by rewarding good performance and achievement. These will equip the science teachers and bring them up to date to the progress in the world of science teaching and learning today.

Award schemes should be introduced into the secondary school education system as challenges to the science teachers. Award schemes are in operation in many developed countries such as Britain (Henkle, 1997) and America (Roger and Plumb, 1999). Similar to award schemes in Nigeria is the science teachers allowance which are paid regularly. Another type of its kind is the STAN awards to the best science teacher of the year. Award schemes are used to recognize the skills of the most effective teachers through Distinguished Teacher Award Schemes (McNaught and Anwyl, 1993 and Land, 1994). The introduction of the Distinguished Teacher Awards Schemes in our secondary school system will go a long way to enhance the science teachers' scholarship interest and create a culture of science which will help them to excel in revolutionary science. The Distinguished Teachers Award schemes have many forms: Teaching fellowship scheme is one of the award schemes to be used for science teachers. Teaching fellowship schemes recognizes the excellence by designating the award winner a Teaching Fellow. The award should attract salary increment, academic status and co-operate identity. The scheme if introduced into the Nigerian secondary school system will motivate the science teachers as well as other teachers in other field to excellence especially in places were appropriate promotion criteria is not established. This will be a good incentive on the part of science teachers to work for excellence in science teaching in secondary school. It will make the teacher to adopt a rigorous and creative approach to curriculum development, develop a reflective attitude to teaching and learning and has a good grasp of the links between teaching and research. These scholarly efforts of

the teacher will improve the students' attitude and performance to science subjects and thus enhance technological manpower development of the nation. Other teachers can benefit from the excellent achievement of the science teachers as the effective approach will be made available to other teachers to improve their teaching method. It will create a competitive spirit among teachers which in turn will improve teaching strategy in our schools.

Another award scheme for consideration is Educational development Grant Scheme. This is a situation where educational development grants are offered to teacher/staff for specific innovations in teaching and learning. The scheme rewards not only excellence but also productivity and creativity. It is more of an incentive to teachers than a reward, encouraging the teachers to develop learning process where students are the main beneficiaries of the award. The teacher benefits by acquiring an enhanced reputation, which can be used in the promotion process and additional support for teaching activities. This scheme if introduced in our secondary school will enhance science teachers' interest in innovation and productivity and encourage scholarship characteristics of the science teacher. It will generate innovation and creativity among the science teachers and makes teaching and learning functional. Techler (1995) stated that innovation, and creativity are important and integral part of the mission of the science teacher and a necessary condition for the existence of the school. Through innovation in teaching, there will be advancement and dissemination of knowledge. Students' performance and attitudes to science will improve, followed by enhancement in technological and scientific manpower growth of the nation. The promotion, salary increment and the status associated with receiving the grant will give the science teacher job satisfaction and confidence. This will enhance commitment and effectiveness in the science teachers. Penick and Bonnestetter (1996) noted that an award of this nature makes the teacher to:

Have high expectation of oneself and students, be model of active inquiry, get students to question facts, teachers and knowledge, stress scientific literacy, get students to apply knowledge, not view classroom as boundaries, put in more than minimal time to make a difference.

Conclusion

It has become clear that Nigeria's technological development in 21st century depends on the quality and quantity of science teachers in our secondary schools. It is the responsibility of the science teachers to provide the type of science education that will enable Nigeria to move along with other nations of the world. The science teachers need to be equipped to face this challenge. They have to be provided with a lot of incentives that will motivate them to accept and withstand the risks and demands of science teaching. This is done by:

- paying them enhanced salary to take care of their socio-economic needs to avoid divided attention in their duty.
- They should be given financial support to enable them improve and acquire higher knowledge in science by sponsoring them to: further studies, conferences and workshops.
- In educational budget for science and technology education, some money should be set aside to be given to science teachers as grants for new innovations in the teaching of science and technology. There should be also an award scheme for rewarding excellence innovations and productivity in science and technology education.

With these incentives introduced in our educational system, science teachers will be motivated to accept teaching as a profession. These incentives will also motivate students to learn sciences after witnessing the fulfillment and benefits enjoyed by their teachers and the bright future that awaits them.

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