



## SCIENCE TEACHERS' AWARENESS AND COMPETENCIES NEEDED IN UTILIZATION OF 21<sup>ST</sup> CENTURY SKILLS IN TEACHING IN AKWA IBOM STATE, NIGERIA

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### ABSTRACT

21<sup>st</sup> century school environment is presented with challenges and demands in the process of teaching and learning science and the teachers requires specific knowledge and skills to prepare the learners to be self-reliant and globally competitive individuals. This study examined science teachers' awareness and competencies needed in utilization of 21<sup>st</sup> century skills in teaching. The design of the study was descriptive survey research design. A sample of 200 science teachers randomly sampled from Eket Senatorial District of Akwa Ibom State was used for the study. Three research questions were formulated to guide the study. Researchers' structured 33-item questionnaire on "teachers' awareness and competence needed in utilization of 21<sup>st</sup> century skill in science teaching" was used for data collection. The instrument was validated by experts and Cronbach Alpha coefficient was used to determine its reliability which gave a coefficient of 0.70. The data was analyzed using mean and standard deviation. The findings showed that science teachers are aware of 21<sup>st</sup> Century skills, but a large number of them lacked the competence needed to utilize these skills, hence utilization of 21<sup>st</sup> century skills in science teaching is low. Based on the findings, it was recommended among others that; the STEM program for teachers training should be redesigned to include the 21<sup>st</sup> century content, knowledge and practical skills and STAN should intensify the online and virtual trainings, workshops and seminars currently practiced as this will help create more awareness and competencies among teachers.

### INTRODUCTION

The present day challenges have put so much pressure on the existing educational curriculum, making the curriculum to respond to multifaceted changes occurring globally in the scientific world.

Technology's exponential growth is rapidly challenging every sphere of human endeavours thereby producing social disruption. Globally, humans are facing severe difficulties at the societal, economic and personal levels, for instance, the recent outbreak of corona virus (Covid-19), which led to unexpected closure of school worldwide. In some states in Nigeria, there is the struggle with insecurity (banditry, unknown gunmen, murders and kidnapping), intolerance manifested in religious fundamentalism (ISWAP, ISIS, Boko Haram) and political crises. On the personal level, there is the struggle with joblessness, unemployment or finding fulfilling employment opportunities and achieving happiness. All of these have implications on education.

Education is changing every day, so is science and technology rapidly expanding, revolving and the applications of scientific ideas to practical situations have grown phenomenally. Educational progress is falling behind technological progress resulting in social and societal backwardness. It is becoming increasingly clear that knowledge alone is not enough to prepare students to thrive in the world (Etiubon et al, 2018). Employers complain about newly hired graduates and their lack of skills in the workplace. In order to truly have expertise and build capacity, students must learn what to do with the information and knowledge they have gained. How can they use information/knowledge to create something new? Can they communicate their knowledge? Can they come together to work or construct greater things than others? It has been observed that when knowledge is learned passively without skills, it is often only learned at a superficial level and therefore not readily transferred to new situations and environment (Bialik & Fadel, 2015). It is only meaningful for the real world and deep understanding to occur by embedding skills within knowledge domains such that each enhances the other (Etiubon, et al., 2018).

The goals of science teaching in Nigeria outlined by the Federal Ministry of Education (FME, 2013) include; the development of basic concepts and principles in preparation for further studies in science and technology; the development of essential skill and attitude, as well as application of science for developments produce scientists for national development; to cultivate inquiry, knowing and rational mind for the conduct of a good life. The Nigerian Basic Science and technology and Secondary Curriculum for Science, Technology, Engineering and Mathematics (STEM) also emphasis the acquisition of scientific

knowledge and skills through the teaching of science and technology subjects such as biology, chemistry, physics and mathematics. When skills are properly acquired by the students through critical thinking, collaboration, creativity, problem solving, as well as adaptability, experimenting and practical activities, the students can then apply them in the production of goods, as well as in rendering useful services for themselves and the society (Akpan, & Udoh, 2022). Education is the most powerful weapon which can be used to change the world, therefore developing 21<sup>st</sup> skills in learners is very crucial.

The education enterprise depends to a large extent on the quality and awareness of its science and technology teachers. It is a known fact that the quality and success of any nation depends on its citizens, which in turn depends on the quality of its education and the awareness of teachers. 21<sup>st</sup> century teaching has been patterned in such a way that it deals with challenges confronting learners. It requires the utilization of specific skills and competencies for the teacher to remain relevant, therefore the need for the teacher to be aware, knowledgeable of the patterns and constantly update their competencies in line with emerging trend. Research has shown that an active engagement of learners with learning leads to better learning outcomes such as understanding, active use of knowledge and retention. Hence, the Nigeria educational system like other countries in the world is looking for best practices to prepare her children and young people in school to cope with life and work in an increasingly complex 21<sup>st</sup> century world.

### **Conceptual Review and Related Literature**

Teaching in the 21<sup>st</sup> century requires specific skills and competencies from the teachers for them to remain relevant. It is the teacher's responsibility to prepare all children for the educational demands of life and work by equipping them with the required skills. Previously, formal education was that of providing students with knowledge they were expected to apply later, In recent years, Albi-Okparaocha, et al.,(2018) have observed that the quality of education across the globe has significantly changed, today, education focuses primarily on life skills. The aim is to teach students to obtain knowledge by themselves and to work in ways that enable them to come up with new ideas. This reality has created the need for teachers to be competent, talented, innovative, as well as be creative problem solvers, skilled and critical thinkers (Sharman, 2017).

### **What are the 21<sup>st</sup> Century Skills**

The term 21<sup>st</sup> century skills is generally used to refer to certain core competencies such as collaboration, digital literacy, critical thinking and problem solving that advocates schools need to teach to help students thrive in today's world (Partnership for 21<sup>st</sup> Century Learning, 2010). It developed a unified collective vision for learning which described the skills, knowledge and expertise students must master to succeed in work and life. It is a blend of content knowledge, specific skills, expertise and literacy. It requires the development of key academic subject knowledge that is (English language, Arts, Mathematics, Economics, History, Sciences, Government etc.) and understanding among all students. Meaning students who can think critically and communicate effectively must build on a base of key academic subject knowledge. 21<sup>st</sup> century skills in education include critical thinking/ reasoning, creativity/creative thinking, problem solving, meta-cognition, collaboration, communication, as well as information, technological literacy and global citizenship (Rich, 2010).

### **Science Teachers' Awareness of 21st Century Skills in Teaching**

The concepts of awareness by science teachers on new technological teaching strategies and 21st century skills/competencies have received increasing attention over the past years. Although many awareness interfaces have been designed and studied, one may say that science teachers are not aware and do not utilize the numerous skills on improvement of teaching and learning (Ndirika, 2015; Udoh et al., 2017). Teachers are the fulcra on which the whole educational system revolves. In order to teach the 21<sup>st</sup> century skills, the teacher must be aware of these skills and possess the skills themselves, since it is required that the teachers exhibit creativity, originality, innovativeness, novelty and be able to manipulate available educational resources to achieve educational objectives. It is expected that the level of teachers' awareness of the 21<sup>st</sup> century skills should be high, with the heavy presence of various types of technological gadgets and availability of information almost accessible to anyone on demand through the internet, the ability to connect instantly with people across the world and updated versions and different skills of the 21<sup>st</sup> century. For educational system to remain relevant in this century, it is very important that the teachers become aware of the skills demanded by the changes in the learning needs of the students and the expectations of the workplace.

Uche et al.,(2016) in a study on teachers' level of awareness of 21<sup>st</sup> century occupational roles in Rivers State secondary schools showed that teachers level of awareness of 21<sup>st</sup> century roles was just moderate and on the average, while the level of awareness of technology and project manager was low. 21<sup>st</sup> century skills are considered innovative strategies needed to be promoted in classroom practices in order to put students to thrive in a world that involves cooperation ,critical thinking, adaptability, grits, tenacity and relying on facts and information. (Padmadewi, et.al., 2020). Samba, et al., (2010) study on teachers' awareness and utilization of innovative teaching strategies in secondary school science in Benue State, Nigeria found that most teachers are aware of innovative teaching strategies, but they are not adequately utilized. In another study (Nadal-Abril2013), teachers awareness of the 21<sup>st</sup> century themes and skills and its relation to classroom practice and to the teachers induction/training; it was observed that teachers were very aware of 21<sup>st</sup> century skills and themes but the teachers integrate the skills to a little extent in teaching inside the classroom. Akpan & Udoh (2022) research on teachers' awareness and competencies in utilization of 21<sup>st</sup> century skills in Science teaching, in Akwa Ibom State found that science teachers are aware of 21<sup>st</sup> century skills for science teaching as some of them are already conversant with the skills.

### **Competences Needed in Utilizing 21<sup>st</sup> Century Skills in Teaching**

The teacher is not merely a teacher of a particular subject, but a person who places the learner at the heart of the job (Wordu & Chisom, 2020), thus all the effort in meeting the challenges of the changing scenarios confronting education invariably lies in the teacher's competence. Competence is a word that consists of different skills, which is classified under knowledge, attitude and abilities to improve performance. It is a comprehensive concept for abilities or capabilities of people or organization (Valli, et al., 2014). It is regarded as a rational factor that meets the performance objective for a desired condition. Competence is an underlying characteristic of individual that is casually related to superior performance in a job. With this knowledge, what is teachers' competence? Ekpo (2010) sees teachers' competence as more than just knowledge or skills, but it entails the ability to solve complex issues by stating and mobilizing psycho social resources of skills and attitude in a particular context.

Competence is the ability of the teacher to implement his/her obligations in a responsible and viable way. The single most important influence on students' learning is the quality of teaching, and a competent teacher is the most critical piece in improving students achievement and closing the achievement gap (OECD, 2022).. Wordu & Chisom (2020) noted that the competence of a teacher in the knowledge abilities and skills are controlled by the teacher so that he can perform that which are required in all the domains of educational objectives. Generally, teachers' competence prior to the 21<sup>st</sup> century included but not limited to the following in order to make positive impact on the students.

- Teacher student relationship
- Preparation of a good lesson plan
- Ability to use different teaching strategies, capable of accommodating different learning styles.
- Capable of using assessment techniques in order to monitor students' performance program.
- Cooperating with other teachers or encouraging synergies between fellow staff to achieve not only in specific lessons, but achieving also in the curriculum mission.
- Capable of communicating with parents and guidance of students.

Globally, the approach in solving teaching and learning challenges in school has changed from that is analog to digital as learners are more knowledgeable, more interrogative, more competitive and more demanding (Sharman,2017, OECD, 2022). What then are expected of the teachers? What instructional skills are the 21<sup>st</sup> century teachers' expected to prepare the students with? How can these teachers be distinguished from those of the past centuries?

According to Uche, et al., (2016) and Wordu & Chisom (2020), the teacher in this century should;

- be capable to pilot and guide the teaching and learning experiences of the learners, as well as prepare the environment that is smart and technologically enhanced for learning to happen and be sustained.
- adopt active teaching strategies to foster effective learning, the theory of constructivism should be adopted to allow learners utilize and construct their own knowledge and world and arrive at their own version of the truth.

- encourage connectivism in their approach, to help students and other teachers share and network their skills and aspirations. As connectivism emphasizes the roles of solving problems through networking of ideas, experience and aspirations in today's world. It is also an important vehicle to link ideas, facts and information.

Siemen (2005) states that teachers have to be knowledgeable, effective listeners, communicators, as well as facilitators, problem solvers, resource coordinators, coaches and mentors. The teacher of the 21<sup>st</sup> century must be resourceful in finding or figuring out new relevant information. The 21<sup>st</sup> century teacher is a model in great moral values; he/she is the parent in the school, a counselor and a model to the students. He encourages the students when they seem weak, disorganized and unmotivated and is exemplary in every way. Above all, the teacher should be competent in the use of and application of the state of the arts information and communication technologies to promote best practices in any area of learning.

Albi-Oparaocha et al (2018) study on maintaining the competence and relevance of teachers in today's economical, technological, political and social environments in the country, note that using global standards for effective learning and teaching in the 21<sup>st</sup> century to measure the competence of teachers in Nigeria especially in terms of technological skills showed that a significant number of teachers in Nigeria are not vast in knowledge and competence, and could be considered irrelevant in the profession. Most of these teachers at their present level of operation cannot effectively deploy the use of technology to achieve the objectives of education and therefore lack competence considered in the present age. The study also showed that most teachers do not advance their career and knowledge with technology and this affects their competence in teaching and managing students that are already using technology as part of their life and increasingly expect to use it for learning in school. Etiubon et al (2018) on socio economic empowerment of senior secondary science students in Nigeria and STEM teachers' preparedness identified the following indicators of teachers' competence to be able to impart skills to its learners, a blend of content knowledge, expertise, literacy, critical thinking, creativity, effective communication and collaboration. The study showed that STEM teachers lacked the competencies and skills to empower their students socioeconomically.

In another study Ogbonnaya et al (2020) on integration of 21<sup>st</sup> century competencies in teaching and learning biology, results showed that the respondents had good knowledge and were aware of 21<sup>st</sup> century skills and competencies, and the extent of integration in the teaching and learning process was also high. Lobo (2016) examined 21<sup>st</sup> century competence and ICT integration in the classroom as it pertains to preparing students for careers in the current and future employment market. The findings showed that teachers did not sufficiently integrate 21<sup>st</sup> century competences into their teachings because they lacked knowledge of these competencies, but supported themselves with other professional materials.

Buabeg-Andoh (2012) in another study, explored teachers skills, perception and practices of ICT in teaching and learning in Ghanaian Second –Cycle school, results showed that correlation between competence and ICT use was positive, teachers perception in terms of using ICT was also positive, but not significant. However, the teachers' basic knowledge of ICT was low. Another study on teachers' competencies in educational technology integration on instructional methodologies in the new normal, DeVera et al. (2020) showed that teachers are lacking competencies related to online instructional preparations. Even though the teachers already encounter digital literacy, they still have some difficulties using online platforms and interactive content. Teachers lack competence in the critical skills of innovation, being technologically/digitally compliant and exposing their students to wide range of technologies, thereby struggling with competencies required to teach and not utilizing 21<sup>st</sup> century skills due to lack of knowledge and not being digitally or technologically literate (Akpan & Udoh, 2022).

Students' poor attitude and performance have been blamed on so many factors; one of such is the non utilization and integration of new methodological elements into the teaching and learning process. According to Udoh et.al (2017) study on science teachers levels of awareness and utilization of blended learning approach for effective STEM teaching in Uyo Municipality, Akwa Ibom State, it was observed that science teachers are not aware of blended learning approach, hence they do not utilize the approach for effective STEM teaching as the science teachers are faced with challenges in the utilization of blended learning approach.



## **STATEMENT OF THE PROBLEM**

The 21<sup>st</sup> century environment is a world of both physical and virtual, which exploits technology in teaching. It is an environment that promotes creativity, critical thinking and productivity in learning. It is obvious that the conventional teaching pattern can no longer meet the needs of the digital world nor prepare students for the future. These factors have placed a lot of demands on the skills, competencies and abilities of the teachers as the needs of the 21<sup>st</sup> century are different from the previous centuries. Poor performance by students at examinations, complaints by parents and employees on the lack of skills and expertise in the workplace by our school leavers and graduates are clear indicators that the traditional modes of teaching and learning seems to be losing relevance and are not adequate to cater for today's learners needs and are not responsive enough to address the challenges of the global competitiveness in the 21<sup>st</sup> century. There is a huge disconnect between what is learnt and what the students actually need to survive in the future and workplace of the 21<sup>st</sup> century. It is in view of the above that this study examined science teachers' awareness and competencies needed in utilization of 21<sup>st</sup> century skills in teaching.

## **Objectives of the Study**

The aim of the study is to ascertain secondary school science teachers' awareness and competencies in utilization of 21<sup>st</sup> century skills in teaching. Specifically, the study sought to;

1. Assess the extent of science teachers' awareness of 21<sup>st</sup> century skills in teaching.
2. Examine the extent of possession of 21<sup>st</sup> century competencies needed by science teachers in teaching.
3. Find out the extent of science teachers' utilization of the 21<sup>st</sup> century skills in teaching.

## **Research Questions**

1. To what extent are science teachers' aware of 21<sup>st</sup> century skills for teaching?
2. To what extent do science teachers possess 21<sup>st</sup> century competences needed in teaching?
3. To what extent do science teachers' utilize 21<sup>st</sup> century skills in teaching?

## **Research Methodology**

Descriptive survey design was used for the study and was guided by three research questions. The study was conducted in Eket Senatorial District of Akwa Ibom State, comprising of twelve (12) Local Government Areas. The population of the study comprised all the 764 science teachers from the seventy five (75) public secondary schools in the Senatorial District. 25% of the population of the study was sampled and a sample size of 200 science teachers was obtained using random sampling technique. A 33-item researchers' structured questionnaire modifying Michael Corneau 21st Century Skills Possible Survey Questions titled "Science Teachers' Awareness and Competences needed in utilization of 21<sup>st</sup> Century skills in Teaching" was used to elicit responses from the teachers. The instrument was in two parts, Part A consisted of demographic item to elicit information on the Local Government Area of the teacher. Part B comprised 32-items on possible science teachers' awareness and competences needed in utilization of 21<sup>st</sup> century teaching skills skills. Three experts from Departs of Science Education and Measurement and Evaluation validated the instrument. It was trial-tested for reliability on forty teachers that were not part of the main study, using Cronbach Alpha coefficient. A reliability coefficient of 0.70 was obtained. Two hundred (200) copies of the instrument were administered and all copies retrieved, which gave 100% return rate. Mean and standard deviation were used to answer the research questions. In making decisions, mean of 1.00 to 1.49 was regarded as low extent (LE), 1.50 to 2.49 was moderate extent (ME), 2.50 to 3.49 great extents (GE), while 3.50 to 4.00 was very great extent (VGE).

## **Data Analysis and Results**

### **Research Question One**

To what extent are science teachers' aware of 21<sup>st</sup> century skills for science teaching?

**Table 1: Mean and standard deviation of the extent to which science teachers' are aware of 21<sup>st</sup> century skills for science teaching (N=200)**

S/N	Extent to which science teachers' are aware of 21 <sup>st</sup> century skills for science teaching	$\bar{x}$	SD	Remarks
1	I know about 21 <sup>st</sup> century skills	1.87	0.72	ME
2	I know about being innovative in teaching	1.92	0.81	ME
3	I understand what being creative means	1.85	0.74	ME
4	I am aware of the skills collaboration (working with people)	1.96	0.71	ME
5	I am aware of the skills of communication (being able to convey ideas and talking to people)	2.28	0.56	ME
6	I know the skill of critical thinking	1.92	0.83	ME
7	I am aware of information literacy skills	2.33	0.86	ME
8	I am aware of media to use for teaching	1.65	0.71	ME
9	I know the gadgets and machines and the skills needed for teaching	2.36	0.98	ME
10	I have the ability to adapt to situations	1.92	0.74	ME
11	I understand what it is to motivate others to accomplish tasks	2.29	0.76	ME
12	I know how to take initiatives	2.44	0.90	ME
13	I know of social skills, meeting people, networking	2.68	0.72	GE
	<b>Average Mean</b>	2.11	0.77	ME

The result in Table 1 showed, the mean response of the teachers on the extent to which they are aware of 21<sup>st</sup> century skills for science teaching. The result showed that, the mean for items 1,2,3,4,5,6,7,8,9,10,11 and 12 fall between 1.50-2.49 which means that to a moderate extent, the science teachers know about 21<sup>st</sup> century skills and being innovative in teaching, they understand what being creative means and are aware of the skills of collaboration, in addition to being aware of the skills of communication, they understand the skill of critical thinking and are aware of the information literacy skills. The result also implies that to a moderate extent, science teachers are aware of media for teaching and they know the gadgets and machines as well as the skills needed for teaching. The result showed that to a moderate extent, science teachers have the ability to adapt to situations and they can motivate others to accomplish tasks and know how to take initiatives in teaching/learning situations. The result further showed that, the mean for item 13 falls between 2.50-3.49 which means that to a great extent, science teachers know of social skills, meeting people and networking. It is also observed that the standard deviation scores of the respondents range from 0.56 to 0.98, the scores were not very far away from each other, which means that the

respondents share similar views on the items. However, the average mean of 2.11 for all the items implies that to a moderate extent, science teachers' are aware of 21<sup>st</sup> century skills for teaching.

### **Research Question Two**

To what extent do science teachers possess 21<sup>st</sup> century competences needed in teaching?

Table 2: Mean and standard deviation of the extent to which science teachers' possess 21<sup>st</sup> century skills /competence needed in teaching (N=200)

S/N	Extent to which science teachers' possess 21 <sup>st</sup> century competences needed in teaching	$\bar{x}$	SD	Remarks
14	I bring innovation when teaching my students	1.41	0.71	LE
15	I back up my lessons with practical or hand-activities	1.59	0.70	ME
16	On creativity, I try out different resources when teaching	1.39	0.65	LE
17	I work and co-exist with fellow teachers and students	2.48	0.74	ME
18	I conveniently communicate my ideas with other people	2.46	0.73	ME
19	I can work online/surf the internet for information	1.48	0.99	LE
20	I can identify credible sources to put out information.	1.42	0.70	LE
21	I am technologically/digitally compliant	1.20	0.80	LE
22	I have the ability to motivate my students to complete their tasks.	2.45	0.70	ME
23	I can create personalized and independent learning experience for my students	1.38	0.88	LE
24	I can expose my students to a wide range of technologies in order to develop their skills and use them for their learning	1.03	0.67	LE
	Average Mean	1.66	0.75	ME

The result in Table 2 showed, the mean response of the teachers on the extent to which science teachers' possess competence to utilize 21<sup>st</sup> century skills in science teaching. The result showed that, the mean for items 15, 17, 18, and 22 fall between 1.50 - 2.49, which means that to a moderate extent, the science teachers back up lessons with practical or hands-on activities, work and co-exist with fellow teachers and students, as well as conveniently communicate their ideas with other people and they have the ability to motivate their students to complete their tasks. The result further showed that, the mean for items 14, 16, 19, 20, 21, 23 and 24 fall between 1.00 - 1.49, which means that to a low extent, science teachers can bring innovations when teaching their students, they try out different resources when teaching and work online/surf the internet for information. The result in Table 2 also showed that to a low extent, science teachers can identify credible sources to put out information, they

are technologically/digitally complaints, as well as create personalized and independent learning experience for their students and expose students to wide range of technologies in order to develop their skills and use them for their learning. It is also observed that the standard deviation scores of the respondents range from 0.62 to 0.99. the scores were not very far away from each other, which means that the respondents share similar views on the items. However, the average mean of 1.66 for all the items implies that to a moderate extent, science teachers' possess 21st century skills needed in teaching.

### Research Question Three

To what extent do science teachers' utilize 21<sup>st</sup> century skills in science teaching?

**Table 3: Mean and standard deviation of the extent to which science teachers' utilize 21<sup>st</sup> century skills in teaching (N=200)**

S/N	Extent to which science teachers' utilize 21 <sup>st</sup> century skills in science teaching	$\bar{x}$	SD	Remarks
25	I use information and communication technologies in teaching	1.21	0.64	LE
26	innovative resources are available for use in teaching	1.28	0.68	LE
27	I use multiple teaching methods and strategies to stimulate learners' interest and motivate learners' participation	1.48	0.56	LE
28	I use activities that will create experiences and develop new practices and understanding for my students.	1.49	0.60	LE
29	I use technology to communicate and engage with my students' authority, and even parents.	1.47	0.65	LE
30	I use internet facilities to get information for my lessons.	1.88	0.57	ME
31	I engage students in collaborative task with one another	2.48	0.64	ME
32	Corporative, collaborative and interactive learning are encouraged.	1.66	1.01	ME
	<b>Average Mean</b>	1.61	0.76	ME

The result in Table 3 showed the mean response of the teachers on the extent to which they utilize 21st century skills in science teaching. The result showed that, the mean for items 25, 26, 27, 28, 29, fall between 1.00 - 1.49, which means that to a low extent, science teachers use information and communication technology in teaching, innovative resources are available for use in teaching, science teachers use multiple teaching methods and strategies to stimulate learners interest and motivate learners participation as well as use activities that will create experiences

and develop new practices and understanding for their students. The result also means that to a low extent, science teachers use technology to communicate and engage with their students, authorities and parents. The result further showed that, the mean for items 30, 31 and 32 fall between 1.50 - 2.49 which means that to a moderate extent, science teachers use internet facilities to get information for their lessons, engage students in collaborative task with one another and corporative, collaborative and interactive learning are encouraged. It is also observed that the standard deviation scores of the respondents range from 0.56 to 1.01, the scores were not very far away from each other, which means that the respondents share similar views on the items. However, the average mean of 1.61 for all the items implies that to a moderate extent, science teachers' utilize 21st century skills in teaching.

## **DISCUSSION OF FINDINGS**

The overall result of the extent to which science teachers' are aware of 21<sup>st</sup> century skills for science teaching showed that to a moderate extent, science teachers' are aware of 21<sup>st</sup> century skills for science teaching. This awareness could be due to the fact that the teachers already have an idea and some are conversant with the skills talked about; since they are members of a professional body the Science Teachers Association of Nigeria (STAN). They are exposed to these skills through writing, publishing, workshops, seminars and conferences. The finding lends credence to that of Uche, et al., (2016) whose findings showed that teachers' level of awareness of 21<sup>st</sup> century roles was just moderate. The finding is also in line with that of Samba, et al., (2010) who found that most teachers are aware of innovative teaching strategies, but strategies are not adequately utilized. This suggest that science teachers know about these 21<sup>st</sup> Century skills, but their awareness level in this context seem to be superficial and shallow, they do not have an in-depth knowledge of the skills and how to use them.

The overall result on the extent to which science teachers' possess 21<sup>st</sup> century competences needed for teaching, showed that to a moderate extent, science teachers' possess competence needed in science teaching. Item analysis of the finding shows teachers lack of competence in seven of the critical skills (innovation, creativity, ability to surf internet/network/online, being technologically/digitally compliant, as well as identify credible sources of information, create personalized and independent experience for their students and exposing their students to a wide range of

technologies). The finding agrees with that of Albi-Oparaocha, et al., (2018) who found that a significant number of teachers in Nigeria are incompetent (not vast in knowledge and practice) in terms of technological skills. The finding also agrees with that of Etiubon, et al., (2018), which showed that STEM teachers lack the competencies and skills to empower their students socioeconomically, as well as DeVera, et al., (2020), finding which also indicated that teachers' lack competencies related to online instructional preparations. This indicates that although schools are in the 21<sup>st</sup> century, the age of globalization and innovation with information communications and technology as the vehicles that drives learning, science teachers are still struggling with competencies/skills required to teach science and technology.

The result of the extent to which science teachers' utilize 21<sup>st</sup> century skills for teaching showed that to a moderate extent, do science teachers' utilize 21<sup>st</sup> century skills for teaching. On analysis of the finding, the low extent in the utilization of most skills could be attributed to lack of knowledge and expertise as most teachers are not digital, computer or technology literate and at times lack of interest to adapt to the new strategies and skills. The finding lend credence to that of Lobo (2016) whose findings showed that teachers did not sufficiently integrate 21<sup>st</sup> century competencies into their teachings because they lacked knowledge of these competencies. The finding agrees with that of Albi-Oparaocha, et al., (2018) who found that most of the science teachers in Nigeria at their present level of operation cannot effectively deploy the use of technology to achieve the objectives of education. The finding contradicts that of Ogbonnaya, et. al. (2020) whose result showed that the respondents had a good knowledge and were aware of 21<sup>st</sup> century skills and competencies, and the extent of integration in the teaching and learning process was also high. The low extent of utilization could be attributed to lack of expertise and lack of in adapting to the skills and strategies required in teaching in the 21<sup>st</sup> century.

## **CONCLUSION**

The 21<sup>st</sup> century school environment is laden with a lot of demands on the process of teaching and learning science and the teachers require specific knowledge and skills to adequately meet the needs of learners and prepare them to be self-reliant and globally competitive individuals, who are able to survive in the 21<sup>st</sup> century workplace. Based on the findings of the study, it was concluded that science teachers are moderately aware of 21<sup>st</sup> century skills and possess competence needed

in utilizing 21<sup>st</sup> century skills in teaching. A good number of them lacked the competence to utilize these skills in science teaching, hence the reason why the extent of utilization 21<sup>st</sup> century skills in science teaching is almost low in Eket Senatorial District of Akwa Ibom State.

## **RECOMMENDATIONS**

1. Professional development programmes for teachers should be transformative, focusing more on making the teachers acquire 21<sup>st</sup> century teaching skills and mastering the arts of teaching using all the skills.
2. Government should put up a policy demanding new teachers to acquire ICT competence or certification before they are employed and serving teachers should be made to undergo same training within a stipulated time. This will encourage teachers to identify and appreciate the new trends in teaching, thereby enhancing awareness and utilization of the skills in teaching.
3. Redesigning of STEM teachers' programme to include 21<sup>st</sup> century content, knowledge and practical skills and activities which seem to be lacking presently.
4. School administrators should ensure that more teachers attend seminars, workshops, and training programmes organized by government and other stake holders on the use of ICT and other innovative teaching strategies in the classrooms. They should not recycle the same teachers who are their family members and friends to these programmes, because of the benefits attached on attendance of such events.
5. Teachers can form and organize self-professional development exercise on 21<sup>st</sup> Century skills in teaching using their fellow technically literate and competent teachers, so that they learn from one another.
6. Science Teachers Association of Nigeria (STAN) should intensify the online and virtual meetings, trainings, workshops, seminars and conference currently practiced, as these have created awareness and more teachers will become aware of the teaching patterns used in this century. This helps them build competencies in the skills required.



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