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Table 1.2: Adjusted Means for Treatment Effects and Critical Thinking

Independent Variable		Critical Thinking			95% Confidence Interval	
Treatment		M	SD	Std Error	Lower Bound	Upper Bound
(i)	Collaborative task method	58.18	11.14	1.26	55.70	60.67
(ii)	Self-directed learning	59.12	9.97	1.23	56.71	61.53
(iii)	Collaborative task method & Self-directed learning	59.17	9.72	1.13	56.94	61.39
(iv)	Traditional Method	57.71	12.75	1.16	55.42	59.99

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The Role of Science Teachers in the Operationalization of Sustainable Development Goal 4 in Nigeria Secondary Schools.

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Abstract

Sustainable Development Goals is a global effort by the United Nations to support and care for the needs of mankind and the universe. Sustainable Development Goal Four (SDG4) is one of the sustainable development goals that focuses on inclusive, equitable quality education and promotion of lifelong learning opportunities for all. The SDG4 has the vision of an inclusive quality education for all including the vulnerable groups. Science teachers therefore need to play their role in making it achievable. However, the education enterprise in Nigeria like other sectors of the society is fraught with frailties such as funds, inadequate infrastructure, prominent among which are lack of inclusiveness and inequality that constitute impediments to sustainable socioeconomic development. Many studies were carried out to evaluate the capacity of Nigeria educational system in the achievement of the set goals of the SDG but none has dealt with the operationalization of the goals by science teachers. In this paper attempt was therefore made, to examine how science teachers could ensure inclusive and equitable quality education, and promote lifelong learning opportunities for all students. The paper highlighted the 17 SDGs with special focus on SDG 4 and the prospects and problems of operationalizing SDG4 at the class room by science teachers. The paper recommends changes in educational policies that constitute impediments to SDG 4, and a more robust synergy between the school, parents, and Civil Society Organizations in school monitoring and evaluation process.

Keywords: Education, Equity in Education, Inclusive Education, Science Education and Sustainable Development Goals

Introduction

The Sustainable Development Goal has 17 agendas with separate targets. The indivisible agendas encompass economic, social and environmental dimensions. The goal emphasizes no poverty for several millions of people that are still living in poverty. While the second on the list is zero hunger, to be taken care of by the food and agriculture sectors. The third goal is on good health and well-being. This is for the well-being for all ages while the fourth goal is on quality education which is the foundation to improve lives and many others. Each goal has its purpose and is interconnected.

With SDGs 4 goal, teachers in secondary schools have a great role to play in ensuring quality education with partnership with other teachers either at primary or tertiary levels to promote lifelong learning opportunities for all. Therefore, SDGs 4 goal that focus on inclusive and equitable quality education would be achieved if other goals like SDGs 5, 13, 14, 15 and 17 are collaborated. Quality Education focuses on the set standard of qualitative education at all levels of education. This is usually ensured by the teacher who teaches in the classroom with learners of diverse needs. The goal 4 ensures that both boys and girls have access to free primary and secondary education by 2030. It also deals with equal access to affordable vocational training in order to eliminate gender and wealth disparities and to achieve universal access to a quality higher education. (Adegbami and Adesanmi, 2018).

Table 1 shows the ten (10) targets of SDG 4 goal. Science teachers need to know that SDG4 has ten targets for different aspects of education. Out of the ten targets, seven targets have expected outcomes while the three are the means of achieving the 7 targets. To achieve this, the SDG4 education goal needs to be understood well, with the implementation of available resources in order to achieve a relevant and effective learning outcome by 2030.

Table 1: Sustainable Development Goal 4 and its Targets

S/N	Targets	Expected outcome
1	Universal Primary and Secondary Education	Relevant and effective learning outcomes
2	Early Childhood Development and universal pre-primary education	All children are ready for primary education
3	Equal Access to Technical/Vocational and higher education	Affordable and quality education for all
4	Relevant skills for decent work	Employment, decent jobs and entrepreneurship
5	Gender equality and inclusion	Eliminate gender disparities and discrimination
6	Universal youth literacy	All youth and some adult to achieve literacy and numeracy
7	Education for sustainable development and global citizenship	Cultural contribution to sustainable development and global citizenship
The three targets for the implementation of the seven targets are:		
1b	Effective learning environments	Implementation by building and upgrading education facilities that are safe, non-violent, inclusive and effective
2b	Scholarships	Scientific Programmes, Vocational Trainings, ICT Trainings among others
3b	Teachers and educators	Increase in supply of qualified teachers, including international cooperation for teacher training in the developed and small island developing states.

Source: <https://en.unesco.org> (2021)

The teachers are the key factor in achieving the entire SDGs 4 target. It requires urgent attention because many schools are predominantly eliminated by uneven distribution of professionally trained teachers especially in disadvantages areas. This issue needs to be addressed because every child should have equal right to quality education. With just and fairness to all, the personal condition of one child would not interfere with the educational pursuit of another (Ainscow, 2020). With many benefits that could be achieved with the targets, there are numerous challenges for the operationalization of this goal at all levels, especially at the Nigeria secondary school level. Hence, in this paper, attempts are made to explain the role of science teachers in operationalization of sustainable development goal 4 in Nigeria Secondary Schools. Attempt was made to describe the teachers' role in ensuring that inclusive, equity and quality education are maintained. Also, the problems and prospects of operationalizing the SDG4 in Nigerian Secondary Schools were dealt with.

Roles of Teachers in Ensuring Inclusive, Equitable and Quality Education

Inclusive education is an educational system that accommodates all students irrespective of their differences into the mainstream classrooms. The students with disabilities do not have access to quality education. The Florida Development Disability Council (2002) reported that there has been drive towards including all students in equitable and quality education since the 1990's. This became persistent even in recent times as the Sustainable Development Goals (SDGs) still emphasizes this drive and is evident in the SDGs number 4. In the quest for achieving the SDGs goal number 4, it is pertinent that developing countries like Nigeria adopt inclusive education in its educational system. Inclusive education as providing education to all learners, including disabled. It is an educational system that provides equal opportunities for learners to receive effective educational services, with needed supplementary aides and support services. This is essential to prepare students irrespective of their disability for productive lives as full members of society.

In an inclusive classroom setting, students with various forms of disabilities are allowed to learn with students without disabilities under the same condition without any discrimination. However, the concept of inclusive education goes beyond merging these two categories of learners together but also includes the gifted students. Therefore, a typical inclusive classroom setting should accommodate the gifted, disabled and those without any form of disability. Inclusive education becomes a necessity in the educational context as exclusive education portrays threat to students with various forms of disabilities. This threat includes, but not limited to depriving them of quality education that students without disabilities enjoy. Segun (2017) reported that the total number of Nigerians with disabilities is 25 million. Any form of exclusion of this group is a threat to national development. Hence, total inclusion in education in a developing country like Nigeria should be accorded necessary attention.

Equity in education signifies fairness in providing quality education for all. Rakum (2017) opined that equitable education means impartiality and fairness in the distribution of access to quality education. The author posited that impartiality and fairness should not be observed on the basis of factors like race, tribe, gender, religion, local government, state, zone and so on. Furthermore, fairness in equitable education implies that factors specific to one's personal conditions should not interfere with the potentials of educational pursuit. Equity in education is targeted at eliminating inequality, having access to quality education, participation or engagement in learning activities, learning processes, as well as learning outcomes (Ainscow, 2020). An equitable education program helps to remove marginalization and exclusion of learners with special needs. It is based on the principle of just and fairness on every member of a society which indicates that every child has equal right to quality education.

The need to intensify efforts towards attaining inclusive, equitable and quality education in Nigeria cannot be overemphasized. Quality education has to do with the attainment of set standards. These standards are usually derived from societal aspirations to which the education system must conform (Humphrey & Crawford, 2015). Also, Ogunyinka, Okeke and Adedoyin (2015) defined quality education as distinguishing parameter that brings out or exposes the worth or goodness associated with educational programs. Education is regarded to be qualitative when learners of an education system demonstrate competence during and after living school (Rakum, 2017). In an attempt to ensure quality education, Nigeria Ministry of Education at both federal and state levels established Quality Assurance Agencies that are saddled with the responsibility of monitoring and ensuring good and qualitative education at all levels of education. However, the attainment of this is largely dependent on the teachers who are the implementers of educational policies. Therefore, it becomes important to highlight the role of teachers in ensuring the implementation of an inclusive, equity and quality education. These roles, from the researchers of this article, are as follows:

1. Teachers should pay attention and demonstrate knowledge and skills in identifying the needs of diverse learners in their classroom. Hence, should endeavor to provide adequate and necessary support required.
2. Teachers should be versatile in the use of diverse technological tools that supports learning for all categories of learners. This is essential as no child is expected to be left out during the learning process.
3. Teachers should adopt the use of pedagogies that will yield lifelong learning. Emphasis should be placed on learner centered activities that are capable of engaging student during the learning process.
4. Teachers should demonstrate knowledge in the diversification of instructional strategies that will suit the needs of the learners at every stage of instructional delivery. This will assist learners to benefit maximally from the learning process.
5. Teachers should endeavor to accommodate and tolerate unfolding events in their classrooms since, it is expected that the classroom contains learners with diverse needs. Hence, the need for teachers to show positive attitude towards teaching in an inclusive classroom.
6. Teachers should show a high sense of enthusiasm and efficacy towards teaching in an inclusive classroom. This will not only provide sense of belonging to students with disability, but will ensure equity among the various categories of learners in the classroom

Prospect of SDG4 in Nigeria Secondary School

Rational use of resources: Schools are required to reduce resource use (water, electricity, paper) and/or to collect waste for recycling (bottles, paper, batteries, toners, and so on);

1. *Contribution to the community:* An additional grade beyond those engaged in formal environmental studies is required to implement a community project aimed at increasing awareness of the environment and bringing about behavioral changes. Examples include adopt-a-site projects, recycling, and extending community project task by the academic communities.
2. *School's Green Leadership:* Each school must establish a green leadership group comprised of students, teachers and others from the community. The group is responsible for promoting the green school accreditation process;
3. *Training Program for Teachers:* A teacher training program in four modules which addresses environmental and sustainability topics is required. Some schools are granted a "Continuing Green School" status if they qualify for additional criteria after accreditation as a Green School. The criteria include a dedicated studies program of 30 hours per student on environmental topics (for all three grades in post primary schools), an ongoing environmental community project and the implementation of additional opportunities for resources efficiency at the school. To date, some 1,224 schools have been certified as Green/Continuing Green Schools (Ilechukwu et al, 2014)
4. *Environmental studies:* Each campus will allow each student to take one elective course on the environment;
5. *Contribution to the community:* Each campus will choose and implement a community environmental project, to be conducted by the administration, the students and the community. The project should lead to a change in behavioral and conceptual norms in the community in terms of environmental orientation.
6. *Rational use of resources:* Each campus will choose and implement one environmental aspect a "reduction" program such as reduction of electricity use, water use, private car use, paper use or an "increasing" program, such as increase in the quantity of bottles, toners, batteries and paper collected for recycling. The assimilation of green building as one of the components of the rational use of resources program is recommended.

Types of solutions (teaching, treatment, guidance, assistance) for each student who is mainstreamed in a regular school are determined by the school in conjunction with the educational staff and the parents. At the same time, schools are provided with numerous solutions including training and supervision for teaching staffs, counselors,

psychologists, inclusion coordinators, learning function specialists, mainstreaming teachers, inclusion hours, inclusion spaces, and many more. A student found to be eligible for special education services and whose parents choose to exercise his eligibility in a regular school will receive a solution from the school's basket of resources and the basket of special education resources and will be an integral part of all the school's students. Guidelines for inclusion in regular schools include:

- Individualized learning plan: The multi-disciplinary staff, under the responsibility of the school principal and together with the parents, will choose the types and scope of support suited to the student's needs, as part of the general curriculum of the class in which he/she will be learning;
- Varied and appropriate teaching in the heterogeneous class: Teaching and learning in the school will be accessible and suited to all student populations, based on three principles: variety and range of presentation modes, variety and range of activities and modes of expression, variety and range of learning activities;
- Support for the regular education system: Special education staff members will work together with regular education staff members, according to the needs of students and staff;
- School-community continuum: The school will be only one component of the broad range of the student's social involvement, so that the student is seen throughout the day in the various frameworks;
- Contact with parents: An informed and positive relationship between educators and parents will be a significant factor in the student's success.

Problems and Prospects of operationalization of SDG4 in Nigeria secondary school

Sustainable Development Goal 4 (SDG 4) is the education goal that aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. Since SDG 4 is made up of ten targets, it is important to address the problems of its operationalization alongside with the targets

The first target is set to ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes by 2030. The discriminatory index that exists between boy education and girl child education in the northern part of Nigeria is a major to the operationalization of this Sustainable Development Goal 4 (SDG 4). It has not been easy striking balance between both genders.

The next target is to ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education. Equal educational opportunities need to be provided to both boys and girls. Both girls and boys should be encouraged towards acquisition of education. In some areas in Nigeria, parents are usually of the view that girls education ends in the kitchen. Hence most people take interest in sending their male children to schools, thereby discouraging the girls from obtaining education. In order to reduce educational inequality to realize SDG4 objectives, it is important that sociable and agreeable atmosphere should be created within homes and schools.

The third target is to ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university. In Nigeria of today, it is no doubt that, there is proliferation of students engaging in early marriage, a larger percentage of our students in tertiary institution were nursing mothers. This menace has deprived many students in this category from accessibility to quality education. Domestic job at home and taking care of their children has also deprived most from enrolling into vocational education outside the classroom. By mere observations, it can be seen that male students are more involved in vocational skills accusations than the females, despite the population the female occupied. Apart from the aforementioned clause, there are many other factors that lead to this inequality among male and female in acquiring quality technical, vocational and tertiary education, including university.

The fourth target is on relevant skills for decent work. The reorganization of the curriculum and instructional strategies enables all-inclusive, quality equitable education that will ensure students acquisition of relevant skills right from secondary school level, so that they are able to promote academic excellence. It does not only lead to alleviation of educational sustainability, but teachers are able to earn appreciation from the students and acquire job satisfaction.

Another problem that is hindering the operationalization of SDG4 in Nigeria secondary school is overcrowded classroom. The students don't get the attention or personalization they require, they also lose interest, which plants the seeds for dropping out. It is proven facts from a study that overcrowding is "sharply" linked to lower achievement among students of low socioeconomic background. That study found that both students and teachers felt overwhelmed, discouraged, and, at times, disgusted with the state of overcrowding within their schools.

Teachers in overcrowded schools, with little resources are in less than ideal condition. Lack of space can lead to lessons being taught in non-instructional areas. The smaller the class, the better the individual student experience most especially at this time where children need more attention than ever to succeed, overcrowded classrooms are making it even tougher to learn and tougher for teachers to be teach sciences effectively.

It is glaring that educational technology applications comes with its downsides. It was noticed that Education has become synonymous with entertainment in many ways. Most students Guidance's are quick to download educational games as soon as kids have the knowledge to operate mobile android devices; they do this with best of intentions for their wards. This scenario as put behind many of their counterpart class who are not technological exposed and are indisposed in getting the needed devices (ISGlobal. n.d.).

Meanwhile, increase teacher funding and support is also a key factor. Policy makers should focus not only on funding the building of new schools and improving older buildings but also on increasing funding for teachers. This can be achieved by the prompt payment of the minimum wages with lot of arrears, particularly in low-income areas. Since many teachers choose to work in affluent areas because of the potential for better pay or working conditions. The quality of teaching in poorer schools can suffer. If policy makers and school officials can work together to attract and retain teachers at such schools. The students with greater educational needs will benefit from the improved teaching quality. Prominent among other challenges are:

1. How to align SDGs with national planning policy framework on Education
2. Problems leadership, coordination and management of the implementation Process
3. Problem of relating to adequacy of financing and other means of implementation

Science Teacher's Roles in Ensuring Lifelong Opportunities

Science teachers will need to focus their energy to develop professional knowledge, skills and practices that include but extend well beyond disciplinary content so that it can also be applicable in the classroom so as to enable all students to learn 21st generation science.

Science teacher must have it in mind that they are to ensure their students are learning the material so that when they graduate from high school, they will be career-ready, college-prepared and able to contribute to society. He/she must always engages students at a high level, knows his/her students' learning styles, brings science lessons to life with real-world applications in practical forms, understands student sensitivities and differences, the teacher must be committed to continual professional improvement (Lynch, 2020)

Science teacher's role is also to make a commitment to keep their science education current by taking advantage of professional development opportunities coming up around them. Highly effective science teachers will be just as committed to their own learning as to their students'. Understanding the latest instructional topics such as scientific misconceptions/alternative conceptions, logical-mathematical and scientific reasoning and motivation are among others must be his priority

Summary

The 2030 Agenda for Sustainable Development is universal, holistic and indivisible, with a special imperative to leave no one behind. The achievement of SDG 4 is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all which plays a central role in building sustainable, inclusive and resilient societies. While education in the 2030 Agenda for Sustainable Development is most explicitly formulated as a standalone goal (SDG4), it also has reciprocal linkages across the 2030 Agenda. Progress has been made towards achieving SDG4, and there are new knowledge horizons and opportunities for strengthened solidarity and partnerships around the provision of quality education and lifelong learning for all. Since education is not only an integral part of, but also a key enabler for sustainable development, it needs to be included in national development plans and strategies for achieving all the SDGs.

Recommendations

The following recommendations were postulated and adapted

1. Inclusion and equity through educating and training are vital to ensuring a transformative education agenda, and the right to safe, quality education and learning throughout life, based on the principles of non-discrimination, gender equality and equal opportunity for all must be ensured.
2. Teaching is a profession and teachers, school leaders, educators and trainers all play a vital role in the collective responsibility to prepare future generations. Accordingly, greater support and resources are needed for relevant initial and continuous professional development, efficient and effective policies, appropriate recruitment and deployment processes, decent working conditions, and opportunities for sharing promising practices, professional autonomy and career pathways for teachers.
3. Highlighting that literacy, including functional literacy, is still a major challenge, greater efforts are needed to eradicate illiteracy through formal and non-formal education and training and ensure equitable access to digital literacy, as well as media and information literacy as a continuum of proficiency levels within a lifelong learning perspective.
4. There is a need to include migrants, displaced persons, returnees, asylum seekers, refugees and stateless persons in education and training systems and to facilitate recognition of their qualifications, skills and competencies, taking account of national context, national legislation and international agreements.

5. Commitments are needed to support lifelong learning opportunities for all to ensure necessary competencies for personal development, decent work and sustainable development, with attention to climate change, adaptation and mitigation.
6. Adherence to the international benchmarks of allocating at least 4-6 per cent of Gross Domestic Product and/or at least 15-20 per cent of total public expenditure to education is necessary to meet SDG 4 targets.
7. Harassment and violence of all forms in education institutions must be addressed.
8. Progress toward SDG 4 calls for the meaningful involvement of youth, students, teachers, school and post-secondary institution leaders, and their representative organizations, as well as communities, parents, civil society and academia at all stages, from planning to monitoring progress in ensuring the right to quality education for all
9. National and regional SDG4 coordination and implementation mechanisms need to be reinforced to strengthen international cooperation, solidarity and partnerships by learning from each other's experiences and developing joint initiatives ensuring complementarity and synergy in our efforts to meet our shared goals and commitments.

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