

Overcoming the Challenges in Science Education

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Article DOI:

10.48028/iiprds/ijirssmt.v9.i1.10

The impact of science education in the daily activities of man and of course the world can never be over emphasized because science education forms the basis for the acquisition of the scientific common senses that are applied in the solution of certain problems. The world is changing every day, therefore, science education which is the vehicle for advancement; innovations and national development have to change too. The paper looks into the concept of science education, goals of science education, emerging challenges in science education and way forward. Suggestions were also made on how best to overcome the challenges in science.

Keywords:

Science Education,
Goals, Impacts,
Challenges and Way
forward

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Background to the Study

Education is a worthwhile venture as it is recognized world wide as the most important engine that propels technological and natural development in modern societies. Education, particularly science education is the factory for production of skilled individuals who are required for the greater height of scientific advancement of the nation from a developing nation to developed nation (Ava, 2007). It is an area of study that has a lot of contributions towards the attainment of the national objectives. Science is the study of natural phenomena and is distinguished from other fields because it relies on the hypothetical deductive experimental approach. Mbajorgu, (2003), perceives science as act of doing and its more concerned with various investigative processes and activities with regards to developing, acquiring processes and activities with regards to developing, acquiring and controlling knowledge, skills capacity and attitude about the natural factors of the environment.

Science education may be defined as the study of the interrelationship between science as a discipline and application principle to its understanding, teaching and learning. Science education encourages students to think and act as responsible scientists by providing opportunities for them to acquire knowledge and understanding of the relevant concept. Odo, (2012) reveals that education through the study of science produces economic benefits and contributes to a country's future wealth by increasing the productive capacity of its people. Science education involves the study of some sciences in depth and in addition educational knowledge and concepts are programmed for understanding how science circular can meaningfully be evaluated. Science education in Nigeria has remained static and unproductive since independence. According to (Momeke, 2007), science education has failed to produce skilled human resources needed for transformation into national prosperity. There is marked decline in productivity at all levels. According to Olagunju (2014), science education is the systematic study of everything that can be examined, tested and verified. Science investigates almost everything that can be observed or detected. To acquire proper scientific skill through science education, it is necessary to fight and overcome the emerging challenges of science education.

Olagunju went further to stress science education as so important because it affords nations the opportunities to explore scientific breakthrough. Providing avenues and access to all facets of science education as well as ways to overcome the emerging challenges will help broaden the scientific skills and knowledge in individuals, increase productivity and significantly improve fortunes of unemployed thereby reducing poverty and unemployment among our youth (Edomwonyi, 2011).

Living in a world where science itself must adapt and thus, we ourselves must broaden our horizons as new knowledge and ideas emerge to replace and add credibility to those we have held on to as the correct way while recognizing that some ideas become obsolete (Donovan, 2013). Science education requires that individuals be aware of the emerging challenges and creating opportunities and strategies for self experience to become part of

the daily routines especially in the application of scientific knowledge in solving problems as the challenges keep emerging. Emerging challenges are the situations that calls for concern and needs to be fixed, if not the system will drastically dwindle. Many Scholars from various fields are recognizing the importance and impact of science education as well as the emerging challenges and ways to overcome these challenges.

Goals of Science Education in Education

There are six major goals of science education in Nigeria. They represent the actual as well as the expected behavior of products as science education. These goals are

1. Having a deep understanding of natural forces, being aware of their environment and acquiring the necessary science concepts and skills for everyday life.
2. Inculcating the habit of ethical observation and drawing conclusions only on available data.
3. Developing scientific attitudes and values including open-mindedness, honesty and curiosity.
4. Developing the necessary process skills for the acquisition and application of scientific concepts, principles, laws and theories.
5. Making effective use of a variety of scientific resources and tools (ICT tools) in the learning and application of science.
6. Produce imaginative and creative work arising from scientific ideas and develop the manner for cooperatively and independently learning (Nnaka, 2010)

The Emerging Challenges in Science Education

Emerging challenges in science education becomes an object of interest.

There is basically a concern about the outcomes of science education at all areas of our life, for instance most industries need many higher grade scientists. The review undertaken by Sir Gareth in 2002 summarized the scale of this problem in identifying some of the causes of the challenges and pointed in particular lack of individuals to study science education led to the shortage of well qualified science educators who suppose to help impart the scientific skills and knowledge to the individuals so as to curb and overcome the emerging challenges.

Emerging challenges include:

1. Missing Link
2. COVID-19 pandemic problems
3. Lack of fund
4. Non Professionalism
5. Let us do it of the way we use to do it syndrome
6. Poor Pedagogical approach
7. Innovations in curriculum
8. Unsatisfactory state of affairs
9. Irregular retraining of science educators
10. Misconceptions about science education concepts, have been militating against science education..

Missing Link

A Link denotes point of connection, when this point is lacking, some problems are bound to emanate, for instance when rules, regulations, policies, and innovations are pointed out but not properly carried out as stated, you found out that there is a link that needs to be connected. Failure to acquire specific scientific skills or meet a learning standard in science education is also a missing link. Instructional strategies inadequately utilized is also a missing link. The missing link as one of the emerging challenges in science education cuts across many areas in science education which has create a problem that needs to be solved. Missing links in text books, facilities, shortage of resources, and qualified science educators are not excluded here. Change in science education curriculum without a follow up for proper implementation so as to have a desired outcome is a missing link. Laboratory work is an indispensable part of science instructions and effective science education cannot exist without practical work (Udo, 2010). Therefore, non availability or inadequate laboratory facilities, equipment and materials to ensure acquisition of scientific skills and competence in science education by the learners is a missing link that needs to be connected through consistency.

COVID-19 Pandemic Problems

One of the most affected areas by COVID-19 is in science education which the system has been slowed down drastically by some restrictive laws. These laws have increased the demand for administrative assistance and pressure in the areas of science education. Science education has faced a lot of challenges since the COVID-19 pandemic because school which is the most common avenue for acquisition of scientific skills through science education has been on lockdown for months, the academic calendars are drastically affected and things are no more the same. The science educators, seminars were not holding due to the pandemic which affected their activities, the government has channeled most energies to solving the problems created by the pandemic thereby neglecting the areas of science education. Science education in this era has experienced a huge challenge online with the measures put in place to fight the pandemic. The measures affects the ways of imparting the scientific skills to the learners and such measures include; physical distancing, wearing of masks (adults and children over 12), hand hygiene, and frequent cleaning (WHO, 2020), suspension of face to face interaction and body contacts all poses challenges in science education especially in schools as students cannot stay together to learn or share equipment. Science educators have tried to manage the situation but still there are challenges especially in the areas of human and material contact.

Lack of Fund

Lack of fund is a big problem which has always pose a challenge to science education as well as an emerging challenge because even of the problem of fund is solved, innovations happen every time which needs a lot of fund; and this has been an emerging challenge all the time in science education. Lack of fund has hindered and discouraged individuals in pursuing science education as a career and funding cuts across almost all the areas in science education ranging from facilities, laboratories to motivations. Science educators

sacrifice to provide materials for science education which require more fund due to its hands-on nature and the materials need to be regularly replaced and updated. Lack of fund as a challenge in science education affects material resource, laboratory equipment and this fund problem need to be tackled to ensure continuity and consistency.

Non- Professionalism

Some science educators are not graduate of science and some graduates of science do not have the right skill and strategy to impart the scientific knowledge to the learners. This challenge has always emerged and hinders science educators to make science happen especially in the classrooms. Non-professionalism includes lack of classroom management, lack of scientific skills, lack of technical know how, arriving late to school, transferring aggressions, dishonesty, disobedience, lies, indecent, dressings, and unpreparedness. Being a science educationist, it has a lot to do with professionalism in line with science education principles. According to findings of Edomwonyi-Out (2011), many teachers are in the profession not by choice but they consider it as a waiting ground, at same time, some graduates of science education studied it by chance and there is no passion for what they do, all they do is to earn a living and such people do not make efforts to improve and update their knowledge, they keep imparting same skill every year with same strategy and such people in science education will always shown on professionalism which is one of the emerging challenges.

Let us do it the way we use to do it Syndrome Doing it as Usual Syndrome

This syndrome has eaten deep and still eating into science education and thus poses a big challenge which needs to be tackled. This syndrome is seen in various areas in science education ranging from science education teaching methods, same facilities every year, same strategy, same personnel resources, same designs, and same management. These attitudes have blinded some science educators to embrace innovations which are a big challenge to science education. A time when new things are being introduced in science education system, some people involved in a bid to avoid stresses, funds, human and material resources that are involved; they will prefer to stick to the old ways thereby failing to adapt to the new situation and resort to this syndrome and with this problems comes in.

Poor Remuneration of Science Educators

Poor remuneration has destroyed the morale of most science educators. This is one of the factors that hinders science educators to give in their best as much as possible in inculcating scientific skills to individuals as they get involved in what is called PLAN B to make ends meet as the economic situation of the country is nothing to write home about. They are demoralized and keep seeking for better opportunities; hence cannot be efficient which causes poor performance on the learners' part.

Poor Pedagogical Approach

This entails the improper use of teaching strategies, aids, and methods. Pedagogical issues has cut across many areas such as; science educators adopting a sketchy exercises than going in-depth, reluctant of the science educator to diversify in scientific areas,

improvise, innovate or handle a specific scientific equipment. All these poor practices are challenges of science education because it hinders the proper acquisition of scientific skills, and learners may lose interest in learning and understanding science education. As Tebabal and Kahssay (2011), stated that purpose of pedagogy is to bring a fundamental change and knowledge transmission. If the science educators fail to apply the needed approach, then there is a challenge.

Innovations in Curriculum

This can also be a form of change or modification in the curriculum. The unimplementation of the modified and updated curriculum content of science education emerges as a challenge in science education. The aim of curriculum innovation and change is to have a desired achievement at the end of its implementation (Shiredo, 2013). Due to the scientific advancement of the nation, the content of science education is also reviewed in-line with the changing world and new dimensions of science education. Such new dimensions include self-reliant education, population and family life education, global warming and green house effect, bioethics and environmental degradation. If not well implemented is a big challenge. The deficient time allocation for each of the areas of the curriculum poses a challenge too as Bowler (2009), described the shortage of resources as the main factor that hinders the effective and proper implementation of the revised curriculum.

Unsatisfactory State of Affairs

When someone is unsatisfied, then something has gone amiss, this means that things are not the way they are expected. Such a situation in science education poses a challenge. For instance, the dilapidated school buildings, unanswered questions about many issues in science education such as euthanasia, outdated textbooks and overcrowded classrooms are all unsatisfactory to science education. Growth. In a classroom that should contain only 40 learners and you see 60 individuals, learning cannot be assured let alone science education in such classrooms as there is no ventilation and a lot of side attractions. Dilapidated buildings cannot be good for learning especially in rainy seasons, if rain starts learning will be cut short and same applies to an extremely sunny day as these are not good to the health. Outdated textbooks also pose a challenge to science education as it lacks many emerging issues and trends in science education. All these call for immediate attention.

Irregular Retraining of Science Educators

According to Wikipedia 2013, training is the process of learning new a new skill in response to changes. Ogba (2008), is of the view that anybody who failed to develop through training is most likely to become obsolete. Irregular seminars, workshops, and conferences for the retraining of science educators is a big challenge to science education because that is where the emerging challenges, issues and innovations in science education are looked into for solution. There is a problem of knowledge retardation if science educators don't undergo retraining to get acquainted with the skills and strategies to overcome these emerging challenges. There is no other way a science educator will be updated in knowledge and acquisition of new skills if not through the regular trainings.

At times the problem of irregular training can be caused by certain factors such as lack of facilities for personnel development, lack of fund and lack of human resources.

Misconceptions about certain Science Education Concepts

In science education a misconception is a preconceived notion about a concept, topic or situation that goes against what is generally accepted by the scientific community. There are problems and challenges when misconception happens. Problems of how to convince individuals to change their conception about a particular situation and this has kept emerging in science education as a big challenge. These misconceptions can be in form of preconceived notions obtained from observations of the natural world, Religions, ideas, and cultures that disagree with scientific evidence. It can also be in form of incomplete understanding of a situation, concept, vernacular misconceptions and factual misconceptions learned from an early age and passed down from generation to generation. Addressing misconceptions in science education is extremely important and should not be ignored.

Way Forward

Missing Link

This can be addressed by setting rules and regulations made about science education stringent with a follow up activities to ensure proper implementation of the policies. Textbooks should be properly edited and scrutinize for the exact purpose before usage to avoid misinformation and also proper updating and replacing worn out and overused science education resources. Workshops should be held so as to disseminate the strategies of filling the missing links.

COVID-19 Pandemic Problems

To cope with the problems posed by COVID-19, extra classes should be established to cover the areas that were not touched as a result of lockdown observed during COVID-19 pandemic. Assigning projects in groups or individuals and at the same time impart the power of creative and critical thinking in individuals to cover up the links and challenges created by the pandemic. Human resources should stick to the measures while engaging in physical contacts.

Lack of fund

Federal and state governments should make funding of science education a priority. Science educators should also engage in self reliant programmes as to help individuals generate income which will eventually help in the development of science education. The science educators should ensure routine reports on the resources that are lacking in science education as to form a reminder to the government that science education needs adequate funding.

Non-professionalism

Government and stakeholders in science education should put up a law that only qualified science educators should handle science education. Ministry of education should organize in service courses for science educators periodically to give them more professional experience.

Let us do it the way we use to do it syndrome

There should be a determined effort to reshape science education which will help science educators embrace current developments in the field as well as improve his efficiency. Science educators should be mandated to attend workshops where they will be exposed to various facets of innovations occurring in science education and the best strategies to adopt and adapt to those innovations. Science educators should also be encouraged to engage in research findings through conferences and long and short term courses.

Poor remuneration

The remuneration of science educators should be reviewed because science education must be valued. If the remuneration becomes attractive, the science educators will be more dedicated and devoted.

Poor pedagogical approach

There should be determined efforts to retrain science educators so as to expose them to the diversified means of acquiring scientific skills. And also where they will be exposed to innovations which entails the process approach where learners are allowed to observe things for themselves because Nwachukwu (2009), States that students are more effective learners if they are intrinsically motivated towards learning than when they are extrinsically motivated..

Innovation in curriculum

There should be a follow up committee to ensure that the new curriculum as a result of innovations are implemented. Also time allocations of the curriculum contents should be properly done to ensure in depth coverage within the stipulated time. Regular Research activities should be carried out to identify those areas that need satisfaction. Regular consultation of the textbooks by science education experts to ensure up to date knowledge. Repairing of the dilapidated school buildings and provision of more classrooms to avoid large classes.

Irregular retraining of science education concepts

Government and other stakeholders in science education and cooperate bodies should help in training and retraining of science educators for effective acquisition of scientific skills and knowledge. Also adequate facilities for human and material resource development should be made.

Misconceptions about certain science education concepts

Getting rid of a misconception is a difficult task but however, there must be a way to erase a misconception. One major and effective way to erase a Misconception is by application of hands on activities where the involved individuals are allowed to create their own knowledge and see things for themselves with a minor assistance from a superior.

Prospects of Science Education

The efforts on ground for the improvement of science education for a better tomorrow are

1. The establishment of more universities and colleges of education with specification for minimum academic standards would solve the problem of both professional

teacher supply and quality of instruction. With enough teachers large class size will be effectively handled.

2. The science equipment centers already established in some parts of the country would provide enough standardized equipment for effective delivery of instruction and for the laboratories.
3. Research results on the effects of innovative teaching styles and better ways of improving our curricular delivery would equip the teachers to better fulfill their roles.

Conclusion

Science education as seen as an applied body of knowledge to the solution of educational problems is also a way of living and solving problems with the knowledge acquired and also a tool and strategy for the greater scientific growth of the national goals. Having the right scientific skills and knowledge acquired through science education will help to a great extent in curbing and overcoming the emerging challenges in science education at all levels.

Recommendations

1. Government and private sectors should put in more efforts and resources towards the development of science
2. More science laboratories should be established and the few existing ones equipped and staffed so that students can have enough facilities to research on.
3. Science teachers should be well paid so that they can put in their best in teaching the students.
4. More modern learning aids such as computers, internet, web sites facilities, overhead projectors, internet web sites facilities, overhead projectors, firms etc. should be provided in schools.
5. Qualitative and affordable science education should be made available for all.

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