
PROFESSIONAL DEVELOPMENT OF SCIENCE TEACHER: A GROWING DILEMMA IN SCIENCE EDUCATION

By

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Abstract

Science is an important instrument towards socio-economic development of any country. For science education to be effectively delivered, skilled and professional science teachers are required. Effective professional development is often seen as vital to school success and teacher satisfaction as well as promoting the quality of science teachers in Nigeria. This paper examined some concepts of professional development, responsibilities and qualities of a great science teacher. It also examined what it takes for a science teacher to be high performing and proffer some recommendations that would help the teacher to develop professionally.

Science education plays a very vital role in the economic growth of a country. Science education is concerned with sharing scientific phenomenon and processes with individuals within the general public (such as children, college students or adults)

traditionally not considered as part of the scientific community. The key element in improving science education is promoting the quality of science teachers. Professional development of science teachers is a crucial issue that any nation should address for its socio- economic as well as technological development. Science teachers attuned to the ever changing needs of the society and industry if they are to remain relevant and contribute towards human capital development. Through continued professional development, science teachers can maintain their skills and pedagogies. Thus, this paper examines some ways through which the quality of science teachers can be raised for their continued professional development.

Professional Development

The term ‘professional development’ means a comprehensive, sustained and intensive approach to improving teachers’ and administrators’ effectiveness in raising student achievement. This is the opportunities for learning available to science teachers through their schools, institutions and governments. Changes in both structure and curriculum of education are very important but may not be sufficient unless it is taken into account that the teacher is the key to the qualitative improvement of an education system and determines the success or failure of whatever curricular reform or innovation it is desired to implement (Dori and Herscovitz,2005). Research in teacher education and professional development is a very important process of change in science teachers (Davis,2003,Vazquez-Bernal,B.,Jimenez-pere,R. and Mellado,V. (2008). Changes in professional development is also not drastic, instead teachers progressively put into practice the ideas seem to them to be important and at the same time attainable (Gunstone,R.F.,Slattery,M.,Bair,J,R.and Northfield,J.R. (1993; Rogan, 2007).

Professional development is an internal process of growth, expansion and increasing complexity of how teachers approach their practice (Greensfeld and Elkad, 2007). It is also presented based on what the teachers already think and do (Mulholland and Wallave, 2005), on the real problems of science teaching and learning, on their everyday concerns, on their background (Henze, I.,VanDriel, and Verloop, N.(2007) and also the context in which science teachers work (Rogan, 2007).

Science Teaching for Conceptual Change

What perspective teachers need to know about different aspects of science teacher education to teach for conceptual change according to Hewson,p. W.,Tabachnick., B. R., Zeichner, K. M. and Lamberger,J.(1999) are as follows:

With respect to how

Perspective teachers need to know

A.STUDENTS learn science

Ideas about students, student learning, and science;
That is:

- Content of science
 - Nature of science
 - Nature of learners and learning
 - Curriculum
- In particular:
- Students' conceptions of natural phenomena
 - Constructivism
 - Learning as conceptual change, including status, conceptual ecology and metacognition.

B.TEACHERS teach science to students.

Ideas about teachers and teaching;
That is:

- Pedagogical knowledge
 - Curriculum
 - Assessment
 - Links between teachers thoughts and actions
- In particular:
- Teachers conceptions of teaching science
 - Strategies for and actions in teaching science
 - Conceptual change teaching

C.PERSPECTIVE TEACHERS learn how to teach science to students

Ideas about perspective teachers learning to teach;
That is :

- Their conceptions of teaching science, including: rationale for teaching. Views of knowledge, learning, science, instruction
- The teaching strategies they use.
- Their teaching practice; that is

- relationships between their thoughts and actions
 - Methods of reflecting about their teaching
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Qualities of a Great Science Teacher

The key to strong student learning is effective teaching by the teacher. Some qualities of a great teacher as outlined by Hendry (2012) are as follows:

1. **Empathy:** This is the ability of a teacher to be bonded with his/ her students, to understand and reason with their emotions and feelings.
2. **Positive mental attitude:** Teachers should be able to think more positive at all times and discard negative thoughts, and also seek to be positive in every negative situation, and should not blame others for failure.
3. **Open to change:** The fact that the real constant in life is “change” should be acknowledged by the teacher.
4. **Role model:** Teachers should be a good role model and should serve as the window through which many young people (students) will see their future.
5. **Creative:** Teachers should be able to motivate the students by using creative and inspirational methods of teaching.
6. **Sense of humour:** A great sense of humour should be exhibited by the teacher. This reduces barriers and lightens the atmosphere especially during heavy periods.
7. **Good presentation skills:** Good presentation skills by teacher stimulate greater learning/ feedback in the students.
8. **Calmness:** A good teacher should keep calm and in good control of himself through some bad experiences during teaching process.
9. **Respectful:** Teacher should try and learn from his peers as well as students. Having respect for others gets you the respect back from others.
10. **Inspirational:** Helping young persons (students) to realize their potential can change their life, which will help them to grow, find their talents, skills and abilities.
11. **Passion:** Teachers should be passionate about teaching so as to make a difference.

- 12. Willing to learn:** Learning is a continuous process, no matter how knowledgeable a teacher is in his/ her subject area, learning never stops. Be always willing to learn from your peer and even your students.

Responsibilities of Science Teachers

The responsibilities of teachers in general and science teachers in particular are summarised according to Ideris (2012) as:

- 1. Teaching and learning:** Among the various responsibilities of science teachers is sharing his/ her expert knowledge with students. This involves developing expert knowledge and expertise in an area and in turn conveying them to students. Preparing course syllabi, course design and motivating students; to create the best learning environment is also part of the teaching and learning responsibility.
- 2. Research:** Science teachers should recognize that they are in a dynamic and changing world, so the need for research. Always participate in creating an environment that is conducive to generate creativity and innovation by undertaking high quality research and collaborating with other researchers. Thus, they should be able to maintain a good team work.
- 3. Publications:** In order to maintain ones' position as a good science teacher/ lecturer, one must "continuously" publish. Without publication, ones' academic reputation will be at stake- the teacher's significance in the teaching profession is judged by his/her publication. Most importantly, they should make research available to others in the same field, and for the public to gain benefit from.
- 4. Consultation:** This can be regarded as extending ones' academic arm to society. This means creating awareness of issues (both in the sciences or social sciences) critical to the nation's development or public concerns.
- 5. Academic adviser and supervisor:** A teacher as an adviser/ supervisor plays a role of guiding, leading, maintaining discipline, controlling problems and co-ordinating efforts which relate to students and their research; and preparing students with other aspects of the learning environment.
- 6. Administrative responsibilities:** Administration is inevitably part and parcel of teaching responsibility within an academic institution. This provides opportunity for academic leadership.

What it Takes to Become a High Performing Science Teacher for Continued Professional Development

Becoming a high performing science teacher needs hardwork, trust, accountability, prudence, transparency and justice on the part of the teacher. This can be achieved through the following:

1. Efforts need to be made in improving the quality of teachers so as to move forward in developing a high performing teaching agenda.
2. Conducive environment to generate creativity and innovation amongst teachers and students needs to be created.
3. Adherence by teachers to their responsibilities; teaching and learning, research, publication, consultation, academic advice/supervision and administrative responsibilities.
4. In the teaching profession as with any other professions, the science teacher must be passionate in his/her carrier (which is necessary in the completion of first degree, which is the chief precondition of an academic career). And this passion should be translated into personal interest for teaching and learning.
5. The science teacher should be the kind of person who would be interested in his/her field of study even if he/she was not paid to do so.
6. In order to maintain a high achievement, science teachers should not treat research as a job, but as a craft arising out of personal interest, or more importantly, personal conviction and should keep abreast with research development in his/her field.
7. Publications, sharing of ideas and knowledge with the general public by the science teacher are ways of achieving high performance. This could be done as journal articles, book chapters, newspaper article, public forums etc.
8. With the popular adage that “Honesty is the best policy”. If the teacher approaches the quest for truth in an honest and sincere manner, then he/she will not be beset by obtuseness and arrogance. The teacher has to be honest about the limitations of his/her knowledge and must not only be willing, but should actively seek to acquire new knowledge from others.
9. The teacher’s life is devoted to the betterment of society and not centred on self-glory or individual gain. Community service extends academic leadership to the community, thus impacting not only his/her institution, but also the larger community, both locally and globally.
10. High performance in science teacher needs a balanced performance (a balance between teaching and learning, research, academic and administrative as well as family responsibilities).

Conclusion

The ultimate goal of professional development of the science teacher is to improve student learning in science through enhanced teacher performance. Getting the teachers to change towards their development professionally (through research and training) may seem difficult. Hence it is a necessary tool that can enhance their skills and consequently improve their quality of teaching in respect of continuing as professional science teachers. Examining some aspects related to professional development of science teachers does not only raise the quality of the teachers but also will ensure their continued professional development.

Recommendations

With the popular saying that “A good teacher teaches, a great teacher transforms”. It is recommended that the science teacher should:

1. Always be hundred steps ahead in the current issues and developments in his/her subject area.
2. Play a pivotal role to derive forward development of high performing teaching agenda.
3. Work hard to produce high quality competitive graduates who are functional, enterprising and employable.
4. Do more than just prepare students for the workforce, but try to link science education to the real world.

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