The Science Education Teacher

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Abstract

Lack of consensus about an ideal teacher education programs is a challenge to experts in science education teachers program. The paper discussed in detail the general characteristics of teachers, and specifically the science teachers' behavior in the classroom. The role of the science teachers' subject matter knowledge in the profession, how their knowledge can be updated while still working (including the use of science clubs) formed the bulk of the discussion under this unit. The responsibilities of the science teacher both within and outside the classroom are an important part of the essay. An ideal science teacher must have the knowledge of disciplinary strategies, particularly in handling the different types of students (differences in age, family background and exposures) before them. Examples of science teachers' training programs (pre-service and Distance Training Program (DTP) at the Kigali Institute of Education, Rwanda are presented for comparative purposes. The conclusion of the paper has a number of suggestions for policy purposes that could improve the work of an ideal science teacher.

Introduction

It is a known fact that if we look at all the factors that influence the quality of education and its contribution to national development (including ICT and science and development) the quality, competency and character of the teacher are undoubtedly the most significant. Unfortunately, there is no consensus with relation to an ideal teacher education programs in general or ideal science teacher education program specifically (Jacobs, et al, 2011,Rohaan, et al, 2010, Baikie, 2002, Cochran and Jones, 1998 and Northfield, 1998). It is a reality that no matter the quality of national educational objectives, policy and vision, if there are no corresponding human resources, in this case the teachers, none of these goals will be achieved. Experts (Otuka, 2006) believes that nothing is more important than securing a sufficient supply of high quality personalities to the teaching profession providing them with the best possible professional development and creating satisfactory conditions of work in which they can effectively appreciate. This situation is necessary because of the attractive conditions of services being presented by other professions. There is the saying that a teacher is like a student. This indicates the magnitude of the responsibility of science teacher in the processes of teaching and learning. The greatest problems at this level that confront both teachers and policy implementers is how to increase the academic and professional efficiency of the science teachers, in the face of the dynamic nature of knowledge, and the demand of the students, parents, the society and the state at large. This leads us to one question: Who is the science teacher, in the field of science education? The answer to the question is contained in our subsequent paragraphs. The paper is presented in the following sequence: 1.The personal characteristics (professional ethics) of a science teacher. 2. The professional development of a science teacher. 3. Science Teachers' knowledge of Subject Matter. 4. The responsibilities of science teachers. 5. Disciplinary strategies by a science teacher while in the classroom. 6. Science teachers training through distance training program-KIE example. 7. Design and implementation of science education

curriculum by science teachers, and 8. Accommodation and retirement benefits for science teachers like other professionals.

The Science Teacher: The personal characteristics (professional ethics) of a science teacher

In the context of science teaching- he or she is the individual with the general liberal science education knowledge that has both breadth and depth in the discipline. An ideal science teacher has his or her knowledge area of specialization and is aware of when learning occurs while discussing with students. As an expert in the principles and practices of teaching and learning, he or she can appraise, assist both individual and group learners. He/ she can use his or her meta-cognitive skills in stimulating thinking, in preserving and extending the creativity of student's skills of learning. As parents, science teachers make their students to be aware of the natural values of the life they exhibits and in helping these students to always re-examine these values from time to time, in line with the dynamic nature of the community and the society they belong. Studies (Unwuka, 2006) have shown that in most schools within the Sub-Saharan Africa there is conspicuous absence of charm of manner in the science classrooms. The situation is so discouraging that some science teachers turn the classroom into prisons while they remain as waders. At this level the students are permitted to be seen but not allowed to talk, discus or ask questions as the lesson goes on. Similarly there are science teachers who believe that some tasks are difficult and uninterested (Otuka, 2006), whether they are relevant or not to the pupil's experiences and needs, are necessary for mental discipline and growth. A close analysis of the behavior of such science teachers is that they have no room for science activities, demonstration nor do they give group work to learners, such as projects. Another factor that is very common among science teachers is the fact that most teachers do not accept new instructional strategies, such as learner-center or inquiry method and concept mapping) because they claim these strategies are academically unnecessary because it wastes time and could make an individual extraordinary mad. Surely, this is a deviation from a conventional or modern teacher. Ideally, it is the responsibility of the teacher to create a congenial environment for students to learn. Moreover, strategies are the processes of establishing and maintaining contact between the learner and the subject matter, in order to form in the learner the appropriate attitude to the subject. Otuka (2006) concur that the science teacher is the pivot on which instructional process resolves, it is he or she that make the classroom warm or cold, he or she determines the quality of the products of the class base on his or her actions. The implication of this is that a science teacher should have a firm grip of his or her discipline and more importantly be able to analyze and interprete the needs, feelings and aspirations of a country not only in the classroom but also at the community where he or she resides.

Related to creating a congenial environment is the establishment of the requisite relationship with the learners. Science teachers must possess personal qualities such as being pleasantly, dignified, humorous, tolerant and responding positively to learners' interests, aims and wishes (Aboki, 2006, Onwuka, 2006, Farrant, 1999) as they relate with the teacher on the daily basis. In summary some of the personal characteristics that science teachers should do and don't include (1). Science teachers should be cheerful as they enter the classroom every morning, (2) as a teacher even if you are sick or annoyed by someone, do not transfer the aggression in such a

manner that it will be shown to your students. Such physical or emotional appearance may spoil the day for the students, and so act with maturity (3) bring with you to the science room humour and humanity in dealing with each child in and out of the classroom, (4) science teaching is a humble profession. Therefore, dressing properly, modestly, simple are necessary examples in good taste. (5). Be friendly with students as a science teacher, and not like a horse rider and his or her horse, (6) do not exploit students in any manner, indicating that the relationship should have no string attached. (7). Ideally, science teachers must be kind, considerate and reassuring in dealing with learners, but at the time must be firm, direct and to the point of discipline, (8) be meticulous in matters that involves fairness to all students because students are quick to any suggestion that involves favouring students. (9) Democratic practice in a science classroom is necessary. Therefore, be judicious in case of using authority and power in the class. If you are not sure of one's self do not exhibit such actions before students.

The professional development of a science teacher

One of the most important characteristics of the science teacher is continues update of ones' skills and professional development. Like the changing nature of knowledge it is the responsibility of the science teacher to equally change in order to meet up with the challenges. This will involve getting informed of new development in science, new methods of teaching, using new materials, particularly, integrating digital instructional material into science teaching and learning (including measurements, assessment and evaluations strategies). One way of doing this involves active participation in in-service workshops, attending professional conferences and meetings, enrolling in graduates programs, including online learning systems (distance learning program that is helping greatly in the training of science teachers all over the world, including the developing nations). This keeps a typical science teacher a breast with new ideas, principles, and concepts that might be emerging as a result of research and development in the teaching of science and technology. Experts are of the views that the problem of teaching of the science in school is not just one of which is of most significant. The main reason is that he or she is responsible for the failures or success taken other factors into consideration. A number of research findings has shown that even where science teachers have a comprehensive syllabus and pre-prepared weekly scheme of work, a well equipped laboratories, and libraries with modern books- science teachers performs badly in their teaching and assessment strategies. Gyuse and Ada (2005) reported that most science teachers do complain that they do not have time, energy or resources for professional development. This is because they do not have the enthusiasm and love for the teaching profession. The implication of this is that a keen and well informed science teacher will definitely take his or her students to greater succeed in science learning, using little or poorly equipped laboratory, poor library and the like. It is as a result of these kinds of development that there are calls that science teaching should be entrusted in the hands of those that appreciate, love the subject and believes in its values to humanity. School principals can create time for science teachers to interact during break/lunch time when they can chart with colleagues and share ideas about classroom practices, science curriculum and discuss how to assist students in their science learning activities.

Professional period of training for science teachers

One area of concern about the science teacher is his or her status as a professional compare to other professions like the law, and medical sciences. Numerically, the number of academic and professional science, mathematics and technology teachers is more and higher than other professionals when compared (Wodi and Dukubo, 2005). In a review of literature they reported that science teachers' qualification is lower than the academic qualification required for entry to other major professions such as law, medicine and engineering. The question is: what is the implication of this to the teaching of science as a profession? With the modernization in the areas of instructional approaches and use of ICT materials, incentives, etc, the average length of period for the training of science teachers has been steadily increasing, though it has been traditionally shorter than the other professions. The low status usually accorded to the teaching profession particularly at the elementary and secondary school within the developing countries (Sub-Haran Africa inclusive) make (Wodi and Dukubo, 2005 and Barkie, 2002) it in such a manner that many progressive students' entry to courses of teacher education is to use it as a stepping stone to an institution of higher learning. This observation is based on the fact that up-till now the basic qualification for entry into the teaching, particularly at the primary school in many developing countries is still a certificate or diploma levels compare to the developed economies where they are degree holders. There are exceptional cases these days as a result of private nursery and primary schools establishment-where the proprietors and a few are degree holders.

In most African countries there are Teacher Training Colleges (TTCs) mainly for the training of elementary school teachers. A teacher at that level could remain and teach the entire subject in one class. Example, one teacher teaches mathematics, geography, social studies, integrated science. It is at the secondary school level that science teachers do specialize in teaching one or two subjects. In view of this situation the problem at the basic education level, particularly in the area of teacher qualification may be reduced if the TTCs are upgraded to the status of colleges of education, whose graduate should now serve as the minimum entry qualification into the teaching profession. The implication of this suggestion means going back to the drawing table where national policies in education and its corresponding budgeting are review.

(a).The training of science teachers at the Kigali Institute of Education, Kigali, Rwanda

Kigali institute of Education (KIE) is a specialized and full fledge university that was established in 1999 , specifically for the training of all grades of teachers (from primary certificate teaching up-to doctorate level). With effect from 2012, the institution is to take over the setting, evaluation and the award of certificate to all graduates of all the eleven Teacher Training colleges in Rwanda. The main objective is to maintain uniformity and increase standard in line with the national and the East African community objectives. One other reason for this responsibility is to lay a sound background for elementary school graduates that will normally serve as prospective candidates for admission into the two colleges of educations and KIE itself. The two colleges of education also train science teachers, who, in line with the Rwandan national policy are suppose to teach the basic sciences at the upper primary and the lower secondary school level. The introduction of the nine years and now twelve years (effective

2012) the demand for these groups of teachers (TTC graduates and diploma holders from the colleges of education) is a challenge for KIE and the Rwandan government.
KIE has a faculty of science that admits students to read biology, chemistry, physics, computer science and integrated science courses for a period of four years for a degree certificate. These students equally read corresponding education courses for the same period of four years hierarchically like their subjects in the faculty of science. In order to ensure that the students are train in real professional practical teaching, micro-teaching is first organize within each of the departments at the faculty of science but under the coordination of the department of curriculum and teaching, at the faculty of education. This is followed with internship training (introduced two years ago), if not it was a school practice program, where the student – teachers will be attached to a secondary school where he or she will practice real teaching and assessment strategies for a period of eight weeks spread out into two semesters (four weeks per semester). Preliminary assessments about the performance of the former graduates of KIE in the teaching profession have shown that they are doing very well despite some inevitable environmental factors that tempers with their daily jobs. The recent salary increment and the forth coming salary increment for all civil servants (including secondary school teachers) is a good development on the part of the government in boosting the moral of members of the teaching profession.

(b). **Distance training program (DTP) of Kigali Institute of Education**

Another area where KIE contributes to Rwandan national development is through it Distance Training Program (DTP). With the assistant of a number of foreign aids the DTP which started with 500 students in its first intake of students will in 2012 admit about 3000 students. The program has contributed a lot in the training of science teachers, who remained in their jobs, in different parts of the country, and graduate with a diploma certificate in education, after three years of training. The training processes involve module production in each course and face to face discussions where the module writers move to designated centers (spread across the country). It is an expensive program in terms of module production, movement of staff for face to face and payment for examination scripts, etc, but it worth doing it for the purpose of national human development. Probably, by the time the uses of electronic system like the one of Atlantic International University (AIU) and similar programs in the United Kingdom, Australia, China, Indira-Ghandi University, India, etc, is in place the cost might be reduced.

Science Teachers' knowledge of Subject Matter

Although there is no agreement or common ground (Jacobs, et al, 2011, Rohaan, 2010,Baikie, 2002, Cochran and Jones, 1998 and Northfield, 1998) on what should be precisely the ideal science teacher education program content or subject matter, Cochran and Jones (1998) identified what they described as a five frame works, namely: the academic, the practical, the technological, the personal and the critical/social. Baikie (2002) identified eight criteria that could be used for science teacher education program that will eventually qualify them as professionals. The criteria includes (a) activities that are essentially intellectual, (b) the command of a body of specialized knowledge, (c) requires extended professional preparation, (d) demands continuous in-service growth, (e) affords a life career and permanent membership,

(f) sets up its own standards, (g) exalts service above personal gains, and (h) has a strong closely knit professional association. It is for this reason that Northfield (1998) reported that many new science teachers do not see their school experiences as closely linked to the formal course input at the university. Jacobs, et al (2011) reported in the State Teacher Yearbook (a publication of about 235 pages) that states' requirement for the preparation of special education teachers continue to decline badly (abysmal), to the extent that most states set an extremely low bar for the content knowledge special education teachers must have to work with students with special needs. With reference to science teachers' content knowledge the National Council on Teacher report (Jacobs, et al, 2011) is a mixture of result because only 24 states do ensure that the middle science school teachers have adequate preparation to teach science. Rohaan, et al (2010) agreed that it is natural for science educators to investigate teachers' professional knowledge, specifically their pedagogical content knowledge (PCK)- defined as a sort of combination of content knowledge with pedagogical and psychological knowledge in addition to the teachers' personal experiences. Accordingly, they argued that PCK include the understanding of how certain concepts of topics, problems, or issues should be discussed or presented and adapted to the students' interests and abilities. They (Rohaan, et al, 2010) argued however, that it is not easy to agree on a 'gold standard' of presenting and explaining content to students. For example, the difficulty in measuring PCK include how to find items which can be judged as right or wrong regarding science educational theories and findings and decide which context information teachers need in item-items for an adequate response. Similarly, Mellado (1998) argued that from the inquiry strategic point of view, science teachers conceptions and how to teach and learn are the results of the teachers' years while in school, which are so deeply rooted that they find it difficult to choose the most appropriate.

One of the ideas that an effective science teacher will ever remain like a student simply means he or she is continuously learning of new knowledge, principles or facts that are emerging, while revising the old ones in order to be up-to-date within his or her area of specialization. Attending refresher courses to revive enthusiasm and to have intellectual food and recreation should be the order of the day for all science teachers. In order to achieve this objective school authority must budget for seminars, conferences and courses in their annual budgetary preparations. Unless this is done where teachers are encouraged, their subject knowledge up-date will not be possible. Collaboration and share of science equipments and material is one way of subject matter increase of science teachers (Aboki, 2007, and Joseph, 2004). It also involve visit to schools and colleges where special features of science are successfully taught, and equipments and books are centrally distributed to government schools and colleges. The ideal situation is that science teachers in new schools (that do not have laboratory nor lab materials) should liaise with the older schools for laboratory practical of their students (Aboki, 2007). One of the benefits of this is that as the teacher move his or her students for practical to another school, the visiting science teacher (particularly, a new or beginning teacher) might realized that the senior science teachers in the school where they are visiting are valuable sources of information and inspiration. He or she may gain about new objectives, methods or strategies that might have emerged from recent research publications, materials, etc. Collaboration could also be done in the area of research between science teachers at the secondary school level and their colleagues in other schools or those at the university levels.

This is common in a number of countries involving a number of associations such as The Science Teachers Association of Nigeria (STAN) and The African Examination Association of (AEAA). Reading culture is a habit that every science teacher must adopt if he or she is to be up-to date in his or her subject area. The implication of this is that even if the school does not have books the science teacher must move out and such for such material. In the same vein skills of improvisations where local instructional materials could be produce is very important. On the basis of these skills such as welding, carpentry, minor electrical connections are necessary knowledge in the laboratory for a science teacher.

In the area of research findings Cochran and Jones (1998) are of the views that as far as the influence of teaching experience is concern the process of teaching increases science teachers' subject matter knowledge. These researchers also reported that studies that compared science teachers' subject matter knowledge to instructional approaches found that high level of science teachers' content knowledge are related to fewer teacher questions, more students' questions and higher level of student participations. On the contrary they discovered that teachers with low content knowledge resulted into low students' participation in the classroom and the teacher low ability for effective preparation for the lessons.

One of the area that is important for science teachers' update of current scientific knowledge is the formation societies or clubs among secondary schools. It breeds valuable ideas where curricula are improved and classroom issues such as methods, activities and resource are shared. During society's conferences and workshops members will use the opportunity to visit industries and other scientific places of interests, which will enrich science teacher's knowledge and skills, and at the end improve their teaching and learning processes.

The responsibilities of science teachers

Experience has shown that science teaching as a cut cross process from elementary school to the higher institutions of learning comes with its corresponding problems at every stage or level. It is the responsibility of those teaching at the elementary level to make sure that they answer questions about natural phenomena surrounding the learners. In the same manner those responsible for teaching students at the secondary and above be prepare to face criticisms of the mind , the brain and consciousness as they grow up in their thinking and actions for meaningful learning. As a result of this special challenge it means that for a science teacher to face the learners he or she should study the subject matter to a deeper level that will enable him teach effectively. One of the implications of this argument is that it is not just simply passing accurate scientific information to the students; the science teacher should be able to stimulate thinking which involves a number of questions from different angles involving the same topic. It indicate that the science teacher's thinking should involve the process of learning of students and the methods through which they might be encourage to apply it in their daily life.

A number of studies (Onwuka, 2006) have shown that science teaching and the process of learning are difficult for both teacher and students, respectively. Surely, there are a number of factors behind the difficulties being encounter. One of the ways of encouraging people to be attracted to science learning is to create a love for scientific study, particularly, among children. This is necessary because a number of parents that had no opportunity in studying sciences and

are in the arts and social sciences do discourage their children not to study the basic sciences even when the children have interest. Science teachers can increase students' interest in science through he exposition of facts, concepts and principles using the simplest possible appliances and by bringing the students into contact with the actual experimentations. As a science teacher it is your job to train the students in scientific procedures, step by step, as well as developing appropriate scientific attitudes. Scientific attitudes such as curiosity, reading habits, spirit of inquiry, determinations are examples that an ideal science teacher must exhibit for his or her students to emulate.

The school set up is a mini society within a bigger community, a region or a nation. As a result of this connection parents, the community, the government and the school its self these days expect accountability of what is happening in the science classroom. This is because the science teacher occupies a very important position in the total educational growth of the children. It must be noted that the local environment where the school operate is full of science activities, and students must be taught by the science teacher to adjust for the purpose of successful living within the complex environment, which changes with time. As a result of this the science teacher must possess a deep conviction that the experiences he or she gives the students are important and will be functional in their contemporary life later. In line with the Bloom's Taxonomy of Educational Objectives (Balarabe, 2007 and Anderson, et al 2001) it is the responsibility of science teachers to ensure that the three main domains (cognitive, affective and psycho motive) are achieved while teaching as well as the students behavior in the society. It means these can be observed mainly at the intellectual, manual, artistic, mechanical, social and creative phases. It equally means given special attention for special aptitude or capability for each and every student so that theses may be discovered and developed to their full potentials. In any case we are aware of the problem of student-teacher ratio population, which makes it difficult for science teachers to carry out this special and important responsibility.

Disciplinary strategies by a science teacher while in the classroom

The significance of classroom control/management cannot be over emphasized, especially at this particular period when the needs and interests of the learners give emphasis on participatory activity (constructivist) and the society generally and parents in particular demand to know about what is happening within the school is on the increase. Classroom management is the only condition that makes the teacher provide what the children need for proper development (for both personal and the societal benefits). Effective science classroom control or management (-Aboki, 2006 and Igunmu, 2004) has the following benefits:

(a).It stimulates learners to realize their creative potentials., (b) It enables learners to be involved in the learning process because they feel it is their class and not that of the teacher., (c) It makes learners accept responsibility for what they do and so give them self control, (d).It helps learners to develop their individual styles of learning and so become productive., (e). It creates avenues for effective use of space, time and material resources., (f).The teacher's leadership brings together and makes use of special knowledge and abilities of individual learner so that the whole class can share them, (g). It gives a learner a sense of belonging to the class, and (h). It makes for effective teaching in which case the teacher teaches well, and economizes the use of time and energy.

Psychologists, curriculum designers, teachers, school managers, etc do not agree on what discipline is and how to maintain it, but they do agree that it is essential, if learning in school is to be effective (Oladele, 1998, Aboki, 2006) . Students have to be disciplined if they are to benefit from formal education of the school and the informal education of the home. The concept "discipline" is originally from the Latin word 'disco', which means 'I learn' (Oladele, 1998). The initial idea is that of submission to rules that structure what has to be learnt . The word discipline is also derived from the word 'disciple' (Oladele, 1998). A disciple is he that follows a leader. A disciple in this context connotes strategies for handling unwilling followers. Discipline is any kind of influence designed to help the student or a child deal with demand from hisher environment that go counter to demands he might wish to make on his environment. Discipline arises from the need to bring about a balance between what the individual wants to do, what he wants of others and the limitations and restrictions demanded by the society in which he lives. When discipline is used in the educational context it generally describes strategies for the elimination of disruptive or anti-social behavior. Discipline also implies procedures and rules, which lead a student to self-manage his or her behavior pattern in order to maintain socially accepted order.

Oladele (1998) categorizes discipline into two groups, namely: self discipline and external discipline while Okon (2007) categorized discipline into four and called them-*prudential, authoritarian, social and self-discipline*, but later argued that the first three can be grouped together as *externally derived.* Self-discipline is educationally desirable because the submission to rules springs from the individual's own decision in which some kind of autonomy is displayed. External discipline occurs when the acceptance of rules arises from other people's desire, example, from those of teachers, parents and peer groups. When a student is bribed to learn something by being offered a price, this becomes an externally imposed form of discipline just as much as coercing a student by threat of punishment. External discipline indicates that the student is being made to do what others want, by manipulating him or her and praying on his/her desires and fears.

Stages of Discipline

As earlier noted, there are many experts in the field of education telling us how to handle discipline in our classrooms. Yet these professionals in education do not agree, probably because of the fact that everyone, regardless of his or her culture, race, or sex passes through the different stages of discipline. Although the progression from stage to stage could be almost the same, the rates vary from individual to individual. It is for this reason that we need to be prepared to address discipline in the science classrooms at the different levels. It should be realized that students are functioning at different stages on the road to self-discipline Similarly, Okon 2007) is of the view that (a) in applying discipline, one must bear in mind that children of different ages have different maturity levels with regard to responding to and understanding the kind of discipline that is being used-i.e. the developmental approach and (b) that whichever level of external discipline it is found necessary or expedient to use, this should always be compatible with the pupil being ultimately able to develop internal self-discipline, which is the ideal discipline. it is better, at whichever level one is operating, to employ the positive rather

than the negative instruments of discipline. It is better, in other words, to offer or give praise rather than blame, to reward rather than punish and to derive discipline from the shared work of the school or the class rather than personal authoritarian control. Four different functioning stages of students to self- discipline namely (1) recalcitrant behavior, (2) self-serving behavior, (3) interpersonal discipline stage and (4) self-discipline stage do exist (Okon, 2007 and Aboki, 2006). We shall discuss numbers 3 and 4 because of their peculiarities to our discussions-the science teacher.

Interpersonal Indiscipline (The mutual interpersonal stage)

Experts (Okon, 2007) believe that majority of learners fall within the stage, particularly at the secondary schools or college level in most developing countries, including Sub-Saharan Africa. These groups of students have the development of sense of discipline. They normally behave according to instruction because somebody at the higher level asked them to. This is the mutual interpersonal stage. They care for what others may be thinking about them, and would like the other person (teachers included) to like them. All you need for them is a gentle reminder. Ask them to settle down, and they will do it quietly. Assertive discipline works with these groups because they understand it, but they rarely need such a heavy-handed approach to classroom discipline. On a number of occasions you find students in your classroom that are in transition from stage 2 to stage 3. May be you will remember a student that gets into lots of trouble in other classrooms but not necessarily yours. It should be realized that this particular child is just learning to trust others and build the interpersonal relationships that are more common with his or her classmates. As a science teacher and as a classroom manager, all that you are expected to do is to let him or her be aware that his or her good behavior is important to you, not only within your classroom but in others as well. If the child is nurtured accordingly, there will be tremendous progress. But then any unnecessary assertive action will slip the student back to square one.

Self discipline (The social order stage)

Students in this group have a sense of right and wrong. Experience has shown that though many middle school and junior high school students will occasionally function at this level, only a few consistently do. In most cases these belong in the category that teachers enjoy working with in their classes. You can even leave these students alone working on a project and come back after 30 or 40 minutes later and find them still focused on the task. They behave in this way because, in their minds, they know that it is the right thing to do. It should be realized that even though they may never tell you, students who function at this level do not appreciate assertive discipline. They are bothered by the fact that other students force teachers to use so much class time dealing with discipline problems. Cooperative Learning activities (described as Inquiry Learning Cycle Approach by Abraham, 1998 and Duran and Duran, 2004) encourage students to be active participants in learning science process skills, such as observation, identification, classification, manipulation, recording (Donald, et al, 2004), etc and it is important at this stage. The teacher who sets up several working groups within the classroom gives students a chance to practice working together while he or she waits close by, ready to step in when the need arises.

How can these disciplinary stages be managed in a science classroom?

We must first remind ourselves that all of us work our way through these stages in this order as we grow up (of course there are differences at the rate at which individuals grow- due to genetic and environmental factors). When you identify the stage at which a student is operating or functioning, it is your responsibility to help that student proceed to the next stage appropriately. It is a mistake for a science teacher to try and skip a stage. Insisting that at stage 1 (one) a student "straighten up and start acting right" (like a stage 4 student) is not a reasonable expectation. It is simply not going to be possible. Alternatively, your expectation should be that the child should act correctly at the second stage, and you will be less frustrated. At this stage you will be surprised to start to notice improvement. It is important to remember that for obvious and many reasons, any student is fully capable of regressing every now and then. When you really get to know your students and are used to them functioning at a particular stage, it is important to find the reason why your students regress when they do. Problems with the family members, friends, alcohol, or drugs may be behind a shift in behavior. It simply might be the students are tired or it could be the onset of illness. Whatever the actual cause, it is worth taking the time to talk with the student and see what is going on.

On an annual basis, an increasing number of children enter schools with different needs from different circumstances prevailing in their lives, such as poverty, trauma due to civil wars etc that schools are not prepared to cope up with for various reasons. Some of the factors related to poverty that may place a student at the risk of academic failure include: being very young, single, having barely educated parents, unemployment, abuse and neglect, substance abuse, dangerous neighborhoods, experiences. To be able to identify and understand children who are at risk is critical if they are to receive support for growth and development from their teachers. This can only be possible if caring and warm relationships have been developed between teachers and learners. This will enable teachers to detect any warning signs that may place students at-risk of failure, interfering with their chances for success in school and life. Academic and behavioral problems can be indicators of impending failures. Among such behaviors are: delay in language development, delay in reading development, aggression, violence, social withdrawal, substance abuse, irregular attendance, depression, etc. Teachers may have some difficulty in reaching a student's parent or guardian. They may also find out that the student does not complete assignments, does not study for tests, or does not come to school prepared to learn because of poverty related circumstances within the home environment. These categories of learners may be unable to concentrate or focus. They may be unwilling to interact with peers and /or with adults in schools effectively. Obviously, issues of this nature will not only have an impact on the science learning of the children from poor backgrounds but can equally impact the learning of other children.

In order to minimize the problems of students from poor background, those who are handicapped in one way or another, others who may be traumatized due to civil crises like those of Rwanda, Natal, northern Uganda, Sudan, the Arab world, etc experts are of the view that when developing curriculum in schools or classrooms where such students are involved, they should be provided with rigorous curriculum. The implication is that provisions should be made for the students to have high expectation, provisions should be made for both the students and the families, early intervention is critical, learners should be made to succeed, and

that this is only possible by creating an enabling environment and the use of activities that foster mutual respect, resilience, self-esteem, self-regulation and self-efficiency. There is the need to develop relationships with students so as to identify their needs and interests (emotional and intellectual), in addition to their individual learning styles. As science teachers we must emphasize that each student is unique with value, talent and abilities; promote awareness and unity in diversity; they should be made to recognize similarities as well as differences in human endeavor. Teachers should make use of the principles of constructivism to make learning interesting. The use of thematic or integrated instruction, cooperative learning and inquiry approaches should be encouraged within our science classrooms.

Conclusion

Can the professional status of the science teachers be raised compared to other professions like medicine, engineering, lawyers, accounting, marketing managers, banking, etc? The answer is yes, provided policy makers decide to look at the conditions of service of the teachers. Analysis about the status of the science teacher equally involves their relationships with their students (clients-with reference to other profession-here the teacher's "clients" should not be considered as total clients because they (students) are active participants (learner-center) while in the case of the other professions their clients do not participate in the activities but only express their problems to the lawyer, doctor or the engineer to solve for them. However, teachers' relationship with their clients is on the daily, weekly, monthly and yearly basis, the clients are at least at the age of compulsory schooling, they are normally taught in large group and not one-to-one (though individualized teaching –learning is necessary) like the relationship of doctors and lawyers. One of the reasons why the one to one client relationship is minimize within the science teaching profession is that the students are not always in depressive mode (unless on special needs cases) that will demand such special attention. Wodi and Dokubo (2005) argued that this type of direct relationship seems to have taken away from the teaching profession much of the mystiques which is still attach to other professions. Probably, as a result of the disappearance of the teacher's gown, the raised dais, and different rituals, the science classroom lack the aura of the operating theatre or court room or the consulting room of the doctor or lawyer. On the basis of this we should agree with Baikie's (2002) idea that professional status cannot be conferred on science teachers, instead it is the responsibility of the teacher to earn the status.

Design and implementation of science education curriculum by science teachers

One important aspect of the science teacher's responsibilities that policy makers seems not to be serious, particularly in the developing countries, is allowing school science teachers to participate in their school curriculum design. The implementation of school science curriculum cannot be fully effectively done without a trained and experienced science educator. The process of implementation involves an advanced planning, coordination and assessment on daily (lesson plans) weekly, monthly and annual basis. Since schools operate on termly basis or semester basis the calendar of the year must be taken into consideration while implementing school science activities, in line with the interest and needs of the learners and the goals,

mission and vision of the country. Science teachers should not only be assigned the responsibilities of implementing science curriculum, they should be involved right from the designing state of the national science curriculum program. This is necessary because experience has shown that when curriculum programs are designed without their involvement and it is then imposed upon them from the top, implementation become difficult because it is the teachers on the ground that knows the peculiarities and difficulties at the implementation level. The implication of this is that the teachers must be trained in the first place, in the subject area (curriculum design).

Accommodation and retirement benefits for science teachers like other professionals

In addition to special training in the field of curriculum design is the issue of conditions of service for the science teachers. This include security of jobs such as owning their personal houses which is a pride to the family, a suitable office accommodation like his or her colleagues in the other professions and not a situation where 15 t0 20 teachers are sharing the same office, sharing same toilets with students, as it is the case in a number of secondary schools in many African countries. School authority must built at least a story building with at least 20 to 25 offices mainly as staff rooms depending on the size of the school. This system will surely minimize a situation where strong and potential science teachers abundant the profession because of lack of proper office accommodation, in-security of jobs, particularly after retirement.

From all that have been discussed I do believe that the science teacher's administrative functions include- the organizational functions, classroom management and operations and appropriate counseling. Methods of instruction can be considered as a process in which science teachers try to achieve classroom management in order to establish a suitable learning atmosphere. Ideally, for a proper class management to be achieved attention must be paid in the areas of efficiency and effectiveness by the science teacher. The concept efficiency describes how a science teacher measures how he or she directs the science activities within the classroom. In order for the teacher to do this job he or she must be qualified, systematic and should be enthusiastic naturally. On the other hand effectiveness measures the academic achievement of the science students, and the level to which they display the type of behavior expected of them by the family, the school authority and the larger society or community. The achievement of effectiveness by the teacher is determine by the teacher's continuous assessment of learners, effective and clear communication as well as the teacher's appropriate personal conduct behavior.

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