Effect of Challenges with Class Size, Classroom Management and Availability of Instructional Resources on Science Teachers' Teaching Practices in Secondary Schools

Gracemary Eloheneke Moluayonge · Innwoo Park*

Korea University

Abstract : This study set out to investigate the challenges to science teacher's teaching practices in the Anglophone sub-system of education in Cameroon secondary schools. A sample of 331 of these teachers was selected using the purposive sampling method. Data was collected by use of a questionnaire and was subjected to inferential analysis. The major findings from the multiple regression were challenges associated with the size and management of a science class have an effect on the teaching practices of a science teacher. However, challenges with availability of instructional resources did not have an effect on science teaching practices. Recommendations to solve the identified drawbacks include the provision of more classrooms to accommodate the ever growing population of students and the organization of many seminars through which teachers could be educated on how to handle classroom problems and improvise when necessary.

keywords : challenges, science teaching, class size, classroom management, instructional resources, teaching practices

Ⅰ. Introduction

The quality of teaching and learning of science subjects is being questioned worldwide. Although the reasons for concern about quality differ from country to country, the primary rallying point is the perceived level of scientific literacy among each country's populace. Concerns also have focused on the usefulness and relevancy of the subject matter included in the science curriculum (Venville & Dawson, 2004). Efforts by the government such as the conception of the Growth and Employment Strategy Paper in the case of Cameroon stress the importance of conceptual understanding of the overarching ideas in science (Government of the Republic of Cameroon, 2010).

Effective teaching and learning of sciences can be influenced by the availability of laboratory equipment, chemicals and materials, laboratory personnel, working conditions in the laboratory, substantial textbooks and accurate periods for the teaching of the subjects (Adefunke 2008; Frank & Saxe 2012). Thus, the availability of instructional resources has a great impact

*Corresponding author: Innwoo Park (parki@korea.ac.kr)

**2017년 7월 20일 접수, 2017년 4월 5일 수정원고 접수, 2017년 4월 14일 채택

http://dx.doi.org/10.21796/jse.2017.41.1.135

on the teaching methods and practices of these science teachers. Studies on resources existing for teaching in Cameroon secondary schools have found disparities in the resources available for the teaching of all subjects and science subjects in particular. Some of the schools were found to lack basic necessities such as sufficient classrooms, offices, desks, textbooks, functional toilets not to mention facilities like laboratories, libraries, workshops, chemicals, science equipment (FEMSA, 1997).

Moreover it has also been documented from studies in the case of Cameroon that the challenges science teaching face centers around the shortage of teaching staff, reception facilities and basic commodities. For basic commodities it was realized that: 3 government schools out of 10 have a gymnasium; 1/5 have a library as against 5/9 for private schools, 4/7 have a school canteen as against 5/9 for the private. As for laboratories, majority of the schools lack functional laboratories due to lack of equipment. In some cases where there is equipment they might still be left unused due to the incompetency of the teacher or might get bad from poor storage. In some schools, studies showed the insufficiency of furniture like benches and desks. This makes sitting and taking notes awkward and burdensome. Coupled with the daily struggles in school such as sharing of textbooks or some lab equipment, this might lead to classroom management issues like making the students paying attention in such an atmosphere, keeping them disciplined and so on. This takes a toll on both the teachers and the students. The shortage of competent and qualified teachers has led to the employment of unqualified persons, a situation which prevails more in the private sector.

Also, the budget allocated for education (15%) is far below what is allocated for education in other countries with the same level of development as Cameroon. 44% of this budget is spent in the secondary level.

Furthermore, given their prices or their unavailability, textbooks and other pedagogic materials are out of the reach of students and teachers. Generally, the rate of buying of textbooks by students is low: with ownership of textbooks by only 3 out of 10 students. The analysis of the discrepancy within provinces reveals that in the Anglophone regions, the level of ownership of textbooks is higher because of the preference for second hand textbooks. As concerns teachers, the level of non-ownership of textbooks is high: one teacher out of 10 owns a textbook in sciences. The absence of a national policy of academic textbooks and didactic material has resulted to a monopoly in the publishing and distribution of these books, which has led to a disorder in the selection of textbooks, high cost and shortage of specialized textbooks.

The working condition of teachers is also a problem area. Cameroonian teachers are demotivated and feel disaffection with a profession that no longer guarantees an image-enhancing social status. The drastic drop in academic standards is also as a result of severe cut in salaries of teachers, which weakened their purchasing power. Practical lessons require time for preparation before the lesson and also clean up after the lesson. Such demotivated teachers find it hard to give their time for this. Moreover,

even in the presence of equipment, some teachers still complain about insufficient time or the very cumbersome procedure involved in carrying out practical lessons and end up using this as a pretext for skipping practical lessons.

This mediocre working conditions- no offices, no secretariat material, no libraries and no documentation; discourage young talented persons from postulating for a teaching career. The conditions oblige a good number of teachers to embark on other strategies, for family and personal survival, which are less "profitable" for the school. The search for external profitable activities reduces teachers' viability, of which students complain. Also the health conditions in most schools is poor - lack of sick bays and inefficient health insurance mechanisms for teachers.

Teachers could likewise be rendered ineffective by large classes that overburden and overload the teacher. Studies have shown that there is a shortage of science teachers at the secondary school level and have to be shared by a large number of students. This leaves a large work load on the teacher. In the sciences, the ratio of students per seat in the laboratories was 1/100 for government schools and 8/100 for the private. This overcrowding has an effect on classroom management as it causes the teacher to sometimes pay attention only on students who are bright and following up. This could be a cause for concern in the case of a practical lesson where it would be hard to monitor individual students' work. (FEMSA, 1997; MINEDUB-MINESEC-MINEFOP-MINESUP, Cameroon, 2006; Government of the Republic of Cameroon, 2010).

The preceding salient points that have been mentioned are all results gotten from prominent studies promoted by UNESCO and IMF. These results predominantly show that the availability of resources is a main aspect that affects the effectiveness of the teaching of sciences and the practices of these science teachers. The availability of classrooms and laboratories which are all resources will now determine the class size and in most cases the students are large in number as compared to the teachers available. This in turn will affect the classroom management and generally affect the teaching practices of the science teacher. Thus, these three aspects: classroom management, class size and availability of resources are interrelated and prominent amongst most studies on science teaching challenges in Cameroon. Therefore, they were chosen as the pivot of this study. The relationship and severity of these three aspects can be seen from the report of a teacher from Cameroon which said:

> "My largest class is 80 students, but that's nothing considering many classes at our school have over 120 students. The students sit four to a bench, with barely enough elbow room to take notes, making a few things more difficult, namely giving tests, managing discipline, making sure they're all following the lesson, and it's near impossible to learn all of their names when I teach them for one hour per week. We've tried many classroom management techniques, some of which worked, some of which didn't. I make multiple versions of our tests for example, and you should have seen the looks of shock and

disappointment on their faces when I told them that their test is different than the person sitting next to them" (Thryn, 2009).

Thus, in order to ensure better teaching and learning of science subjects in Cameroon, it was deemed necessary for an investigation to be carried out on challenges teachers face in the teaching of science subjects in respect with the availability of instructional materials, class size and classroom management.

The main objective of this study was to investigate the challenges to science teachers' teaching practices in the Anglophone sub-system of education in Cameroon secondary schools. Anglophone education is one based on the Anglo-Saxon model. This is the post-independent educational system of former West Cameroon Education Federated State which was guided by the West Cameroon Educational Policy of 1963. It is now guided by Law No. 98/004 of 14th April 1998 which is the Law on Education in Cameroon. Specifically, the objectives of this study were to:

1. Find out if the challenges science teachers encounter with the availability of instructional resources has an effect on the challenges they face with their teaching practices.
2. Find out if the challenges science teachers encounter with the class size have an effect on the challenges they face with their teaching practices.
3. Find out if the challenges science teachers encounter with classroom management have an effect on the challenges they face with their teaching practices.

Based on the objectives, the following hypotheses were proposed:

H: Challenges with availability of instructional resources has a significant effect on challenges with the teaching practices of science teachers in Secondary Schools.
H: Challenges with class size has a significant effect on the challenges with the teaching practices of science teachers in Secondary Schools
H: Challenges with classroom management has a significant effect on the challenges with teaching practices of science teachers in Secondary schools.

Ⅱ. Review of Related Literature

1. Availability of Instructional resources and science teaching practice challenge

Instructional resources are any medium of instruction that assists the teaching/learning process. Meanwhile teaching practices are all the activities carried out by the teacher to facilitate the teaching and learning process. The availability of educational resources is very important because of its role in the achievement of educational goals and objectives. The extent to which an organization like an educational institution attains her objectives is directly proportional to the educational resources available and

their utilization (Adeogun & Osifila, 2009).

The teaching methods employed by science teachers in Secondary schools amongst others are greatly influenced by the kind of instructional resources available. The quality of participation received from the students will thus be determined by these teaching methods. Everything being equal, in a case where instructional resources are made available and in right proportions, the science teacher will employ student centered methods wherein the students are greatly involved in hands on activities, discussions, experimentation and very practical activities with each other. Such an approach arouses curiosity, imagination and critical thinking. However, in the case where these instructional resources are unavailable, this might lead the teacher to use mainly teacher centered methods like lecture and giving notes and the students just have to passively listen and observe. In such a case the teacher is the main source of information such that if the teacher is misinformed, everyone is at risk of being in the dark too. An instructional mode that is teacher centered has a negative effect on science teaching and learning and can gradually diminish students' interest (FEMSA, 1997).

Science teaching is more effective when there is availability of laboratory resources (Orji, 2006) as well as technical know-how. However, researches have shown that there exist competency problems arising from the training of science teachers (Ajaja, 2009).

Studies have revealed several issues science teachers face with the availability of resources including: combined science laboratory is available in most of the schools but separate laboratories for physics, chemistry and biology are not available, there is deficiency of science apparatus and the available apparatus are also not workable in most of the schools, there is a deficiency of science teachers and laboratory attendants in schools, science magazine and journals are not available in the libraries of schools, and the number of periods for theory is sufficient but number of periods for practicals is not sufficient (Naseer *et al.*,2010; Mohanty, 2007).

2. Class size and science teaching practice challenge

Class size refers to the number of students being taught by a teacher in one class. The question of class size sparks heated debate among educators (American National Science Teachers Association, 2004). This applies across all subjects, including the sciences. Creativity, rote memorization, calculation, an educational environment of creative and inspired thought is very important in the sciences.

Different countries and organizations have varied limits for the student- teacher ratio for both practical and theoretical lessons. For practical lessons wherein the students are under the instruction of one teacher, the number of students should not exceed 35 in the case of Cameroon. However, in the case of Ireland, England and Wales, they should not exceed 20 students. On the other hand, for a non-practical class, Northern Ireland recommends that the students not exceed 30; Cameroon provides that the students should be 60 per class; meanwhile the World Bank does stipulate a secondary general

class to be made up of 30 students (Irish National Teachers' Organization, 2017; Ministry of Secondary Education in Cameroon; Regulation 15 of the Secondary Schools Grant Conditions Regulation for Northern Ireland, 1973).

Generally speaking, reviews of the literature have split into those that conclude that effects and benefits of class size reduction (CSR) on classroom processes are relatively trivial (Ehrenberg *et al.*, 2003) and those that have been much more optimistic about the positive effect of CSR on classroom processes (e.g., Anderson, 2000, Biddle & Berliner, 2002, Finn *et al.*, 2003). Amongst the found effects are:

Class size has an impact on peer interaction. The relationship between classmates significantly affects how well students in that class learn. In a larger class environment, they might be more prone to rowdiness or disruptive behaviour that distracts them from what is being taught. Students in a smaller class, on the other hand, are more likely to bond with one another and collaborate when learning and studying the material. This matters for science students, particularly as they get to higher levels of education and find themselves needing to form study groups and work in teams on assignment (Psychological Science in the Public Interest, 2004).

Another aspect that can be affected by class size is teacher availability. Students ultimately benefit or suffer from the set-up of a classroom, but the size of a class affects the teacher's experience as well. A science instructor can tailor the material to the students' needs, finding creative ways of helping them understand what is being taught and learning to make connections and problem-solve for themselves. Rather than relying on lectures, teachers can devise hands-on experiments in which they work closely with students through a realistic simulation, or they can organize frequent trips to laboratories or other practical venues from which their students can learn. These approaches tend to be more feasible on a regular basis with a small group (Association for Science Education, 2004).

Moreover, class size can have an influence on the teacher. Perhaps the most consistent finding is that class size affects individualization of teaching (Wilson, 2006). The smaller the class the more likelihood there is that a teacher will spend more time with individual students. In smaller classes there also tends to be more teaching overall and large classes present more challenges for classroom management, student control and marking, planning and assessment. Teachers are put under more strain when faced with large classes (Wilson, 2006). Qualitative studies by the Class Size and Pupil Adult Ratio suggest that in smaller classes it can be easier for teachers to spot problems and give feedback, identify specific needs and gear teaching to meet them, and set individual targets for students. Teachers also experience better relationships with, and have more knowledge of individual students (Wilson, 2006).

Classroom management can also be greatly impacted by the class size. Studies have highlighted large class sizes in secondary science as making it difficult for teachers to manage practical classes (The scientific learned societies and the American

Association for Science Education, 2004). It has also been revealed that it is the top sets in science that tend to be larger so that it is the most able students who are being most directly affected (American Association for Science Education, 2004).

Studies have also shown that larger classes lead to more and bigger groups within the class, and this has an adverse effect on the amount and quality of teaching and the quality of students' work and concentration in these groups. It is therefore important educationally to consider the mediating role of within class groupings. (Blatchford, 2004; the Class Size and Pupil Adult Ratio-CSPAR).

Furthermore class size can affect the curriculum. Research shows a moderating role of school subject on relationships between class size and classroom processes. Rice (1999) found that in science, as class size increased, less time was spent on small groups and individuals, innovative instructional practices, and whole group discussions. In the CSPAR study, the overall effects of class size on individualized attention were found in all subjects but English.

Overall, results suggest that while small classes will not make a bad teacher better, they can allow teachers to be more effective; conversely large classes inevitably present teachers with difficulties and the need for compromises. Small classes can offer opportunities for teachers to teach better (Anderson, 2002) or, to use a different term, they can create facilitating conditions for teachers to teach and students to learn (Wang and Finn, 2000).

3. Classroom management and science teaching practice challenge

Classroom management is the creation of a positive teaching and learning environment. For most teachers, confronting some sort of classroom management problem is a daily occurrence.

These problems may include infractions of school or classroom rules, showing disrespect, cheating, using obscene words or gestures and openly displaying hostility, undermining the instructor's authority, leaving class too frequently, "spacing out" or sitting with back to instructor, poor hygiene, verbal or physical threats, gum, food, pagers, and cell phone disruption, monopolizing discussions, sleeping in class, repeated lateness and absences, refusal to participate or speak, sexual innuendo, flirting, or other inappropriate suggestion, sharing/copying work, plagiarism or lying, too much chit chat and disrespectful behavior (Amada, 1999; Borich, 2011).

Moreover, other studies have shown when the class is about to embark on an activity, students whisper and have puzzled faces meaning that they haven't a clue what to do, a group of students are not paying attention due to excessive talking or students refuse to participate in class, some students do not do their assignments and others attend classes infrequently (Singh, 2010; Sonia, 2009).

Classroom management is very vital for the science teacher and since he/she is involved with more practical activities, more skills are needed. Moreover, it has been shown that classroom management can take

up a considerable amount of a teacher's time. This time is generally focused on keeping the students on task and ensuring that the task is effective (Stanger, 1996). One reason why students are not disciplined naturally is because students' motivations do not match those of the teacher. The findings from studies have indicated that students will learn best from teachers that combine positive reinforcement with preventative discipline, effective management, and interesting instruction (Lang *et al.*, 1994). In the light of this information, effective management and instruction must allow students to socialize whilst learning interesting content. The amount of time spent on discipline may therefore be minimized with an appropriate form of classroom management.

Ⅲ. Method

1. Participants

From the total population of all the science teachers teaching general education science subjects in the Anglophone sub-system of Education in Cameroon (2396), a sample of 331 Biology, Chemistry and Physics teachers was selected. To get this sample, the researcher used non probability sampling, specifically the purposive sampling method since the study was already streamlined to Chemistry, Physics and Biology teachers. In each of the halls, copies of the questionnaire were randomly distributed to those who were willing to participate. These subjects were used in line with Garner (2009) and Press Association (2011) who believe these are the traditional science subjects.

2. Tools

A questionnaire with close-ended likert-type scale items was used to collect data. Each item had response opinions that were rated on a five-point scale, consisting of: strongly agree=5, agree=4, neutral=3, disagree=2 and strongly disagree=1. This questionnaire consists of five sections. The first section was a cover letter dealing with the ethical considerations like assurance of confidentiality, voluntary participation and informed consent. The next section appertained to the demographic information of the science teachers. The remaining sections each contained items referring to each latent variable.

The items for each of the sections of the instrument were gotten from the literature of studies that already been carried out in and around Cameroon and in the field of science education. Concerning items for availability of instructional resources, these were chosen from the reports done by UNESCO and IMF showing the most prominent problems that were persistent in the teaching of sciences. These have been documented in the Sector wide approach (2006) and the growth and employment strategy paper for the Republic of Cameroon (2010). These concerns were also found to be raised in the works of other scholars (Ajaja, 2009; Mohanty, 2007; Naseer *et al.*, 2010). Issues like the presence of a laboratory, qualification of the teachers, and presence of textbooks are ideas that

kept recurring. So the researchers thought this could be representative of the situation faced by Cameroon science teachers. In the case of the class size, the items for the instrument were also drawn from the prominent studies already mentioned that were promoted by UNESCO and IMF and documented in country reports like the Sector Wide approach by the Republic of Cameroon(2006). These points were also reiterated by results from studies by other scholars (Anderson, 2002; Blatchford, 2004; Finn *et al.*, 2003; Wilson, 2006). For the items on teaching practices by these science teachers, its items were also drawn from the already mentioned reports documented in the sector wide approach and the growth and employment strategy paper for Cameroon as it was reported that some of the teachers complained of their class being too large, without sufficient resources and no time to finish the cumbersome science syllabus. In the case of classroom management, the items were also a collection of ideas of the issues raised by the already mentioned country reports (Sector Wide approach by the Republic of Cameroon and Growth and employment strategy Paper) and also recurring issues raised in many other studies (Amada, 1999; Borich, 2011; Singh, 2010; Sonia, 2009).

Both the face and content validity of the instrument was gotten. The face validity of the questionnaire was assured by first giving it to course mates to check for organization and grammatical errors. Sample copies were also given to an Education professor and other linguistic experts to review for language, appropriateness and clarity. After the corrections were made, the questionnaire was considered valid. To check for the content validity of the questionnaire, the researchers went through the items carefully to make sure that they were in line with the objectives of the study. This was also confirmed by the professor.

In order to check for consistent measurement by the questionnaire, a pilot test was carried out on twelve science teachers in Buea sub division, South West Region, Cameroon-four for Chemistry, four for Physics and four for Biology. These teachers were no longer used in the main research.

Table 1. Demographic information of participants

Variable	Category	Frequency	Percentage
Type of school	Lay private	22	7.3
	Denominational	76	25.2
	Government	203	67.4
Subject	Physics	91	30.2
	Chemistry	93	30.9
	Biology	117	38.9
Gender	Female	65	21.6
	Male	236	78.4

3. Procedures

The questionnaire was personally administered to respondents by the researcher during the marking of the 2015/2016 Cameroon General Certificate of Education Examination (CGCE). A suitable time for administering it was negotiated with the chief examiner in the marking centres for Biology, Chemistry and Physics and the instrument was given to teachers willing to take part in the study. Some of the questionnaires were immediately completed and returned on the spot while the others were collected later. Of the 331 copies of the questionnaires administered, 301 were returned, resulting in a 90.94% response rate. The table below illustrates the demographic information of those who finally returned their questionnaire.

Ⅲ. Results

1. Reliability and Validity of the Questionnaire

Data from the closed-ended questionnaire were quantitatively analyzed using the Statistical Package for Social Sciences (SPSS) vision 22. Each item was considered a continuous variable, with the highest score being 5 pertaining to strongly agree and the lowest being 1 pertaining to strongly disagree. The reliability, Exploratory Factor Analysis, inter item correlation and finally the indirect effects between the latent variables were further computed. The tables below illustrate.

From table 2 above, it can be seen that the Cronbach's alpha for each of the four latent variables is above 0.7 which is the lower bound for true reliability; availability of instructional resources (5 items; α = 0.837), class size (5 items; α = 0.880), teaching practices (4 items; α = 0.867), and classroom management (8 items; α = 0.890). This indicates a high level of internal consistency for the items found in each of the four latent variables. Overall, these analyses indicated that the three distinct predictors of the challenges science teachers face in teaching science subjects and factors for challenges in their teaching practices were internally consistent.

Data were subjected to factor analysis using Varimax rotation. The factorability of all the items was examined. First it was observed that all the measured items for each of the latent constructs had a factor loading of above 0.5 which indicated that the latent construct had acceptable factor values for the study. Secondly the Kaiser-Meyer-Olkin Measure of sampling adequacy was .841 which is above the recommended value of 0.7 (Kaiser, 1974) indicating that the data were sufficient for EFA. Given these overall indicators, factor analysis was deemed to be suitable with all items. Table 3 above illustrates.

2. Tests of the Effects

In order to carry out a multiple regression analysis to test for the hypothetical effects of the independent constructs on the dependent constructs, an analysis of the inter item correlation was carried out to

Table 2. Reliability Analysis

Measured Items	*M*	*SD*	Cronbach's alpha
- Availability of Instructional Resources			
Laboratory materials are not sufficient to conduct practicals	2.96	1.110	0.837
The periods allocated for practicals are not sufficient	2.71	1.019	
The number of qualified teachers for my subject in my school are not enough	2.96	1.032	
My subject does not have a laboratory for itself	2.94	1.053	
I do not have the standard textbooks for my subject	2.29	1.409	
- Class size			
I have problems controlling my class because it is too large	2.92	1.038	0.880
Students I teach in Large classes show disruptive behavior	3.33	0.899	
I have difficulties following up all my students in large classes	3.27	0.874	
Large class size demotivates me	3.37	0.887	
Students I teach in large classes participate less in class	3.32	0.871	
- Teaching practices			
My class is too large for effective demonstration.	2.93	0.974	0.867
I do not have enough resources to give my students projects to carry out	3.35	0.857	
It is time consuming for me to seek alternative ways to ensure that students learn the subject matter.	3.36	0.925	
I find it difficult to finish the syllabus if I involve too many demonstrations, investigations, problem solving and projects in my lessons.	3.41	0.903	
- Classroom Management			
My students whisper or express confusion when about to embark on an activity	3.01	1.177	0.890
Students do not actively participate in my lessons	3.09	1.036	
The arrangement of benches in my class does not favour free movement	3.30	1.015	
My class is too large for effective class control	3.12	0.918	
Students' phones are a source of distraction in my class	3.04	0.953	
Students are sometimes drowsy in my class	3.13	0.885	
Students come late for practicals	2.85	1.187	
My students whisper or express confusion when about to embark on an activity	3.15	1.061	

Table 3. Exploratory Factor Analysis Results

Rotated Component Matrix					
Construct	Measured Items	Component			
		1	2	3	4
Classroom Management	Students come for practicals without lab manuals	0.772			
	My class is too large for effective class control	0.772			
	The arrangement of benches in my class does not favour free movement	0.772			
	My students whisper or express confusion when about to embark on an activity	0.765			
	Students are sometimes drowsy and sleepy in class	0.754			
	Students' phones are a source of distraction in my class	0.737			
	Students actively participate in my lessons	0.712			
Class Size	Students I teach in Large classes show disruptive behaviour		0.841		
	Students I teach in large classes participate less in class		0.819		
	Large class size demotivates me		0.814		
	I have difficulties following up all my students in large classes		0.769		
	I have problems controlling my class because it is too large		0.733		
Availability of Instructional Resources	The number of qualified teachers for my subject in my school are not enough			0.881	
	The periods allocated for practicals are not sufficient			0.852	
	Laboratory materials are not sufficient to conduct practicals			0.754	
	My subject does not have a laboratory for itself			0.746	
	My school does not have a library			0.622	
Teaching Practices	I find it difficult to finish the syllabus if I involve too many demonstrations, investigations, problem solving and projects in my lessons				0.888
	It is time consuming for me to seek alternative ways to ensure that students learn the subject matter				0.886
	I do not have enough resources to give my students projects to carry out				0.816
	My class is too large for effective demonstration				0.610

Kaiser-Meyer-Olkin Measure of Sampling Adequacy .841

Table 4. Inter-item Correlation of variables

Construct	M	SD	1	2	3	4
Availability of Instructional Resources	2.77	0.882	1			
Class Size	3.24	0.753	.340**	1		
Classroom Management	3.12	0.791	.256**	.337**	1	
Teaching practices	3.26	0.774	.232**	.308**	.459**	1

** Correlation is significant at the 0.01 level (2-tailed).

determine whether there is sufficient relationship amongst the variables. The outcome of the correlation analysis indicated that all the items had relationships with each other. The least correlated items were availability of instructional resources and teaching practices (r=.232, p<0.01) while the most correlated items were teaching practices and classroom management (r=.459, p<0.01). Since all the correlation values exceeded the acceptable bench mark of 0.20 the data was then considered suitable for regression analysis. Table 4 above illustrates.

Multiple regression analysis was used to test the hypotheses. The results of the hypothesis testing were accepted when the null hypothesis in a study is deemed not rejected, if the t value is equal or greater than 1.96 and the p value is equal to or less than 0.05(Landau & Everitt, 2004). Based on this premise, the analysis thus showed that the result was significant, F (3,297) = 31.724, p<0.005, R^2=.243. Moreover the results revealed that availability of instructional resources was not a significant predictor (β =.082, t=1.515, p=0.131) of teaching practices. Thus H01 was not rejected. However, classroom size (β=.149, t=2.670, p<0.005) and classroom management (β=.387, t=7.131, p<0.005) had significant effect on science teaching practices. Signifying that $H_0$2 and $H_0$3 respectively were rejected. Therefore,

Table 5. Direct Effects

Dependent Variable	Independent Variable	Standard error	*B*	*t*	*p*
Teaching Practices	Availability of Instructional Resources	0.048	0.082	1.515	0.131
	Class Size	0.057	0.149	2.67	0.008
	Classroom Management	0.053	0.387	7.131	0.000

R^2 = .243, Adjusted R^2 = .235, F = 31.724, p = 0.000, df = 3,297

based on the empirical results from this study, Null Hypothesis 2 and 3 were rejected while Null hypothesis 1 was not rejected.

Ⅳ. Discussion

These results thus imply that with the exception of availability of instructional resource, the two core challenges to the effective teaching of science subjects (class size and classroom management) significantly impacted science teaching practices. These results are consistent with the findings of other researches (Blatchford, 2004; Crocker, 1999; Rice, 1999; Wang & Finn, 2000) which showed that difficulties with class size and classroom management impacted science teachers' teaching practices. It is therefore imperative to address these challenges as a matter of urgency in order to enhance the effectiveness of the teaching of science subjects at the secondary school level.

However, the finding from this study that shows that hitches with the availability of resources is not a predictor of challenges with science teaching practices is not in accord with results of studies like Thryn, (2009) and Adeogun & Osifila (2009) who think availability of resources and teaching practices are related. Cameroon like any other developing country has a number of constraints in its educational sector be it insufficient resources, large class sizes, time and financial constraints amongst others. However, drawing inspiration from ideas gotten at seminars, workshops, departmental meetings and even through interactions with their fellow teachers on a daily basis, the science teachers have adopted other forms of teaching materials based on the curriculum. Furthermore through these forums, they have learnt to improvise and even share the available resources amongst themselves, not just amongst teachers in one School but across schools. Such conventional practices may account for the lack of direct effect of the availability of instructional resources on science teaching practices.

Getting through challenges with teaching can be traumatic; however, challenges like class size is not the major deterrent to positive learning environments. The number of students is important, but the attitude of the teacher in dealing with the class size makes the difference (Blatchford, 2009). Thus be it a large or small class, be it that resources are available or not, it is the teacher's call to either make the class conducive for positive learning outcomes or not.

Ⅴ. Conclusion and Recommendations

The findings of this study indicate that the science teachers in secondary schools in the Anglophone sub-system of Education in Cameroon have many challenges which can be hinged on large class sizes of science students, classroom management difficulties and many student related issues. The situation therefore calls for reflections and actions from the various stakeholders and also the retraining of all science teachers in Cameroon, through seminars and workshops,

and provision of instructional resources to reposition science teaching in Cameroon. This will enable teachers to teach the sciences in line with national standards and aspire to catch-up with international specifications. The information from this research could be disseminated through seminars and talks in schools and even at divisional, regional, national and international gatherings of science teachers.

Based on the findings of this study, recommendations according to the different objectives were made for policy and practice. Concerning recommendations towards the challenges science teachers face with class size in their teaching practices: the students should be admitted based on the available classrooms. Also, seminars should be held informing teachers on strategies they can use to make teaching/learning in large classes more effective. Moreover, larger classrooms should be provided for science students. In regards to classroom management issues; seminars should be conducted by the administration from time to time to provide the teachers with management skills and to also provide them with a forum where they could share their management difficulties with one another, get encouragement and advice.

As concerns recommendations for practice for reducing the problems the science teachers face with class size; for large classes, teachers could divide the class and teach them at different sessions. Also, teachers could also divide the class into groups and give them activities. Moreover, lessons should be filled with many hands on activities to keep the students busy. Regarding recommendations for issues with classroom management, Science teaching improvement programmes should be drafted jointly by science teachers in the Divisions and Regions to give them a better orientation on what is expected of them and expose them to current methods of teaching and presenting content material to learners. Also, rules should be laid down by the teachers on issues like bringing cell phones to class, late coming for lessons, sleeping in class and even coming for practicals without manuals. These will serve as a deterrent to the students when they attempt to break these rules.

Propositions for a follow up to this study could be: Observational study of problems science teachers face; Higher Education teachers' problems in teaching science subjects; and Secondary school teachers' problems in teaching arts subjects.

References

Adeogun, A. A., & Osifila, G. I. (2009). *Relationship between educational resources and students' academic performance in Lagos State Nigeria*. Lagos, Nigeria: University of Lagos.

Adefunke, T. (2008). Quality assurance in the upper basic education through effective curriculum implementation. *Nigerian Journal of Curriculum Studies, 15*(30), 23-33.

Adeyemi, A. (2009). *The issue of class size*. Retrieved from www.socailresearch.net/wcbcontval.htm

Ajaja, P. (2009). *Evaluation of science teaching in secondary schools in Delta State 2-*

teaching of the sciences. Abraka, Nigeria: Kamla-Raj.

Amada, G. (1999). *Coping with misconduct in the college classroom*. Asheville, NC: College Administration Publications.

Anderson, L. W. (2002). *Balancing breadth and depth of content coverage: Taking advantage of the opportunities provided by smaller classes*. Greenwich, UK: Information Age Publishing.

Blatchford, P., & Mortimore, P. (1994). The issue of class size in schools: What can we learn from research?. *Oxford Review of Education, 20*(4), 411-428.

Borich, G. D. (2011). *Effective teaching methods: Research-based practice*. Boston, MA: Pearson.

Cooper, H. M. (1989). Does reducing student-to-teacher ratios affect achievement?. *Educational Psychologist, 24*(1), 79-98.

Ehrenberg, R. G., Brewer, D. J., Gamoran, A., & Willms, J. D. (2001). Class size and student achievement. *Psychological Science in the Public Interest, 2*(1), 1-30.

FEMALE EDUCATION IN MATHEMATICS AND S CIENCE IN AFRICA [FEMSA]. (1997). *Resources and facilities for teaching and learning of Mathematics and science school.* Retrieved from http://www.unesco.org/education/educprog/ste/projects/girls%20africa/femsa/femsa2.html

Garner, R. (2009). *Traditional science subjects make comeback.* London, UK: The independent.

Government of the Republic of Cameroon (2010). *Growth and employment strategy paper: Reference framework for government action over the period 2010-2020*. Washington, DC: International Monetary Fund.

Frank M., & Saxe, R. (2012). Teaching replication. *Perspectives on Psychological Science, 7*(6), 600-604.

Irish National Teachers' Organisation. (2017). *Class Size*. Retrieved from http://www.into.ie/ni/schools/education/classsizes/

Lang, H., McBeath, A., & Hebert, J. (1994). *Teaching strategies and methods for student-centered instruction.* Toronto, Canada: Harcourt Brace & Co.

MINEDUB-MINESEC- MINEFOP- MINESUP, Cameroon. (2006). *Draft document of the sector wide approaches on education*. Yaounde, Cameroon: UNESCO.

Mohanty, G. (2007). *Essential facilities for quality bioscience teaching in secondary schools*. Retrieved from http://www.handle.net/123456789/1225

Orji, A. (2006). The effect of greeno and polya problem solving models on student's achievement and interest in physics in senior secondary schools in Abuja metropolis of Federal Capital Territory. *NASHER Journal, 6*(3), 149-154.

Press Association. (2011). *Gove questions science curriculum.* Retrieved from www.pressassociation/gove-questions-science-curriculum-134032992.html

Rice, J. K. (1999). The impact of class size on instructional strategies and the use of time in high school mathematics and science courses. *Educational Evaluation and Policy Analysis, 21*(2), 399-414.

Singh, R. (2010). *Strategies for behaviour problems faced by a teacher in the classroom*. Troy, NY: Bright Hub Inc.

Sonia, M. (2009). *Some classroom management problems, their reasons and solutions.* London UK: British Council.

Stanger, J. (1996). *An exploration into classroom management of science teachers*. Sydney, Australia: Balmain High School.

Thryn (2009). *Teaching challenges in Cameroon*. Accra, Ghana: Hinge of Africa.

Venville, G., & Vaille, D. (2004). *The art of teaching science*. Sydney, Australia: Allen & Unwin.

Wang, M., & Finn, J. D. (2000). How small classes help teachers do their best: Recommendations from a National Invitational Conference. *CEIC Review, 9*(2), 279-297.

Wilson, P. (1996). *Wilson wants smaller third grade classes*. Retrieved from http://www.thefreelibrary.com/Wilson+wants+smaller+3rd-Grade+classes.-a083950716