Implications of Class Size in Teaching Agriculture in Secondary Schools: Kenya's Challenge in Implementing Competency-Based Curriculum

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ABSTRACT

Class size is an important consideration in classroom teaching as it influences choice of classroom activities. Classroom activities, define how a teacher interacts with learners and are key in determining the quality of learning. Class size has increased over time in Kenya due to an increase in population and the implementation of educational reforms geared towards ensuring that all children acquire basic education. The students' performance in agriculture at national examinations has been of concern prompting research to find out the reasons why. This study sort to find out the status of class size in agriculture lessons in Kenyan secondary schools and its implications in the implementation of the agriculture curriculum. A survey involving 151 agriculture teachers was done and data collected using questionnaires, focus group discussions and classroom observations. Data was analyzed using descriptive statistics. The findings of the study were that, the increasing class size has forced agriculture teachers to lean more towards teacher-centered teaching approaches which do not enable learners to acquire the requisite competencies. As Kenya implements the Competency-Based Curriculum, it is prudent to consider class size as one of the factors that will determine the success of the timely educational reforms.

Key words: Class size, Competency-Based Curriculum, agriculture, secondary school
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INTRODUCTION

In Kenya, agriculture as a learning area is intended to enhance relevant basic agricultural skills development for food security and career advancement (Konyango &Asienyo, 2015). The objectives of teaching any subject indicate the behaviour change expected of students whose achievement can be assessed through the use of examinations. The yearly report from the Kenya National Examinations Council (KNEC) (2019) indicates that

students' performance in agriculture as consistently below average (50 percent). Students' academic performance is influenced by many factors among them the classroom context. The classroom context is important in determining the teacher-learner interaction in class and thus influences how students learn. This study sought to find out the status of class size as a component of the classroom context and its implications in teaching of agriculture in public secondary schools. Since Competency-Based Curriculum (CBC) in Kenya has proposed that agriculture be a core subject from grade 4 to 9, class size would therefore be an imperative consideration in the implementation of agriculture curriculum.

Education is one of the key factors that determine the development of not only the human resource but also the economy of a nation (Kumar, 2018). To this end, the Kenyan government has undertaken the task of offering free and compulsory education to its citizens up to the age of 18 years which has led to implementation of educational reforms geared towards ensuring that all citizens have access to education (Japan International Cooperation Agency (JICA) & International Development Centre of Japan (IDCJ), 2012). The government envisages providing quality education to all learners and to which, the Kenya Education Sector Support Programme (KESSP) proposed priority areas one of them being the strengthening and improvement of secondary education (Ministry of Education, Science & Technology (MoEST), 2005). The successful completion of secondary school education depends largely on how the curriculum is implemented (Kidane & Worth, 2012).

Agricultural education in secondary schools, if handled well, can be crucial in producing skilled human capital able to address challenges in Kenya. Some of these challenges would be food security (Njura, Kaberia & Taaliu, 2019) and unemployment which in Kenya is highest among the youth aged 15 to 24 years (Hall, 2017). Such issues may be

alleviated through agricultural education by imparting basic agricultural skills to secondary school students who could then engage in economic agricultural activities.

Class size is one of the key features of a learning environment that is said to have an effect on learning and which the teacher has little or no control over. Class size in this study specifically refers to the number of students being taught by an individual teacher in a classroom. Class size is different from 'average class size' which is commonly calculated by dividing the number of students enrolled in a school or education system with the available classrooms (Great Schools Partnerships, 2014). Another commonly used term is the 'student-teacher ratio' (STR) which is used to express the relationship between the number of students and teachers in a school or an education system. To work out STR, the 'full time equivalent' (FTE) teachers is used which refers to all 'instructional staff' including all those who contribute to the academic process of the learners directly, namely; teachers, librarians, laboratory technicians. Some instructional staff may not be assigned traditional teaching roles rather they assist the teacher who has been assigned a particular class. This may not portray the actual number of students a teacher handles in class and Chingos (2013) states that 'the STR is nearly always smaller than the average class size' (p6). Student-teacher ratio are commonly used as comprehensive indicators of the overall quality of a school or education system (Great Schools Partnerships, 2014).

The debate on class size seems to be a continuous debate and research has shown conflicting results on its effect on student academic achievement. However, Woods (2015) asserts that small classes could be beneficial in improving student outcomes. Blatchford, Moriaty, and Martin (n.d.), suggest that policy makers usually argue from an economic point of view when they say that class size does not matter. Mathis (2016) and Chingos (2013) state that the continuing dialogue on class size appears to be due to financing of education and particularly number of teachers to be employed and remunerated, which is a concern for every government. O'Neil (2012) states that from research, there is evidence that increase in class size often results in poorer or inadequate learning

resources like classrooms and increases teachers' workload. This is likely to affect the quality of education.

Woods (2015) posits that teachers find it easy to manage a smaller class, give individualized attention, prepare for the lessons, grade students and give feedback. This in turn results in greater teacher job satisfaction (Organization for Economic Cooperation & Development (OECD), 2019). Chingos (2013) found that public school teachers preferred an improvement in working conditions, which includes class size, to an increase in salary. Besides, Schools, teachers and parents all prefer smaller classes because it is believed that small classes lead to better teaching and learning (Kariuki & Guantai, 2005) since the amount of individual attention a learner gets from the teacher increases. According to Great Schools (2018), 'reducing class size is an appealing and visible way for government and public schools to show that they are improving the quality of education'.

The recommended class sizes according to international standards is 40 students (MoEST, 2014). However, comparison in different countries reveals that in OECD member countries, class sizes range from 19 to 32 in lower secondary (OECD 2019). Among the OECD member countries is Finland whose education system has been lauded as exemplary has an STR of 13:1. Comparing this to STR in most African countries, the desire to have an education system functioning as well as in countries like Finland may be a mirage. In Africa, the STR in public secondary schools range between 11.11 to 68.13 (Lapitskiy, 2016).

In Kenyan secondary schools, class size is becoming increasingly larger which may lead to difficulties in class management placing the teachers in a difficult situation. In 2012, the STR in public secondary schools had grown to 41:1 (MoEST, 2014). The growing class size is due to various factors; an increase in population growth where Kenya's population

growth rate is 2.5 percent and 22 percent of its population is aged between 10 and 19 years (UNICEF, 2013). Secondly, various educational reforms have led to many more citizens having access to education than before. In the year 2003, Free Primary Education (FPE) was implemented in Kenya and many children who had no access to education were able to join primary schools (Ogola, 2010). The enrolment of children into primary schools in 2003 went up by 20.12 percent (World Data Atlas, n.d.) leading to NER growth of 84.9 percent. This same population would a few years later join secondary schools which led to an expected increase in secondary school enrolment but a change that was not fully prepared for.

In the year 2008, through the Free Day Secondary School Education (FDSE) policy in Kenya, there was a rapid increase of the proportion of students continuing from primary to secondary schools (Brudevold-Newman, 2017). With the strategic objective of the government is to provide free and compulsory quality basic education up to the age of 18 years (Republic of Kenya, 2013), another educational reform dubbed the '100 percent primary to secondary school transition policy' was introduced in the year 2018 (MoEST, 2015). This policy allows all learners who complete primary school level to proceed to secondary school regardless of their performance in the national examinations administered at the end of primary school. Previously, the learner's performance would be used as a criterion for admission into secondary school, meaning not all would proceed on to secondary schools. Due to the educational reforms afore mentioned, a high expansion of student population has been observed at secondary school level where the enrolment went up from 2.1 million in the year 2013 to 2.9 million in the year 2018 (Kenya National Bureau of Statistics, 2019). To provide quality education, the government envisaged the necessity of having quality teachers, support systems and improved physical and working conditions (MoEST, 2005) all of which have not been fully implemented. According to Ndolo and Simatwa (2016), the quick expansion of student

enrolment in public secondary schools has led to the stretching of resources, STR and student-classroom ratio beyond national standards.

Kordjazi (2014) suggests that spatial dimension in the classroom is a 'silent language' that forms people's action determining how people think about and relate to each other. It is therefore important to make classrooms, where learning takes place, as suitable as possible for learning. Tondeur, De Bruyne, Van Der Driessche, Mckenney, and Zandvliet, (2015) supports this by stating that the spatial organization of a classroom can be associated with changes in teaching practices. The restrictions offered by the walls and the floor space available can therefore offer opportunities or limitations in the ways a teacher can conduct the lesson. Therefore, when the class size increases but the classroom size remains static, teachers may be forced to get coping mechanisms and one of them being a change in teaching approaches, often less appropriate ones. This may also be reinforced by the fact that other teaching and learning resources may be over stretched as the class size increases.

Competency-Based Curriculum (CBC) focuses on the understanding of concepts and skills and how the learner can apply them in real life situations (Republic of Kenya, 2017). Due to the focus on competencies, CBC calls for change in teaching approaches and learning environment. In Kenya, the education system is changing from 8-4-4 into a CBC. This curriculum reform is guided by the vision of 'nurturing every learner's potential' and a mission of producing 'empowered, engaged and ethical' citizens (Ogutu, 2017; Republic of Kenya, 2017). The new curriculum aims at equipping the learners with 21st century skills and developing human resource that will be able to engage in economic activities (Ogutu, 2017). The curriculum change is aimed at making the goals of education to be accomplished for the betterment of the country. This shall be accomplished through the provision of excellent teaching, school environments and resources and a sustainable visionary curriculum that provides every learner with seamless, competency-based high-

quality learning that values every learner. It is therefore important for the government to restructure the learning environment as one way of ensuring that the teachers are giving their best during classroom teaching.

Classroom teaching can be explained using various models like the *Mitzel's model for the study of classroom teaching of 1960* (Roberts & Dyer, 2005). This model has four components; the *presage variables* representing the teacher, the *context variable* which represents the learner characteristics, classroom environment and, school and the community. The presage and the context variables interact during the actual teaching in class to give the *process variable* whose outcome is the *product variable* that indicate both the immediate learner growth and the long-term learner effects. This study is hinged on the classroom environment as part of the context variable in a teaching and learning process. Class size as a part of the classroom context tends to have an effect on how the teacher teaches, that is, the interaction between the teacher and the learners (process variable) and ultimately affects the outcomes of instruction (product variable). Interrogating the challenges of classroom interactions in a class size beyond what is recommended will help to appreciate the challenges teachers are facing in curriculum implementation.

RESEARCH APPROACH

The study was done in Nakuru County, Kenya which has 317 public secondary schools all offering agriculture subject. The study adopted a descriptive survey design where the perspectives of the agriculture teachers were sought. The target population was 296 agriculture teachers deployed in public secondary schools in Nakuru County. One sub-county was used for piloting and thus the accessible population for the study was 262 agriculture teachers. Simple random sampling was used to obtain 151 agriculture teachers from among the target population. Three instruments were used to collect data namely the Agriculture Teacher Questionnaire (ATQ) that required agriculture teachers to provide their information concerning class size for agriculture lessons and opinions

about challenges they face in teaching agriculture related to class size. Secondly, the Focus Group Guide (FGG) was used to allow the researchers to get an in-depth information on the topic. Lastly, a Classroom Observation Guide (COG) was used to allow the researchers observe and collect data from actual agriculture lessons. Data from FGG and COG were used to corroborate the data collected from the questionnaires. Three focus groups made up of 7-10 agriculture teachers each were conducted and ten classroom observations were made. The researcher was a non-participant observer during the agriculture lessons observed. For the focus group discussions and classroom observations the researchers worked with participants who were willing to be involved.

The ATQ was pilot-tested using 20 agriculture teachers. Hazzi and Maldaon (2015) states that 10 to 20 percent of the main sample size is adequate for pilot-testing. The instrument had a Cronbach's reliability coefficient of 0.754 which is acceptable for studies in social sciences (Hair, Black, Baln & Anderson, 2010). The COG and FGG were given to experts in the field of education for validation. Data was analyzed using descriptive statistics

RESULTS AND DISCUSSION

The sample comprised of (74) 49 percent females and (77) 51 percent males. The age of the respondents was grouped in three categories, 20-30 years (37.09 percent), and 31-40 years (33.11 percent) and above 40 years (29.80 percent). The teaching experience of the respondents was grouped into three categories, five years or less (39.07 percent), six to ten years (25.17 percent) and above 10 years (35.76 percent).

Data collection on average agriculture subject class size was done at two levels (Form 1 & 2 and Form 3 & 4) because agriculture being an optional subject, the students are given an opportunity as they join Form 1 to take or not to take the subject. A second opportunity is given at the end of Form Two to drop or continue with the subject. Three categories of class size were availed to the agriculture teachers to choose from for both the lower and higher classes. The three categories of class sizes were; less than 20, 21 to 50, and above

50 students in an agriculture class. From classroom observations done, out of ten (10), five observations were in Form 1 and 2, while the other five were done in Form 3 and 4 classes. The class size summary from the ATQ is as indicated in Table 1.1.

Table 1.1

Class Sizes for Agriculture Subject

	Class size (No. of students)			
	Less than 20	21-50	Above 50	Total %
Form 1 & 2				
% Respondents	3.3	28.5	68.2	100
Form 3 & 4				
% Respondents	9.9	38.4	51.7	100

Source: Field data

From Table 1.1, though the percentage of the large classes (above 50) drops from 68.2 percent in Form 1 and 2 to 51.7 percent in Form 3 and 4, the category of large classes continues to dominate. From the classroom observations made, 50 percent of the lessons observed were in the 'above 50' category of class size. One of the classes observed had more than 100 students. Some of the reasons contributing to the large class sizes is insufficient facilities and resources including human resource which forces the agriculture teacher to combine agriculture students from different streams at the same level and teach them as one group. A research on teaching of agriculture in Kenya done by Kyule, Konyango and Nkurumwa (2016) found that in some schools, students lack a basic classroom where they can sit and learn agriculture forcing the teacher to conduct the agriculture lesson under a tree. This is due to the fact that the optional subjects are timetabled at the same time and most schools lack enough rooms to hold the different groups taking different subjects. Such situations force the agriculture teachers to combine the agriculture students into one group thus increasing the class size.

The ATQ had five items that required the agriculture teachers to give their perceptions of how class size influences their teaching practice. The items were presented in a five Likert-scale format; SD=strongly Disagree, D=Disagree, U=Undecided, A=Agree, SA=Strongly Agree The analysis of the items is as presented in Table 1.2.

Table 1.2

Influence of Class Size on Teaching of Agriculture

Items		SD	D	U	A	SA	Total
It is easy to organize a field trip for my class	n	21	46	12	61	11	151
	%	13.9	30.5	7.9	40.4	7.3	100
The number of students in my class is large	n	21	37	7	45	41	151
	%	13.9	24.5	4.6	29.8	27.2	100
The number of students in my class makes it easy for me to teach	n	41	45	11	34	20	151
	%	27.2	29.8	7.3	22.5	13.2	100
Number of students makes it easy to carter for the resources needed for teaching agriculture	n	33	60	12	37	9	151
	%	21.9	39.7	7.9	24.5	6.0	100
Number of students in my class is fairly small hence easy to manage	n	46	43	9	45	8	151
	%	30.5	28.4	6.0	29.8	5.3	100

Source: Field data

From Table 1.2, when asked whether they perceive their class size as large, 29.8 agreed, and another 27.2 strongly agreed that their class size is large. This agrees with the class observations done where 50 percent of the classes had a class size of above 50 students. It is also in line with the summary on Table 1.1 whereby 68.2 and 51.7 percent of the

respondents had a class size larger than 50 in Form 1 and 2 and in Form 3 and 4 respectively. As to whether it is easy to teach the number of students they have in class, 29.8 percent disagreed and 27.2 strongly disagreed meaning that agriculture teachers could be having challenges in teaching. If agriculture teachers with large classes are struggling or are uncomfortable to teach large numbers, it is important then to interrogate how well the agriculture curriculum is being implemented and thus how much the students are gaining from agriculture subject. When asked about ease of organizing field trips, 40.4 percent agreed that they find it is easy to organize for field trips for their students. However, from focus group discussions, many of the participants expressed that lack of use of field trips is constrained by other factors other than their ability or willingness to organize for one. Among the constraints that hinder the use of field trips as a teaching strategy are large class sizes, lack of support from the school administration, and expenses involved.

As to whether the class size makes it easy for them to carter for learning resources, 39.7 percent disagreed and 21.9 strongly disagreed. The implication of this is that agriculture teachers may not be using learning resources adequately when teaching. This was confirmed through the class observations done where none of the ten teachers observed used any form of learning resources. The focus group discussions also revealed the same as some teachers said that getting enough resources and preparing them for a large class is time consuming which makes them opt to teach without teaching aids. This concurs with Evelia, Mwangi and Obara (2014) who found that agriculture teachers in Kenya mainly use lecturing and other teacher-centered approaches for teaching.

When asked to respond to ease of class management, 30.5 percent strongly disagreed and 28.5 percent disagreed that the class size makes it easy to manage the class. Class size therefore seems to be posing a challenge in class management implying that quality teaching and learning may not be taking place during agriculture lessons. This relatively

high number of respondents who are having difficulties in managing their classes could also be compounded by the fact that a large number of agriculture teachers (37.09 percent) are within the 20-30 years age bracket and 39.1 percent have five years or less of teaching experience. The fact that a substantial number of agriculture teachers are young and inexperienced may have implications in the teaching of agriculture subject in secondary schools. This is because such teachers are said to be still trying out their teaching practice before they can settle for what works and what doesn't in the teaching and learning process (Shah & Udgaonkar, 2018).

This indicates that agriculture students are being taught in ways that are not suitable for skill acquisition. From the focus group discussions, many respondents admitted to not using the best teaching approach due to the large number of students in class. They said the situation is getting worse with the 100 percent primary to secondary school transition. This could imply that having large class sizes is posing a challenge in teaching agriculture and may be pushing agriculture teachers towards the use of teaching approaches that are less appropriate. This is supported by Ayeni and Olowe (2016) when stating that teachers are placed under more strain when handling large classes.

CONCLUSION AND RECOMMENDATION
Agriculture is a practical subject and large class size hinders the acquisition of adequate learning resources and use of more appropriate teaching approaches. If this situation is not remedied, it may have dire consequences on the implementation of CBC in Kenya whose vision is to have 'engaged, empowered and ethical' citizens. The new curriculum (CBC) is meant to equip the learners with knowledge, skills, values and attitudes to enable them create solutions for the problems in the real world. The issues that need to be addressed are; how to make learning more engaging and participatory given the class sizes, how to equip the teacher to adequately cope with the situation before a solution(s) to large class sizes is/are instigated.

The Kenyan government needs to urgently address the challenge of class size by mobilizing resources to put up more classes and employ more teachers. This will require considerations to increase educational funding.

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