SCHOOL OF GRADUATE STUDIES

IMPACT OF CLASS SIZE ON ACADEMIC ACHIEVEMENT IN CHEMISTRY AT PUBLIC SECONDARY SCHOOLS OF SEBETA AWAS WOREDA, OROMIA REGION

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A THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTERS OF SCIENCE IN CHEMISTRY

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As member of the Board of Examiners of the MSc Thesis Open Defense Examination, We certify that we have read evaluated the Thesis prepared by Fikadu Ejeta and examined the candidate. We recommend that the Thesis be accepted as fulfilling the Thesis requirement for the degree of Master of Science in Chemistry

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I declare that this thesis entitled "Impact of Class Size on Academic Achievement in Chemistry at Public Secondary Schools of Sebeta Awas Woreda", Oromia, Ethiopia. In Partial fulfilment of the requirements for the degree of Master of Science in Chemistry is my own work and has not been submitted to any university for similar purpose. The references used in this thesis are duly recognized by proper citations.

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TABLE OF CONTENTS

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ACRONYMS

CSR----------Class size reduction

DSSs ----------District Secondary Schools

PTA ----------Parent-Teacher Association

RQ ----------Research Questions

SAGE----------Student Achievement Guarantee in Education

TLMs----------Teaching and Learning Materials

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure page

ABSTRACT

This study assessed the impact of class size on academic achievement of chemistry in secondary schools in Sebeta Awas Woreda. The study used descriptive survey research design whereby both qualitative and quantitative approaches were the basis of data collection and data analysis. A sample of three public secondary schools was selected using the simple random sampling technique. The population of the study comprised all the eight chemistry teachers, three principals, one vice principal, one supervisor and one hundred sixty-two students. Data was collected using questionnaire, interview, observation and document review and the analysis of the questions was done using descriptive statistics, frequency, percent, mean and standard deviation. The research questionnaires were validated by advisor, supervisor and two senior science teachers in secondary schools of Tefki and Awash Melka and the pilot-test method was used to ascertain its reliability with coefficients of 0.92 for the teachers' questionnaires and 0.98 for the students' questionnaires. The findings revealed that class size had negative impact on academic achievement in chemistry. It was also observed that class size has psychological and social impact on students' academic achievement and negatively influence teacher's quality of work and assessment, whereas, they are improved by small class size. It was recommended, among other suggestion, that governments should prioritize the construction of more building of additional classrooms and the employment of more teachers to provide solution to the problem of high students-teachers ratios. The students-teacher ratio should be 45:1 as suggested by National Policy on Education as against 70-112 and above as discovered from the study. As a long-term measure, the government should increase budget allocation to improve schools' infrastructural facilities.

KeyWords: *Large Class Size, Academic Achievement, Secondary School*

1. INTRODUCTION

1.1. Background of the Study

Education in every sense is one of the fundamental factors of development. No country can achieve sustainable economic development without substantial investment in education. It enriches people's understanding of themselves and the world; it improves the quality of their lives and leads to broad social benefits to individual and the society. Education raises people's productivity, creativity and promotes entrepreneurship as well as technological advancements. In addition it plays a very crucial role in securing economic social progress and improving income distribution. It is generally believed that, the achievement of the objectives of all human need fundamentally depends on the quality of education available in the particular society. Class size of the schools is one of the aspects of school variable that could affect the quality of education received by students in any school system. The impact of class size among other variables on the academic achievement of secondary school students have been issue of concern and ongoing to researchers.

However, the quality of education can be influenced by various factors, one of which is the size of the classroom. It is considered as one of the important determinants of academic performance over which teachers in schools have little or no control. Class size are often mentioned by experts in the educational literature as having effects on students' feelings and performance, quality of school budgets and administration as well (Ruffinn, *et al*., 2018). Class size may be defined as the number of students per teacher in a given class or the population of a class (Ajayi *et al.*, 2017). The duo of chemistry and science are two areas, each requiring attention for its teaching and learning and the proper dissemination of the knowledge for the advantage of humanities and society at large. Teachers of chemistry who are the epicenter in the dissemination of the knowledge tend to find it uncomfortable in the process; which is attributed to a number of factors, emphasis had been made on class size especially because of the role it play in the process of teaching and learning chemistry because of the bearing to life entirely (Tsafe, 2014). Science teaching and learning in schools was in fact, a privilege. These laudable objective teachers who could not properly and adequately disseminate the concept to the students, chemistry is one of pivotal subjects in technology, its effective teaching must be handle with all seriousness (Hadiza, *et al*., 2021).

Chemistry is a science that involves a lot of practical activities (Akanbi *et al*, 2018) observed that the most important feature of effective chemistry teaching is to support theoretical explanations with actual practices in the laboratory. It thus requires that adequate laboratory facilities needed to be provided for effective teaching and learning of practical chemistry but due to the class size many chemistry teachers abandon practical's but rather concentrate on theoretical explanations. Chemistry teachers have applied several instructional approaches in teaching chemistry yet the derive result in students' performance has not been achieved (Eriba, 2013). (Hadiza *et al,* 2021) further reported that poor performance of students in chemistry among others include teachers inadequate preparations, methods adopted in teaching this subject and class size, the pursuance of how improve the performance of the student in chemistry is concern for this investigation.

The study by (Mokobia & Okoye, 2011), explained that educators universally have identified; class size as important and desirable attribute of effective educational system. Consequently, the debate has continued in the educational literature stakeholders such as academics, policymakers and parents over the educational consequences of class size. Some researchers have maintained that class size is a tool which can be adopted in measuring the performance of the educational system (Kedney, 2013). According to (Imoke, 2006), optimum class size implies rational coordination of educational infrastructures, subject to available number of students in order to attain high level of productivity. According to (Doyle, 2014), in modern day education, the focus is on the needs, interest and comfort of the students. Thus, managing class size allows students to learn effectively without disturbing one another (Garret, 2008).

Besides, the literature has argued that pedagogies specifically designed for teaching smaller classes sometimes overlap with pedagogies employed when teaching larger classes but have distinct characteristics that differentiate them from those employed when teaching larger class (Aturupane & Wisniewski, 2013). Small class pedagogies can include project work where students are individually monitored and provided with continuous feedback on investigative tasks designed to develop higher order thinking skills (Bosworth, 2014). Additionally, these studies suggested that advantage should be taken of having fewer students in a class to provide learning experiences that facilitate increased collaboration and communication among students, provide helpful learning opportunities and promote student Meta cognitive skills through the development

of information discovering and help-seeking behaviors. According to (Amhadahe, 2016), one of the most essential parts of the teaching and learning process is assessment and evaluation of students. Large classes require large volumes of marking to be done and feedback given to students. This is a major challenge, especially in the selected woredas' secondary schools. In large classes, teachers are upset with the workload and resort to traditional teaching and assessment methods. Teachers are unable to finish marking assignments, exercises and examinations on time, and this delays the feedback given to students.

In Sebeta Awas Woredas' secondary schools still, the class size is becoming increasingly unmanageable, putting teachers in an impossible position of giving individual student required attention. In the schools, the teachers' eye contact with the students in class has become so reduced that some of the poorly motivated students can form number of committees at the back of the class while teaching is going on to engage in non-school discussion. The students' engagement, behavior, and retention are affected in so many ways by the size of the class (Azigwe *et al*., 2016). This conclusion was drawn when reviewing studies on the link between student engagement and class size conceptualized student engagement in two forms, namely, social engagement (how a student interacts socially with other students and teachers in either pro-social or anti-social ways) and academic engagement (students' attitude towards schooling and the learning process). The study indicated that when students are placed in smaller classes, they become more engaged, both academically and socially, and argue that with strong social and academic engagement, academic achievement improves. A research by (Rubin, 2012) indicated that as the class size increases, student achievement declines. Contributing to exiting studies, conclusion from a study by (Allen *et al*., 2013) was that 62 students per teacher was a threshold number and once class size went beyond 62, learning effectively stopped. Thus, as the number of students in a class was more than 62, teachers found it difficult to teach effectively and efficiently leading to students not being able to also learn effectively since low participation of class activities were possible.

On the other hand, while a number of studies have found support for the importance of class size on students' academic achievement; others strongly disprove this claim concluding that class size has little or no impact on objective student outcomes. For example, it has been argued that increasing the intake of senior secondary school students in a large class has numerous

benefits for the schools and the country as a whole. It helps to reduce the cost of building additional classrooms of which few schools as well as the country have the resources to fund additional classrooms and teachers. Also there is usually high energy, fun and excitement in large class size in public senior secondary schools. In addition, students learn to work well in groups since group work is a necessity in large class size (Owolabi *et al*., 2012; Azigwe *et al*., 2016).

However, this study aims to demonstrate that an inverse relationship exists between class sizes and learning outcomes. This means that the higher the number of students in a class, the lower the level of concentration which leads to poor performance of the students. Copious of the studies have investigated the influence of class size on student attitudes, behaviors, and outcomes. The class size may generate a lot of controversy due to the difficulty of teachers to work with it. These controversies may serve as thorns that fall down the achievement of students at the secondary school level. Some of these problems may be teachers may find it difficult to; use varied teaching methodology in teaching, to control the students in class and there may be insufficient teaching and learning resources and students may find it difficult to concentrate in the class. Hence the quality of teaching, learning and assessment of students may be affected.

Chemistry is one of the subjects which require demonstrations and much student attention. Therefore, the present study sought to use chemistry as baseline to revisit the issue of class size implications on quality of teaching and learning. The study would be focuses on three effects of class sizes; instructional, psychological and social impact of class size on students' academic achievement in secondary schools of a study area. This study would make clear that learning in a large class impacts negatively on the students' achievement. It is an exploration of the difficulties that are frequently encountered by the teachers dealing with large classes and the effects on student learning. It is also an investigation of the approaches and strategies adopted by the teachers to handles difficulties encountered in such contexts.

1.2. Statement of the Problem

Free and equal access to education has leads to a significant increase in the number of pupils enrolled per classroom since the beginning of free education in the middle of the 19th century. In Sebeta Awas woredas' secondary schools today, the teacher-student ration has gone far beyond the stipulation of the National Policy on Education. Students stay more than ninety in each class, seating arrangement are altered, thereby making teaching and learning more difficult. The fact that students' achievement in Chemistry and in the sciences at the secondary school level is low is no longer news. Several researchers have reported the downward trend in the achievement of students in science and chemistry in particular. Studies, carried out on the impact of class size in schools, at both the primary and secondary school level, and found that in larger classes, student- teachers interaction decreased, which resulted in a lower level of student engagement confirming students' poor academic performance (Blatchford & Brown, 2011).

Several factors have been reported responsible for this decline in students' performance. In most schools, ineffective teaching is due to conditions such as lack of resources facilitating teaching and alarming and overcrowded class size. In the past and still at present in our country, students' prior knowledge was not considered seriously (Abayneh Lemma, 2012). This was a gap between this study and some of previous works. As a result of expanding class sizes, without funding for additional classrooms and teachers, students mental development has suffered, which has a significant or disastrous impact on their academic achievement in the district. It is on this premise that this study investigated the impact of class size on secondary school students' achievement in chemistry.

1.3. Research Questions and Hypotheses

The study was guided by the following key questions:

1. What are the problems and challenges faced by teachers and students in large classes?
2. What are the effects of class size on the quality of teaching, learning and assessment of students' learning?
3. What are the ways forward to overcoming the challenges faced by teachers and students in large class size at public secondary schools of the district?

Hypotheses

The following null hypotheses would be tested:

i.) Class size has no significant impact on secondary school students' academic achievement,

ii.) Class size has no significant influence on the quality of teaching, learning and assessment.

1.4. Objectives of the Study

The study was conducted with the following general and specific objectives.

1.4.1. General Objectives

The objective of this study was to assess the impact of class sizes on the academic achievement in Chemistry, targeting grades 9 and 10, within the public secondary schools of Sebeta Awas Woreda, located in Oromia Region.

1.4.2. Specific Objectives

The specific objectives of this study would be to:

- Identify the problems and challenges faced by teachers and students in large classes;
- Assess the effects of class size on the quality of teaching, learning and assessment;
- Provide possible suggestions to overcome the problems and challenges of class size at public secondary schools of Sebeta Awas Woreda.

1.5. Significance of the Study

The study was provided important information for different concerned educational professionals and other stakeholders of education that are found at various levels.

It used as an additional source of information for students, teachers and for school administrators.

Finally, the study may be useful for other researchers who are interested to conduct further research in the area of impact of class size on academic achievement in chemistry.

1.6. Delimitation of the Study

This research would be more conclusive if it were carried out at regional level. However, because of constraints like; to collecting reliable and valid data, to easily manage the research work, time and budget the study would be delimited to assess the impact of class sizes on students' learning and academic achievement at secondary schools (9-10) of the district in general. The study was conducted in Sebeta Awas Woreda, Southwest Shoa Zone,Oromia Region whereby three ordinary secondary schools were involved namely; Tefki secondary school, Awash Melka secondary school and Kelecha Guda secondary school. The selection of these schools based on the fact that they were all having large classes and some of their classes had small dimensions compared to others. Moreover, the researcher used a sample of 175 respondents. These were: one supervisor, three principals of schools, one vice principal, eight chemistry teachers and one hundred sixty two students.

1.7. Limitation of the Study

Under this study the researcher encountered some limitations in the process of collecting data; these were: inconsistency on schedule, for example principals were very busy with their normal official activities, unwillingness of a few respondents to fill the questionnaire and returned on time and the shortage of time to collect the data were the constraints encountered by researcher. However, the researcher would appoint the respondents frequently and showing the commitment to complete this study successfully.

1.8. Operational Definition of Terms

Class size: "Class size is equal to regular enrollment divided by the number of classes" (Hoxby, 2000).

Academic achievement: The level of knowledge acquisition that occurs in a given course as defined by end-of-course grade point average (South Carolina Department of Education, 2007).

Class size reduction (CSR): Reducing the student-teacher ratio in a particular classroom (Funkhouser, 2009)

2. LITERATURE REVIEW

2.1. Concept of class size

Understanding a relationship between the number of students in a classroom and the academic achievement of the students is vital to teachers. In the following review of the literature, a researcher would try to examine studies analyzing the effects of large class size on student academic achievement conducted at secondary schools of public education. Several studies which were discussed in this literature review have shown a significant effect of class size on student achievement; while others have shown little to no effect. Stakeholders at all levels of education need empirical data regarding the significance of the relationship between class size and academic achievement. Unfortunately, making the decision of whether or not to decrease the number of students within the classroom to increase academic achievement is one that is only confused by the abundance of contradictory studies into the topic (Biddle & Berliner, 2002). In addition to the number of students, other factors such as the teacher competency, the availability of resources have been associated to the investigation of the impact of class size on student learning.

Class size, according to (Blatchford, Moriarty, & Martin, 2002) is a very important environmental factor that influences teachers and pupils in a number of ways but, the other contextual factors should not be ignored. In the same vein, (Mulryan-kyne, 2010), argues that there are several factors that should be considered as relevant such as the nature of the course being taught, the accommodation and facilities that are available and the resources needed. For example, meeting the needs of a class of 50 in a science laboratory designed for 30 is likely to be more challenging than presenting a history lecture to 220 students in a lecture room designed for 200. “The great challenge to experts, scholars and teachers was to provide sufficient evidence to identify the connection between class size and student achievement” (Mulryan-kyne, 2010).

The factors such as student ability, background, age and experience should be taken into consideration while designating a class as large or ‘too large’ however, the skills, competencies and ability of the teacher’s also important factors. Researches by (Salgado & Mundy, 2018) advance several reasons for variations in terms of optimum class sizes in different learning institutions. They believed that systems around the world differ in many aspects and important sources of variation include examination systems and the existence of high-stake incentives for

students and educators. It also includes the provision of remedial instruction for lagging students or enrichment classes for outstanding achievers, the level of allocation of resources, and the quality of educators among others. However, some assumed estimations of educational production functions may be biased by omitted variables such as characteristics of good teaching. These include the ability to communicate challenging content; involve students in hands-on experiences; provide clear and immediate feedback and supportive family involvement and endogeneity of class size for student performance. This study makes clear that learning in a large class impacts negatively on the student achievement.

2.2. Historical background of class size

The need to determine whether a relationship exists between class size and student academic achievement is one that can be traced back to the foundation of the educational system in America (Biddle & Berliner, 2017). According to (Callahan, 2018), the need for educational administrators to become more efficient and effective in the expenditure of educational funds was one of the reasons for the initial studies regarding class size. Superintendents at the beginning of the twentieth century sought to apply Frederick Taylor's scientific management principles within the world of education; thus, per-pupil costs were analyzed and class sizes adjusted to maximize cost ratios (Callahan, 2018). William McAndrew of Chicago was one such superintendent who not only analyzed the cost effectiveness of staffing smaller class sizes but also conducted his own scientific studies in order to provide empirical data in support of his larger classes, leading to the evolution of a formula method for determining the appropriate instructional workload for teachers that would establish the class size norms found in many districts.

2.3. Challenges of large class sizes

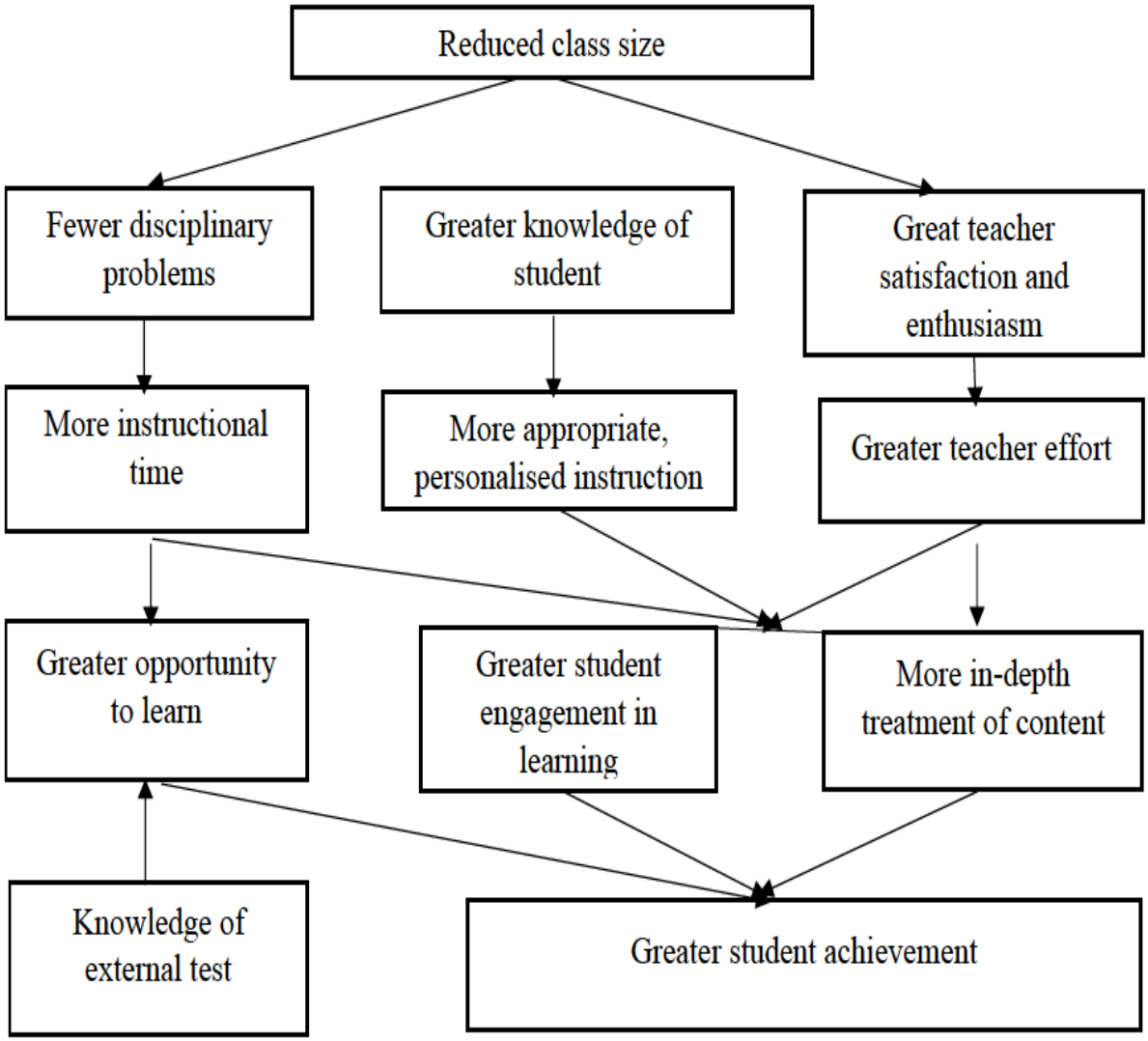
There are numerous studies conducted to examine the impact of large classes on teaching and learning at post-secondary education institutions (Lloyd-Strovas, 2015). Class size is one of the most important factors in the teaching and learning process, it has the potential to determine how much is learned (Gakure & Kithae, 2013). For example, the level of social engagement that can lead to noisy and disruptive behaviour is often associated with large class size, while on the other hand; many studies have revealed that smaller classes tend to perform better on all kinds of assessments as compared to large classes, the challenges of large classes relate to size, academic performance, student engagement, teaching and learning problems, and physical aspects. The bulk

of the studies show that problems associated with large classes include many facets of teaching and learning.

According to (Matoti & Lenong, 2018), central to the problems in large classes is the conflict between the large class format and the learning goals, which often leads to unwanted consequences because students lack motivation. Also contributing is students' unpreparedness for the large class format, lack of accountability in student classroom behaviour, inadequate facilities, and lack of accessibility and personalization (Mulei & Waita, 2016). While learning goals may require students to be involved and take part in classroom activities, a large class format forces a teacher to spend more time on classroom management hence decreasing time spent on active learning. Student participation is associated with positive outcomes for student achievement; however, research findings on the effect of class size on student participation are mixed (Zheng & Warschaure, 2015).

2.4. Class size reduction

Glass and Smith (1978) found that smaller class sizes are linked to increases in students' achievement. They found that the greatest gains in achievement occurred among students who were taught in small classes. They concluded that small classes improved students' engagement, teachers' morale, and the quality of the instructional environment. Other studies agreed that the most important classroom process affected by the reduced class size was the shift from group instruction to individual instruction, especially stronger in classes with more below-average students (Molnar *et al*., 1999). Overall, these results indicated that there's more likelihood of students receiving more attention and learning supports from teachers in smaller classes than in larger classes. Figure 1, below show how reduced class size affects student achievement. Achievements can be measured qualitatively in area such as the extent teacher-student and student-student interactions, the ability of students to work within a group, and student's self-ratings on how they understand the lessons relative to class size



Source: Filges, Sonne-Schmidt and Nielsen (2018)

Figure 1.Benefits of reduced class size in teaching learning.

2.5. Class size reduction and teacher working conditions

The number of students can affect the conditions of teachers work in many ways. Among other aspects of their job, it can constrain the type and frequency of learning activities; the relationships teachers can develop with students and their families; and the amount of non-instructional work teachers are required to engage in. Workload can also affect teacher morale, collegiality, and their work within a learning community, as well as student engagement.

Research suggests that teachers with smaller classes have higher morale than do those with larger classes(Wenglinsky, 1997), in part because they are better able to complete daily lesson plans, feeling more relaxed and less pressured. Teachers in smaller classes report being more satisfied with their jobs because they have more personal and academic interactions with students, fewer classroom discipline issues, and more opportunities to accommodate individual needs (Johnston, 1989).

2.6. Teacher-student interactions and instructional behavior

Researchers (Achilles *et al*., 2002; Zahorik *et al*., 2003; Tienken & Achilles, 2009;) have recognized that teacher activity in class creates opportunities for student learning, and that student outcomes are leveraged through instructional practice. For example (Anderson, 2002) noted that small classes would not, in and of themselves, solve all educational problems. What teachers do in those classes is what matters. Small classes enable teachers to know each of their students better. Therefore, they can keep track of how each student is doing on the learning task of the moment and intervene more effectively to help the individual student make progress.

2.7. Class size and student achievement

Despite class size being one of the most researched educational topics, there is still no clear agreement among researchers on the effectiveness of small class sizes in improving student achievement (Moodley, 2015). Some studies have pointed to small and insignificant effects of small class size while other studies point to positive and significant effects on student achievement of small class size. “Class size, cannot influence academic achievement directly but must influence what teachers and students do in the classroom first before it possibly affects student learning” (Hanushek & Woessmann, 2017). Investigating the relationship between class size and student achievement focused on the question of why smaller class sizes should be expected to enhance student achievement (Anderson, 2000). According to Anderson’s model, class size has an indirect effect on student achievement through disciplinary problems, knowledge of student and teacher satisfaction, and enthusiasm. These are variables that have a direct effect on the amount of time spent teaching and learning activities, the teaching and learning opportunities, and teacher effort respectively (Balestra & Backes-Gellner, 2014). The model predicts that increasing instruction time, individualized instruction, and teacher effort has the potential to produce greater student engagement. According to(Exeter *et al*., 2010), the level of

student engagement is operationalised as the amount of time spent by a student on his or her learning activities. In light of these explanations, a smaller class size affords teachers and students more time for teaching and learning activities. A student who devotes more time to learning activities is more likely to achieve higher learning results (Bettinger, Rogers & Taylor, 2017). This suggests that smaller classes are indirectly related to higher student achievement.

Most research studies found that smaller class sizes could have positive effects on student learning and academic achievement, and many initiatives at the level of the state, policy, and individual institutions sought to lower student-teacher ratios. (Beattie & Thiele, 2016) argue that the rationale behind this is that if teachers have fewer students, they can dedicate more time and attention to each student, including more time, diagnosing specific learning needs, critiquing work products, and giving students one-on-one instruction and academic support. Bowne and co-workers found that small class size benefits students regardless of their intelligence level, as some of them had been graded according to achievement level. Smaller class sizes are associated with greater individualization and informality, higher quality of instruction, and a more positive school climate (Beattie & Thiele, 2016). They form three categories into which the broader variables can neatly fit, and these are teacher consequences, students' consequences, and classroom instruction. (Hanushek & Woessmann, 2017) concur with (Beattie & Thiele, 2016) and refer to these three categories as behavior management, individualization, and curriculum. They add that smaller classes make discipline easier, because "you spend more time teaching and less time policing". Educators felt that smaller classes make discipline easier. This perception was from observational data that indicated that students give closer attention when class size was reduced.

2.8. Effects of large classes on student engagement

The number of students in class is a concern for policymakers and those involved in higher education. Studies conducted on class size effects on teaching and learning have suggested that large classes lead to higher dropout rates, lower attendance, cheating, and decreased breadth and depth of the subject matter. It also results in fewer teacher-student interactions, limited teacher feedback, increased reliance on the teacher, and less student participation in class (Leachman & Masterson, 2017). While policymakers are concerned with widening access to and increasing participation in higher education, there remain recurring concerns about student success and the overall quality of higher education (Chen, Lowenthal & Bauer, 2016). Frequently,

studies identify large class sizes as problematic for student engagement, because engagement decreases as class size increases (Blatchford *et al.,* 2011). Student engagement describes students' devotion to their education; it includes student involvement and participation throughout the teaching and learning process (Harding, 2018). The teaching and learning environment includes interaction with instructors, peers, the curriculum, and the instruction itself (Boehm, 2021). Krause (2007) identified three types of environment in which students can become engaged with their learning: (i) in the classroom during the lecture, by being involved in study-related activities; (ii) by participating in out-of-class activities such as study groups or tutorial classes, and (iii) in a skill - based employment training.

According to (Kumaraswamy, 2019), an engaged student is a 'deep' learner, looking to develop his or her knowledge, reflecting on the facts and details presented in the classroom and relating them to their own experiences. While a disengaged student typically takes notes in class and memorizes key points just to obtain a 'pass' in the course. These arguments suggest that student engagement has to do with the time and effort that students invest in their studies, and the interaction with the teaching and learning environment. (Hanushek & Woessmann, 2017) stated that student engagement can be broken down into three dimensions, namely, behavioral, emotional, and cognitive. Behavioral engagement has to do with students' observance of rules, such as adherence to class rules and being undisruptive during classroom activities (Australian Council for Educational Research, 2010; Mitchell, Leachman & Masterson, 2017). Emotional engagement refers to a student being engaged emotionally with peers and teachers; it includes actions such as showing empathy to others. Cognitive engagement involves engaging with the study material and going beyond what is required. According to (Matoti and Lenong, 2018) promoting student engagement is key in addressing issues like low student success, high dropout rates, and low attendance. Research by (Moodley, 2015; Cash *et al*., 2017) shows that there are low levels of student engagement in large classes and the teaching methods preferred by lecturers in large classes do not promote student engagement. Student engagement is negatively affected by limited interactions in a large class size environment (Blatchford, Bassett & Brown, 2011). Active learning assumes that students learn effectively when they are actively involved in their learning and are asked to reflect on it, this is not the case when student attendance and engagement are low. Logic and common sense suggest that with more students in the class, there

will be more distractions and more possibility of being off-task, and conversely, smaller classes will provide more opportunity to engage students and keep them on task.

2.9. Cost implications of class size reduction

There's no doubt that the greatest obstacle to widespread implementation of CSR is the cost brought about by the need for additional teachers, classrooms, facilities, and services. The cost issue has been raised by several critiques of CSR policy (McRobbie *et al.*,1998; Guillemette, 2005),even though many researchers questioning the cost of CSR also acknowledge the positive effects on students (Mishel & Rothstein, 2002; Phelps, 2011; Nandrup, 2016). While many of these researchers warn against the use of tax dollars on CSR until it has proven its value, there has been little effort to try to determine standards related to cost-benefit or cost-effectiveness for education reforms more broadly.

3. RESEARCH DESIGN AND METHODOLOGY

3.1. Description of Study Area

This study was conducted at Tefki Secondary School, Awash Melka Secondary School, and Kelecha Guda Secondary Schools in Sebeta Awas Woreda, South-West Shoa, Oromia Regional State. The Woreda center is 25 km away from Addis Ababa, the capital city of Ethiopia. Sebeta Awas Woreda is located between 8°9' N, latitude and 38˚39' E longitude, with an elevation of 2,356 meters (7,730 feet) above sea level (Fekadu Dereje, 2019). The Woreda is bordered on the East by Akaki woreda, on the West by Ejere, on the North by Welmera and Sebeta city and on the South by Tole and Kersa woreda. It has 24 (21 rural and 3 urban) kebeles covering total area of 40,995.24 hectors according to agricultural expert of the woreda's reports. The total population of the Woreda is 75,509, of which 38,510 are male and 36,999 are female. Most of the inhabitants (81.38%) speak Afan Oromo, and (17.76%) speak Amharic and the remaining (0.86%) of the population speaks other languages. The climatic condition of Sebeta Awas woreda is 5% Dega (cold temperature), 65% Woinadega (optimum temperature) and 30% Kola (hot temperature) and the economic status of the people is more of agriculture, producing cereal crops like: barley, wheat, teff, and maize according to the current annual statistics of Sebeta Awas Woreda (CSA, 2022).

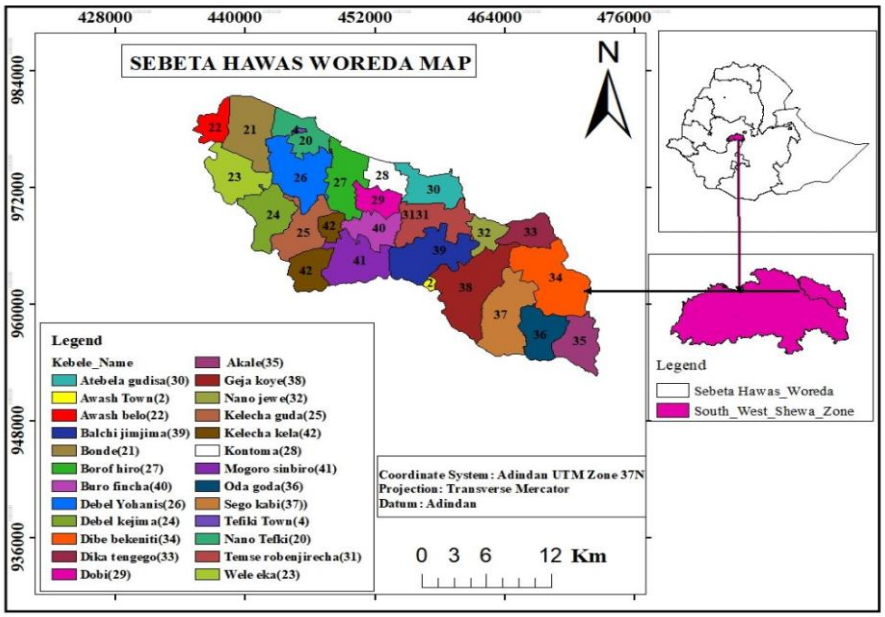


Figure 2.Map of the study area.

3.2. The Research Design

For this study, descriptive survey design was utilized to investigate both the current class size in secondary schools and the challenges experienced by teachers and students in large class size in Sebeta Awas Woreda. The descriptive survey was used because it aims at primarily describing, observing and documenting a situation as they occur rather than explaining them. The design has the advantage of producing a good amount of responses from a wide range of people and it involves extracting information from a large number of individual using the same set of questions through personal contact.

3.3. Research Methodology

This study employed both qualitative and quantitative approaches. These were the basis of data collection and analyses. The reasons for the use of mixed methods were to build on the strengths that exist between qualitative and quantitative research approaches. According to Creswell (2008), use of both quantitative and qualitative methods better to reduce the limitation of a single method. It can also provide more comprehensive answers to research questions, going beyond the limitations of a single approach. This study used both qualitative and quantitative approaches in order to understand the nature and the effects of large classes on students' academic achievement.

3.4. Population of the Study

The target population for this study was secondary schools' students, chemistry teachers, principals, vice principal since most academic activities in schools controlled by vice principal; and supervisor of Schools. The population of this study was chosen because the researcher believed that they were affected directly or indirectly by the problem of large class.

3.5. Sample Size and Sampling Techniques

The South West Shoa zone contains 12 woreda and 23 secondary schools. From these, Sebeta Awas woreda (13.04%) which contain three secondary schools, (Tefki, Awash Melka & Kelecha Guda) would be selected as the sample, using simple random sampling technique through a lottery method. Most of the schools found in the zone have relatively similar in infrastructure, facility and availability of necessary human resources to provide independent and equal chance of being selected for the study. Because the researcher had planned to use mixed approaches (qualitative and quantitative methods) the sample used was relatively high to support

generalization of data. The sample was randomly and purposely selected. This study used a sample of 175 respondents whereby 1(100%) supervisor, 3(100%) principals, 1(100%) vice principal of the school and 8(100%) chemistry teachers were purposely selected. During the academic year of 2022/2023, a total of 457 grade 9 students and 391 grade 10 students were enrolled in these secondary schools. Out of these, 162 (19.1%) students (82 from grade 9 and 80 from grade10) would be selected by using stratified random sampling method for the purpose of study using the following sampling formula. The Slovin's formula allows a researcher to sample the population with a desired degree of accuracy (Stephanie, 2003).The reason to use this sampling formula is to make the sampling more representatives.

$$n = \frac{N}{1+N(e)^2},$$ Where, n = size of sample for the research use

N = Total number of students

e = margin of error at 10%

1= designates the probability of the event occurring.

Table 1: The composition of the sample

Sample schools	Respondents→	Population of Teachers	Principals	Vice-Principal	School Supervisor	Students
Tefki sec.school	Population	3	1	-	1	336
	Sample size	3	1	-		64
	Sample in %	100	100	-		19.047
Awash Melka sec.school	Population	4	1	1		355
	Sample size	4	1	1		68
	Sample in %	100	100	100		19.15
Kelecha Guda sec.school	Population	1	1	-		157
	Sample size	1	1	-	1	30
	Sample in %	100	100	-	100	19.108
Sample technique	Simple Random Sampling	Available	Available	Available	Available	Stratified random sampling

3.6. Methods of Data Collection

In this study, both primary and secondary data were collected. Primary data were obtained from respondents, whereby respondents' views, perceptions, experiences and attitudes towards the problem being studied were collected. Primary data collected helped the researcher to get the real and original information concerning the problem at hand/under study. Secondary data from different source were also used to give more clarification and additional information to the questions that were not well clarified by the respondents; hence the research objectives were achieved. The sources of secondary data used in this study included the total number of students per classes, tests and Examinations results records, admission and attendance registers in the sampled schools. The following instruments were used in this study.

3.6.1. Questionnaires

In this study, questionnaire was used as a major instrument to collect primary data from the selected sample groups of teachers and students. The instrument consists of a series of questions dealing with some psychological, social and instructional topics given to an individual or a group of individuals with the objective of obtaining data with regard to some problem under investigation. This instrument was selected by the researcher to collect information from a large sample with minimum cost and in a short time. In addition, it is more appropriate tool to obtain quantitative information, than other tools and easier to the researcher to construct questions, analyze and interpret the responses of the respondents (Best, 2004). Both closed-ended and open-ended questions were used to tap information on the current class size in secondary schools, the impact of class size on students' academic achievement, the challenges facing teachers in teaching large class size as well as the strategies and measures on combating the problem from student. Closed ended questions were used because they were easy to score and could be answered quickly especially when several items are involved or when sample is large. Open – ended questions were used to provide a free chance to respondents for the purposes of getting their views, opinions and attitude on the effects of large classes on students' academic achievement. Open-ended questions also provided respondents with an opportunity to suggest solutions towards the problem at hand.

3.6.2. Interview

The researcher conducted interview questions to obtain supplementary information to validate the information obtained from the questionnaires. Semi structured interview questions were used because of their flexibility and to make clear any time when there is ambiguity (Cohn & Manian, 1995). Interviews consist of oral questions by the interviewer and oral responses by the research participant (Gall, 1996). Additionally, the researcher used interviews to collect data because a free response method whereby the researcher had an opportunity to ask extra questions as a result more information was obtained. The interview guide was prepared to direct the researcher during the face-to-face interview. The interviews were administered to principals, vice principal and supervisor of schools.

3.6.3. Observation

Observation is the method of data collection involving watching people, events, situations or phenomenon in order to obtain first-hand information about particular phenomena. Observational check list was used to collected data during direct observation in the classroom setting whereby the researcher observed the way students were learning and integrating during the lesson, the way they shared their experiences with other students in the classroom during the lesson, the way the teachers were facilitating lessons in large classes. The researcher got other issues beyond those that were covered in the questionnaires and interviews.

3.6.4. Documentary Review

Documentary review involves the review and analyzing accurate information which is recorded or published in related to the area of the study (Omari, 2011). Documentary review was used to help the researcher to get the insight of the existing information regarding the impact of large classes on student's academic achievement. Through different documents like records of students enrollment in each class/stream, tests and Examinations results records, students exercise books. (to check if students are given exercises) to found out teaching and learning strategies suitable for large classes and the researcher got the picture of student's academic achievement; this helped to support participants' views, opinions and suggestions concerning the problem at hand.

3.7. Validity and Reliability of Instruments

3.7.1. Validity

For this study, different sources of data would be employed. The questionnaires, interviews and checklist questions that were used to collect data for this study was validated by advisor, supervisor and senior science teachers in secondary schools of Tefki and Awash Melka secondary schools. The correction and suggestion made would strictly adhere before producing the final copy of the instrument. The data were cross-referenced and cross-validated to check the validity of study using these various data sources.

3.7.2. Reliability

The researcher design questionnaires that consist of close-ended and open-ended items. Pilot-test would be conducted to test the reliability of the content. It would done with the objective of checking whether or not the items included in the instruments can enable the researcher to obtain relevant information and to identify and eliminate problems in collecting data from the target population. Before the actual data collection, questionnaire would test with 10 teachers and 30 students of Teji secondary school that is out of sampled schools, to check internal reliability of items. The reliability of the instruments would be checked by using Cronbach's Alpha at alpha. According to Orodho (2009) a correlation coefficient of 0.75 and above should be considered high enough to judge an instrument as reliable. A reliability coefficient of 0.92 would be obtained for the teachers' questionnaires and 0.98 for the students' questionnaires and certain improvements would be made on some questions of vague contents. Hence the tools were considered acceptable for this study.

3.8. Methods of Data Analysis

Quantitative and qualitative data analysis techniques were used; moreover, descriptive statistics tools such as frequency which tell us the number of cases in each category, percentage to use the proportion of cases contained within each frequency and mean score and standard deviation to compute variable dialogue are used to interpret quantitative data. For analysis of data SPSS statistics version 20 was used. A 5 of points rating scale of Likert's types was used with assigned values of 5, 4, 3, 2 and 1 as options for the items on the questionnaires.

These options are: -Strongly agreed (SA) 5 points

-Agreed (A) 4 points

-Undecided (UD) 3 points

-Disagreed (D) 2 points

-Strongly Disagreed (SD) 1 point

The mean of the above was determined by calculating the average.

$\bar{X}= \sum \frac{fx}{n}$ Where, $\bar{X}$= mean

f = frequency

x = nominal value of an option

Σ = summation sign

n = number of the respondent

A cut-off point of 3.00 was used to determine the mean which is thus:

$$\frac{5+4+3+2+1}{5} = \frac{15}{5} = 3.00$$

This means that any mean score equal to or greater than (>) 3.00 was considered as agreed response and any mean score less than (<) 3.00 was considered as disagreed responses.

The qualitative data drawn from interviews are quoted and narrated in words to support and triangulate data gathered through questionnaires. The contents of interviews had similar ideas of the questionnaires. Also data gathered from document related to large class size are summarized and narrated in words. Finally, the results would be discussed, interpreted, summarized and recommendation would be made for each questions. According to (Cohn, L, & Manion L, 2001) triangulation is the process of using multiple data collection methods, data sources or theories to check study findings.

3.9. Ethical Consideration

In this study, special emphasis would be given to ethical considerations. Attempts were made to make the research process professional as well as ethical. The resources that used in this research were acknowledged properly. The participant's consent to participate in the research is voluntary, free of any coercion or promises of benefits. Respecting the ideas of all the participants individuals, was given due consideration. Clarity, truthiness and acknowledgement of others ideas and comments in the process of the successful accomplishment of this paper were given special attention throughout the works of the study.

4. RESULTS AND DISCUSSIONS

4.1. Characteristics Information of the Research Respondents

Table 2: Summary and the characteristics of the participants.

Respondents	Categories											
	Sex			Age				Educational Level		Year of experience		
	M	F	T	15-25	26-35	36-49	>50	1st deg.	2nd deg	1-9	10-19	>20
Principals	3 (100%)	- -	3 (100%)	- -	-	3	-	-	3 100%	-	3 (100%)	-
Vice principal	1 (100%)	-	1 (100%)	-	1(100 %)	-	-	-	1 100%	-	1 (100%)	-
Supervisor	1 (100%)	-	1 (100%)	-	-	1 100%	-	-	1 100%	-	1 (100%)	-
Teachers	6 (75%)	2 (25%)	8 (100%)	-	5(62.5 %)	3(37.5 %)	-	7(87.5 %)	1 (12.5%)	2 (25%)	6 (75%)	-
Students	87 (59%)	61 (41%)	148 (100%)	148 (100%)	-	-	-	-	-	-	-	-
Total	98 (60.9%)	63 (39.1%)	161 (100%)	148 (92%)	6 (3.7%)	7 (4.3%)	-	7(53.8 %)	6 (46.2%)	2(15.4 %)	11 (84.6%)	-

Characteristic information of DSSs, principals, vice principal, supervisor of schools, teachers as well as students who responded to the questionnaires and participated in interview sessions.

4.2. Current Class Sizes in Secondary Schools of Sebeta Awas District

In this study the researcher sought to find out the size of classes available in secondary schools in Sebeta Awas district. The guiding questions were “How many students are in each class”. These questions were posed to supervisor, principals and vice principal of schools through interview. Also observation and document analysis were done with the assistance of the class teachers as it was requested by the school principals, and presented according to table 3 below.

Table 3: Current class size in secondary schools in Sebeta Awas Woreda

Average Number of students per class in;	Academic year					
	2013		2014		2015	
	9th	10th	9th	10th	9th	10th
Tefki sec.school	83	78	91	87	112	105
Awash Melka sec.school	77	70	89	74	92	85
Kelecha Guda sec.school	74	71	83	76	80	77

The results gathered through interview, observation and documentary reviews show the same, whereby majority of the available students were placed in overcrowded classes. In all sampled schools, there were a high number of students in classes. The student population varies across three selected schools for this study: Tefki Secondary School possess a range from of 78 to 112 students, resulting in an average of 92.6 students per class. The numbers indicated that the class size is almost higher than two-fold of modern class size. In case of Awash Melka Secondary School, the student count relatively better than the aforementioned one, falls between 70 and 92, averaging at 81.2 students per class. Kelecha Guda Secondary School accommodates a student's range 71 to 83 per class, with an average of 76.8 students.

The numbers of students were the determinants of the size of the classes at school; this simply means students were distributed according to the total number available in the respective class so that they can be accommodated in available classrooms. Through observation the researcher witnessed most of classes in the sampled schools being full of students. There were no free chances that could allow easy movements. Students and teachers couldn't move so easily from one place to another, students had to remain at their respective places while teachers were limited to stand in front of the classes. The real situation shows that students were not free; the classroom situation was not so much conducive and supportive to students to learn as it was difficult to interact and share ideas and talents.

In addition to that the head of schools, supervisor and vice principal involved in the interview confirmed that, the class size to be big in some schools in Sebeta Awas district. They said: "Some schools in the district are having many students compared to the infrastructures available at those schools as the result we are forced to allocate many students in each classroom. We are supposed to have classes of 40 to 45 students but the situation isn't, so in some schools due to inadequate infrastructures specifically classrooms". The current situation in classes especially in the sampled schools is similar to the one which was described and distinguished by (Haki Elimu, 2004) whereby many students were allocated to school while there were no enough teachers and classroom to equip them. Classrooms are too congested while students need to learn comfortably for their academic performance.

4.3. Class Size and Students' Academic Achievement

Students' academic achievement for three years were checked out through documentary review whereby the researcher passed through academic documents and compared the students achievement for three years; the researcher used average of chemistry examination results for 2013,2014, and 2015 academic years. Results in table below reported the inverse relation of class size and students' achievements for three academic years.

Table 4: Class size and students' academic achievement

Academic year	2013				2014				2015			
Grade	9th		10th		9th		10th		9th		10th	
Name of sec.school	No.students per.class	Chem. Av. exam score	No.students per.class	Chem.Av. exam score	No.students per.class	Chem.Av exam score	No.students per.class	Chem.Av. exam score	No.students per.class	Chem. Av. exam score	No.students per.class	Chem. Av. exam score
Tefki	83	67.3	78	65.8	91	64.5	87	63.9	112	57.6	105	59.7
Awash	77	71.3	70	69.2	89	66.0	74	65.75	92	70.7	85	66.8
Kelecha	74	66.7	71	67.4	83	67.5	76	65.6	80	62.5	77	64.9

As it was observed from the study most of students in all sampled schools were perform fairly and poorly. If a student cannot perform better at that lower level he/she is not expected to perform better in the higher levels as the way they go higher lessons become more complicated. Generally, the good academic achievement most of the time is the measure of effective teaching and learning; It is very difficult for someone to explain that the process of learning took place effectively when students' academic results are not good enough to prove what is being said.

According to the data in table 4 above, students in the sampled schools do not perform better as it is expected. The DSSs principals, vice principal and supervisor when they asked to explain on the reasons that might have made students to perform the way they are performing said that; "It is true that our students in some of our schools do not perform to the expectation, the major reason is students in our schools are not attended accordingly, they are not given much activities to make them practice what they are learning as practice makes perfect" from that response it is clearly proved that a class size has an impact to students' academic achievement. This finding agree with finding done by (Bandiera, 2010), who showed that the effect of class size on students' achievement is as expected negative, students always do worse in big classes. Hence it is possible to conclude that large class sizes have a negative impact on students' achievement.

4.4. The Challenges Facing Teachers in Teaching Large Class Size

The first objective of this study aimed to identify the challenges facing teachers in teaching in large class sizes in Sebeta Awas district. In order to know the challenges facing teachers when teaching large class sizes, the researcher administered questionnaires to 8 chemistry teachers, and interviews 1 supervisor 3 head of schools as well 1 vice principal. Also the observation checklists were used to find out the challenges facing teachers when teaching large classes.

***RQ.* 1** What are the problems and Challenges faced by teachers and students in teaching and learning in large classrooms in secondary schools of Sebeta Awas Woreda?

The following table presents views of teachers on the challenges facing teaching in large class size.

Table 5: Challenges facing teachers in teaching large class sizes

No. Questions	SA	A	UD	D	SD	Mean	Std. Deviation
1. Inability of teachers to paid attention to individual students that need special attention.	1(12.5%)	5(62.5%)	1(12.5%)	1(12.5%)	-	3.7500	.88641
2. Lack of classroom control and management at overcrowded classroom.	1(12.5%)	4(50%)	1(12.5%)	1(12.5%)	1(12.5%)	3.3750	1.30247
3. Teachers found it difficult in conducting effective continuous assessment in classroom.	2(25%)	5(62.5%)	1(12.5%)	-	-	4.1250	.64087
4. Examination malpractice became rampart in overcrowded classroom.	1(12.5%)	5(62.5%)	-	1(12.5%)	1(12.5%)	3.5000	1.30931
5. Lack of effective use of instructional materials to meet the requirement of individual student in the classroom.	1(12.5%)	5(62.5%)	-	1(12.5%)	1(12.5%)	3.5000	1.30931

The data (weighted mean of item 1 = 3.75 and a standard deviation of 0.886). The mean rating is above the cut-off point of 3.0. This implies that 75% of the respondents agreed that a very big challenge that the teachers are mostly facing when having many students in classes is inability to paid attention to individual students that need special attention. Teachers when teaching are unable to attend students who are in need of teachers' close attention and help. This means, that individual attention is not given to students (slow learners) who may need it in large classes. This was seen as a challenge not only to the side of teachers but also to students. They have been learning in different styles because they have different abilities; this cause teachers not to achieve fully their lessons objectives. The situation was linked to poor achievement in academic and the national examinations results whereby a good number of students do not perform better.

The data also shows that the mean rating of item 2 is 3.375 and with the standard deviation of 1.302. The mean rating is above the cut-off point of 3.0. This implies that 62.5% of the respondents agreed that, teachers are also facing difficulties in managing students while teaching; they said sometime some students are found doing other business when teachers are teaching. This was also proved through observation whereby some students in some classes were chatting with their friends even when they were asked to discuss with their fellow they were not

so serious with the business at hand as it was supposed to be when a teacher was at a certain corner other students were doing other things as the teacher couldn't manage to keep eyes to most of students in a class.

Seven respondents out of 8 which are 87.5% with the mean ratings of item 3 are 4.125, and the standard deviation of 0.640. The mean rating is above the cut-off point of 3.0. This implies that the respondents agreed that teachers are also facing difficulties in conducting effective continuous assessment in classroom. This is due to the fact that when students are many in class it is not easy for a teacher to manage marking of students' activities. Some teachers said that even when they are forced to give exercises to students they give few questions so that they can be able to mark student's activities in time.

The data also shows that respondents with the mean ratings of item 4 are 3.500, with the corresponding standard deviation of 1.309. The mean rating is above the cut-off point of 3.0. This implies that 75% of the respondents agreed that examination malpractice became rampart in overcrowded classroom and lack of effective use of instructional materials to meet the requirement of individual student in the classroom are some of the problems faced by teachers teaching in large classrooms in secondary schools of Sebeta Awas Woreda.

Classroom observations made by the researcher also confirmed that majority of teachers were monopolizing the teaching and learning processes instead of facilitating the learning process. However, students need to be given opportunities to participate in the process of learning. It is proved that students learn better by doing. When the teachers were asked the reason to why they don't give students the opportunity to participate fully in the lesson, they claimed that "it is not easy to allow full participation in a class having many students". Smaller classes have positive effects on students' learning and academic achievement. The basic justification is that if teachers have fewer students, they can devote more time and attention to each student. The findings of this study also agrees with (Blatchford, Martin, & Browne, 2002), who found that teachers in large classes were not able to engage students fully to the lessons and it was very difficult for teachers to find time to mark pupils' activities.

Most studies on class size focus on student academic achievement, at the elementary and secondary levels suggest that smaller classes positively impact academic performance. Others indicate that class size has limited or no impact on students' performance. Similarly, in higher education, some studies indicate no difference on course grades between large and small classes (Raimondo *et al*., 1990; Karakaya *et al*., 2001). On the other hand, others report negative effects of class size on students' academic performance (Paola *et al*., 2013; Maringe & Sing, 2014). For instance, (Yara, 2010) in his study on class size and academic achievement of students in mathematics in Southwestern Nigeria found out that the performance of students in large classes was very low (23%) compared to those students in smaller classes (64%). In addition (Adeyela, 2000), found in her study that large class size is not conducive for serious academic work.

A research by (Bosworth, 2014) revealed that, the correlation between class size and student achievement is complex with many disagreeing results. The study concluded that class size has tiny impact on student achievement. Besides, (Karakaya & Ajayi, 1990) in their study of the relationship between instructional resources and student's academic performances in Ogun State found no significant relationship between class size and students' academic achievement. In the same vein, (Afolabi, 2002) found no significant relationship among class size and students' learning outcomes. (Stephens *et al*, 2014) stated that there is no guarantee that smaller classes will automatically lead to more productive works. The findings were inconsistent with the results of (Rubin, 2012) which indicated that as the class size increases, student achievement declines.

The finding of this study suggest that; class size can affect teaching and learning in different ways. A class with large numbers of students leads to increased number of academic and pedagogical issues. Further, the findings of this study show that large class size affects the teacher's ability to paid attention to individual students that need special attention, choices and decisions making, require greater investment of time and resources. For many teachers, finding efficient ways and time to communicate with a greater number of students, to assess their achievement and to correct hundreds of exam papers is a great challenge. Evident from the findings of this study indicated that, class size significantly influences classroom discipline, engagement and assessment and use of instructional materials in teaching and increase strain on teachers. This is consistent with the findings of (Coomeyras, 2000) that, effective teaching seems impracticable for teacher educators having large class sizes of 50, 75, 100 or more.

Therefore, insufficient teaching materials, students disruptive behavior, inadequate infrastructural facilities, difficulty in conducting effective continuous assessment in classroom ranked the major causes of large class size in secondary schools in Sebeta Awas woreda. Hence, the discussion time becomes scrappy among students in large classes and teachers may rely on passive lecturing, assign less written homework or fewer problem sets, and may not require written papers.

Hypothesis one (H_0)

Class size has no significant impact on secondary school students' academic achievement.

Table 6 reveals that 75% of the respondents agreed that class size has significant impact on secondary school students' academic achievement as against 25% of respondents who disagreed. The chi-square calculated value of 87.69 was greater than the chi-square table value of 3.84 checked at 0.05 level of significance and at 1 degree of freedom. The null hypothesis is therefore rejected. This implies that class size has significant impact on secondary school students' academic achievement.

Table 6: Chi-square test of the impact of class size on secondary school students' achievement.

Opinion	Observed frequency	Expected frequency	Df	Level of sig.	X^2-cal	X^2-tab	Decision
Not significant	32(25%)	64(50%)	1	0.05	87.69	3.84	
Significant	96(75%)	64(50%)					Significant

***RQ.* 2** What are the effects of Large Class Size on the quality of teaching, learning and Assessment of Students' Learning in secondary schools in Sebeta Awas Woreda?

The next table presents frequency, percent, mean and standard deviation scores of respondents on the impact of class size on the quality of teaching, learning and assessment.

Table 7: Impact of large class size on the quality of teaching, learning and assessment

No. Opinion	SA	A	UD	D	SD	Mean	Std. Deviation
1. High numbers of the students in classroom affect quality of my teaching.	3(37.5%)	4(50%)	-	1(12.5%)	-	4.1250	.99103
2. Large class size makes assessment of students difficult.	1(12.5%)	5(62.5%)	1(12.5%)	1(12.5%)	-	3.7500	.88641
3. Large class size affects the time for marking students' scores.	2(25%)	3(37.5%)	1(12.5%)	1(12.5%)	1(12%)	3.5000	1.41421
4. Large class impacts on useful monitoring/evaluation of lessons and time for remedial teaching.	2(25%)	4(50%)	1(12.5%)	1(12.5%)	-	3.8750	.99103

The result presented in table 7 showed that, the mean ratings of item 1 are 4.125, with the standard deviation of 0.99. The mean rating is above the cut-off point of 3.0. This implies that 87.5% of respondents agreed that, high numbers of the students in classroom affect quality of teaching. This means that smaller classes lead to improvement of quality of teaching. Also, 75% of the respondents with the average mean value 3.75 which is above the cut-off point of 3.0 with the standard deviation 0.886, indicated that large classes' size makes assessment of students difficult and affects the time for marking students' work; however, it has impacts on useful monitoring/evaluation of lessons and time for remedial teaching. In this regard 75% respondents with the mean value of 3.87 which is above the cut-off point of 3.0 with corresponding standard deviation 0.991, responded that learning in overcrowded class leads to pupils' poor learning and poor achievement are some of the effects of over-population on the quality of teaching and learning in secondary schools of Sebeta Awas Woreda.

The majority of the teachers who responded to the question concerned to assessment declare that class size affect their choice of methods, materials and assignments. As they suggested, effective assessment is only possible and suitable in small classes. A minority of the informants reports that, assessment and marking is possible in large classes. The researchers in an attempt to resolve this difference embarked on a follow-up interview. In this interview, respondents indicated "large class size in no small way affects quality of teaching and assessment, since teachers are unable to give individual attention to slow learners students". The findings of

this study reported that, in large class size; assessment in general and continuous assessment in particular, is also affected by class size.

Academic performance relates to what pupils have learned or the abilities they have acquired, and it is typically evaluated through assessments like exams, performance reviews, and standardized tests (Santock, 2006). It is not an easy task to develop effective teaching and assessment. Therefore, teachers were not able to assess their teaching effectively, because to ensure effective teaching throughout a course period, teachers must necessarily assess all the topics treated in the semester to establish the success level of the instruction. With regard to how large class size affects the quality and effectiveness of teaching, (Amua-Sekyi, 2010) put it this way "*You cannot set essay questions. It is not practicable. Tutorials are impossible. It is counterproductive. You have to face the whole class... We are not challenging students. The interaction is not close enough...*" As a result of this, teachers are unable to marking of assessments, give adequate assignments, practical, class work, difficult to organize quizzes and class tests regularly and provide feedback to students. In Sebeta Awas Woreda's educational system, particularly in public secondary schools, this is a serious issue. When classrooms are large and as a result of their frustration with the workload, teachers start implementing conventional techniques of instruction and evaluation, including (quiz, exam), which leads poor student's academic achievements.

Hypothesis two (H_0)

Class size has no significant influence on the quality of teaching, learning and assessment.

Table 8 reveals that 62% of the respondents agreed that class size has significant influence on the quality of teaching, learning and assessment at secondary school as against 38% of respondents those disagreed. The chi-square calculated value of 98.79 was greater than the chi-square table value of 3.84 checked at 0.05, level of significance and at 1 degree of freedom. The null hypothesis is therefore, rejected. This implies that class size has significant influence on the quality of teaching, learning and assessment at secondary school.

Table 8: Chi-square test of the influence of class size on the quality of teaching, learning and assessment.

Opinion	Observed frequency	Expected frequency	Df	Level of sig.	X^2-cal	X^2-tab	Decision
Not significant	49(38%)	64(50%)	1	0.05	98.79	3.84	Significant
Significant	79(62%)	64(50%)					

RQ.3 *What are the ways forwards for overcoming the problems faced by teachers and students in large classroom during teaching and learning in secondary schools in the Sebeta Awas Woreda?* The tables below report the results from the study and discuss the findings in line with the focus of the study.

Table 9: Possible suggestions to reduce the challenges of teaching-learning in large class size.

No. Questions	SA	A	UD	D	SD	Mean	Std. Deviation
1. Admission of the students in secondary schools should be based on minimum standard as specified by National Junior Secondary School Curriculum.	1(12.5%)	4(50%)	1(12.5%)	2(25%)	-	3.5000	1.06904
2. Heads of schools work collaboratively with other education stake holders to reduce the problem of classroom problems.	1(12.5%)	5(62.5%)	-	2(25%)	-	3.6250	1.06066
3. Teachers not are rigid, be flexible and try their best to select better and reasonable teaching and learning strategies and techniques suitable for large class sizes.	2(25%)	2(25%)	1(12.5%)	2(25%)	1(12.5%)	3.2500	1.48805
4. Provision of adequate funds by the government for procurement and maintenance of teaching facilities for conducive learning by individual student.	1(12.5%)	4(50%)	1(12.5%)	1(12.5%)	1(12.5%)	3.3750	1.30247
5. More provision of conducive classrooms in all secondary school under study to reduce the overcrowding in the classroom.	1(12.5%)	4(50%)	1(12.5%)	1(12.5%)	1(12.5%)	3.3750	1.30247

The data (weighted mean of item 1 is 3.50 and a standard deviation of 1.069).The mean rating is above the cut-off point of 3.0. This implies that 62.5% of respondents agreed that, Admission of the students in secondary school should be based on minimum standard as specified by National Secondary School Curriculum. Also the mean ratings of item 2 are 3.625, with the corresponding standard deviation of 1.060. The mean rating is above the cut-off point of 3.0. This implies that 75% of respondents agreed that, heads of schools work collaboratively with other education stakeholders to reduce the problem of classroom problems, 50% of the respondents with the mean ratings of item 3 are 3.25 and with the standard deviation of 1.488. The mean rating is above the cut-off point of 3.0. This implies that respondents were agreed that, teacher should not be rigid; they should be flexible and try their best to select better and reasonable teaching and learning strategies and techniques suitable for large class sizes. The mean rating of item 4 is 3.375, with the standard deviation of 1.302. The mean rating is above the cut-off point of 3.0. This implies that 62.5% of respondents agreed that, provision of adequate funds by the government for procurement and maintenance of teaching facilities for conducive learning by individual student and more provision of conducive classrooms in all secondary school under study to reduce the overcrowding in the classroom are some of the ways forwards for overcoming the problems faced by teachers and students in over-populated classroom during teaching and learning in secondary schools in the study area.

This finding is supported by the research done by (GER, 2015), which stated that; a variety of reform efforts have been focused on decreasing class sizes or the average class size in an education system as a strategy for improving school and student performance. To solve the problems facing chemistry teachers in public secondary schools, chemistry teachers are constantly trained and retrained. This will help to improve the quality of chemistry education in public secondary schools. Training should take cognizance of effective teaching strategies, acquisition of adequate concept of the nature of science and adequate knowledge base/ content for effective chemistry teaching. However if teachers are properly trained, it is expected that they will be effective. Therefore it is strongly recommended to improve the existing chemistry teachers training programme with respect to admission criteria, curriculum, teaching practice and measurement and evaluation process. Proper training of teacher may strengthen the causal relationship between the various qualities of teachers and academic achievement.

4.5. The Challenges Facing Students in Learning Large Class Size

The first objective of this study aimed to identify the challenges facing students in learning in large class sizes in Sebeta Awas district. In order to know the challenges facing students when leaning in large class sizes, the researcher administered questionnaires in line with the impact of large class sizes on students' achievement, instructional strategies, psychological readiness and social interactions to 162 DSSs students. Also the observation checklists were also used to find out the challenges facing students when learning in large classes. The following table presents the frequency, percentage, mean and standard deviation of respondents on the impact of class size on academic achievement of the students' in chemistry.

Table 10: Impact of class size on students' achievement

No. Opinions	SA	A	UD	D	SD	Mean	Std. Deviation
1. Students have the opportunity to cheat during class exercises, test and examination in large class size	59(40%)	37(25%)	12(8%)	21(14%)	19(13%)	3.6486	1.44686
2. Students hardly see writings on the board when seated at the back in a large class?	33(22%)	40(27%)	6(4%)	31(21%)	38(26%)	2.9932	1.55400
3. Students are very active in large class size than in small class?	9(6%)	25(17%)	21(14%)	38(26%)	55(37%)	2.2905	1.28969
4. Smaller class sizes allow more time for teachers to help students with practical in chemistry and develop their skills which can increase student's achievement?	63(43%)	51(34%)	5(3%)	16(11%)	13(9%)	3.9122	1.29850
5. Students can do other things like copying notes in large class when chemistry lesson is going on without the teacher noticing?	31(21%)	23(16%)	7(5%)	45(30%)	42(28%)	2.7027	1.53623

The result above shows that a good number of the students agreed that there is a high opportunity of cheating during examination in a large class (see table 10); this was confirmed by 65% of the respondents with average mean value of 3.648 & 1.446 corresponding standard deviation. This means that the true achievement of the students cannot be ascertained since poor students stand to benefit from the act of cheating. Also the mean ratings of item 2 are 2.993, with the standard deviation of 1.554. The mean rating of item 2 was below the cut-off point of 3.0. This implies that, 49% of respondents agreed that; the students can hardly see the writings on the

board in a large class. However, this figure was contradicted by 47% of them who indicate that they can clearly see writings on the board in a large class. Additionally, it can be observed that large class makes it difficult to be active in class. This was confirmed by 63% of the students with the mean ratings of item 3 are 2.290, which has the corresponding standard deviation of 1.289. The mean ratings of item 3 are below the cut-off point of 3.0. This implies that respondents disagreed that students are very active in large class size than in small class.

Furthermore, 77% of the total respondents with the mean ratings of item 4 are 3.912, with the standard deviation of 1.298. The mean ratings of item 4 are above the cut-off point of 3.0. This indicated that respondents agreed that smaller class sizes allow more time for teachers to help students develop appropriate practical skills which can increase student's achievement. This means that in large classes it would be difficult for teachers to help students to develop skills to increase their achievement. The findings have largely confirmed that large class size has negative effect on students' academic achievement in chemistry. Unexpectedly, 58% of the respondents with the mean ratings of item 5 are 2.702, and the standard deviation of 1.536 were disagreed. The mean ratings of item 5 are below the cut-off point of 3.0. This implies the respondents disagreed that they can do other things like copying notes in large class when chemistry lesson is going on without the teacher noticing them. This may be attributed to the fear of being punished when caught and the desire to pay attention in chemistry class due to its perceived ambiguity of the subject.

There is a strong reason to conclude that large class size could negatively affect students' academic achievement. Large class affects student's assimilation in chemistry Education and that information from the teacher is not properly disseminated. There is no motivation for students to attend classes and it leads to high case of examination failure. Students are likely to lose concentration, focus and even attention from teachers. The results further confirmed the study by (Azigwe, & Creemers, 2016) which indicated that in a large class teacher find it difficult to teach effectively and efficiently leading to students not being able to also learn effectively since low participation in class activities were possible. The study also revealed that effective learning becomes difficult in a large class; while small class size provides learning experiences that facilitate increased collaboration and communication among students, provide helpful learning opportunities and encourage student meta-cognitive skills through the development of

information discovering and help-seeking behaviors through practical orientation and class participation. The following table represented that class size has some relationship with instructional strategy be it positively related or negatively related.

Table 11: Impact of class size on instructional strategies

No. Questions	SA	A	UD	D	SD	Mean	Std. Deviation
1. The teaching of practical chemistry skills is neglected in large class size?	20(14%)	34(23%)	14(9%)	43(29%)	37(25%)	2.7095	1.41062
2. Teachers are likely to give more class exercise to students in smaller class size than in larger class size?	63(43%)	43(29%)	3(2%)	17(11%)	35(25%)	3.7297	1.47816
3. The use of demonstration for simple experiments in large class would make lessons more interesting?	17(11%)	23(16%)	8(5%)	61(41%)	39(26%)	2.4459	1.33648
4. The atmosphere in large class size is always teacher-centered with passive students?	67(45%)	43(29%)	9(6%)	18(12%)	11(%)	3.9257	1.29411

The result above revealed that the mean ratings of item 1 are 2.709, with the corresponding standard deviation of 1.41. The mean rating is below the cut-off point of 3.0. This implies that the respondents disagreed that teachers neglect the practical aspect of chemistry due to large class size. This was confirmed by 54% of the respondents those disagreed that the teaching of chemistry practical skills is neglected in large class size. This is consistent with the findings by (Aturupane, Glewwe, & Wisniewski, 2013) which revealed that teachers are able to use teaching strategies that fit the large class size such as group work and working on projects rather than employing pedagogies like collaborative learning and the systems and structures needed for working effectively within the context of collaborative learning are embedded in the careful sequencing of activities that follow a specific design to promote learning. This means that in terms of instructional practicability and ways of teaching, class size has no significant relationship with respect to instructional strategy.

The mean rating of item 2 above was 3.729, with the standard deviation of 1.478. The mean rating is above the cut-off point of 3.0. This implies that 72% of the respondents agreed that teachers were likely to give more class exercise to students in smaller class size than in larger class size. In this regards regular exercise is an important instructional strategy which helps to increase academic achievement of students (Hattie, 2009). Results presented in table 11 above shows that the mean ratings of item 3 are 2.445, with the standard deviation of 1.336. The mean rating is below the cut-off point of 3.0. This implies that the respondents disagreed that the use of demonstration for simple experiments in large class would make lessons more interesting. This means the use of demonstration for simple experiments in large class size would not be appropriate and could not make lessons interesting and 56% of the students held this view.

Also, the mean ratings of item 4 are 3.925, with the standard deviation of 1.294. The mean rating is above the cut-off point of 3.0. This implies that, 59% of the total respondents accepted that in large classes, the atmosphere is teacher-centered with passive students. This is evidence that class size has implications on instructional strategy and students' academic achievement but (Stephens *et al,* 2014) stated that there is no guarantee that smaller classes will automatically lead to more productive works. Similar to the evidences found in this study, (Amhadahe, 2016) noted that discussion time becomes scrappy among students in large classes and teachers may rely on passive lecturing, assign less written homework or fewer problem sets, and may not require written papers. The results reported in Table 12 provide evidence to show that there are psychological impacts of class size on the performance of the students.

Table 12: Impact of class size on students' psychological readiness

No. Questions	SA	A	UD	D	SD	Mean	Std. Deviation
1. Most students feel shy to speak in large class size?	29(19%)	58(39%)	10(7%)	-	23(15%)	3.2568	1.39055
2. Students seldom have the opportunity to express their self in large class size?	31(21%)	49(33%)	20(13%)	34(23%)	14(9%)	3.3311	1.29567
3. Students feel more relaxed in large class size since it's difficult to know themselves by name?	23(16%)	55(37%)	19(13%)	35(24%)	16(10%)	3.2297	1.27292
4. Students like sitting at the back of the class to hide from the attention of the teacher in large class size?	18(12%)	43(29%)	3(2%)	50(34%)	34(23%)	2.7365	1.40631
5. Students find it difficult to concentrate due to the noisy and stressful atmosphere in large class size?	43(29%)	47(32%)	9(6%)	12(12%)	31(215)	3.3784	1.50014

Large class size has psychological impacts on the student's academic achievement (see Table 12). This was confirmed by 58% of the respondents with the mean ratings of item 1 are 3.256 and standard deviation of 1.390. The mean rating is above the cut-off point of 3.0. This indicated that most students feel shy to talk in the classroom. This means that, most of the students in large class may not understand the concept of what is taught as the size deters them from voicing out to ask questions, similar findings have been reported in previous study by (Rubin, 2012). This could negatively affect their participation and achievement in the class. Also, the mean ratings of item 2 are 3.33 and the standard deviation of 1.295. The mean rating is above the cut-off point of 3.0.This implies that, 54% of the respondents agreed that students seldom have the opportunity to express themselves in large class size and the mean ratings of item 3 are 3.229, with the standard deviation of 1.272. The mean rating is above the cut-off point of 3.0. This implies that, 53% the respondents agreed that students feel more relaxed in large class size since it is difficult to know them by name. On the other hand, the mean ratings of item 4 are 2.736, with the corresponding standard deviation of 1.406. The mean rating is below the cut-off point of 3.0. This implies that, 57% of the respondents are disagreed that students like sitting at the back of the class to hide from the attention of the teacher in large class size.

However, one important psychological impact of class size that was observed in this study is that 61% of the students with the mean ratings of item 5 are 3.378, and the standard deviation of 1.50. The mean rating is above the cut-off point of 3.0. This indicate respondents agreed that students find it difficult to concentrate due to the noisy and stressful atmosphere in large class size hence this adversely affect their academic progress. Lastly, it is evidential that the overall impact of all the test items revealed that large class size has significant negative impact on students' psychological readiness. Thus, it is reasonable to conclude that large class size has significant negative impact on students' psychological readiness to achieve academic excellence. The results reported in table 13 provide evidence to show that there are Social impacts of class size on the performance of the students.

Table 13: Social Impact of Class Size on Students' Academic achievement

No. Questions	SA	A	UD	D	SD	Mean	Std. Deviation
1. Student-Student interaction is mostly neglected in large class size?	19(13%)	25(17%)	18(12%)	28(19%)	58(39%)	2.4527	1.46772
2. Teacher-Student interaction is mostly neglected in large class size?	44(30%)	48(32%)	16(11%)	25(17%)	15(10%)	3.5473	1.34182
3. Teachers easily identify students who need extra tuition and attention during lesson period in small class size than in large class size?	47(32%)	55(37%)	13(9%)	19(13%)	14(9%)	3.6892	1.29810
4. Teachers find it difficult to remember students by name in larger class size?	27(18%)	69(47%)	16(11%)	27(18%)	9(6%)	3.5270	1.16319
5. Teachers are unable to notice students who are not serious with jottings and note copying?	26(18%)	67(45%)	6(4%)	37(25%)	12(8%)	3.3919	1.25971

The mean weighted of item 1 is 2.452 with the standard deviation of 1.467. The mean rating is below the cut-off point of 3.0. This implies that, 58% of the respondents disagreed that student-student interaction is very high in large class size. This means that in a large class size, student – student interaction which enhances inter-student relationship and creates good social bond is achieved. This contradicts the findings by (Finn, 2003), which suggested that when

students are placed in smaller classes, they become more engaged both academically and socially and further argued that with strong social academic engagement, academic achievement improves. The differences in the results may be attributed to differences in social settings of where (Finn, 2013) conducted their study and the current study setting.

Moreover, majority of the students, 62% with mean ratings of item 2 are 3.54, with the standard deviation of 1.341. The mean rating is above the cut-off point of 3.0. This implies that, respondents reported that teacher-student interaction is mostly neglected in large class size. The study by (Altinok & Kingdon, 2012) found that it is difficult for teachers to spot problems during lessons and give corrections, identify specific needs of the students and gear teaching to meet them, set individual targets for students, and be flexible in the use of different approaches in teaching. Also, the mean ratings of item 3 are 3.689, with the standard deviation of 1.298. The mean rating is above the cut-off point of 3.0. This implies that, 69% of students agreed that teachers easily identify students who need extra tuition and attention during lesson period in small class size than in large class size.

Additionally, 65% of the students that has the mean ratings of item 4 are 3.527 and the standard deviation of 1.163. The mean rating is above the cut-off point of 3.0. This shows respondents believe that teachers find difficulty to remember students by name in larger class size while, another the mean ratings of item 5 are 3.391, with the standard deviation of 1.259. The mean rating is above the cut-off point of 3.0. This implies that, 63% of respondents agreed that teachers are unable to notice students who are not serious with jottings and note copying and this invariably has an adverse effect on the progress of the students' academic achievement. More infrastructural facilities should be provided to all public secondary schools especially science facilities for effective teaching and learning. Science requires adequate resources such as classrooms, laboratories, textbooks, charts models and consumables like chemicals and reagents for the teachers to engage students in practical and activity work, the stakeholders in Science Education should provide enough funds to build more classrooms, laboratories and provide equipment and resources for the teaching and learning of science.

4.6. Instructional Classroom Strategies for Large Class Sizes

The findings of the study presented the existing of large classes in the selected public secondary schools in Sebeta Awas district. This can be the case also in other parts of the zone. This seemed still a factor that hinders students' academic achievement. This is due to the fact that majority of the developing countries have been committed to the goal of education for all, thus the increase in enrollment in schools. But, this does not go simultaneously with the resources available in schools. It was sincerely learned that without enough human resources, Infrastructures and other necessary resources, like teaching and learning materials, it is not easy to reduce the class sizes. Therefore, it is much better while waiting for the commitment to increase resources proportional to the number of students to find possible strategies that can help students learn better in large classes. The following are the strategies obtained from the respondents as well as the secondary data; a teacher teaching in large class should do the following to facilitate effective teaching and learning which is practiced if potential challenges teachers may face when implementing these strategies, such as resistance from students or lack of administrative support were corrected.

- The classroom should be selected according to the learning goals and instructional objectives.
- Write learning objectives for each individual lesson and base your active learning strategies on those objectives.
- Teachers should work co-operatively to develop different and practical types of continuous assessment.
- Teachers should use a variety of teaching methods and strategies
- For a good class management, teachers should set rules of acceptable behavior
- Teachers with little experience should be assisted by teachers with greater experience and training.
- Teachers should adopt approaches that offer active learning.
- Teachers must conduct research into pedagogy and keep up with recent advances in pedagogical approaches and new technologies to improve the large class experience.
- Focus on the most important content and spend your time designing activities related to those essential concepts.

- Make the materials relatable to students by showing them how it applies to their everyday lives. This simply means connect students' learning to real world applications.
- Use pair and group work to increase students' involvement;
- Use questions and answers effectively by asking thoughtful questions.
- Use a variety of activities that is use classic active learning strategies for instance role plays, problem – solving activities, demonstrations, buzz groups and many others are great ways to get your students actively involved in the learning process.
- The assessments should base on the overall course outcomes and the learning objectives for individual subjects.
- Use enough supplemental illustrations examples that students cannot get from any other place other than in class; this will motivate them and make them more committed to the lesson.

Generally, all students whether in small classes or in large classes have the right to learn; therefore, it is the obligation of the teacher to use a variety of strategies to let this right be fully achieved. We call for the teachers to help their students, be committed and responsible by creating activities that will automatically motivate students to participate fully and joyful in the lesson this will help the specific objectives of the lesson or course be effectively achieved.

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

This study was carried out in Sebeta Awas Woreda, South-West shoa zone found in Oromia region whereby three public secondary schools were involved namely Tefki, Awash Melka and Kelecha Guda secondary schools. In order to achieve the research objectives, questions were made which guided the proper conduction of the study. Questions were formulated in questionnaire, interview, observation and documentary reviews based on the research questions and were administered to the selected samples in the study area. A total of 175 samples were randomly and purposively selected. The respondents were students, teachers, and principals, vice principal as well as schools supervisor. The data collected were analyzed using descriptive statistics and presented in tables. From the analysis of the data, the following were revealed; the number of students in most of the classes observed were big it ranged from 70-112 students per class; the recommended number of students per a classroom in Ethiopia is 40-45 students. Classes were congested to the extent that teachers and students were not free to move while in the class. The biggest challenges that faced teachers were teaching strategies suitable for large class sizes, teachers were claiming of not having enough time to mark students activities, management of classes, Less special attention to the needy, teaching and learning materials were not enough due to the excessive number of students as well as in sufficient students involvement during the lessons as a result it was difficult to know students' abilities and disabilities.

Class sizes have a great contribution to the students' academic achievement. Students in large class sizes were not served as it was required due to the fact that their individual problems were not attended timely, their misconceptions were not regularly corrected, they were also not given enough activities that could help them practice what they were learning not only that but also the interaction in classes with big number of students were not so high which seem to affect students' achievement. This proves that when a class size decreases students' achievements/ performance increases. For better understanding students need conducive environment for learning. Instructional strategies for large class sizes were identified which are believed to help students learn better as all students whether in small classes or in large class sizes have the right to learning concussively and accordingly.

5.2. Conclusions

This study was carried out to investigate the impact of class size on students' academic achievement in chemistry in secondary schools in Sebeta Awas Woreda. Three areas of possible impacts of large class size on students' academic achievement were investigated: impact of class size on students' achievement; psychological impact of class size on students' achievement and social impact of class size on students' academic achievement. The study revealed that there was the opportunity for students to cheat during class exercises, test and examination in large class size. This translates that the actual performance of the students could not be seen or reflected in their class score and this could subsequently affect them adversely in any external examination. Other impacts of large class size were difficulty in following and seeing what has been written on the class room board; difficult on the side of the teachers to devote time to help students develop appropriate practical skills, hence this can impede students' achievement. Large sized classes have negative impact on the academic achievement of students. It is also concluded that class size has significant impact on assessment and the appropriateness of teachers' instructional strategies. With respect to the psychological impact of class size on students' achievement, it was revealed that students' feel shy to speak in large class size and also find it really hard to express themselves in a large class; also, the atmosphere becomes noisy and stressful, thereby breeding the opportunity to miss lessons without the notice of the teacher in large class size. There is therefore enough reason to agree that large class size has psychological impacts on students' academic achievement. Lastly, the social impact of class size on students' academic achievement revealed that though student-student interaction is enhanced in large class, teacher – student's interaction is mostly neglected in large class size. Furthermore, it was observed that teachers are not able to identify students who need extra tuition and attention during lesson period in large class size.

Generally class size is a very vital factor for the achievement of the education objectives. Students need a free and conducive environment to enable and easy their learning. Also for the effective teaching to take place teachers need favorable environment and reasonable number of students. That they can be in a position to manage as effective classroom management maximizes students learning opportunities. It should be noted that there's a very close relationship between the class size and the students' achievement this is due to the fact that when the process of learning is not well facilitated; students' academic achievement will automatically be affected. As it was observed from the study most of students in large class sizes perform fairly and poorly.

5.3. Recommendations

A careful look at the suggestions provided by all respondents reveals that all groups of respondents have similar views with respect to the types of solutions that could be used to manage the problem. Based on the findings of the study the following recommendations were made:

The Government

- Should build more classrooms and providing necessary teaching and learning resources or appropriate number of human resources (teachers), and so having appropriate teacher/students ratio at schools.
- Should increase budget allocation to improve schools infrastructural facilities as a long term measure.
- The Ministry of Education, policy makers, parent - teachers association (PTA), communities, non-governmental organizations, corporate bodies and religious organizations should contribute to renovate and build more classrooms to contain the growing enrolments in the schools and provide schools with the facilities they need to make teaching and learning easier and effective.

The School Leadership

Heads of schools should;-

- ✓ Work hand in hand (collaboratively) with other education stakeholders so that school infrastructures can be improved and new can be added this can help to reduce the problem of classroom congestion.
- ✓ Supervise and coordinate the available teachers so that they don't use the class size as a ticket for not attending students respectively, despite of the situation teachers should try their best to teach students as students have the right to be taught.

Teachers

- ❖ Teachers have to try their best to achieve the best for the students,
- ❖ Should know that students are most of the time eager to learn and they can perform wonderfully if they can be closely assisted by their teachers.

- should not be rigid, they should be flexible and try their best to select better and reasonable teaching and learning strategies and techniques suitable for large class sizes let teachers explore and focus on what can be done well in large classes.

Community of Sebeta Awas Woreda

The whole community of the district should keep in mind that students need to be loved, need good and conducive learning environment and they need to be given all necessary support so that they can be developed holistically. So let us join our hands and work together for the betterment of our children's future and the nation at large.

Sincerely speaking, this study cannot claim that have exhaustively covered all that could have been said about students' academic achievement in secondary schools. There are still many other factors that affect students' academic achievement which can form interesting topics for future scholars; these include incompetent teachers' globalization as well as home factor. The investigation of these factors and many others will help in improving and modifying students' academic achievement in secondary Schools

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7. APPENDICES

Appendix A

Questionnaire for Teachers

Wolkite University:

College of Natural and Computational Science

Department of Chemistry

This study is an attempt to explore the impact of teaching and learning in large size classes.

Your co-operation in completing this study by responding to the following questions would be greatly appreciated. Please do not put your name on the questionnaire since all the responses are confidential and anonymous.

Gender: M__ F___ Years of teaching experience: ___Teaching position: Grade___ Specialization_____

RQ. 1 What are the problems and Challenges faced by teachers and students in teaching and learning in large classrooms in secondary schools of Sebeta Awas Woreda?

Impact of class size on teachers teaching.

No.	Questions	SA	A	UD	D	SD
1	Inability of teachers to paid attention to individual students that need special attention.					
2	Lack of classroom control and management at overcrowded classroom.					
3	Teachers found it difficult in conducting effective continuous assessment in classroom.					
4	Examination malpractice became rampart in overcrowded classroom.					
5	Lack of effective use of instructional materials to meet the requirement of individual student in the classroom.					

RQ. 2 What are the effects of Class Size on the quality of teaching, learning and Assessment of Students' Learning in secondary schools in Sebeta Awas Woreda?

Impact of Class size on the quality of teaching, learning and assessment.

S/N.	Items	SA	A	UD	D	SD
1	High numbers of the students in classroom affect quality of my teaching.					
2	Large class size makes assessment of students difficult.					
3	Large class size affects the time for marking students' scores.					
4	Large class impacts on useful monitoring/evaluation of lessons and time for remedial teaching.					

RQ. 3 What are the ways forwards for overcoming the problems faced by teachers and students in large classroom during teaching and learning in secondary schools in the sebeta AwasWoreda? Possible suggestion/comments/to reduces the challenges of teaching-learning in large class sizes.

S/N.	Items	SA	A	UD	D	SD
1	Admission of the students in secondary schools should be based on minimum standard as specified by National Junior Secondary School Curriculum.					
2	Heads of schools work collaboratively with other education stakeholders to reduce the problem of classroom problems.					
3	Teachers not are rigid, be flexible and try their best to select better and reasonable teaching and learning strategies and techniques suitable for large class sizes..					
4	Provision of adequate funds by the government for procurement and maintenance of teaching facilities for conducive learning by individual student.					
5	More provision of conducive classrooms in all secondary school under study to reduce the overcrowding in the classroom.					

-What are the other difficulties that you may experience while teaching a large class?

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-Are there any comments and suggestions you would like to make about class size and student achievement?.....

.....

-What practical tips do you suggest for teaching large classes?

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.....

*******THANK YOU*******

Appendix B

Questionnaire for Students

Wolkite University:

College of Natural and Computational Science

Department of Chemistry

This study is an attempt to explore the impact of teaching and learning in large size classes. Your co-operation in completing this study by responding to the following questions would be greatly appreciated. Please do not put your name on the questionnaire since all the responses are Confidential and anonymous.

. Gender: I am: Male-------- Female---------Grade------

Table 1: Impact of Class Size on Students' Academic achievement.

No.	Questions	SA	A	UD	D	SD
1	Students have the opportunity to cheat during class exercises, test and examination in large class size					
2	Students hardly see writings on the board when seated at the back in a large class?					
3	Students are very active in large class size than in small class?					
4	Smaller class sizes allow more time for teachers to help students with practical in chemistry and develop their skills which can increase student's achievement?					
5	Students can do other things like copying notes in large class when chemistry lesson is going on without the teacher noticing?					

Table 2: Impact of Class Size on Instructional Strategies

No	Questions	SA	A	UD	D	SD
1	The teaching of practical chemistry skills is neglected in large class size?					
2	Teachers are likely to give more class exercise to students in smaller class size than larger class size?					
3	Teachers allow students to frequently ask questions during class session in a large class size?					
4	The atmosphere in large class size is always teacher-centered with passive students?					

Table 3: Impact of Class Size on Students' Psychological Readiness

No	Questions	SA	A	UD	D	SD
1	Most students feel shy to speak and express them self in large class size?					
2	Students seldom have the opportunity to express their self in large class size?					
3	Students feel more relaxed in large class size since it's difficult to know themselves by name?					
4	Students like sitting at the back of the class to hide from the attention of the teacher in large class size?					
5	Students find it difficult to concentrate due to the noisy and stressful atmosphere in large class size?					

Table 4: Social Impact of Class Size on Students' Academic achievement.

No	Question	SA	A	UD	D	SD
1	Student-Student interaction is mostly neglected in large class size?					
2	Teacher-Student interaction is mostly neglected in large class size?					
3	Teachers easily identify students who need extra tuition and attention during lesson period in small class size than in large class size?					
4	Teachers find it difficult to remember students by name in larger class size?					
5	Teachers are unable to notice students who are not serious with jottings and note copying?					

-Is there any difficulties and challenges that may you experience while learning in large classes? if your answer is yes; mention some of it**.**----------

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What practical tips do you suggest to overcome the challenges of learning in large classes?

*******THANK YOU*******

Appendix C

INTERVIEW GUIDE FOR DISTRICT SUPERVISOR, *PRINCIPALS AND VICE PRINCIPAL*

Dear interviewee,

My name is Fikadu Ejeta, a master student from the University of Wolkite I am conducting research in order to investigate the impact of class size on students' academic achievement in chemistry in public secondary schools of sebeta Awas Woreda. Your fully participation in administering this instrument will help education stakeholders to understand better the relationship between class size and students' achievements. Responses will only be used for academic purposes and will be treated with utmost confidentiality as the entire instrument is anonymous. Please take your time and answer these questions according to your own perceptions. Thank you very much for your time and positive considerations may the almighty God bless you exceedingly!

Gender: Male-------- Female---------work position----------Experience--------

1. How important is the issue and impact of class size to you? _____
2. How many students do you have at your school? _____
3. How many students are in one form and in each class? _____
4. Do the infrastructures available equivalent to the number of students enrolled at your school?
5. How many teachers do you have at school? ___. What is the teacher students' ratio at your school? _____
6. (a) Do you think the size of the class has an impact on student's academic achievement?
   (b) Is there any relationship between the class size and students' academic achievement in secondary schools?
7. Is there a correlation between class size and discipline problems? if Yes what are they?

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8. Based on your experience, which class sizes that result in maximum effectiveness for students in terms of academic achievement, small or large class size? Why? ----------

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9. ***What are the other difficulties that a teacher may experience while teaching a large class?***

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10.Are there any comments and suggestions that you would like to make about class size and student achievement?----------
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Thank you in advance for your cooperation.

Appendix D

Checklist for Document Review

Observation checklist

1. The number of students in a class
2. Students participation in a lesson
3. Teaching methods and strategies used by teachers during classroom sessions
4. Class management
5. Physical facilities in classrooms.

Documentary review guide

1. Records of students enrollment in each class/stream
2. Tests and Examinations results records
3. Students exercise books. (to check if students are given exercises)
4. To find out teaching and learning strategies suitable for large classes