SPECTACULAR JOURNALS
www.spectacularjournals.org

Journal of Art, Social Science and Political Science Vol. 1(1) pp. 012-024, September, 2020
Available online http://spectacularjournals.org/jassps
DOI: 10.5281/zenodo.4021410

Original Research Article

Learning environment as fuel for students' engagement in learning in technical secondary schools of the English speaking sub-system of education in Cameroon

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Abstract

Educational systems world-wide and in the developing world in particular have their focus on learners' academic achievement and how well stated Educational objectives are attained. This generally provides the basis for measuring the efficiency of the school system. On the way of this aspiration lies an inherent hurdle of learning environment which is more often than not overlooked. As the nature and character of every man depends on his environment, so too does engagement in learning, and globally, academic achievement depend on the learning environment. Technical education in Cameroon today is expected to contribute significantly in the development of the country by instilling learners with the necessary competencies required for them to become functional and productive members of the community. The question of learning environment becomes even more critical when we recall that the educational system is the only industry that produces skilled manpower for itself and every other sector of the economy. There are however growing concerns regarding the ability of our technical schools to train and produce the required skilled manpower for Cameroon's economy. Whether this happens or not depends on the daily experiences in the school environments of these learners that systematically evolve to meet the demands of modern society. This paper focused on how the Learning Environment, specifically class size and gender influence students' Engagement in learning in Technical Secondary Schools of the English-Speaking Sub-system of Education in Cameroon. The explanatory sequential mixed method research design was used, and data collected using the questionnaire and interview guide. The study targeted all form 7 students of Industrial specialty in Technical Secondary Schools of the English-Speaking Sub-system of Education in Cameroon. The sample consisted of 360 respondents selected using the simple random sampling techniques. Recommendations made by the study suggested that government should expand the spaces in classrooms and workshops and respect the UNESCO recommendation of 25 students per class especially in technical education. Girls should also be encouraged to enroll in technical schools and in the industrial sciences in particular.

Keywords: Learning environment, engagement in learning, gender, technical education.

INTRODUCTION AND CONTEXT OF STUDY

The turn of the 21st century brought about challenges that the educational system in general and technical education in particular needed to adjust and respond to particularly in the areas of globalization, information and communication technologies and industrialization (production and distribution of goods and services). On the international stage, Cameroon adheres to a number of initiatives in the field of education, and technical and vocational education in particular. A case in point is the Revised Convention on Technical and Vocational Education adopted in 2001 during the 31st session of the United Nations General Conference on Education, which

recommended the suppression of barriers between levels and domains of education, between education and the job market and between the school and the society, by rendering technical and vocational education an integral part of the basic general education of each and everyone in the form of initiation to technology, to the job market as well as to human values and acceptable citizenship norms for responsible citizenship (SWAe, p.28). It is therefore clear that there is awareness that technical education will quicken the meeting of developmental aspirations and hence, a pressing need to improve the learning environments through investment.

Furthermore, goal 3 of Cameroon's "Vision 2035" (in the Growth and Employment Strategy Paper, GESP) requires the country to become a newly industrialized country. The specific objectives of this goal again fall squarely on technical education and reads:

Intensify investment in infrastructure and production sectors; develop a sound, competitive and diversified manufacturing sector that can transform the structure of imports and exports; collect savings, finance growth and development; modify that pattern of foreign trade and gain new markets; integrate itself in the international arena and improve banking intermediation. (GESP, p.54)

With the realization of the need to develop technical education, as the critical avenue for economic emergence, the government of Cameroon embarked on a strategy to expand technical education in the country following the elaboration of the Growth and Employment Strategy Paper (GESP, 2010). In 2011, the Head of State of Cameroon made a policy statement during his campaign for re-election to the presidency, stating that Cameroon will in 2012 become a huge construction site in a bid to meet her development aspirations. Consequently, the demand for technical education which is seen as a vehicle to lay the foundation stone for an industrial Cameroon has continued to be on the increase. To match this vision with action, year after year, at the beginning of each academic year, the Prime Ministry signs decisions creating a number of secondary technical colleges and high schools (65 in 2011 alone). The issues however, go beyond just creating schools to touch on the facilities and personnel provided to facilitate the training of the nation's workforce.

Despite the pressing need for a skilled labour force, it has been observed that many students are disengaged from their learning. Marzano et al. (2003) hold that the result of disengagement in learning is poor development of skills which are prerequisites of academic achievement and employability. This observation seems to fit the puzzle because students' academic achievement in technical examinations in Cameroon has been observed to be historically low Ngundam and Tanyi (1990). In recent times, it has been observed that the academic achievement in technical examinations organized by the Cameroon General Certificate of Education (GCE) Board has remained very unsatisfactory in the past decade with pass rates below 35% in both theoretical and practical examinations (CGCEB, 2005-2015). Results of similar examinations in the French speaking sub-system such as the "Certificatd' Aptitude Professionelle" (CAP) and Baccalaureat are not any different. These poor academic achievements in developing countries according to UNICEF (1990) have mostly been caused by poor learning environment. This trend has raised a lot of questions both on the part of teachers and students on the adequacy of their efforts and experiences accrued in the learning environment.

The Problem

It has been observed that learners in our technical schools appear not to be fully engaged in their learning. The number of students in classrooms compared to the number of teachers and facilities is also large leading to a competition in the use of available equipment as well as teachers' inability to attend to individual learning problems. The number of female students in the industrial sciences compared to the male students is also observed to be almost insignificant. A lot of students tend to cut classes, refuse carrying out basic learning tasks, do not show enthusiasm and commitment towards their studies, and worse still, engage in alcoholism and drug consumption. This significantly impedes the learners' ability to engage in practical activities as well as limits the teacher's pedagogic choices for effective learning. Researchers have demonstrated that the result of learners' disengagement in learning is poor academic achievement (Sullivan et al., 2014; Culver, 2015; Kidwell, 2010; and Jones et al., 1994).

Ngundam and Tanyi (1990) in their research presented statistics of success in the "Certificatd Aptitude Professionelle" (CAP) and Baccalaureat between 1983 and 1987 which averaged about 27.6%. Today, students' academic achievement in technical examinations organized by the Cameroon General Certificate of Education (GCE) Board has remained very unsatisfactory in the past decade with pass rates below 35% in both theoretical and practical examinations (CGCEB, 2005-2015). The objective of this paper seeks therefore to establish whether learning environment in terms of class size and gender affect students' engagement in learning in technical secondary schools of the English-Speaking Sub-subsystem of Education in Cameroon.

Research Hypotheses

Based on the foregoing objectives, the following specific hypotheses were tested:

$H_0$1: There is no significant difference between the mean learning engagement of students in small and large classes in technical secondary schools of the English-

Speaking Sub-system of Education in Cameroon.
H_a1: There is a significant difference between the mean learning engagement of students in small and large classes in technical secondary schools of the English Speaking Sub-system of Education in Cameroon.
$H_0$2: There is no significant difference between the mean learning engagement of male and female students in technical secondary schools of the English-Speaking Sub-system of Education in Cameroon.
H_a2: There is a significant difference between the mean learning engagement of male and female students in technical secondary schools of the English-Speaking Sub-system of Education in Cameroon.

The Conceptual Framework

The learning environment generally comprises of a set of complex, interacting and interdependent components of both organic and non-organic materials whose aim is to ensure the effective acquisition of knowledge, transferability and sustainability of skills learned. The roots of learning environments research and the classroom learning environment according to Ghosh (2015) can be traced to the works of early social psychologists (such as Thomas, Moos an Lewin, 1928) of the 1920s in the United States of America. In the last century, the study of classroom environments has received increased attention by researchers, teachers, school administrators and administrators of school systems.

Ghosh (2015) stated that the concept of environment, as applied to educational settings, refers to the atmosphere, ambience, tone, or climate that pervades the particular setting. It is noteworthy from the outset to recognize that classroom environments are human environments. Accordingly, research in this field has focused historically on the psychosocial dimensions of the environment - those aspects of the environment that focus on human behaviour in origin or outcome (Boy and Pine, 1988) to the neglect of the physical dimension and instructional dimensions.

The first researchers to develop the precursors to learning environment studies were Lewin (1936) and Murray (1938). While conducting research in business settings, Lewin (1936) realized that considering both the learning environment and the individuality of subjects was a good way of determining and analyzing human behaviour. Duruji, Azuh and Oviasogie (2014), opine that learning environment include classroom spaces planning, administrative places planning, circulation spaces planning, spaces for conveniences planning, general infrastructure planning, the teachers as well as the students themselves are essential in teaching-learning process. The extent to which students' learning could be enhanced depends on their location within the school compound, the structure of their classroom, availability of instructional facilities and accessories. It is believed that a school with adequate learning environment contributes to stir up expected outcomes of learning that will facilitate good academic achievement, by encouraging effective teaching and learning.

According to Bosque and Dore (1998), learning and teaching environment ought to implement six functions: inform, communicate, collaborate, produce, scaffold, and manage. They added that conceptually speaking, the learning environment refers to the whole range of components and activities within which learning happens.

Clearly therefore, educational systems must constantly evolve in order to effectively respond to the rapidly changing demands of the societies they serve. This evolution rests significantly on the quality of educational offering that hinges on the organization of the learning environment and available learning opportunities. Innovations in curricula, methodologies, materials and technologies may require major changes in the design and organization of the environments in which they are housed Tambo (2012). Innovations can be relatively simple and inexpensive, such as rearranging schedules and seating patterns to allow additional time and space for guided group practice or collaborative problem solving.

To reach a common understanding of how both the physical and psychosocial dimensions of learning environments affect the quality of learning, an exploration of the relationship between place and process is needed. To understand this relationship, it is fundamental we answer the following questions posed by Bosque and Dore (1998): How does one define a place to learn? Why is it that children learn more effectively when there is a clear connection between the place of learning and the world in which they live? How can the different elements of learning environments be assessed in relation to local, national and international definitions of quality? Answers to these questions are found in the situated cognition of Smith and Ragan (2004) who insist that for learning to be meaningful, learners must be at the center of it and such learning must be connected to the contextual realities (environment) of the learners.

Class Size

Most attention has been paid to whether or not smaller classes lead to better academic outcomes for learners. There is a good deal of controversy over the magnitude of these effects (Anderson, 2000; Biddle and Berliner, 2002; Blatchford and Mortimore, 1994; Blatchford, Goldstein, and Mortimore, 1998; Hattie, 2005; and Wilson, 2006) though there is some agreement, drawing on experimental (e.g. Finn and Achilles, 1999) and naturalistic studies (Blatchford, Bassett, Goldstein and Martin, 2003), that smaller classes have positive effects on pupil academic engagement and performance, if

introduced immediately after school entry, that is, with the youngest children in school.

However, it is now recognized by many - and not just critics of class size reductions - that in order to better understand the effects of class size, and help facilitate better classroom environments and effectiveness, we need to know more about effects on what goes on in classrooms, that is, classroom "processes" such as interactions between teachers and students and student behaviour. Blatchford, Bassett and Brown (2011) insist that class size has a significant effect on the conduct of classroom activities and is a strong influence on learner engagement.

Class size is referred to as students to teacher ratio per class (Ali, 2012). Class size According to Adeyemi (2008) referred to as an educational tool that can be used to describe the average number of students per class in a school. In the view of Ikolo (2011), class size equally means group which is a set of persons among whom there exist a definable or observable set of relations. The word group then can refer not only to a set of persons but to a place where the interaction occurs.

Dror (2009) noted that class size has become a phenomenon often mentioned in the educational literature as an influence on students' socializing pattern and academic performance, quality of instruction, administration and school budgets. The scholar added that class size is an administrative decision over which teachers have little or no control. Kedney (2013) described class size as a tool that can be used to measure performance of the education system. Imoke (2006) remarked that optimum class size in a school system implies rational coordination of educational infrastructures, subject to available number of students in order to attain high levels of productivity.

Ogunyemi and Hassan (2011) on their part maintained that the issue of small or large class size can be counterproductive. In remote and even local areas, classes are found to be over-congested which is indeed an indication of the dearth of educational facilities in schools. The issue of large class sizes and the associated consequences is paramount. The phenomenon of large classes is fast becoming the vogue in secondary schools in Cameroon especially following the adoption and implementation of the collective promotion strategy in primary schools in 2006. The large class syndrome has been attributed to the expansion in annual students' enrolment.

Sesugh (2012) notes that there is tremendous increase in the enrolment of students and in the average size of classrooms in secondary schools these days across Africa from 30 - 40 students to60 - 75 or even more in many countries. Government regulations in Cameroon put standard class sizes at not more than 40 (forty) in secondary schools (Education Fact Sheet – Cameroon, 2018). The rapid expansion in enrolment has meant that the average number of students per class has increased to sometimes above a hundred in major towns. These conditions do not seem to favour students' engagement especially in technical education where one would expect the classes to be even smaller to permit adequate practice.

Though, open enrolment in schools is laudable, the deficiency is in the corresponding provision of adequate infrastructures, inadequate classrooms, short supply of teachers, dilapidated structures and classrooms which look like poultry in some schools (Sesugh, 2012). "Seats and desks which are basic classroom requirements are insufficient and in some secondary schools, students are sitting on ransacked furniture and some even sit on bare floor" he adds.

Common sense and logic suggest that with more children in the class there will be more potential for distraction, and more possibility of students being off task. Conversely in small classes there will be more opportunities to engage children and keep them on task. Even though there is also some body of research that does not present the relationship between class size and learning outcomes to be very significant, there is a general agreement that the size of a class affects the conduct of classroom activities and that fewer students will make the learning process more engaging. When we consider technical education whose main target is hands-on skills, then it will be clear that such effect may be more far reaching than reflected by some of the studies reviewed, conducted in general education classrooms.

Engagement of Students in Learning

Student engagement is an important concept to be considered if learners are to develop the desired skills. Engagement requires not only being active but also feeling and sense making (Harper and Quaye, 2009). Bomia and colleagues (1997) define student engagement as students' willingness, needs, desire motivation and success in the learning process. Hu and Kuh (2001) and Kuh (2009a) refer to student engagement as the time allocated by students to educational activities to contribute to the desired outcomes and as the quality of their related efforts.

According to Stovall (2003), student engagement includes not only the time students spend on tasks but also their willingness to take part in activities. Krause and Coates (2008) associated student engagement with the high quality in learning outcomes. All these definitions could be said to have common points for each school level. It is also important that student engagement in general be defined in a way to cover the processes of campus engagement and class engagement. In this respect, student engagement was defined by Gunuc and Kuzu (2014) as "*the quality and quantity of students' psychological, cognitive, emotional and behavioral reactions to the learning process as well as to in- class/*

out-of-class academic and social activities to achieve successful learning outcomes."

According to Abbing (2013), the term "engagement" comprises two constructs that are frequently used in research with divergent terminologies. The first one represents a person's drive or energy to perform a certain action. This construct is usually named "motivation" or "motivational factor" (Thoonen, Sleegers, Peetsma, and Oort, 2011). A review of studies over motivation by Vansteenkiste, Lens, and Deci (2006) reveals that it has been consistently identified as a strong predictor of high academic achievement.

The second construct measures whether someone actually turns his motivation into concrete behaviour. This construct is named "motivational behaviour" by Thoonen et al. (2011), but the term "student engagement" can be used interchangeably. Crumpton and Gregory (2011) define school engagement as a behavioural manifestation of motivation. Thoonen et al. (2011) provide an overview over three components of motivational factors that stimulate students' engagement in learning: The expectancy, affective and value component. These components include:

Expectancy component

This component refers to the individual's belief in his own abilities. This component is often addressed using the term "self-efficacy". Bandura (2009, 2010a) says that self-efficacy has a powerful influence over behavior. For example, a student who has low self-efficacy might not even try to study for a test because he doesn't believe it will do him any good. It is constantly identified as an important predictor of academic achievement (Komarraju and Nadler, 2013). It affects the motivation of a student as those with higher self-efficacy tend to persist longer, work harder andseek assistance, if necessary (Linnenbrink and Pintrich, 2012).

Value component

The value component refers to the perceived importance and desirability of the student's goals. In research on the students' goal orientation, a distinction between two concepts is often applied: Students with a mastery orientation (also named task-goal orientation) are focused on their own professional development and the mastery of a particular task. In contrast, students with an ability-goal orientation (also named performance-oriented or ego-oriented) focus primarily on others' perception of the students' abilities (Anderman, 2003). Studies on goal orientation suggest that mastery orientation is the more desirable alternative as ability-goal orientations often lead to self-handicapping strategies and students with this orientation develop lower levels of mastery (Urdan, Midgley, and Anderman, 1998).

Affective component

The affective component comprises the student's feelings and emotions about the school environment. This component is closely related to general wellbeing at school. this component into account is essential as individuals do not behave entirely rationally. Their motivation is also determined by relations with peers and teachers. The significance of peer relations for at-risk students becomes clear with the finding by Pratt and George (2005) that whether or not students find friends in the first month after they change the school is the single greatest predictor of subsequent success. Future dropouts tend to be rejected by their school peers and feel less popular (Ellenbogen and Chamberland, 1997).

Gender and Students' Engagement in Learning

Research studies have demonstrated that gender is a significant influence on students' academic engagement evidenced by the fact that research reports exist showing disparities in academic performance relative to gender (Amir et al., 2014; Kinzie et al., 2010 and Sharma, 2013). Findings of some of these studies are presented as follows:

Kinzie et al. (2010) conducted a study that examined the engagement patterns of male and female undergraduates in different types of baccalaureate-granting institutions. A descriptive-comparative research was employed in this study. The sample included 182 students' high school students of Canossa College, San Pablo City, school year 2014-2015 selected randomly. Two sets of instruments were used for data collection: The Student Engagement Questionnaire adapted from the exploratory factor analysis conducted by Sharma, and Bhaumik, (2013) in their study on the predictors of student engagement and Rotter's Locus of Control Scale and Student Engagement Questionnaire.

A two-way analysis of variance (ANOVA) was conducted using Statistical software to identify the main effects and the interaction effects of gender and perceived control on student engagement at a .05 level of significance. Descriptive statistics and hierarchical linear modeling show that on balance, undergraduate women participate more frequently than their male counterparts in educationally purposeful activities. Male first-year and senior students devote less time and effort to academic challenge tasks, such as working hard to meet expectations and spending time studying; senior males also participated less often in active and collaborative learning activities. Institutional type is unrelated to gender differences in engagement. The results point to areas where institutions could focus efforts to enhance the

quality of the undergraduate experience for all students.

Amir, Saleha, Jelas, Ahmad, and Hutkemri (2014) conducted a study titled “Students' engagement by age and gender: A cross-sectional study in Malaysia. The aim of the study was to explore students' engagement level at schools based on gender and age in Malaysia. Student's engagement to them is a fashionable term to describe the degree of their engagement in classroom learning. Students' engagement has three main components, namely affective, behaviour and cognitive using cross-sectional approach. The study sample comprised of students who were 12, 14 and 16 years old who were selected randomly. The instrument for data collection employed in this study was an adapted version of Students' Engagement Inventory. The result of the pilot test showed that the instrument had a high reliability index of 0.85 Cronbach Alpha.

Findings of the study revealed that engagement level in school differs by age and gender. Younger students recorded higher school engagement level as compared to elder ones. Female students reported to have higher level of engagement when compared to boys. This shows that school environment is perceived differently by different age groups and genders. As students grow older, they find that school activity is less interesting or fail to cater for their growth needs. It is suggested that school administrators and teachers plan for a more conducive atmosphere and meaningful learning activities. Different age groups and genders among students need to be addressed differently to create a better learning environment in accordance with their emotional, psychological and cognitive development. In a developing country such as Cameroon, Students' engagement in school activities is a major factor in determining students' success in education; hence, the teachers need to possess the necessary skills to dynamically engage students in classroom activities.

METHODOLOGY

The explanatory sequential mixed method research design was used in this study which allowed for collection of quantitative and qualitative data in order to explain the relationship between learning environment and students’ engagement in learning. This study involved upper sixth students of public technical secondary schools of the English-Speaking Sub-system of Education of Cameroon purposively and randomly selected. The purposive sampling technique was be used to select both the Divisions, Subdivisions and schools to be included in the study meanwhile the simple random sampling technique was used for the selection of respondents (students and teachers). The purposive sampling technique was also used to select students and teachers to be involved in the interview. For teachers specifically, the most experienced of them in terms longevity in service were interviewed.

Data was collected from a total of 362 respondents (using the structured questionnaire and interview guide) selected from the parent population (3995 students and teachers) using the simple random sampling and the snow balling techniques. The above number of respondents for the study were drawn with the help of the Krejcie and Morgan (1970) table (in Amin, 2005), for the selection of a sample as a function of the total population.

Instrumentation and Data Collection Procedure

Three main instruments were used to collect data in this study which were: a structured questionnaire (for students), and an interview schedule (for teachers). These instruments were tested for reliability through a pilot test and reliability estimates were found to range from 0.72 to 0.90 using the Chronbach Alpha test.

Quantitative data analysis was done descriptively and inferentially to establish the relationship between students’ learning environment and their engagement in learning with the assistance of the SPSS (version 21.0). The data collected from the questionnaire was summarized and presented in a tabular form using percentages for descriptive purposes. Summaries of this data were then used for hypotheses verification for inferential purposes. The statistical tool here was the independent t-test.

On the other, the qualitative data derived from the structured interview guide were analysed using the thematic analysis approach with the aid of themes, groundings/frequency and quotations. Themes are umbrella words which capture the main idea of the participants’ statements. On the other hand, groundings also call frequency represent the number of times that a particular theme/concept surface from the direct statements of the participants.

PRESENTATION OF FINDINGS

The first specific research question addressed the effect of class size on students’ engagement in learning in technical secondary schools in the English-Speaking Sub-System of Education in Cameroon. The class sizes of the students are first presented in Table 1 followed by their opinions on how class size affects their engagement in learning.

The result in Table 1 reveals that 180(51.4%) of the respondent’s study in classrooms with 41 to 60 students while 30(8.6%) of them study in classrooms with less than or equal to 20 students. A further 134(38.3%) of them study in classrooms with between 21 and 40 students with just 6(1.7%) of them in classrooms with more than 60 students. The statistics reveal that 53.1% of respondents study in overcrowded classrooms.

The following table below indicates the opinions of the

Table 1. Class Size.

Number of Students in class	Less than 20	21-40	41-60	Above 60	Total
Frequency (f)	30	134	180	6	350
Percentage (%)	8.6	38.3	51.4	1.7	100

Table 2. The effect of class size on students' engagement in learning.

Statements	Stretched				Collapsed	
	Strongly agree (SA)	Agree (A)	Disagree (D)	Strongly disagree (SD)	SA/A	D/SD
We sit more than three per desk made for two students in class	37 (10.6%)	156 (44.6%)	98 (28.0%)	59 (16.9%)	193 (55.1%)	157 (44.9%)
The large class makes it difficult for teacher to attend to individual student's learning problems	19 (5.4%)	75 (21.4%)	169 (48.3%)	87 (24.9%)	94 (26.9%)	256 (73.1%)
We easily work in groups of two to three students in class	16 (4.6%)	63 (18.0%)	145 (41.4%)	126 (30.0%)	79 (22.6%)	271 (77.4%)
We easily work in groups of two to three students during workshop	32 (9.1%)	82 (23.4%)	155 (44.3%)	81 (23.1%)	144 (41.1%)	236 (58.9%)
There is usually a lot of noise in class in the absence of the teacher.	14 (4.0%)	64 (18.3%)	144 (41.1%)	128 (36.6%)	78 (22.3%)	272 (77.1%)
The number of students is too many compared to equipment available in the workshops	122 (34.9%)	161 (46.0%)	5 (1.4%)	62 (17.7%)	283 (80.9%)	67 (19.1%)
I find difficult to practice in the workshop because the groups are made of too many students	154 (44.0%)	123 (35.1%)	19 (5.4%)	54 (15.4%)	277 (79.1%)	73 (20.9%)
Workshops are too small to accommodate all students	40 (11.4%)	105 (30.0%)	120 (34.3%)	85 (24.3%)	145 (41.4%)	205 (58.6%)
I feel uncomfortable in my class because it is too large	53 (15.1)	125 (35.7%)	128 (36.6%)	44 (12.6%)	178 (50.9%)	172 (49.1%)
Multiple response set (MRS)	**235 (7.5%)**	**786 (25.0%)**	**1235 (39.2%)**	**894 (28.4%)**	**1021 (32.4%)**	**2129 (67.6%)**

n=350

respondents on how class size affects students' engagement in learning in Technical Secondary Schools of the English-Speaking Sub-system of Education in Cameroon.

Findings from Table 2 showed that while 32.4% of the respondents generally agreed that class size affects their engagement in learning, 67.6% of them disagreed. For instance, a majority of the respondents 193(55.1%) agreed that they sit more than two on desk made for two students in class while 155(44.9%) of them disagreed.

Also, findings showed that a majority of students 256 (73.1%) disagreed that the large class makes it difficult for teacher to attend to individual student's learning problems with 94 (26.9%) of the agreeing.

Findings also showed that a majority of the respondents 271 (77.4%) disagreed that they easily work in small groups of two or three in class during lessons while 79 (22.6%) of them agreed. By the same token, only 144 (41.1%) of the students agreed that they easily work in small groups of two to three during workshop with 236 (58.9%) of them disagreeing. This is an indication that the collaborative learning strategy is not effectively used.

Findings further reveal that over 80.9% of the respondents agreed that the number of students is too many compared to equipment available in the workshops as opposed to 19.1% of them who disagreed. Consequently, 79.1% (277) of the student's state that they find it difficult to practice in the workshops because the working groups are usually made up of many students while (73) 20.1% of them disagreed.

Furthermore, findings revealed that 205 (58.6%) of the

Table 3. Independent t-test analysis of influence of class size on students' engagement in learning.

Class size	N	Mean	SD	t-value
Students in normal class sizes	164	29.12	5.43	5.73**
Students large class sizes	186	26.09	4.73	
Total	**350**	**27.61**	**5.08**	

*p<0.05, df=348; critical t = 1.97

Table 4. Comparing the mean learning engagements of male and female students.

Engagement in Learning	N	Mean (x)	SD	t-value
Male	305	27.20	5.22	5.51**
Female	45	31.15	4.39	
Total	**350**	**29.18**	**4.81**	

*p<0.05, df=348; critical t = 1.97

respondents disagreed that workshops are too small to accommodate all students with 41.4% of them agreeing; meanwhile 178 (50.9%) of the students state that they feel uncomfortable studying in their classrooms because there are too many students. Therefore, the laboratory spaces are in themselves not too small to accommodate the students but are rather lacking in required instructional materials.

Verification of research hypothesis

This hypothesis was designed to find out if there is a significant difference in the mean learning engagement of students who study in small classes and those who study in large classes in Technical Secondary Schools of the English-Speaking Sub-system of Education.

H_{01}: There is no significant difference between the mean learning engagement of students in small and large classes in technical secondary schools in the English-Speaking Sub-system of Education.

The independent variable in this hypothesis was class size, while the dependent variable was students' engagement in learning in technical secondary schools in the English-Speaking Sub-system of Education. The responses in the sample were categorized into two groups based on whether their class sizes were normal or large.

Group 1: Students in normal class sizes

Group 2: Students in large classrooms

The scores of the dependent variable were got from the scores recorded from the responses got from the ten questionnaire items that measured students' engagement in learning in technical secondary schools in the English-Speaking Sub-system of Education. The statistical analysis technique used to test this hypothesis was the independent t-test. The result of the analysis is presented in Table 3.

The result of the analysis in Table 3 reveals that the calculated t-value of 5.73 is higher than the critical t-value of 1.97 at a 0.05 level of significance with 348 degrees of freedom. With this result, the null hypothesis was rejected and alternative retained. This means that there is a significant influence of class size on students' engagement in learning in technical secondary schools of the English-Speaking Sub-system of Education in Cameroon.

Since there is a significant influence of class size on students' engagement in learning in technical secondary schools of the English Speaking Sub-system of Education, a further examination of the difference reveals that the mean value of students' engagement for students who study in small class sizes (mean=29.12) is higher than that of students who are in large class sizes (mean =26.09). Therefore students who study in small class sizes have a better engagement in learning than their counterparts in large class sizes.

The second objective aimed at doing a comparison of the learning engagement of male and female students. This was done to establish whether or not males engage better in learning than females. The statistical technique used here was the independent t-test.

Findings in Table 4 revealed that there is a significant difference in the mean learning engagement scores of male and female students in technical secondary schools of the English-Speaking Sub-system of education in Cameroon. This is so because the calculated t-value of 5.51 is greater than the critical t-value of 1.97 at 0.05% level of confidence. Further exploration of this result shows that female students, even though fewer than male students in technical schools appear to be more engaged in learning than males with respective mean engagements of 31.15 and 27.20.

Table 5. Teachers' perception of how class size affects their ability to group students for learning.

Themes	Frequency	Quotations
Grouping perceived as difficult in large class size	9	**"**Grouping facilitates learning but the number of students is large making grouping difficult. Grouping facilitates learning and helps students who are slow to pick up faster"
		"A class with many students will not permit me to group all the students during learning".
		"It affects my ability to group them because the classroom size is too large".
		"There are many students in my class, so grouping them during lessons is particularly difficult. I therefore make use of grouping only during workshop with sometimes as many as four to five students per group".
		'The number of students in my class is too large, over 60. Grouping them for learning is sometimes almost impossible".
		"With many students in class, grouping is complicated".
		"The number of students in my class is too large, over 60. Grouping them for learning is sometimes almost impossible".
Grouping perceived as easy in small class size	3	"It affects my ability to group them because the classroom size is small".
		'I do not have difficulties grouping students for learning because they are not many".
		"I find little difficulties putting my students into groups because I have fewer students in class (26).

Analysis of Qualitative Data

The data gathered from the interview of technical education teachers is presented here using main themes, frequencies and quotations of the responses.

Teachers' perception of how class size affects their ability to group students

The Table 5 below summarizes the teachers' opinion on how class affects the grouping of students during workshop and lessons.

Findings showed that many of the teachers indicated that grouping students for learning is difficult for large class size which negatively affects their ability as depicted in some of their statements **"**Grouping facilitates learning but the number of students is large making grouping difficult. Grouping facilitates learning and helps students who are slow to pick up faster", "A class with many students will not permit me to group all the students during learning", "It affects my ability to group them because the classroom size is too large", etc.

On the contrary, with respect to small class size, some of the teachers stated that grouping is easy as reported by some of them "I do not have difficulties grouping students for learning because they are not many", "I find little difficulties putting my students into groups because I have fewer students in class (26).

Class size and teachers' ability to attend to student's individual learning problems

The Table 6 below indicates teachers' responses on how class size affects their ability to attend to individual learning difficulties.

Findings showed that all the teachers find it difficult to effectively attend to students learning problems with the only reason being that the class size is large. This can be seen in some of their statements "It becomes too difficult to attend to all the students, making learning difficult for a populated class", "A class with many students will not permit me to reach all the students and solve their individual problems", etc.

DISCUSSION

The effect of class size on students' engagement in learning in technical secondary schools in the English-Speaking Sub-system of Education in Cameroon

Findings relative to class size showed that there is a significant, strong and positive relationship between class size and students' engagement in learning in technical secondary schools of the English-Speaking Sub-system of Education in Cameroon. Further findings from the t-test analysis revealed that there is a significant difference

Table 6. Teachers' opinion on how class size affects their ability to effectively attend to learner individual problems.

Themes	Frequency	Quotations
Difficult to attend to all learners (large class size)	12	"It becomes too difficult to attend to all the students, making learning difficult for a populated class". "A class with many students will not permit me to reach all the students and solve their individual problems". "Due to the classroom size, they are more than the normal classroom size and the time allocation for the course, so it makes it difficult for me to give each student attention" "Due to the classroom size, they are more than the normal classroom size and the time allocation for the course, so it makes it difficult for me to give each student attention". "The class in my opinion is overcrowded and so I cannot be able to attend to every learning difficulty. Managing the classroom and causing students to focus in class is sometimes difficult as well. "Since the class is too large, it is difficult for me to attend to individual learning problems" "I have just 25 students in my class but attending to individual learning difficulties is still not easy". "Since the class is too large, it is difficult for me to attend to individual learning problems".

between the mean learning engagement of students in large classes and students in small classes with students in small class sizes recording higher average engagement. This result meant that students will better engage in learning if the class sizes are smaller ideally around UNESCO's recommendation of 25 students per class.

Teachers interviewed affirmed that due to the large number of students in their classes, attending to individual students' learning difficulties is very difficult meanwhile students identified competition for use of equipment, rushing to class to secure seating space, noise, large groups during workshop and discomfort were some problems highlighted by students as resulting from large class sizes. Both teachers and students agreed that students' engagement in learning especially during workshop would be better if there are fewer students in class. The reasons advanced for this is that there will be adequate time on task for students, proper follow-up, and the possibility for students to be passive would be significantly reduced.

The above findings are corroborated by empirical evidence from other researchers including Blatchford, Bassett and Brown (2011) who examined the effect of class size on classroom engagement and teacher-pupil interaction and differences in relation to pupil prior attainment and primary vs. secondary schools in the United Kingdom. They found that at primary and secondary levels, smaller classes led to pupils receiving more individual attention from teachers, and having more active interactions with them. Classroom engagement decreased in larger classes, but, contrary to expectation, this was particularly marked for lower attaining pupils at secondary level. Low attaining pupils can therefore benefit from smaller classes at secondary level in terms of more individual attention thereby facilitating engagement in learning.

Furthermore, in an earlier experimental study Blatchford, Bassett, and Brown (2005) engaged in a research project titled "the Class Size and Pupil Adult Ratio (CSPAR) aimed at providing a full analysis of the educational effects of class size and adult child ratio differences over the whole of Primary and Secondary Education in the UK which was later extended to Europe and parts of Australia. This study investigated the effect of class size on four main classroom processes over a period of three years: 1) pupil classroom engagement and off-task behaviour; 2) Teacher-pupil interaction; 3) Teacher individual attention to pupils; and 4) Pupils' active involvement with the teacher. Findings led Blatchford et al. (2005) to conclude that students in small classes in the elementary grades are more engaged in learning behaviours, and display less disruptive behavior than do students in larger classes.

To them in their findings, it seems likely that the number of children in a class will decrease the amount of time that can be spent on instruction and time spent dealing with individual children. This expectation is consistent with teachers' views (Bennett, 1996; Pate-Bain et al., 1992) and some previous research (Cooper, 1989; Glass et al., 1982). A different view however, comes from Bourke (1986) who in an Australian study did not find a class size effect on primary school pupils' engagement.

In a similar manner, Ajayi, Audu, and Ajayi (2017) investigated the influence of class size on students' classroom discipline, engagement and communication in senior secondary schools in Ekiti state, Nigeria, and found that class size has significant influence on senior

secondary classroom discipline, engagement and communication. Again, Gobena (2013) on his part conducted a study that was designed to investigate the perception of teachers towards teaching large class sizes as prevalent in some selected Eastern Ethiopian Higher Learning Institutions today due to the present social demand for education. The findings revealed that the teachers were not favorably contented to teach large class sizes. The majority were of the view that in such class sizes, it is difficult to engage in practical work; there was less concentration on the part of the students; teaching is teacher–centered; the level of students' participation is low and there are heavier demands on facilities and instructional materials. The study further revealed that teachers have the attitude that coping strategies such as peer tutoring and instructor – expressiveness and teaching behavior can be employed by them to assure quality in teaching and learning in these institutions.

The four studies reviewed to support the findings of this study all indicated that class size significantly affects students engagement in learning. Classrooms that are overcrowded are likely to cause students to slip into restlessness, pose classroom management and interaction challenges to teachers, inhibit collaborative learning, and impose an unhealthy competition for the use of learning resources. Larger class sizes can lead to students having a passive role in class which tend to distract the rest of the class without the teacher even noticing. When the student-teacher ratio becomes too high, the situation can be describes as overcrowding. Since the early 1900's, educators have been concerned with the issue of school overcrowding (Smith, 1907) and its effects on student learning and behaviour (Dobbs, 1935, Boots, B. N., and Ahonen, 1978). Overcrowded schools generally occur when student enrollments exceed building or classroom capacity (Lewis et al., 2000).

The negative effects of large class sizes it must be said pose a serious problem to slow learners who for the most part are unable to accurately follow up learning activities. In this light, more intellectually able and extrovert learners engage more and learn more to the detriment of the slow ones. The situation becomes very dire in certain subjects such as Mathematics and Physics where teachers are observed to have the tendency of moving forward to other learning activities provided the bright students have understood. The result for slow learners here is frustration and a total disengagement from the learning process.

Despite the fact that reviewed studies support the view that more learning engagement will occur in small class sizes, many respondents were found to be engaged as well in large classrooms. This as earlier mentioned could be explained by their intellectual abilities and focus as mentioned earlier. This observation is not very far from the conclusions of Blatchford, Bassett and Brown (2011) who found that 80% of the students in their study affirmed to be affected by class size while 20% of them were not affected.

From a theoretical standpoint, Vygotsky's Social Constructivism that emphasizes the need for learning to occur in a social context where learners can interact to build their own knowledge is very useful. Learners by the dictates of this theory are supposed to be helped by teachers especially and significant others across the Zone of Proximal Development to bridge the gap between what they already can do and what they can do with help through a system of scaffolding and providing hurdle help. Scaffolding is an assemblage of pedagogical techniques, for example, questioning, illustrations, demonstrations etc. that can enable the learner to learn better.

Vygotsky therefore sees the learner here as an apprentice who acquires knowledge and skills from those who already possess such knowledge and skills. Apprenticeship is extremely important in technical education since their training is preparation of technicians for the job market. Hurdle help here can be likened to attending to students' learning difficulties and when there are too many students in class, as highlighted by both students and teachers in this study, it becomes impossible to scaffold all students. This makes that many students still leave the learning situation with difficulties that should have otherwise been handled if there were fewer students in class.

Students' Gender and engagement in learning in technical secondary schools of the English-Speaking Sub-system of Education in Cameroon

Female were observed to be a demographic minority in industrial studies across the sampled technical secondary schools. Out of the 350 respondents who completed students' the questionnaire only 45 of them were female. It was therefore deemed necessary to compare the mean learning engagement of male and female students. Findings revealed that there is a significant difference in the mean learning engagement of students in technical secondary schools of the English Speaking Sub-system of education. Female students were observed to be more engaged in learning than male students. The calculated t-value for this relationship was 5.57 which was sufficiently high enough to conclude that gender is a significant factor in students' engagement in learning.

This finding relative to gender is corroborated by Kinzie et al. (2010) who surveyed the engagement patterns of male and female undergraduates in different types of baccalaureate-granting institutions. Descriptive statistics and hierarchical linear modeling showed that on balance, undergraduate women participate more frequently than their male counterparts in educationally purposeful activities. Male first-year and senior students

devote less time and effort to academic challenge tasks, such as working hard to meet expectations and spending time studying; senior males also participated less often in active and collaborative learning activities.

Amir, Saleha, Jelas, Ahmad, and Hutkemri (2014) on their part also conducted a study aimed exploring students' engagement level in schools based on gender and age in Malaysia. Findings of the study revealed that engagement level in school differs by age and gender. Younger students recorded higher school engagement level as compared to elder ones. Female students reported to have higher level of engagement when compared to boys. This shows that school environment is perceived differently by different age groups and genders. As students grow older, they find that school activity is less interesting or fail to cater for their growth needs and hence need the school environment to be motivating enough to keep them in school.

The above reviews relative to gender confirm the observation by this study that gender is a major factor in students' engagement in learning. The fact that female students engage more in learning is also established but unfortunately there very few students in the industrial sciences. Therefore encouraging females to take up studies in technical education and industrial studies in particular could be a very good venture for the future.

CONCLUSION

This paper established the fact that there is a significant influence of learning environment on students' engagement in learning in technical secondary school of the English-Speaking Sub-system of Education in Cameroon. The element of class size on the one hand is of importance because it determines whether or not teachers are able to attend to students' individual learning needs as well as the time spent on practical learning tasks on the other. Large class sizes tend to put a lot of pressure on the existing equipment and the sometimes very small classroom and workshop spaces. Gender was also found to be a significant factor in determining student's engagement in learning with female students being more engaged in learning than males.

Recommendations

Based on the findings, and conclusions of the study, the following recommendations were made thereof:

The government should construct much needed classroom spaces and workshops so as to accommodate the students in over-crowded classrooms. In this light, efforts should made to achieve the recommended class size of maximum by the state of 40 for technical schools (Education Policy and Data Centre, and Cameroon Education Fact Sheet, 2018) as well as 25 students per class policy of UNESCO. The policy of creating new schools without teachers, classrooms, laboratories, workshops etc. appears not to be doing a lot of justice to the students. The focus should be on equipping the existing schools with the required human and material resources to foster effective training.

Girls should be encouraged to take more interest in technical education; particularly in the industrial sciences because they were observed to be more engaged in learning than their male counterparts. Parents can be of significant help here and should be educated on the necessity of sending their children to technical education.

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