

Teachers' Competence, Classroom Organization and Climate as Predictors of Students' Academic Achievement in Secondary School Biology

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Abstract

This study investigated teachers' competence, classroom organization and climate as predictors of students' academic achievement in Secondary School Biology in Ogun state with four hypotheses formulated for the study.

The study adopted a descriptive survey research design. The target population used for this study comprised of all Public Secondary School (SS) teachers and their students. Purposive sampling technique was used to select one qualified Biology teacher from each selected school and random sampling technique was used to select ten students from the SSII class in each of the selected schools. The four instruments were Teachers' Competence Rating Scale, Classroom Organization Rating Scale, Classroom Climate Rating Scale and Biology Achievement Test used and their Coefficient reliability values were obtained 0.82, 0.79, 0.85 and 0.87 respectively. t-test and Analysis of Variance formula were used to analyse data collected at significant level of 0.05.

Results revealed that teacher competence, classroom organization and climate did not significant contribute when taken together to students' academic achievement in Biology ($R^2 = 0.013$; $p > 0.05$) and teacher competence, classroom organization and climate did not have significant relative contribution to students' academic achievement in Biology ($R^2 = 0.006$, 0.005 , and 0.001 , $P > 0.05$), there was no significant difference between less qualified and qualified teachers on students' academic achievement in Biology ($t = 1.355$; $p > 0.05$), there was significant difference between less qualified and qualified teachers on teachers' competence in Biology ($t = 4.024$; $p < 0.05$). Among the recommendations is that qualified Biology teachers should be employed to teach students in the classroom in order to enhance students' achievement in Biology.

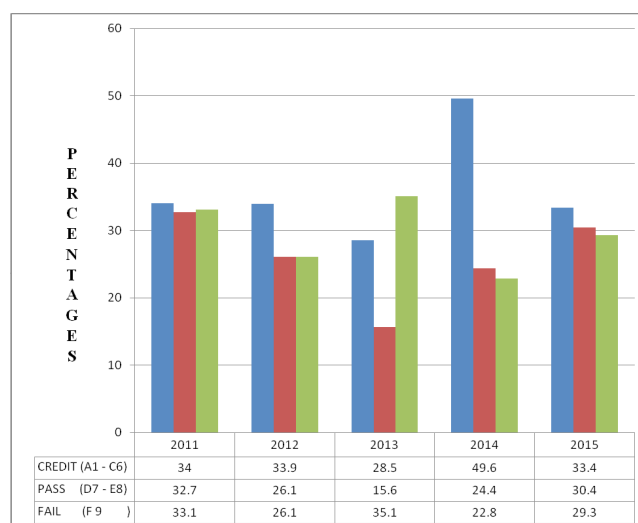
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Introduction

Biology is a very important science subject being offered at the Senior Secondary School level. The subject enables students to learn about different human organs and parts. Sarojini (2010) defined Biology as the science of physical life of animals and plants. Therefore, Biology is essential in nation building considering the role it plays in various aspects of the economy and public life. The Biology curriculum is planned such that the teacher is compelled to use activity oriented, learner-centered approach to teach. The effective teaching of Biology cannot be achieved without positive and meaningful interaction between the teacher, students and the environmental resources (Nzewi & Nwosu, 2010).

Despite the importance and popularity of Biology among science subjects, the performance of students in Biology is discouraging, despite the many efforts that have been made by governments, parents, educators and teachers to improve the students' performance in Biology at secondary schools. Nonetheless, these have not succeeded, as shown by the results of students in West African Examinations Council Biology between 2011 and 2015 as shown in Figure 1

Figure 1: Performance of Students at the May/June WASSCE Biology in Nigeria at (2011-



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Source: West African Examinations Council (WAEC) Office, Onikolobo, Abeokuta (2011)

Figure 1 presented above shows the percentage of performance of students in Biology at the West African Senior School Certificate Examinations (WASSCE) conducted by the (WAEC) between 2011 and 2015. As the Figure 1 indicates, the number of students that passed Biology at credit level (A1-C6) was consistently less than 50% for the past consecutive five years (2011-2015). Ibe and Maduabum (2001) argued that candidate performance at the Senior Secondary School Certificate Examinations (SSSCE) conducted by WAEC has consistently remain poor with Biology having the highest enrollments in the science subjects. But some studies found that teachers' experience and educational qualifications significantly influenced students' academic achievement in Biology (Njeru & Orodho, 2003; Ankomah, 2005; Ugbe & Agim, 2009; Asikhia, 2010; Yala & Wanjohi, 2011; Olaleye, 2011). It also observed by Ademulegun (2001) that the poor performance of students' in Biology is as a result of incompetence and less qualified teachers' teaching the subject. It has been observed that the influence of these variables (teachers' competence, classroom organization and climate) on the learning outcome of students in Biology as measured by students' academic achievement has been the subject of several studies (Adediwura & Tayo, 2007; Adu & Olatundun, 2007; Schacter & Thum, 2004; Starr, 2002).

However, teachers' competence is considered one of the variables determining learning outcomes in Biology. Trinder (2008) defines competence as the ability of a professional to apply knowledge, skills and experiences in performing activities within a given occupation in order to produce a required outcome. From the teaching point of view, teachers' competence involves an individual teacher's ability to function as expected in employment and do a particular job or perform a set of tasks under various conditions including the ability to cope with contingencies. Ajao (2001) while assessing the effect of competence on academic performance found that teachers' competence significantly determines students' academic performance. He found a significant (direct) relationship between teachers' competence and students' performance. According to Afe (2001), teachers' have been shown to have an important influence on students' academic achievements, because the teacher is ultimately responsible for translating policy into action and principles based on practices during interaction with the students.

Teachers' qualification is also one of the variables which determine teachers' competence. Teachers' qualifications is the level of attainment or achievement in professional training that determines the quality of services offered based on competence of individual teachers (Abe, 2014). According to Adu and Olatundun (2007), teachers' qualifications refer to academic or professional achievement that enables an individual to become a competence teacher. A qualified teacher is one who holds a teaching certificate earned from a reputable and accredited institution and is thus licensed to offer services in his/her area of specialization (Musau & Abere, 2015). Ijaiye (1998) submitted that improving the quality of the teaching force in schools is the key to raising students' achievement, consequently Lassa (2000) claimed that education cannot be provided by just anybody, it requires a

teacher who plans and delivers the lessons or instruction in such a way that objectives can be achieved. Studies done by other scholars found that teachers' professional qualifications and teaching experience are not significantly related to students' academic achievement (Rivkin 2005, Buddin & Zamarro, 2009, Mbugua 2012, Kimani 2013, Musau, 2013). Other studies indicate that having higher order academic achievements such as a master's degree had no influence on student performance (Darling-Hammond, 2000).

The third variable of this study is classroom organization. According to Emmer and Gerwels (2006), classroom organization referred to the action a teacher takes to create an environment that supports and facilitates instructions, academic, social and emotional learning. It is the process of creating favorable conditions to facilitate instructions as well as that of regulating social behavior of students. Teachers in the classroom are by the nature of their profession, managers of classroom activities. The classroom teachers' job unlike that of other professionals is concerned with maintaining order, allocating resources, regulating the sequence of events and directing his own attention towards achieving educational goals. Classroom organization is the most difficulty element of teaching for most teachers as teachers experience various challenges when teaching. Some teachers might decide to leave the teaching profession because of the challenges they experience when teaching like indiscipline among students and poor attitude. When a teacher loses control of his or her class, it is difficult for him/her to regain control. Poor classroom organisation leads to lower rate of academic engagement in class as teachers spend a lot of time correcting misbehaviour caused by poor management skills. Effective classroom organisation entails communication of behaviours expected clearly and communication of academic expectations. It also entails creating a cooperative learning environment. For instance, a study conducted by Rischer (2008) revealed that classroom organization had significant (positive) effect on students' academic achievement. But David (2002) was of the view that classroom organization had negative (significant) effect on academic of students in science. This position was supported by Usman (2012) who concluded that classroom organization neglected could reduce the achievement of students in any subject. The results above indicated that divergent opinion existed on the relationship between classroom organization and academic achievement. It is therefore imperative to clarify the misconceptions in findings by finding out the actual relationship between classroom organization and academic achievement among secondary school students in Biology.

The fourth variable of this study is classroom climate. According to Negru and Damian (2010), classroom climate refers to the totality of variables noticed in a classroom. It includes variables such as physical element (chairs, tables, chalkboard, classroom windows, books and students' bags and belongings) and human elements (students and teachers). Negru and Damian (2010) opined that there is a relationship between classroom climate and students' academic performance while Qaiser and Ishtiaq (2014) is of the opinion that insignificant relationship exist between classroom climate and students' academic achievement. The inconsistent in research findings as relate to classroom climate and students' achievement form premise for the choice of

the variable in this study. An effective classroom climate is one in which the teachers' authority to organize and manage the learning activities is accepted by the students. This study was expected to be important in establishing the role of teacher competence in improving Biology performance in WAEC examinations in public secondary schools. The study also enables education administrators and managers understand the necessity of ensuring teachers take further training and professional development as a milestone to improve Biology performance in WAEC examinations. The study will also be useful to the Teaching Service Commission (TSC) as an employer and the Ministry of Education in setting standards and monitoring performance of teachers and schools. The study also enables education financiers to realize the need to invest more in developing teachers' competences, classroom organization and climate as a means to improving performance in Biology.

Statement of the Problem

The classrooms in developing countries seems to discourage students from learning: such situation the classroom situation is usually jam-packed with students; the classroom environment is not spacious and conducive; and teachers find it difficult to teach adequately and manage the class effectively due to large number of students in the class. This result to students tends to skip lessons. They may not listen attentively to what is being taught, sometimes they may not copy or update their notes, and some may not perform or carry out their academic task adequately. All these frequently contribute to poor academic performance of students. Hence, this study investigated teachers' competence, classroom organization and climate as predictors of students' academic achievement in secondary school Biology.

Statement of the Hypotheses

The following null hypotheses are formulated and tested for this study:

- Ho1. Teachers' competence, classroom organization and climate do not significantly individualy contribute when taken together to students' academic achievement in Biology.
- Ho2. Teachers' competence, classroom organization and climate do not significantly relatively contribute to the students' achievement in Biology.
- Ho3. There is no significant difference between less qualified and qualified teachers on students' academic achievement in Biology.
- Ho4. There is no significant difference between less qualified and qualified teachers on teachers' competence.

Method

a. Population

The target population of the study comprised of all Public

Secondary Biology teachers' and their students' in Ogun East Senatorial District Areas, Ogun State, Nigeria. It has a population of 123 secondary schools in Ogun East Senatorial District Areas

b. Sample and Sampling Techniques

The sample of the study consisted of 55 Biology teachers and 550 students selected secondary schools in Ogun East Senatorial district areas.

This study adopted a multi-stage sampling technique as follows:

- i At the first stage, a purposive sampling technique was used to select Ogun East Senatorial district from the three Senatorial districts in Nigeria, which contained two zones (Ijebu and Remo), These were chosen because the researcher is familiar to the zones and nearer to the place of study.
- ii At the second stage, a proportional sample technique that is 50% of total number of local government areas in the district. That is, three Local Government Areas were selected from Ijebu zone while the remaining two are from Remo zone.
- iii At the third stage, a proportional sample technique that is 75% of the schools from the selected Local Government Areas. That is, 35 selected schools were selected from Ijebu while the other 20 were from Remo.
- iv At fourth stage, a purposive sampling technique was used, that is, there must be a qualified Biology teacher (B.Sc. Ed.) taking SSII and if they are more than one in the class, we use random sampling techniques to pick a teacher from each of the 55 selected schools, thirty-five Biology teachers' from Ijebu and twenty Biology teachers from Remo. Finally, an arm of the class of the students' was randomly selected.

c. Instrumentation

1. The study used the following instruments.
2. Teachers' Competence Rating Scale (TCRS)
3. Classroom Organisation Rating Scale (CLORS)
4. Classroom Climate Rating Scale (CLACRAS)
5. Biology Achievement Test (BAT)

Teacher's Competence Rating Scale (TCRS)

This instrument was adapted from teaching practice manual developed by Faculty of Education, Olabisi Onabanjo Uni

versity, Ago-Iwoye. It is used to determine teachers' competence in Biology. It contained two sections (A & B). Section A consisted of the qualification of Biology teachers such as: B.Sc, B.Sc (Ed). Section B comprised of 16 items. These items were divided into four sub-headings such as lesson preparation, classroom teaching, instructional resources and evaluation. The lesson preparation consisted of six items, the classroom teaching consisted of three items, the instructional resources consisted of four items while evaluation consisted of three items.

The modified version of the instruments was given to two experts in the areas of educational management and science education for perusal in order to re-establish its face validity. The experts examined the instrument suitability to detect the teachers' competence in classroom, the adequacy of the statements in relation to the items and the language used in terms of clarity. The observations of the experts were noted and used to improve the rating scale. The instrument was revalidated using 20 Biology teachers' which they were not part of the selected sample, then Cronbach alpha formula was used to compute reliability coefficient value to be 0.82.

Classroom Organization Rating Scale (CLORS)

This instrument was developed by Shahid (2002), It was adapted to examine the classroom organization. It has two sections (A-B). Section A contained the personal data of the Biology teachers. It contained 20 items of likert rating scale of four points (Strongly Agree, Agree, Disagree, Strongly Disagree). In scoring the scale, 4 is assigned to Strongly Agree; 3 is assigned to Agree; 2 is assigned to Disagree, 1 is assigned to Strongly Disagree.

The modified version of the instrument was given to two experts in the areas of educational management and science education for perusal in order to re-establish its face validity. The experts examined the instrument suitability test the ability of Biology teacher's on how the classroom is been organize, the adequacy of the statements in relation to the items and the language used in terms of clarity. The observations of the experts were noted and used to improve

the rating scale. The instrument was revalidate using 20 Biology teachers' which they were not part of the selected sample, then Cronbach alpha formula was used to compute reliability coefficient value to be 0.79.

Classroom Climate Rating Scale (CLACRAS)

This instrument was developed by (Shahid, 2002), It was adapted to examine the classroom climate. It has two sections (A-B). Section A contained the personal data of the Biology teachers. It contained 25 items of likert rating scale of four point ((Strongly Agree, Agree, Disagree, Strongly Disagree). In scoring scale: 4 are assigned to Strongly Agree; 3 is assigned to Agree; 2 is assigned to Disagree, 1 is assigned to Strongly Disagree.

The modified version of the instruments was given to two experts in the areas of educational management and science education for perusal in order to re-establish its face validity. The experts examined the instruments suitability to examine the classroom atmospheric condition, the adequacy of the statements in relation to the items and the language used in terms of clarity. The observations of the experts were noted and used to improve the rating scale. The instrument was revalidate using 20 Biology teachers' which they are not part of the selected sample, then Cronbach alpha formula was used to compute reliability coefficient value to be 0.85.

Biology Achievement Test (BAT)

This instrument was constructed to determine the performance of students taught by the Biology teacher's in Senior Secondary Schools. It had two sections (A&B). Section A consists of students' personal data such as Local Government Area; name of school; present class and sex. Section B consisted of initially 60 items of multiple-choice objective test, later reduced to 40 derived from the past senior secondary school objective questions conducted by WAEC and NECO. Each item had one correct option (the key) and four distracters (A-D). The BAT was developed based on Secondary School II level using Federal Ministry of Education Secondary School Curriculum for Mathematics (2009) pre

Table 1: Showing the Analysis of Variance Analyses of the Joint Contribution of Teacher's Competence, Classroom Organization and Climate on Students' Achievement in Biology

Multiple R=0.114					
Multiple R square=0.013					
Adjusted Multiple R square=0.007					
Standard error of estimate=8.615					
Analysis of variance					
Model	Sum of Square	Df	Mean Square	f -ratio	Significant value
Regression	529.945	3	176.648	2.380	0.069b
Residue	40526.608	546	74.225		
Total	41056.553	549			

pared as guideline. The test was specifically drawn to cover the Transpiration, Heart and Micro-organisms. 60 items of the BAT were developed using a table of Test Blue Print. The Kuder - Richardson 20 formula was used to establish a coefficient reliability estimate of the instrument to be 0.87.

Method of Data Collection

During the research period, the letter was been given from the department, the schools involved were visited and permission was sought from the principal of each schools to use their Biology teachers' and Biology students'. Four instruments were used for data collection (Classroom Organization Rating (CLOQ), Classroom Climate Rating Scale (CLACRAS), Teachers' Competence Rating Scale (TCRS), and Biology Achievement Test (BAT). The researcher collected data of Biology teachers' through the principal and the researcher distributed achievement test for the student to test their performance for a duration of 30 minutes and the questionnaire were collected back from both principal and Students'.

Method of Data Analysis

The data collected from this study was analyses using t-test

Table 2: Showing the regression analysis of the relative contribution of teacher's competence, classroom organization, classroom climate on student's achievement in Biology.

Variables	R	R Square	Adjusted R	Significant
Teachers' Competence	0.078	0.006	0.004	.518
Classroom Organization	0.074	0.005	0.004	.579
Classroom Climate	0.022	0.001	-0.001	.054

do not significantly predict students' academic achievement in Biology but they account for 1.30% of the variance in the dependent variable. Therefore, it implies that teachers' competence, classroom organization and climate do not significantly predict students' academic achievement in Biology.

H02: Teachers' competence, classroom organization and climate do not significant relatively contribute to the students' achievement in Biology.

Table 3: Showing Teachers' Qualifications on Students' Academic Achievement in Biology.

Qualifications	N	Mean	Std. Deviation	Df	T value	Significant value
Less qualified	231	26.81	8.691	445	1.355	0.176
qualified	319	25.69	8.540			

shows that the R values for teacher's competence, classroom organization and climate are 0.078, 0.074, and 0.022 respectively. While the R Square values for teachers' competence, classroom organization and climate are 0.006, 0.005, and 0.001 respectively. The Adjusted R values for teacher's competence, classroom organization and climate are 0.004, 0.004, and -0.001 respectively. Since their significant level of P are greater than 0.05. Therefore, this hypothesis 2 is accepted. This indicated that teachers' competence, classroom organization and climate are contributing

and Analysis of Variance (ANOVA) statistical methods. Analysis of Variance was employed to test the first and second hypotheses and t-test was employed to test the third and fourth hypotheses. The hypotheses were conducted at 95% level of significance.

Results and Discussion

H01: Teacher's competence, classroom organization and climate do not significantly individually contribute when taken together to student achievement in Biology.

Significant ($P > 0.05$)

a. Predictors: (Constant), teachers' competent, classroom organization, classroom climate

b. Dependent Variable: students' achievement

Table 1, indicate that the combination of the variables (teachers' competence, classroom organization and climate) in predicting the students' achievement in Biology yielded a coefficient of multiple regression (R) = 0.114 and multiple regression square (R^2) = 0.013. The table also shows that F - ratio value 2.380 at significant level of 0.05. Thus, this means that when these variables are taken together, they

Significant $P > / 0.05$

a. Predictors: (Constant), teachers' competence, classroom organization, classroom climate

b. Dependent Variable: Students' Achievement

Table 2 present the parameter estimates of these variables (teachers' competence, classroom organization and climate) on students' achievement in Biology. The result

but not significantly to explaining students' achievement in Biology.

H03: There is no significant difference between less qualified and qualified teachers on students' achievement in Biology.

Significant at $P > / 0.05$ level of significance

Table 3 revealed that the mean scores of students taught

Table 4: Showing the Teachers' Qualifications on Teacher's Competence in BiologySignificant at $P < 0.05$ level of significance

Qualification	N	Mean	Std. Deviation	Df	T	Significant
B.Sc.	231	44.20	9.922	445	4.024	0.000
B.Sc. (Ed.)	319	47.52	7.513			

by less qualified teachers' and qualified teachers' are 26.81 and 25.69 respectively. The Standard deviation values of the less qualified teachers' and qualified teachers' are 8.691 and 8.540 which is less than P values. The degree of freedom is 445. The t-test value is 1.355 and the level of significance value is 0.176. Since the level of significance value 0.176 is greater than 0.05. Therefore, this hypothesis 3 is accepted. This implies that there is no significant difference on teachers' qualification and students' academic achievement in Biology.

H04: There is no significant difference between less qualified and qualified teacher's in teacher's competence in Biology.

Table 4 reveal that the mean scores of teacher's competences by less qualified teachers' and qualified teachers' are 44.20 and 47.52 respectively. The Standard deviation values of the less qualified teachers' and qualified teachers' are 9.922 and 7.513 respectively. The degree of freedom is 445. The t-test value is 4.024 and the level of significant value is 0.000 respectively. Therefore, this hypothesis 4 is rejected. This implies that there is a significant difference on teachers' qualification and teacher's competence in Biology.

Discussion

From the findings of Hypothesis 1, this result implied that, teachers' competence, classroom organization and climate does not significantly individual contributed on student academic achievement in Biology. This result was in line with the findings of Kplan and Owing (2001), which found that teachers' competence has no significant effect on students' academic achievement; the knowledge of the teachers and how it can teach the subject determine the performance of the students on that particular subject. Ilugbusi, Falola and Daramola (2007) showed that all the variables are not significant in the determination of students' achievement in external examinations such as West Africa Senior School Certificate Examination (SSCE), National Examination Council (NECO). Qaiser and Ishtiaq (2014) is of the opinion that not significant relationship exist between classroom climate and students' academic performance.

From the findings of Hypothesis 2, this result implied that teachers' competence, classroom organization and climate did not have a significant relative effect on student academic achievement in Biology. This result supported the findings of Kplan and Owing (2001), examined the effect of teachers' competence on student academic performance. In their report teachers' competence has no significant effect on students' academic achievement, the knowledge of the teachers' and how it can teach the subject determine the performance of the students' on that particular subject.

Ilugbusi, Falola and Daramola (2007) showed that all the variables is not significantly in the determination of students' achievement in external examinations such as West Africa Senior School Certificate Examination (SSCE), National Examination Council (NECO). Qaiser and Ishtiaq (2014) was of the opinion that insignificant relationship exist between classroom climate and students' academic performance. However, this result is in contrary with the finding of Bangbade (2004) found out that all this variable has significant relationship with students' academic achievement. Also, Adediwura (2007) found out that teachers' competence, classroom organization and climate as a significant measured on students' academic achievement in Biology.

From the findings of Hypothesis 3, this result implied that teachers' qualification does not significantly difference on students' achievement in Biology. This result was in line with the findings of Onyeachu (2008), found that there is no difference between teachers' qualifications and students' achievement; Owolabi (2007) also found that teachers' qualification did not significantly determine students achievement in secondary schools. This result affirmed Shacter and Thum (2004) found that qualification did not have significant difference with academic achievement of students in Biology. However, this result was in contrary with Maguswi (2011); Adaramola and Obomanu (2011). Maguswi (2011) found that lack of qualified teachers of Biology had a significant contribution to students' failure and Adaramola and Obomanu (2011) found that lack of qualified teachers led to consistent poor performance of students in Biology.

From the findings of Hypothesis 4, this result implied that teachers' qualification has significantly difference on teachers' competence in determined the students' academic achievement in Biology. This result was in line with the findings of Ngada in Fajonyomi (2007) who found that teachers' qualification was significant on teachers' competence. This view is supported by Nkwodimah's (2003) found that teachers' qualification had a significant contribution on teachers' competence. Elliot (2005) noted in a longitudinal study that well-qualified teachers had a significant influence on high school students' achievement in Biology. In this study teacher qualification was measured by education, experience and teacher competence. However, this result is contrary to the finding of Rivkin (2005) who did not find any convincing evidence that a first degree raises teachers' competence at secondary school level. The finding further concurred with Kimani (2013) who asserted that additional professional qualifications beyond the first degree do not significantly lead to improved competence of teacher at the secondary school level. A study done by Myrberg and Ros (2003) found that a master's degree was not significantly found to be associated with improved teacher competence in delivering Biology content in secondary schools.

This study found that there were significant difference less qualified and qualified teachers in teachers' competence in Biology. Hence, it was concluded that qualifications had significant effect on teachers; competence.

Conclusion

Results revealed that Teachers' competence, classroom organization and climate did not have relative effect on students' academic achievement in Biology. It was concluded that teachers' competence, classroom organization and climate does not have combined effect on students' academic achievement in Biology.

Recommendations

The recommendations made in this study were based on the study findings in relation to the existing literature. According to the findings presented in the previous chapters, the following recommendations were imperative:

Teachers should be skilled in classroom organization so as to influence students' academic performance positively, and teachers should strive to create a conducive classroom climate to help students attain academic success.

Qualified Biology teachers should be employed to teach students in the classroom in order to enhance student achievement in Biology.

Biology subject teachers should be encouraged and be facilitated to participate in trainings and other in-service trainings to enhance their competence at work and how to control and organized the classroom for effective learning to take place.

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