



# Effect of Chemistry Teacher's Commitment on Public Secondary School Student Performance in Chemistry Subject in Nyagatare District, Rwanda

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**Abstract:** Teachers are the key actors in guaranteeing effective teaching and learning processes. The data from the national examinations have shown that students' performance in Chemistry has been generally poor and this has been observed in five selected schools that have a science combination where chemistry is a major subject in the Nyagatare district. The purpose of this study was to determine how chemistry teacher commitment influences student performance in chemistry in selected public secondary schools in Nyagatare District. Descriptive survey research design was used. Data were collected using questionnaires, focus group discussions, lesson observation forms, and interviews. The study targeted 21 teachers, 5 Heads of the school and 142 students. Yamane formula was applied to determine the sample size of the students and the selection of teachers and headteachers was done using purposive sampling. We analyzed the information by using an excel sheet and findings were reported using frequency tables and percentages to enable easy interpretation. Qualitative data were analyzed thematically and reported in narrative form. The findings of this study indicate that teacher's commitment leads to good student performance and the more a teacher is committed and engaged the more students learn from him /her new knowledge. A good teacher should be committed in order to achieve the intended objective. This will produce a good performance in his /her respective lesson. The study recommends that stakeholders get involved in working on strategies to motivate the teacher, including organizing workshops and seminars where teachers can appraise their knowledge and skills.

**Keywords:** Academic performance; Chemistry; Students' engagement; Secondary school; Teacher commitment.

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## 1. Introduction

Johannessen & Skaalsvik (2014) define teacher commitment as teachers' sense of purpose and focused energy that is evident to others through the display of personal initiative, adaptability, effort, and persistence directed towards the organization's goals. That is a reason why the commitment of a teacher deals with motivation and looking for a new impact. It has been proved that committed teachers make difference in the achievement of their students. Committed teachers are emotionally bonded to their work (Jones & Kessler, 2020) Beyond that, committed teachers are aware of the advancement of learners' knowledge.

The research conducted by (Dimkpa, 2015) in Nigeria argues that teachers' commitment has been viewed as a great critical factor in students' academic performance in Chemistry subjects. In this context, the committed teacher feels energetic and dedicated and is the one who is absorbed by his work (Ruqaishi, 2017). Scholars also underline that passion is also associated with commitment, caring, enthusiasm, and hope. Passion is very important to motivate and inspire students in their learning process (Girls & Sciencetechnology, 2019). It requires enthusiasm and motivation for learning, and high levels of commitment, with teachers, not only knowing the content to be taught but also knowing the impact their teaching has on their student's ability to become self-directed lifelong learners (Franklin & Harrington, 2019). Indeed, in teaching and learning,

teachers' commitment is very important to enrich the interest of students in performing chemistry subject. This means that teachers who are committed work hard with vigour are also dedicated, and feel happily absorbed in their work (Jaya & Ariyanto, 2021). They should show positive emotions, which are enthusiasm, happiness, and joy, have better physical and psychological health, create their own resources, and transfer their commitment to others (Kaczmarek et al., 2022). However, teachers should understand that students also play a significant role in the teaching and learning process.

## **2. Literature Review**

### **2.1. Teacher commitment to academic performance**

The research conducted by (Dimkpa, 2015) in Nigeria argues that teachers' commitment has been viewed as a great critical factor in students' academic performance in Chemistry subjects. In this context, the committed teacher feels energetic and dedicated and is the one who is absorbed by his work (Ruqaishi, 2017). Scholars also underline that passion is also associated with commitment, caring, enthusiasm, and hope. Passion is very important to motivate and inspire students in their learning process (Girls & Sciencetechnology, 2019). It requires enthusiasm and motivation for learning, and high levels of engagement, with teachers not only knowing the content to be taught but also knowing the impact their teaching has on their students' ability to become self-directed lifelong learners (Franklin & Harrington, 2019)

### **2.2. Teacher commitment to teaching**

Work commitment is defined as the degree to which a person desires to be involved in work. It can also be defined as the degree to which a person psychologically identifies with his or her work (Juaneda-Ayensa et al., 2017). A teacher with a strong work commitment has more positive thoughts and feelings about their occupation than those with a weak work commitment. Teachers have distinct personality traits, belief systems, and cognitive abilities that influence their decisions and activities in the classroom (Ibad, 2018). We cannot ignore that teacher commitment to teaching is compared to the psychological link between teachers and their teaching. It is identified in a teacher's willingness to provide effective teaching, high levels of enthusiasm, and willingness to devote extra time to students and The more dedicated a teacher is, the longer he will remain in the teaching profession (Tuğrul Mart, 2013) In this context, teacher commitment to teaching is defined as a willingness to participate in the teaching and learning process. (Altun, 2017)

### **2.3. Teacher commitment to the profession**

Professional commitment refers to one's attitude toward one's profession or vocation. The professional

commitment was defined by (Tuğrul Mart, 2013) as the advancement of individual vocational goals and the drive and commitment associated with achieving these goals. Furthermore, the teacher to profession entails psychological attachment to the job or occupation, which is combined with personal identification and satisfaction as a teacher (Collie, R.J., Shapka, J.D., Perry, N.E., & Martin, 2016). Teacher self-efficacy is important in an educator's choice of personal goals, persistence when faced with adversity, and motivation to perform certain behaviors in teaching, such as when using digital learning content (Bray-Clark, N & Bates, 2003). We cannot overlook the importance of teacher commitment to the job because it improves not only the development of necessary skills but also relationships to have a productive career without regard to the institution in which he or she is employed ((Toropova et al., 2021). Workers are advised to direct their emotional behavior toward the tasks assigned to them. This type of person falls into two categories. First and foremost, there are those who take part in the assigned work. Second, some people concentrate on their profession in order to improve their professional skills, abilities, and knowledge (Mwesiga & Okendo, 2018). As a result, we can define teacher commitment to the profession as the level of teacher involvement and motivation to work and to improve skills, knowledge, and teaching abilities.

### **2.4. Teacher commitment to school**

According to (Hussen et al., 2016) teacher commitment to school has been a major source of concern when compared to other areas of teacher commitment. It has only been studied to determine its nature and impact on teacher commitment to the school. (Baptista & Molina-Andrade, 2021) have shown that science teachers are more committed than language school teachers. The high level of commitment at school demonstrates the teacher's involvement in school activities in order to achieve the school's objectives. In this view, teacher commitment to the school is defined as the teacher's beliefs and acceptance of the school's values and goals (Celik & Yildiz, 2017)

### **2.5. Teacher commitment to student**

Dannetta (2002) agreed that commitment to students is embedded in the teachers' high efficiency and expectations. He also affirmed that students' commitment regards both teachers' and students' achievements to attain the school's mission. There is good motivation for teachers when students are surely motivated. It motivates teachers to handle students' problems or to know well students' achievements and development (Koca & Ph, 2016). It is very dangerous to students when teachers have a low level of commitment because it may affect students' achievement, less sympathy and lower tolerance for frustration in teaching and learning activities. Teachers who are committed to their students are exactly engaged with students. The engaged teacher works hard to set meaningful classroom activities and gives new ways of learning (Shu, 2022). Indeed, teacher commitment to students is regarded as a teacher's involvement and responsible

engagement in student learning (Altun, 2017). In short, in education, we should consider these dimensions because they are necessary to achieve the school objectives, improve teachers' professionalism, increase students' performance and have changes in teacher practice.

### 3. Methodology

Ranneerselvam (2006) defined a research methodology as a system of models, procedures and techniques used to find out the results of the research. In this chapter the researcher discusses research design, research instruments, study population, sample strategies and sample size, data collection techniques, data analysis procedures, validity and reliability ethical issues and the conclusion of the chapter.

#### 3.1. Research design

Research design is concerned with techniques and methods that a researcher chose to collect data and analyze them. This study adopted a descriptive survey research design. According to (Ishtiaq, 2019) argues that the descriptive research deals with identification of attributes of special phenomenon based on either observational basis or the explanation of correlation among phenomena.

This method is very important just because it generates a proper meaning of what a research problem is all about before it investigates why it exists in the first place. This method uses most of the time the way of examining people's feelings, attitudes, and thinking about specific aspects. Indeed, this method has been useful for this research because teacher's engagement was immediately measured or observed but this inferred from certain cues that gave the implicit nature of teacher characteristics (Sokolov, 2017). To obtain the data we used questionnaires to the teacher, headteacher, that represent various engagement variables., focus group discussion and lesson evaluation schedule, results were collected and analyzed the information by using an excel sheet and findings were reported using frequency tables and percentages to enable easy interpretation. Qualitative data were analyzed thematically and reported in narrative form. We used a descriptive research design and based on qualitative and quantitative approach. The study targeted 21 teachers, 5 heads of the school and 142 students. Concerning the targeted schools, these were selected according to their location. Yamane formula was applied to determine the sample size of the respondents and the selection of teachers was using convenience sampling. To collect data, questionnaires were distributed to 21 teachers and 5 heads of secondary school for data collection, all headteachers and five chemistry teachers were interviewed, focus group discussion was done by the students and I carried out a lesson observation in class. The findings of this study were therefore analyzed and interpreted to have adequate conclusions and recommendations for improvement and further research.

#### 3.1 Study setting

This study was carried out in Nyagatare District, which is one of the seven districts of Eastern Province in Rwanda. The study dealt with chemistry teachers and students in Senior Secondary School in science combination as they are the people studying chemistry as a separate subject. Concerning the targeted schools, these were selected according to their location, and the science combinations they have. We used a descriptive research design and based on qualitative and quantitative approach and data were collected using questionnaires, focus group discussion, lesson observation form and interview. The study targeted 21 teachers, 5 heads of the school and 142 students.

#### 3.2 Data collection instrument

During this study, we used various instruments for collecting data to make it more accurate, reliable, and certain. Primary data were collected using questionnaires, focus group discussion and lesson observation schedule. As result, we got a quick, cheap, and efficient way of obtaining more information from a good number of respondents data were collected by direct administration of the instruments to the informants. To obtain secondary data, the researchers used results sheet from the district about students' academic performance.

#### 3.3 Study population

The target population was composed of chemistry teachers, headteachers of secondary schools and student in advanced level. Therefore, the study population was composed of 21 teachers, 5 headteachers and 142 students. The researcher selected purposively five secondary schools in Nyagatare District. The total population was 168. Yamane formula was applied to determine the sample size of the respondents.

#### 3.4 Sampling strategies

The researcher selected 5 secondary schools purposively to be part of the study because students in advanced level in science combination as they are the people studying chemistry as a separate subject. Chemistry teachers and headteachers also were selected purposively because they are expected to have relevant information on teachers' engagement to enhance secondary school students' academic performance in chemistry subject.

#### 3.5. Sample size

The sample of this research comprised of all 5 headteachers of selected schools because they were in small number. All 21 chemistry teachers presented in selected schools because they were few. The sample size of students was 105 for students from 142 students of science combinations containing chemistry subject as a major subject. Yamane formula was applied. The total sample were 131 respondents. The above selected sample was based researcher (Mckenzie and Cttrell, 2011) who stated that there is no rule for sample size in

qualitative inquiry that when determining the sample size for qualitative study. The researcher had to balance the need for appropriate data with the resource needed to collect it.

$$n = \frac{N}{1 + N * (e)^2}$$

n: The sample size

N: The number of populations

E: Acceptable sampling error

### 3.6. Data analysis

Collected data were read, checked, revised, and marked. Grouping was done according to variables considered to the study research which reflected on the objective of the study.

In the analysis of the data both qualitative and quantitative method both were involved. In the quantitative method, simple frequency tables and percentages were calculated, and inferences were drawn by comparing the figures. Numerical data were put into a spreadsheet (Excel) to generate tables, and graphs. They were presented in accordance with the themes of research topics. In addition, qualitative data were

analyzed according to their themes and completed quantitative data.

### 3.7. Validity and reliability of the study

#### 3.7.1. Validity

Validity is used to make sure that the instrument measures what will be measured. A check was done by revising the questions to remove some ambiguity, wrong phrasing of questions by presenting the instrument to the supervisor. The questions conveyed the same meaning to all respondents. Validity of the designed instruments was measured by review of experts. The feedback enabled to fine tune the instruments.

#### 3.7.2. Reliability

The level to which a measuring instrument produces the same results after many repeated trials is referred to as its reliability. Aside from the chosen schools, piloting was carried out in other schools. The schools were of the same level, with public schools and rural secondary schools both on the same level. The instruments were chosen after a comparison of responses for the various items. The Cronbach's alpha for the research tools was **0.79**, indicating that the tool was reliable.

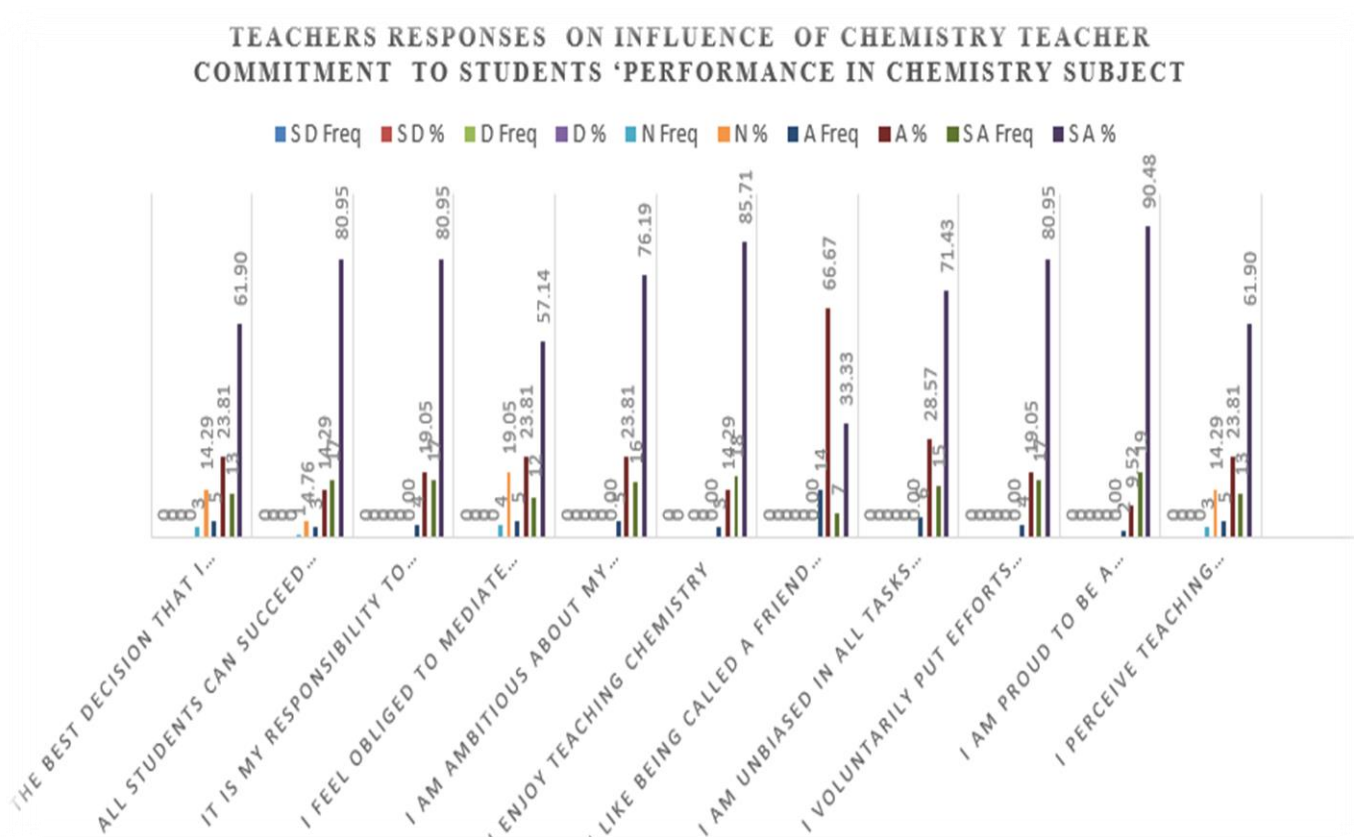
## 4. Results and Discussion

**Table 1: Teachers' Responses on the Influence of Chemistry Teacher Commitment to Students 'Performance in Chemistry Subject**

Item	S D		D		N		A		S A	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
The best decision that I have ever made is to become a chemistry teacher.	0	0	0	0	3	14.29	5	23.81	13	61.90
All students can succeed, and it is my mission to ensure their success through active participation	0	0	0	0	1	4.76	3	14.29	17	80.95
It is my responsibility to ensure good relationships among students	0	0	0	0	0	0.00	4	19.05	17	80.95
I feel obliged to mediate rival groups of students	0	0	0	0	4	19.05	5	23.81	12	57.14
I am ambitious about my work	0	0	0	0	0	0.00	5	23.81	16	76.19
I enjoy teaching chemistry	0	0	0	0	0	0.00	3	14.29	18	85.71
I like being called a friend by the other teachers at my school	0	0	0	0	0	0.00	14	66.67	7	33.33
I am unbiased in all tasks related to school	0	0	0	0	0	0.00	6	28.57	15	71.43
I voluntarily put efforts for support slow learners	0	0	0	0	0	0.00	4	19.05	17	80.95
I am proud to be a chemistry teacher	0	0	0	0	0	0.00	2	9.52	19	90.48
I perceive teaching chemistry as the best choice I did for my lifetime career	0	0	0	0	3	14.29	5	23.81	13	61.90

This table depicts the impact of chemistry teacher commitment on students' chemistry performance. A chemistry teacher is proud of being a chemistry teacher, according to 90.47% of respondents. It also demonstrates that 80.95% of chemistry teachers strongly believe that all students can succeed and that it is their mission to ensure their success through active participation. It is his responsibility to maintain positive relationships among students, and he is objective in all school-related tasks. Chemistry teachers in Chesty

71.42% agree that he is objective in all school-related tasks and is ambitious about his work. 61.90% agree that the best decision a chemistry teacher has ever made is to become a chemistry teacher, and he considers teaching chemistry to be the best decision he has ever made for his lifetime career. Whereas 57.14% strongly agree that the chemistry teacher feels obligated to mediate rival groups of students. Few respondents (33.33%) strongly agree that a chemistry teacher enjoys being referred to as a friend by his colleagues.



**Figure 1: Teacher Responses on the influence of chemistry teacher commitment to student performance.**

**Table 2: First class observation on influence of chemistry teacher commitment to student performance in chemistry subject**

Teachers' commitment	First observation						Mean	SD
	Teacher1	Teacher2	Teacher3	Teacher4	Teacher5	Teacher6		
There is clear evidence that the teacher has a good understanding of the subject content and competences	3	4	5	4	5	3	4.00	0.89
The teacher adapts the contents to the learner's level of understanding successfully to facilitate them to achieve the instructional objective	3	3	3	3	3	3	3.00	0.00
Teacher projects sufficient energy, enthusiasm energy or confidence when teaching.	4	4	3	3	4	4	3.67	0.52
Chemistry teachers demonstrate a strong desire and commitment to teaching.	3	4	5	4	5	4	4.17	0.75
The teacher seems well organized and followed through on assigned tasks.	4	4	3	3	4	4	3.67	0.52
Teachers demonstrate an understanding of the basic teaching-learning principle.	3	4	5	4	5	4	4.17	0.75
Teachers voluntarily put effort into slow learners.	4	4	3	3	4	4	3.67	0.52
The teacher is willing to be engaged in teaching work	4	4	3	4	3	4	3.67	0.52
Overall mean	3.50	3.88	3.75	3.50	4.13	3.75	3.75	0.24

We spent time observing chemistry teachers' commitment to their jobs. On the first occasion, we discovered that teachers have a certain level of dedication. Chemistry teachers demonstrated their dedication to their jobs in the above table. The average is 3.75, with a standard deviation of 0.24. They scored differently in the class observation we conducted. One received a score of 4.13, while the other demonstrated his commitment with a score of 3.88. The two scored on the level of 3.75. Last but not least, he received a 3.50. This observation shows that chemistry teachers are unquestionably dedicated to their profession.

**Table 3: Second class observation on influence of chemistry teacher commitment to student performance in chemistry**

Teachers' commitment	Second observation						Mean	SD
	Teacher1	Teacher2	Teacher3	Teacher4	Teacher5	Teacher6		
There is clear evidence that the teacher has a good understanding of the subject content and competences	5	4	5	4	5	4	4.50	0.55
The teacher adapts the contents to the learner's level of understanding successfully to facilitate them to achieve the instructional objective	5	5	3	4	3	4	4.00	0.89
Teacher projects sufficient energy, enthusiasm or confidence when teaching.	4	4	4	4	4	4	4.00	0.00
Chemistry teachers demonstrate a strong desire and commitment to teaching.	5	4	5	4	5	4	4.50	0.55
The teacher seems well organized and followed through on assigned tasks.	5	4	4	3	4	5	4.17	0.75
Teachers demonstrate an understanding of the basic teaching-learning principle.	4	4	5	4	5	4	4.33	0.52
Teachers voluntarily put effort into slow learners.	4	3	4	4	3	4	3.67	0.52
The teacher is Willing to be engaged in teaching work	4	4	5	4	3	4	4.00	0.63
<b>Overall mean</b>	4.50	4.00	4.38	3.88	4.00	4.13	4.15	0.14

Table 3 shows how teachers feel about teaching chemistry. They increased their level of commitment to the teaching and learning process as they received more advice at that point. Teachers demonstrated a high level of commitment to their daily duties and responsibilities after the first-class observation. The average is 4.15, with a standard deviation of 0.24. Chemistry teachers performed differently in their respective classes. The first teacher received 4.50, the second received 4.38, and the third received 4.13. The fourth and fifth teachers each received a 4.00. The last one received 3.88. Indeed, we were impressed by the dedication of chemistry teachers. Our findings have been supported by the participant interviews and questionnaires.

One of the schools' principals and chemistry teachers unanimously agreed that a teacher's commitment is critical to student performance. They provided their perspectives and responses, which support the previously mentioned data. In our interview, the Chemistry teacher confirmed that his commitment is the key to managing the class and his lesson properly. He revealed that commitment is his inner motivation because becoming a chemistry teacher is the best decision he has ever made. Many chemistry teachers stated in their interactions and interviews that they are very proud of being chemistry teachers. The

participants unanimously agreed that when a teacher voluntarily makes efforts to support slow learners, their performance improves. The participants believed that strong motivation to teach results in good student performance.

They also demonstrated that the teacher would deliver the entire curriculum because chemistry is his or her hobby. During our conversation with them, they insisted that a good relationship between students and teachers builds a proper way for students to perform better. Aside from that, the chemistry teacher agreed that teaching chemistry was his best choice for a lifetime career. To summarize, our interviewees believed that in order to perform chemistry, both students and teachers must be committed. Participants in the interview agreed that the engagement and commitment of chemistry teachers promote student performance in selected Nyagatare District schools. Students unanimously agreed that their teacher relates his knowledge and delivered content. He also understands the subject matter because students receive sufficient explanations to make the lesson flow smoothly and understandably.

The interviewees strongly agreed that through the commitment of the teacher, they can learn a lot because

they get the exact answer to the chemistry question that they ask themselves. They are now doing well as a result of his chemistry knowledge. The participants agreed, based on the interviews we conducted, that their chemistry teacher exhibits sufficient energy, enthusiasm, and confidence when teaching. He joins them and clarifies the assigned tasks. When they are unsure about the instructions, he can assist them. Indeed, the interviewees all agreed that the teacher is self-assured when teaching. They confirmed that their chemistry teacher has never been discouraged, even if the content has not yet been fully grasped. They admired his approach to his students, which consisted of repeating the material until everyone understood it.

## Discussion

In this study, we looked at the main idea that determines how chemistry teachers' commitment influences students' performance in chemistry class. It has been investigated in various ways, and many participants strongly agree (90.47%) that a chemistry teacher is proud of being a Chemistry teacher. Beyond that, the objective was interpreted to mean that 80.95% of chemistry teachers strongly believe that all students can succeed and that it is the teacher's mission to increase student success through active participation. It is his responsibility to foster positive student relationships. Indeed, as a goal of our research, the commitment has been detailed in the sense that Chemistry teachers 71.42% agree that a good teacher is objective in all school-related tasks and is ambitious in his work. 61.90% agree that the best decision a chemistry teacher has ever made is to become a chemistry teacher, and he considers teaching chemistry to be the best choice he has ever made for his lifetime career. During the interview, 57.14% strongly agreed that the chemistry teacher feels obligated to mediate between rival student groups. Few respondents (33.33%) strongly agree that a chemistry teacher enjoys being referred to as a friend by his colleagues.

Furthermore, the teacher's commitment is demonstrated in the interaction we held with teachers, where 90.47% of teachers are enthusiastic, with 90.47% teaching chemistry. This means that being enthusiastic while teaching plays an important role in content delivery. Students are more engaged, more willing to contribute to class discussions, and more willing to discuss any problems or concerns they have with a module when their teacher is enthusiastic. The theme also influences students' performance in a module or course. Teachers who are enthusiastic are thought to be more effective (Hooda & Annu, 2018). A teacher's enthusiasm is a key component of their competence and health. It is an important part of a teacher's professional development. The enthusiasm of the teacher increases students' enjoyment, interest, and motivation, which has a significant impact on their performance (Patrick et al., 2000). In this view, we demonstrated that being a proud chemistry teacher outweighs all other factors that influence a teacher's commitment. They consist of a specific sequence of psychological changes such as

cognitive processing, verbal and nonverbal expression, and behaviour or action tendencies. Teachers' expectations of themselves are frequently unrealistically high, such as being prepared for and effectively responding to every disciplinary issue, being able to motivate any student for schoolwork, or being fully responsible for students' academic achievement (Rubie-Davies et al., 2010). This demonstrates that being proud to be a chemistry teacher promotes some skills that teachers use to teach effectively. In other words, pride influences not only teachers but also students to achieve certain goals and targets in their daily activities.

So far, the commitment of a chemistry teacher is shown where 90.47% feel proud of being a chemistry teacher. They make their learners more competent in chemistry whereas enjoying teaching chemistry helps teachers to teach effectively and students gain more knowledge for that matter. The chemistry teacher's commitment has been examined successfully in the previous chapter. A good teacher should be fully engaged so that he /she attains the targeted objective. This will produce a good performance in his /her respective lesson.

## 5. Conclusion and Recommendations

### 5.1 Conclusion

Based on the findings of our study, we can conclude that Teacher's commitment leads to good students' performance. The students benefit from their group interaction. Internal motivation enables a chemistry teacher to be very enthusiastic about his students. In this context, the outcomes of that interaction will reflect the student's performance.

### 5.2 Recommendations

Basing on the research findings and conclusions, the following recommendations are to be made: The findings indicate that Teacher's commitment leads to good students' performance. It is therefore necessary for education stakeholders to find out different ways of having committed teachers. The study shows that chemistry teachers are well qualified. However, they need workshops and training. This may enhance staff commitment of chemistry teachers. Monitoring and evaluation is always necessary to help chemistry teachers to improve their ways of teaching.

The students need to know the relevance of chemistry in our daily life. This will lead them to attend class with enthusiasm.

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#### 8. Conflict of interest

None

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