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FACTORS CONTRIBUTING TO LOW ACADEMIC ACHIEVEMENT OF grade ten students in Biology under Samtse Dzongkhag

Thesis

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FACTORS CONTRIBUTING TO LOW ACADEMIC ACHIEVEMENT OF GRADE TEN STUDENTS IN BIOLOGY UNDER SAMTSE DZONGKHAG.

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Factors contributing to low academic achievement of grade ten students in Biology under Samtse Dzongkhag.

Declaration of Originality

DECLARATION OF ORIGINALITY

I hereby certify that I am the sole author of this dissertation and that no part of this dissertation has been published or submitted for publication. I certify that, to the best of my knowledge, my dissertation does not infringe upon anyone's copyright nor violate any proprietary rights and that any ideas, techniques, quotations, or any other material from the work of other people included in my dissertation, published or otherwise, are fully acknowledged in accordance with the standard referencing practices.

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Abstract

ABSTRACT

The quality of science education is recognized as an important goal. However, the deteriorating academic achievement of grade ten students in Biology was of concern, thus to militate this problem, it was important to investigate the factors influencing low academic achievement in Biology. Though there are various factors associated to students' academic achievement, the specific mechanism through which those factors exert their influence on students' academic achievement are not fully understood. Based on the empirical studies carried out in the past, this study investigated the factors influencing grade ten students' academic achievement in Biology in four selected higher and middle secondary school of Samtse Dzongkhag. The sample of the students consisted of 155 students, three principals, and four Biology subject teachers who were teaching those students during the study. The study employed the concurrent mixed method research design. The tools used were interview and survey questionnaire. The validity and reliability were checked through pilot study and had Cronbach alpha above 0.6. The quantitative data was inferentially analysed through Pearson's correlation test in Statistical Package for Social Sciences (SPSS) version 22 and qualitative data were thematically analysed based on emerging themes. The findings highlighted that the factors such as parents' education qualification level, students' attitude towards Biology, academic motivation, study habit, English language proficiency of students and teacher competence had significant positive correlation with students' academic achievement.

KEYWORDS

Academic achievement, academic motivation, attitude, proficiency, correlation, influence.

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List of Abbreviations

LIST OF ABBREVIATIONS

BCSE	Bhutan Certificate for Secondary Education
DEEWR	Department of Education, Employment and Work place Relations
OECD	Organization of Economic Co-operation and Development
REC	Royal Education Council
SDT	Self Determination Theory
SPSS	Statistical Package for Social Science

CHAPTER 1: INTRODUCTION

1.1 Background

Science Education is one of the most important aspects of human resource development in the world. Today, the students' academic achievement plays an important role in producing competent graduates who will become great leaders and manpower for the country that holds responsible for the country's socio-economic development. Therefore, Science education should equip the learners with the scientific knowledge, skills, values and attitudes that will help them to become active, informed and critical citizens who can contribute to debates about sensitive moral, ethical and environmental issues (Royal Education Council, 2019).

Academic achievement is defined as a successful accomplishment or performance in a particular subject area which is indicated by grades, marks and scores of descriptive commentaries (Dimbisso, 2009). The grades and scores obtained by students represent students' academic standing, and are also the pointer of the school's effectiveness, an indicators of quality education, a major determinant of the wellbeing of youths in particular and the nation at large (Lewin et al. 2011).

Science of biology teaching is important in the schools because it helps students to comprehend the natural phenomena of how lives evolve, survive and change over time, and provides scientific understand of how all living and non-living organisms interact with each other. Similarly, Nwosu (2005) also claimed that biology provides a platform for teaching students to develop the ability to apply science concepts and principles in solving everyday life problems. With knowledge explosion all over the world through the internet facilities, the biological knowledge has also been expanded. However, over the past years, the academic achievement of the students in science subjects, particularly in biology was not so impressive and enticing.

According to Waters and Marzano (2006), there are ranges of factor that influence the quality of academic achievement in students. A series of variables has to be considered while identifying the factors that contribute towards quality of academic success. Identifying the most contributing variables or factors in academic achievement is a very complex and challenging job.

Several studies have indicated that there are many associated factors that contribute to low academic achievement of students (Çimer, 2004 and Tekkaya et al. 2001). For example, factors such as difficult biological concepts, learning stress, low socio-economic status, teachers' competence are some of the prominent factors that contribute to low performance of students (Özcan, 2003). These factors negatively impact on students' motivation and achievement in biology. Experiencing difficulty in Biology learning could further attribute to many other associated factors such as classroom learning environment and lack of students' interest and motivation in science subjects.

Study by Kibet et al. (2012) have also indicated that school-based factors (the availability and use of teaching/ learning facilities), socio-economic factors (the education of the parents and their economic status), student factors (motivation, interest and attitude), school type and the teachers' competence as the factors that contribute to the learners' low academic achievement in the science subjects. Furthermore, Moswela (2014), claimed that stakeholders of learners' academic achievement are people involved in leading and directing learners towards their competent development. These stakeholders include parents, teachers and the government.

1.2 Statement of the Problem

Samtse Dzongkhag has been able to produce the Bhutan Certificate for Secondary Education (BCSE) toppers simultaneously for the past two years (e.g., 2016 & 2017). However, the academic achievement of the students in science subject remains low in comparison to the rest of the Dzongkhag. Moreover, students performed lowly in grade ten biology at BCSE level examination. The mean mark scored by grade ten students under Samtse Dzongkhag in the year 2016, 2017 and 2018 was 48.96%, 45.92% and 49.73% respectively, which is much lower in contrast with "national mean marks of 51.90%, 45.73% and 53.2% respectively (see Table 1.2). This indicates that academic achievement in biology subject by grade ten students is comparatively low.

Similarly, the Dzongkhag-wise BCSE result analysis in biology subject for the past three consecutive years showed that Samtse Dzongkhag remains one of the low performing Dzongkhag in the country with mean score of 48.2% and ranking 17th out of twenty Dzongkhag (see Table 1.1).

Therefore, this study explored the major factors that contribute to students' low academic achievement in biology by grade ten students in BCSE under Samtse Dzongkhag.

Table 1. 1

A Comparative Study of BCSE Mean Marks for The Science Subjects Dzongkhag-wise.

Sl. No.	Dzongkhag	Biology Mean Scores in BCSE	Rank
1	Trashigang	52.73	1
2	Pemagatshel	52.04	2
3	Tsirang	51.73	3
4	Samdrupjongkhar	51.73	3
5	Lhuntse	51.67	5
6	Dagana	51.57	6
7	Punakha	51.5	7
8	Paro	50.86	8
9	Zhemgang	50.63	9
10	Bumthang	50.43	10
11	Mongar	50.33	11
12	Trashiyangtse	50.32	12
13	Trongsa	50.27	13

14	Wangdiphodrang	49.91	14
15	Gasa	49.39	15
16	Sarpang	48.29	16
17	Samtse	48.2	17
18	Chhukha	47.97	18
19	Thimphu	47.55	19
20	Haa	41.7	20

Table 1. 2

A Comparative Study of BCSE results for Biology Subject for The Past Three Consecutive Years.

Year	Biology (mean marks)
2018	49.73
2017	45.92
2016	48.96
Average mean marks	**48.20**

1.3 Purpose of the Study.

The main purpose of the study is to explore the factors contributing to low academic achievement of grade ten students in Biology in Samtse Dzongkhag.

1.4 Research Question

1.4.1 Main Research Question

The overarching question that guided this study was: What are the factors influencing the low academic achievement of grade ten students in Biology under Samtse Dzongkhag?

1.4.2 Research Sub-questions

i. Does parental background influence students' academic achievement in biology?
ii. Does teacher competence influence students' academic achievement in biology?
iii. Do students' attitude towards biology influence academic achievement of students in biology?
iv. Does study habit influence students' academic achievement in biology?
v. Does academic motivation influence students' academic achievement in biology?
vi. Does language proficiency of students influence their academic achievement in biology?

1.5 Significance of the Study.

The findings of this study on factors influencing to students' low academic achievement in biology under Samtse Dzongkhag will be of immense benefit to the entire schools in Bhutan, particularly to biology teachers, school management and Dzongkhag administration in Samtse. Especially, in the preparation of various interventions and teaching learning strategies for the improvement of students' academic achievement in biology and other science subjects too. It is also expected that recommendations generated out of this study may serve as useful information for the concerned stakeholders for improving the standard of science education in the country. In addition, the finding of this study will serve as baseline information for other researchers who desire to carry out similar research in future.

1.6 Definition of Key Terminologies

Following are the key terminology with operational definitions:

1.6.1 Academic Achievement:

It is defined as a successful accomplishment or performance in a particular subject area which is indicated by grades, marks and scores of descriptive commentaries (Dimbisso, 2009).

1.6.2 Academic Motivation:

Academic motivation is used for students' motivation (intrinsic, extrinsic and amotivation) towards academic activities.

1.6.3 Attitude Towards the Subject:

Attitudes are considered as the degree of positive or negative feelings towards an object, course or event. Positive or favourable attitude facilitates the learning of subjects while a negative attitude results in low learning because achievement determines behaviour. Students' attitude here also refers to the tendency to think, feelings or preferences, interest that a person has about the subject.

1.6.4 Study Habit:

Study habit is type of study routine that students regularly use at home and in the school environment. It enables them to acquire effective learning by preparing study schedule to study, building habit of concentration, note taking, time management, self-discipline and organization.

1.6.5 Proficiency:

Proficiency can be defined as "the ability of students to use the English language to make and communicate meaning in spoken and in written contexts".

1.6.6 Teacher Competence:

Teacher competency refers to good knowledge of using innovative instructional teaching methods, assessment practices and evaluations. Teacher competency also refers to ability of the teacher to help guide and counsel his or her students to achieve high grades.

1.6.7 Correlation:

Relationship between two variables.

1.7 Summary

Quality science education plays a crucial role in 21st century, moreover, students' excellence in academic achievement determines the future of the nation. Especially, biology education is of paramount importance. However, deteriorating academic achievement of grade ten students in Biology was of concern, thus to militate this problem, it was important to investigate the factors influencing low academic achievement in Biology. The significance of this study will provide opportunity for the concerned authority to guide them for better learning outcome hence the better academic achievement.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter presents the review of the literature relevant to the factors contributing to low academic achievement of the grade ten students in Biology. Based on it, first section 2.2 covered literature on relationship between parents' educational level and students' academic achievement. Furthermore, to see the correlation between teacher competence and students' academic achievement is discussed on section 2.3. Additionally, student factor in correlation to academic achievement is reviewed into four sections: section 2.4 reviewed literature on students' attitude to subject, followed by academic motivation and study habit of students on section 2.5 and 2.5.1 respectively. Finally, section 2.6 reviewed literature on English language proficiency and students' academic achievement.

2.2 Parents' Educational Level and Students' Academic Achievement.

Learning achievement is of utmost importance because through achievement, the success of the teaching and learning process achieved by students can be seen. Learning outcomes and achievements obtained by children cannot be separated from the role of parents, varying from how to accompany while studying to use their knowledge to be transmitted to their children. The level of parental education is closely related and it influences students' learning achievements. Parents plays an important role in leading to operative growth and development of their children (Kudari, 2016). In addition, Alrehaly (2011), emphasized that parents are an important factor affecting their children's science learning and achievement. Furthermore, Thoha and Wulandari's (2016) study indicated that, parents with higher level of education make it possible to be more confident in their ability to help their children, this will significantly influence the academic ability of children.

The study carried out on secondary school students' academic achievement in Pakistan showed that, parents' education has significant effect on students' overall academic achievement (Farooq et al. 2011). Similarly, Rabgay's (2015) study carried out in higher secondary school in Bhutan, revealed that, socioeconomic factor such as parents' education resulted in differences in academic achievement of the students. Furthermore, Memon (2010) found that, majority of the students whose parents had better educational qualification

performed better as compared to those students whose parents were less educated or illiterate. It was further supported by Ikechuwu (2012) and Nwachukwu (2002) study, which revealed that, parents with different educational level positively affect students' academic achievement. Additionally, Udida et al. (2012), study found effect of parental socioeconomic background on student's academic achievement in Biology and found father's education happen to be significant. Similarly, the study done by Akinsanyo et al. (2014) and Davis-kean (2005) showed that parents' education qualification has the highest significance on the academic achievement of students.

However, study by Osuafor and Okonkwo (2013), revealed that, family structure, parents' occupation and education level did not have significant influence on students' achievement in biology. Which means, family background did not have much influence on student's achievement in biology as against what previous studies portrayed. Furthermore, Essien (2002), also found that, parents education level had no significant influence on the student's achievement in geography. Similarly, Widhyadi (2019), result concluded that, the level of the parental education did not have significant influence on student biology learning environment. In addition, it is also stated that, level of parental education cannot be used as a bench mark whether children will be motivated to learn if parental education is high.

Therefore, the study aims to find the significant correlation between the level of parental education on grade ten students' academic achievement in biology. The result of this study is expected to provide empirical benefits, that are expected to enrich knowledge related to parental educational levels and biology learning achievement.

2.3 Teacher Competence and Students' Academic Achievement.

Education is often considered as construction of knowledge as well as competence and potential development. Students are expected to be able to learn without the limitation of time and place. In addition, an important issue in education is to provide opportunities for students to think while they are solving problems, analysing and synthesising their knowledge at every level of their studies (Sootipon, 2010). For this very purpose, teachers need to manage effective teaching and learning process so that students know how to learn and utilize their knowledge appropriately in their daily lives in society with happiness. Therefore, teacher

needs to develop their competencies in accordance with educational transformation in practices as well as professional activities effectively (Surasak, 2013).

Sultan and Shafi (2014), defined competencies as particular and self-evident qualities that teachers should have. According to Anselmus (2011) teacher's competence refers to the right way of conveying units of knowledge, application and skills to students. The right way includes knowledge of content, process, method and means of conveying content. Teacher competence also refers to ability of the teacher to help guide and counsel his or her students to improve and enhance higher academic achievement. Prasertcharoensuk et al. (2015) saw that teachers need to have the following competencies; curriculum content mastery, providing curriculum content to pupils in a proper order, organizing the content, mastery in employing training tools into practice, keeping accurate records and giving feedback to the learners. Furthermore, Ilanlou and Zand (2011) mentioned that teachers need to be good class managers by having specific skills of communicating with pupils in their classes, have skills and evaluate the academic achievement in class. In this study, teacher competency refers to good knowledge of using innovative instructional teaching methods, assessment practices and evaluations. Teacher competency also refers to ability of the teacher to help guide and counsel his or her students to achieve high grades.

The objective of education sector of any country cannot be attained when the students are taught by incompetent teachers. This type of teachers would not be able to properly and adequately disseminate the concepts to the students. Thus, for teaching and learning to take place in school, teachers are the most significant persons. Even the success of the curriculum to be implemented needs teachers who are competent (Wamala & Seruwagi, 2013). Similarly, Ilanlou and Zand (2011) opined that, educational plans are likely to be successful, only if teachers are well trained with requisite competencies for delivery and execution of plan. In addition, Akiri (2013), stated that, the academic achievement of the students and subsequent quality of education is dependent on service delivery by teachers. Furthermore, study by Stronge et al. (2007), indicated that schools and their effort do make a difference and much of that difference can be linked directly to teachers.

Study carried out in Malaysia by (Omar et. al., 2018) showed significant association between teacher competence and students' achievement. Thus, teacher have shown to have an

important influence on students' academic achievements. Furthermore, Allen & Fraser's (2007) study found the existence of strong relationship between teacher ability and viable learning outcome. Ugbe & Agim's (2009) study did revealed that there is a significant relationship between teachers' competence and students' academic achievement.

However, aforementioned findings contradicted with the study conducted by Fernandez (2013), which showed that there is no significant relationship between teachers' competence and learners' academic achievement. Similarly, Olabintan and Badru (2018) also found that, teacher competence, classroom organization and climate did not have significant relative contribution to student's achievement in biology. This finding is further supported by study carried out by Wamala and Seruwagi (2013) which suggested that, higher teacher competency alone may not directly translate into better academic achievement of the students. One must critically assess the students' situation with regard to their background characteristics in order to obtain better academic achievement.

2.4 Students' Attitude to Biology Subject and their Academic Achievement.

According to Adesoji (2002) attitude is a cognitive, emotional, and action tendency to a particular behaviour intent. He further mentioned that attitude is an important factor that determine achievement of students in science. Similarly, Akinyemi (2009), stated that, attitude is required through learning and can be changed through persuasion using variety of technique. Once the attitude is built, it helps to shape the experience the individual has with an object, subject or person. Though, attitude changes progressively, people constantly form new attitudes and modify old ones when they are exposed to new information and new experiences (Adesina and Akinbobola, 2005). Attitude has an effect upon students' selection of different subjects and also on their interest and achievement in the scientific knowledge (Adesoji, 2002). For this study, attitudes are considered as the degree of positive or negative feelings towards science of biology learning and their interest. Positive or favourable attitude facilitates the learning of subjects while a negative attitude results in low learning because achievement determines behaviour.

Gagne and Briggs (1979) defined attitude as "an internal state which affects an individual's choice of action toward some objects, person and/or event". Learners' attitude may determine whether the learners will like or enjoy biology lessons or not. A positive

attitude towards biology may bring about good results while negative attitude may bring low academic achievement. Learners' attitude and interest towards biology may cause low academic achievement (Mukhwana, 2013). He further stated that, when learners show negative attitudes towards biology, it leads to lack of motivation hence, affect their achievement in the subject. When examining the related literature, studies on attitude and motivation appear to focus on general science instead of branches of science, such as physics, chemistry and biology (Cavas, 2011; Güden and Timur, 2016). However, the number of studies dealing with both attitude and motivation towards biology is quite limited (Wang et al. 2007).

Findings by Shah et al. (2013) as well as Faaz and Khan (2017) revealed that, students' positive attitude to science subject is highly correlated with the science academic achievement. Moreover, Khan & Ali (2013), inquiry found that variables i.e., attitude of students towards science and their academic achievement were interlinked and correlated. They also found that, higher the positive attitude of students' attitude towards science, the more likely to get better results in their academics. Moreover, findings also showed that there is significant relationship between the students' attitude to biology and students' academic achievement in biology (Funke et. al.,2016).

However, some researchers also proposed that the weak association between attitudes and achievement, which might be related to the perceived difficulty of science, the lack of effective teaching and the influence of ethnic and home background (Osborne et al., 1998).

2.5 Academic Motivation and Students' Academic Achievement.

One of the most important components of learning and achievements is motivation and this is also most difficult to measure. Psychologists define motivation as an internal process that activates, guides, and maintains behaviour over time (Anderman et al. 1999). In plain language motivation is what gets you going, keeps you going and determines where you are trying to go. Students who are motivated to learn something uses higher cognitive processes in learning about it and absorb and retain more from it (Driscoll, 2005). In educational point of view, motivation has a multidimensional structure which is correlated to learning and academic achievement. Despite different interpretations of motivation, in the discipline of education, motivation is a tri-dimensional phenomenon consisting of individuals' beliefs in

ability in carrying out a specific task, reasons and goals of the individual in doing the task and the emotional responses concerning carrying out the task.

Motivation is another factor thought to impact the students' academic achievement; motivation towards learning biology is one of the factors that influences students' achievements in biology as a subject (Alucdibi and Ekici, 2012). Abundant evidence of documents on motivation as an important predicting students' achievements and performance were revealed by (Beal and Stevens, 2007; Broussard and Garrison, 2004; Zhu and Leung, 2011). Motivation plays an extensive role in students' conceptual change development, critical thinking, usage of learning strategies and success in science (Tuan et. al. 2005). Research exploring the relationship between students' success and their motivation towards science also shows that there is a significant positive relationship between motivation and science success (Bryan et. al. 2011; Chan et al. (2012); Chow and Yong, 2013).

For this study, Academic motivation is used for students' motivation towards academic activities (Elliot and Dweck, 2005) and is explained by "Self Determination Theory" (SDT) by Deci and Ryan (1985). Theory divides motivation into three categories; extrinsic motivation, intrinsic motivation and amotivation. Intrinsic motivation is an inner force that motivates students to engage in academic activities, because they are interested in learning and they enjoy the learning process as well (Scheifele, 1991). Students with learning goals of seeking understanding of mastery of science content and skills are said to be intrinsically motivated (Cavallo et. al. 2003). Stipek (2008), reported that, students who are intrinsically motivated undertakes an activity for its own sake, for the enjoyment it provides, the learning it permits, or the feelings of accomplishment it overtakes.

On contrary, "Amotivation" means absence of motivation; individuals who lacks motivation conduct tasks without knowing the aim and have difficulties in understanding the interaction between their behaviours and its outcome (Deci & Ryan, 2000). If individuals cannot establish a connection between their actions and the results of their actions there is no motivation, and individuals experience a motivation (Cheon and Reeve, 2015). Thus, in this case, individuals cannot make association with the impact of their actions or the impact of their surroundings and thus they cannot be motivated either intrinsically or extrinsically. Therefore, the individuals who believes that his actions will not provide a benefit for him or

her does not take any action and falls into the state of amotivation (Tahiroğlu and Aktepe, 2015).

Although there are studies showing that there is a positive relationship between intrinsic motivation and achievement (Burton et. al. 2006), there are studies suggesting that intrinsic and extrinsic motivation should be combined together in order to motivate an individual to get into action and for a goal (Hayenga and Corpus, 2010). It is important therefore, to look into the relationship between these two variables i.e., intrinsic motivation and amotivation on students' academic performance in this study. Furthermore, Eymur and Geban (2011) found statistically significant correlation between intrinsic motivation and academic achievement of the learners.

Amrai et al. (2011); Gupta and Mili (2016); Sikhwari (2014), reported that there is a significant positive relationship between academic motivation and academic achievement. Ugur (2015), also reported that academic motivation of students does predict their academic performances and also mentioned that motivation of students was a significant variable in students' academic success.

It is also important to acknowledge the students' motivation for learning for a better projecting of the education objectives, for reshaping the contents of learning and the strategies of teaching and learning. The relationship between motivation and academic achievement is still ambiguous and it can be determined only with constant observation of the students. The significant correlation between the study programme and the students' increasing motivation was, on the other hand, noticeable. The studies underling the importance of motivation as a factor that facilitates that learning achievements of the individuals (Wolters and Rosenthal, 2000) have argued that learning achievement and effectiveness may vary according to motivators such as interest, desire and need (Tahiroğlu and Aktepe, 2015). Concerning the existing gap in the academic motivation of students, this study examines the relationship between academic motivation and academic achievement of the students.

2.6 Study Habit of the Students and their Academic Achievement.

The way students take their studies greatly determines their level of academic achievements. Persistent preparation and learning strategies developed and employed consciously by the students, influences their level of academic achievement. Thus, study habit is one of the learning factors that significantly influences students' academic achievements. Especially in education, proper study habits and skills necessitate to proficiency as well as high quality of learning (Dehghani and Soltanalgharaei, 2014).

According to Nagaraju (2004) study habit means the habit that an individual has formed with respect to his learning activities. Study habit is type of study routine that students regularly use at home and in the school environment. It enables them to acquire effective learning by preparing study schedule to study, building habit of concentration, note taking, time management, self-discipline and organization. In other words, study habits include behaviours and skills that can increase motivation and convert the study into an effective process with high returns, which ultimately increases the learning (Hashemian and Hashemian, 2014).

Accordingly, there are two types of study habit: good study habit includes studying in quite place, studying daily, turning off devices that interfere study (TV & mobile phones), takes note of important content, having regular rests and breaks, listening to soft music, studying based on own learning style and prioritizing the difficult contents (Ebele and Olofu, 2017). On contrary, Siahi and Maiyo (2015) mentioned procrastination, evading the study, studying in inappropriate conditions and loud sound of music and television during study as worst study habits. Additionally, inefficient study leads to waste of time and learner's energy (Hashemian & Hashemian, 2014). Additionally, Chand's (2013) study carried out in Hamipur, Himachal Pradesh, India, observed that, good study habit led to good academic record and bad study habit lead to low academic record as there is direct relationship between study habit and academic achievement.

Various literature has revealed that shows correlation between study habit and academic achievement. For instance, Anwar (2003), conducted study to investigate the degree of relationship between study habits and academic achievements of senior secondary school schools of Lucknow city of Utter Pardesh (India) and found that academic achievement of

students having good and low study habits differ significantly in favour of those who had good study habit. Similarly, Sherafat and Murthy (2016), and Rabia et. al. (2017), study carried with 270 students in Government Allama Iqbal College for Women and Government Technical College for boys at Sialkot, Pakistan, indicated that existence of positive correlation between study habit and academic achievement of the students. Furthermore, Osa-Edoh and Alutu., (2012) stated that, students who possess adequate mental abilities sometimes do not perform well in their academic works because they do not know how to study effectively or do not use the effective method to study. Besides, Mark and Howard (2009) highlighted that low study habits are the most common challenge for the students.

However, Musa and Garba (2019) found that there was no significant effect of the study habit on academic acievement in secondary schools in Makurdi Metroplis, Nigeria. Consequently, it is apparently clear from literature review to the area of educational study that study habit considerably contributes and influences the academic achivement of the students. Albeit, negatve correlation of study habit and academic achievement is prevalent. Thus, this study will attempt to investigate the influence of study habit on academic achievement of grade ten students in biology.

2.7 Language Proficiency of Students and their Academic Achievement in Biology.

English language plays pivotal role in enhancing educational attainment through improved communication ability. The lower level of English language proficiency not only leads to poor performance in English language but also hinder their academics in general. When students' proficiency in English language is high, it will definitely affect and improve the academic achievement of such students. Nonetheless, where the proficiency in English is lacking in any academic setting, it will definitely lower the academic achievement of such students.

Proficiency can be defined as "the ability of students to use the English language to make and communicate meaning in spoken and in written contexts" (DEEWR, 2009). Therefore, students must be able to read, write, listen and speak effectively. Unfortunately, those students who lack the necessary language skills will not be able to engage in the learning process and will struggle to pass their academics. Thus, English prepares students for

meaningful instructions and academic achievement in academic subject taught using English language (Kong et al. 2012).

Hence, language proficiency is a key to academic achievement for students. Thus, students need to be proficient in English for better grasp of knowledge in Technology, Science and Mathematics. As Aina et al. (2013) claimed that, language proficiency in English is significantly related to academic achievement. In addition, study by Javier (2001), stated that, the students' weaknesses in Science and mathematics subjects are attributed to the student's difficulty in English language. He also mentioned that, students' difficulty in English included difficulties in making inferences and interpretation of information, deducing meaning, drawing conclusions and summarizing ideas. Which sums up with the problem of comprehension, where by students are not able to understand what they are reading. He further insisted that, the skills in English are pre-requisite in learning concepts in science and mathematics. Thus, more the students are proficient with the English language, the more likely to perform well in their academic subject.

Student's achievement in school also depends upon their level of proficiency in the language of instruction. Furthermore, research findings from school contexts have been reported, for instance, the result of the study conducted by Wilson and Komba (2012), showed that, more proficient students are in English the better they are in academic subjects. These findings are in consistent with Fakeye (2014) and Fakeye & Ogunsiji, (2009) whose study revealed that the existence of significant correlation between English language proficiency and academic achievement of the subject studied. Similarly, Aina et al., (2013) study revealed that, there is a correlation between proficiency in English language and academic achievement of the students in science.

2.8 Summary

There are numerous factors that contribute to low academic achievement of the students in biology. Literature revealed that, if the students' parents are having better education qualification level, students performed better due to guidance and support. On the other hand, teacher competence in terms of pedagogy also correlated to students' academic achievement. Similarly, student who are motivated and had positive attitude towards subject, with good study habit enhanced their academic achievement. Furthermore, English language proficiency

was also correlated to students' academic achievement. Hence, this study explores how this factor influences academic achievement of grade ten students in biology.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter highlights on various component of the research methodology used in this study. In this segment, firstly section 3.2 described the research paradigm followed by research approach (3.3) and research design (3.4). Whereas, section 3.5 discussed variables and 3.6 will highlighted on location of the study. Following, sampling technique and sample size is discussed under section 3.7 and 3.8. Furthermore, research instrument is discussed on section 3.9. How the data was collected and how it was analysed is discussed in the section 3.10 and 3.11respectively.

3.2 Research Paradigm

World view is a general philosophical orientation about the world and the nature of research that a researcher brings to a study (Creswell, 2014). World views are often referred as "paradigm" by Lincoln et al., (2011). Creswell (2018) categorized all educational and psychological research into four major paradigms namely; post-positivism, constructivism, transformative, and pragmatism. A researcher is particularly guided by one world views to progress with research. Creswell (2018) suggested that every individual preparing a research proposal or plan make explicit the larger philosophical ideas they support. Often individuals develop world views based on their discipline orientations and research communities, advisors and mentors, and past experiences. The types of beliefs held by individual researchers based on these factors often leads to embracing a strong qualitative, quantitative and mixed methods approach in their research. For an instance, Morgan (2007) pointed out that philosophical world view underpinning the mixed method approach is pragmatism.

This study was guided by the pragmatic paradigm. The rationale for opting this paradigm was identifying the factors that were influencing the low academic achievement of grade tens students in biology. For this purpose, the study is not just limited to either quantitative or qualitative data. Thus, mixed methods approach was followed to answer the research question. According to Creswell (2014) pragmatic researchers believe in collecting and analysing information using both quantitative and qualitative approaches rather than

confining to only one approach. In such studies, researchers are free to choose the methods, techniques, and procedures of research based on their needs and purposes.

3.3 Research Approach

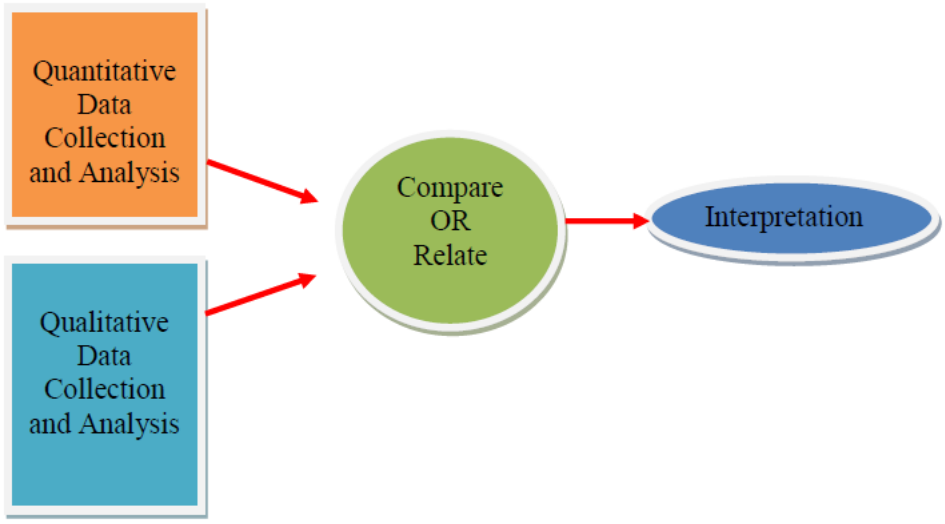
Research approaches are the plans and the procedures for each research that span the steps from broad assumptions to detailed methods of data collection, analysis and interpretations. It consists of philosophical world view, research design and research method (Creswell, 2014). According to Creswell (2018), there are three approaches namely qualitative research, quantitative research and mixed methods research. “This study was grounded on mixed methods approach”. This is an approach to inquiry involving collection of both quantitative and qualitative data, integrating the two forms of data, and provides a more complete understanding of a research problem then the either approach (Creswell, 2018). The rationale behind for choosing such an approach is at general level it reduces the limitations of the two other approaches, at practical level it provides a sophisticated, complex approach to research that appeal to those on the forefront of new research procedures, and at procedural level it compares different perspective drawn from quantitative and qualitative data (Creswell, 2018).

3.4 Research Design

Research design is the conceptual blueprint within which study is conducted. According to Creswell (2012), research design is a specific procedure involved in the research process such as data collection, data analysis and report writing. Similarly, MacMillan and Schumacher (2001) define research design as a plan for selecting subjects, research sites, and data collection procedures to answer the research question(s). They further indicate that the goal of a sound research design is to provide results that are judged to be credible. So, different researchers have their set values and intended goals of the research process, thereby research aims and purposes will be accomplished. In this study, “a Convergent Parallel Mixed Methods Design was employed”. The rationale for choosing this design was, this design comprises of collecting both quantitative and qualitative data simultaneously and relating to one another (see Figure 1.1). Ultimately, gathered data was merged, analysed and outcome was interpreted to answer the research problem. Benefit of this approach is that one data collection form supplies strengths to offset the weaknesses of the other form (Creswell, 2012) and help to obtain deeper understanding of the problem (Mataka & Kowalske,2015).

Figure 1. 1.

Convergent Parallel Mixed Methods Design



Note: Adopted from (Creswell, 2012, p. 541)

3.5 Variables

It is very important for the researcher to identify the variables in the research. Creswell (2014) mentioned as a characteristic or attribute of an individual or an organization that can be measured or observed and varies among the people or organization being studied. Characteristics of an individual include personal aspects such as grade level, age, or income level, while attribute represents how individual feel, behave, or think such as self-esteem, engage in smoking, display of leadership quality. Basically, there are two types of variables; "independent variables", those variables that probably cause influence or affect the outcomes where as "dependent variables" are those that depend on the independent variables; they are outcomes or result of the influence of the independent variables.

In this study dependent variable was mark obtained in BCSE annually, and independent variable were parents' education qualification, teacher competence, students' attitude to biology subject, study habit, academic motivation, English language proficiency using English marks scored in BCSE (refer Figure 1.2).

3.6 Location of the Study

The study was carried out in two middle secondary schools and two higher secondary schools under Samtse Dzongkhag.

3.7 Sampling Technique

Sampling is the process of selecting certain members or a subset of the population to make statistical inferences from them and to estimate characteristics of the whole population. Mertens (2010) defined "Sampling Technique" as the decision that a researcher makes regarding from whom data will be collected, who is included, how they are included. On the contrary it is difficult to gather data from every possible individual, thus the researcher has to be mindful about his decision to collect valid information from the participants. Hence different researcher uses different techniques to get the information, which determines his quality of result, this statement is supported by Mertens (2010) who states that strategy for selecting a sample influences the quality of the data and the inferences made from it. Although there are variety of sampling techniques like probability sampling: simple random sampling, stratified random sampling, cluster sampling, systemic sampling and multistage sampling, besides there is non- probability sampling like quota sampling, snowball samplings etc. (Taherdoost, 2016).

In this study "a simple random sampling technique was employed for collecting the data". It is a method of obtaining information where every single member of a population is chosen randomly, merely by chance and each individual has the exact same probability of being chosen to be a part of a sample.

3.8 Sample Size

This study used representative sample using Krejcie and Morgan (1970) formula for sample size calculation. To respond to the questionnaire, a total of 155 grade ten students was involved. Similarly, three principals, four head of the departments and four teachers teaching the current grade ten students participated.

3.9 Research Instruments

A research instrument is what we use to collect information (data) to answer the research question(s). It applies to qualitative, quantitative and mixed methods approaches. Research instrument is broadly classified into two types; researcher completed and subject- completed. Researcher-completed instruments include for example, a tally sheet and observation forms where the instrument is completed by researcher. Subject-completed instruments include for example, questionnaires, that is completed by participants. Therefore, in this study, survey questionnaires and interview questions were used during the data collection.

3.9.1 Questionnaire

To explore the factors influencing for the low academic achievement in BCSE by grade ten students in Biology; firstly, demographic information was collected with following information; gender, parent occupation and qualification, marks obtained in Biology and English in annual examination. Secondly, in terms of student factor; to find how "attitude towards the biology subject" is correlated to academic achievement, a Five-point Likert scale questionnaire ranging from "*strongly agree*" to *Strongly disagree*" was adopted from Russell & Hollander.,(1975). Similarly, to see the correlation of study habit and academic achievement, questionnaire was adopted from Oladebinu (2018), which was also a five-point Likert scale. In conjunction, to see how "academic motivation was correlated to academic achievement, "Academic Motivation Scale for Learning Biology (AMSLB)" was used, which was adopted from Ayudin et. al. (2014). Finally, to see how "teacher factor" i.e., competency of teachers in terms of instructional methods was correlated to academic achievement of the students, 10 questionnaires with five-point Likert scale was utilized.

3.9.2 Interview

Morgan (1997) claimed that, interview is a purposeful conversation, usually between two people but sometimes involving more, that is directed by one in order to get information from the other. The purposes of interviews are varied. In research, it is used as a specific tool for gathering information to validate the quantitative findings, testing hypothesis or used in conjunction with other methods. The rationale for the use of interview in this study was to

explore variables under investigation in greater detail, and to supplement and add depth to the result of quantitative approach and enhance the validity of the findings of this research.

In this study, guided semi-structured one-on-one interview was adopted for the qualitative approach in this study. Creswell (2012) defined one-on-one interview as a data collection process in which the researcher asks questions to and records the answers from the only participant in the interview at a time. It can also be termed as a face-to-face interview, in which a person interviews another person in person. Additionally, the interview guide provided a clear set of instructions for the interviewer, thereby allowing the respondents to express their view freely but preventing the discussion from diverging away from the topic. To get precise data, interview with twelve students, four biology teachers and three principals was conducted in the school for about twenty to thirty minutes after class hour, with consent from the participants. Each interview was audio-taped and transcribed verbatim was subsequently used for thematic analysis. Furthermore, guided interview allowed the researcher to focus on the research questions, and at the same time, dig deeper through probing to get rich and significant information on the issue under study.

3.9.3 Validity and Reliability of the Instruments.

Validity indicates the instruments' accuracy. According to Cohen et al. (2000) validity is "demonstration that a particular instrument in fact measures what is contend to measure". For this study, questionnaire on "attitude towards the biology subject" was adopted from Russell & Hollander (1975), similarly, study habit questionnaire was adopted from Oladebinu (2018). Academic Motivation Scale for Learning Biology (AMSLB) was adopted from Ayudin et. al. (2014). These questionnaires were presumed to have high validity. Furthermore, to see reliability of the survey questionnaires, it was verified through a pilot study carried out in one of the schools and found Cronbach alpha coefficient of .90 for attitude towards the biology subject questionnaire. Similarly, study habit and Academic Motivation Scale for Learning Biology (AMSLB)" had reliability of .73 and .80 respectively. Additionally, teacher competency questionnaires were developed in consultations with the supervisors and co-supervisors for its validity. Besides, teacher competency questionnaire has Cronbach alpha of .95 which was highly reliable. Furthermore, the interview questions were

verified by principal supervisor and co-supervisor to check intent of fulfilling the purpose of the research.

3.10 Data Collection.

For this study, approval from the Chief Dzongkhag Education Officer of Samtse Dzongkhag (see Appendix I) and principal of the four school were obtained (see Appendix J) to collect data. Prior to survey and interview questionnaires, the researcher briefed participants on the purpose of the research and their right to withdraw from the participation if they feel it's not convenient. Furthermore, researcher distributed informed and voluntary consent forms (see Appendix K, L, M & N) to the participants, and were asked to fill up the informed consent form and were assured that their participation was voluntary and confidential. Finally, all the data collected from interviews and questionnaires were kept confidential.

3.11 Data Analysis.

To draw the meaning from the information collected, this study took two responses separately and put them together to summarize. Inferential analysis in particular Pearson Correlational Analysis Test was employed using electronic software SPSS version 22, to find the correlation between the mentioned variables (refer Section 3.5). Additionally, qualitative data i.e., interview was analysed by generating central theme from transcribed interview data. Finally, findings were triangulated to answer the research question.

3.12 Ethical Issues

While conducting research concerning human subjects, researchers must be conscious of the problems their study can create. Therefore, researchers must make every effort to minimize or eliminate any harm to their research participants. Therefore, ethical clearance to conduct this research was obtained from Dean of Research and Industrial Linkages Samtse College of Education (refer Appendix H). After obtaining the approval from concerned Chief Dzongkhag Education Officers (refer Appendix I) and principals (refer Appendix J), informed consents of the participants (refer Appendix K, L, M and N) were obtained.

Participants was briefed on the purpose and implications of the study and the use of various data obtained from them. To maintain anonymity and safeguard the participants' codes was used to represent them.

CHAPTER 4: RESULTS

4.1 Introduction

This chapter presents the key findings drawn from both quantitative and qualitative data of the study. The purpose of the study was to identify the potential factors that influence the poor academic achievement of grade ten students in biology. Data were analysed and presented in sections to address all research sub questions to answer primary research question. Therefore, this chapter presented the key findings of the study in the following sub-headings:

4.2 Demographic Profile

A total of 155 grade ten students have participated of which 45% were male and 54.8% were female (Table 4.1). In addition, three principals, four biology teachers who were currently teaching grade ten and four Head of the Department (HoD) for science subjects for respective school participated for the semi-structured interview as shown in Table 4.1.

Table 4. 1

General Information of the Participants

Gender	No. of Students	No. of Biology Teacher	No. of HoD	No. of Principal
Male	70	3	4	3
Female	85	1	0	0
Total	155	4	4	3

4.3 Parent Education Qualification Level Versus Students' Academic Achievement.

Analysis based on parents' education qualification indicated a significant positive correlation ($r = 0.3$, $p<0.01$) between the parents' education qualification and academic achievement of the grade ten students in biology subject (Table 4.2). This result indicates potential influence of parents' education qualification level over their children's academic achievement in biology learning.

Table 4. 2

Pearson's Correlation Coefficient Test for Parents' Education Qualification Level versus Students' Academic Achievement.

Correlation				
			Scores	Parent Education
Pearson's R	Parent Education.	Correlation Coefficient.	0.3**	1.00
		Sig. (2-tailed)	0.001	
		N	155	155
	Scores	Correlation Coefficient.	1.00	0.3**
		Sig. (2-tailed)		0.001
		N	155	155

** Correlation Coefficient is significant at the 0.01 level (one tailed).

Similarly, qualitative data collected through face-to-face semi-structured and structured interview indicated that parents' educational qualification level does influence the academic achievement of their children in biology subject. For instance, Student 5 opined;

> "Yes, if parents are qualified, our academic achievement will be better because they can give advice, guidance and suggest us different ways to study and prepare for examination through their experience."

Similarly, Teacher 3 voiced out;

> I do agree that students' academic achievement will be better if the students' parents have better education qualification because those who are qualified, they usually guide and support their children in learning process. They specially motivate and inspire them to learn better.

In the same line, principal 3 stated that;

> "We see those children who are guided by parents seems to perform better, because, whatever taught in school they get time to revise, relearn guided by parents".

Therefore, this finding addressed the research sub question 1of this study (refer Chapter 1).

4.4 Subject Teacher's Competence Versus Academic Achievement in Biology.

Teacher competence refers to good knowledge of using innovative instructional teaching methods, assessment practices and evaluations. It also refers to how teacher render support to students learning process. Data on teacher's competence revealed the prevalence of positive significant correlation ($r = 0.46$, $p<0.01$) between the teacher competency an academic achievement of the students as reflected in Table 4.3.

Table 4. 3

Pearson's Correlation Coefficient Test for Competence of Teachers versus Students' Academic Achievement.

Correlation

			Scores	Teacher competency.
Pearson's R	Teacher competency.	Correlation Coefficient.	0.466**	1.00
		Sig. (2-tailed)	0.001	
		N	155	155
	Scores	Correlation Coefficient.	1.00	0.466**
		Sig. (2-tailed)		0.001
		N	155	155

(** Correlation Coefficient is significant at the 0.01 level (two tailed).

Similarly, the qualitative data too confirmed that teacher's competence does influences the academic achievement of the students. For instance, Principal 1 expressed;

> Competency of teacher is very much necessary, if teacher is not competent to teach a particular subject then it will directly have impact on the students.

Similarly, subject teachers too admit that teachers' competency is required to increase the students' engagement in their learning, hence improving their academic achievement. For example, Teacher 3 expressed:

> The way we teach students in most appropriate method or strategy can enhance students' understanding of the concepts. Right approach should be used for a

particular lesson to get best learning outcome which will directly affect the academic achievement of the students.

The overall finding of this data accordingly addressed the research sub-question 3 of this study (refer Chapter 1).

4.5 Analysis of Students' Attitude Data versus their Academic Achievement.

Students' attitude here refers to the tendency to think, feelings or preferences, interest that a person has about the subject. In order to examine the relationship between students' attitude versus their academic achievement, Pearson correlation coefficient test was performed. Result indicated there was existence of strong significant positive correlation ($r = .68$, $p<0.01$) between students' attitude towards the biology subject and academic achievement (see Table 4.4).

Table 4. 4

Pearson's Correlation Coefficient Test for Students' Attitude Towards the Biology Subject Versus Academic Achievement.

Correlation

			Scores	Attitude
Pearson's R	Attitude	Correlation Coefficient.	0.68**	1.00
		Sig. (2-tailed)	0.001	
		N	155	
	Scores	Correlation Coefficient.	1.00	0.68**
		Sig. (2-tailed)		0.001

	N	155

(** Correlation Coefficient is significant at the 0.01 level (2-tailed).

Concurrently, qualitative data too revealed that students' attitude towards biology subject does influence their academic achievement. For instance, Teacher 3 expressed that:

> Yes, if the students have negative attitude which is built by individual due to difficulty of the content or if it is influenced by others i.e., halo effect of interest in other field will largely affect the academic performance of the students by not building enthusiasm or spirit for learning. On the contrary, those students with positive attitude towards the subject has good academic performance.

Similarly, some of the HoD expressed that interest was lacking for learning biology. For instance, HoD 2 voiced that; "Students consider science subject as minor subject and Luke warm interest in learning biology" by the same token Principal 2 also stated that;

> If there is no enthusiasm and jest in child himself, I think learning will not take much which will lead to low academic performance.

Further, Students 4 expressed that;

> It is because of their particular aims, most of them are interested in other things and their ambitions for life are completely unrelated to biology. Thus, they neglect biology and plan to study another subject.

Further supported by Student 5 when he expressed that;

> It is not easy because we have to mark all the diagrams and biology textbook as a whole is written in crowded paragraphs which drives our interest away hence making it difficult.

Therefore, the prominent finding of this study addressed the research sub question 4 of this study (refer Chapter 1).

4.6 Academic Motivation versus Academic Achievement in Biology.

Another key finding of this study was, students' academic motivation does influence the achievement of the students in biology. For example, Pearson correlation coefficient test was conducted to examine the coexistence of any association between students' motivation versus achievement in biology subject. Result indicated that there was a strong negative correlation ($r = -0.616$, $p<0.01$) between students' academic achievement and their amotivation.

Additionally, analysis of data on intrinsic motivation revealed prevalence of strong positive correlation ($r = 0.69$, $p<0.01$) between students' intrinsic motivation and their academic achievement in biology subject as shown in table 4.5

Table 4. 5

Pearson Correlation Coefficient Test on Academic Motivation Versus Students' Academic Achievement.

		Correlation			
			Scores	Intrinsic Motivation	Amotivation
Pearson's R	**Intrinsic Motivation**	Correlation Coefficient.	0.697**	1.00	1.00**
		Sig. (2-tailed)	0.001		0.001
		N	155	155	155
	Amotivation	Correlation	-0.616**	1.00	1.00
			0.001	0.001	

	Coefficient.	155	155	155
	Sig. (2-tailed)			
Scores	N	1.00	0.697**	-0.616**
			0.001	0.001
	Correlation Coefficient.	155	155	155
	Sig. (2-tailed)			
	N			

(** Correlation Coefficient is significant at the 0.01 level (two tailed).

In the same way, qualitative data too revealed that motivation does influence the students' academic achievement. For instance, Teacher 5 expressed that:

> Motivation lays an important role in learning and producing outcomes. Those who are motivated to learn, they give 100% effort to learn and come up with better ideas and academic achievement.

4.7 Students' Study Habit versus Academic Achievement in Biology.

Additionally, in order to examine the relationship between students' study habit and their academic achievement, Pearson correlation coefficient test was performed. The finding revealed the existence of strong positive correlation between students' study habit and their academic achievement through the Pearson correlation coefficient test result ($r = 0.631$, $p < 0.01$) as reflected in Table 4.6.

Table 4. 6

Pearson Correlation Coefficient test on Students' study habit versus students' academic achievement.

Correlation

			Scores	Study Habit
Pearson's R	Study Habit	Correlation Coefficient.	0.631**	1.00
		Sig. (2-tailed)	0.001	
		N	155	
	Scores	Correlation Coefficient.	1.00	0.631**
		Sig. (2-tailed)		0.001
		N	155	

** Correlation Coefficient is significant at the 0.01 level (two tailed).

The quantitative finding is confirmed by teachers in the interview that study habit does influence students' academic achievement in biology. For example, Teacher 3 expressed:

> Study habit plays very important role in terms of academic achievement. As we can see that most of our students has become reckless about time management, they are seen most of the time in social media platform and other co-curricular activities. Which indeed keeps them away from studies and at eleventh hour they try to study for examination with stress, thus academic performance is highly affected by study habit. We can notice that those who have better result in academic achievement have good consistent study habit. In addition, student 5 expressed that: "If we give more time to biology than it gets easier. Thus, study habits will surely affect our academic achievement in biology".

The overall finding of this data, therefore, addressed the research sub question 5 of this study (refer Chapter 1).

4.8 Language Proficiency versus Academic Achievement in Biology.

From the Table 4.7, it is evident that, there is a significant positive correlation ($r = 0.514$, $p<0.01$) between students' language proficiency in English and students' academic achievement in biology.

Table 4. 7

Pearson's Correlation Coefficient test on language proficiency of the student in English and their academic achievement in biology.

Correlation				
			Scores	Language competency
Pearson's R	Language competency	Correlation Coefficient.	0.514**	1.00
		Sig. (2-tailed)	0.001	
		N	155	155
	Scores	Correlation Coefficient.	1.00	0.514**
		Sig. (2-tailed)		0.001
		N	155	155

** Correlation Coefficient is significant at the 0.01 level (two tailed).

Similarly, qualitative data too revealed that, language proficiency of the students' does influence their academic performance. For instance, Teacher 3 expressed:

> Language proficiency does affect in academic performance of the students. This is because, they are not able to comprehend the concepts, questions during examinations and ways of answering. Those with better language competency, they are able to understand the concepts and are able to comprehend in their own ways and perform better in their academics.

In the same line, Teacher 2 stated that; "Students find difficulty in writing answers in their own words".

Therefore, this finding addresses the research sub question 6 of this study (see Chapter 1).

4.9 Summary

The key findings of this study revealed the factors that influenced to low academic achievement of grade ten students in biology. For this very purpose quantitative data supported by qualitative data with relevant verbatim of student, teacher, and principal participants revealed that Student attitude towards the subject (biology), academic motivation to learn, study habit of the students and language proficiency of students had significant positive correlation with students' academic achievement, which means these factors were influencing the students' low academic achievement in biology. Additionally, it was also found that teacher competence does influence students' academic achievement in biology.

CHAPTER 5: DISCUSSION

5.1 Introduction

As the nation is progressing towards a developed nation, Bhutan needs to create a society that is scientifically oriented, progressive, knowledgeable, having high capacity for change, forward looking, innovative and contributor to scientific and technological development in the future. However, aforementioned society can be achieved only in the presence of citizens who are creative, critical, inquisitive, open minded and competent in science and technology.

Through science education, students develop capability to understand scientific knowledge, identify important pivotal scientific questions, draw evidence-based conclusion and make decisions about how human activity affects natural world (OECD, 2007). Further, it is of utmost importance for all students to become scientifically literate in this science and technology governed world. Thus, the need to learn science subjects has become a necessity for all the students. However, the falling number of students choosing to pursue the study of science, is found to be a great concern in many countries, despite the increasing recognition of the importance and economic utility of scientific knowledge (Gottfried et al. 2009; Kiemer et al. 2015).

Biology is one of the leading subjects of the natural science cycle in the school education system, because of its importance in the formation and development of the personality. Without the adequate knowledge of Biology, it is impossible to ensure a healthy life style and preservation of environment would be a great challenge. Biology science education plays an important role in producing quality human resources to compete in the mastery and development of technological science. Realizing the role played by Biology in the field of science, Royal Government of Bhutan (RGoB) has incorporated it as a compulsory discipline in Bhutanese education system for grade nine and ten. Nevertheless, students' achievement in Biology for grade ten has been found to be a dismal. For instance, the mean mark scored by grade ten students in Biology under Samtse Dzongkhag for past three years was 48.2 percent, which was below national mean mark (49.93%) in BCSEA.

Science achievement at secondary school level is critical because in this level there is a transition of general ideas taught in lower secondary classes to in-depth and specific concepts

with separate subject for three disciplines of science (biology, physics and chemistry). Furthermore, exploring the factors affecting academic achievement at the secondary school level is particularly important, because it is the period of life in which students contemplate and negotiate their future trajectories (Gottfried et al. 2009). Therefore, this study explored to study the factors that were influencing the academic achievement of grade ten students in Biology which is broadly categorized into student factor, teacher factor and parent factor using mixed methods approach.

5.2 Students' Parents Educational Qualification level

The world of education requires the roles of parents as the parents are the main source of learning model for their children. Parents and home are, indeed the first and foremost centre of education that can determine learning success. In this study, analysis based on parents' education qualification showed a significant positive correlation ($r = 0.3$, $p<0.01$) between the parents' educational qualification and students' academic achievement, indicating a potential influence of parents' education qualification over their children's academic achievement in learning biology. This finding is in agreement with Akinsanya et al. (2014); Ikechuwu, (2012); Rabgay, (2015) that reported parents' education qualification has the highest significant influence on the academic achievement of students. This is attributed to the ability of educated parents to provide better support and academic guidance to their children or a child can always seek further help on the clarification of difficult concepts been taught in the schools. Furthermore, Davis-Kean (2000), found positive relationship between parents' education level and their expectations for their children.

The findings of the study also revealed that those parents with better education qualification level actively involved in the students' academic matter by providing timely guidance and support as well as necessary resources and facilities. Hence, those students tend to have better academic achievement. Similarly, Topor et al. (2010) pointed out that increased parental involvement in a child's education is significantly related to increased academic performance. Further, Cholifah, (2006) and Eryanto, (2013) revealed that children who have educated parents usually have high aspirations and expectations for the academic achievements of their children. Furthermore, study by Wulandari, (2015) indicated that parents with higher level of education make it possible to be more confident in their ability to

help their child's education. Hence, it is substantial to know that, the family has the potential to influence a child's academic achievement as it is the first learning environment for the child. This finding coheres with the finding of a study by Okeke et al. (2009) who stated that the initial experience that would mould the child's values, aspirations, emotions, interest and attitudes are offered by the parents or family. Additionally, Essien (2002) asserted that what the child learns at home and how his family motivates him towards education contributes to the child's success in school. Therefore, it can be concluded that, parents' education qualification level influences the academic achievements of grade ten students in Biology.

5.3 Teacher Competence versus Students' Academic Achievement.

Teacher competency refers to good knowledge of using innovative instructional teaching methods, assessment practices and evaluations. Teacher competency also refers to ability of the teacher to help guide and counsel his or her students to achieve high grades. The present study revealed the prevalence of significant positive correlation ($r = 0.46$, $p<0.01$) between the teacher competence and academic achievement of the students. This finding indicates that teachers' competence in teaching has greater influence on the academic achievement of students. It is found that if teachers are competent, they would be able to make learning effective by applying various interactive teaching strategies, effective assessment and evaluation tools to appreciate their learning and further improve to enhance students' academic achievement. This finding is comparable with the findings of Teygong, (2008) who revealed the existence of positive relation between teaching methods (pedagogy competence) and academic achievement of students in Chepkorio Ward. Because of the improved students' academic achievement while using various teaching pedagogies by the competent teachers, the study suggested the teachers to incorporate different approaches to teaching. Similar findings of the significant association between teacher competence and students' academic achievement were reported by several other studies (Ajao, 2001; Allen and Fraser, 2007; Omar et. al. 2018; Sultan and Shafi, 2014; Ugbe and Agim, 2009).

Further, Gautek (2004) explained that a competent teacher engages students in dialogue and manages through dialogue to achieve genuine learning because when students and teachers are engaged in shared critical dialogue, they mutually create and construct knowledge, instead of passively transmitting it. This is mainly attributed to their ability and

opportunity to share their experiences, reflect upon them and finally make critical evaluation regarding the way they themselves have obtained that knowledge and those experiences. In addition, a study by Kimani et al. (2013) affirmed that teachers' provision of individualized attention to weak students has a significant effect on academic achievement in secondary schools. Therefore, the finding of this study indicated that, teacher competence does influence the academic achievement of the grade ten students in Biology.

5.4 Student Attitude to Biology Subject versus Students' Academic Achievement.

Attitudes are considered as the degree of positive or negative feelings towards an object, course or event. Positive or favourable attitude facilitates the learning of subjects while a negative attitude results in low learning because achievement determines behaviour. Students' attitude here also refers to the tendency to think, feelings or preferences, interest that a person has about the subject. In school, attitude of the students toward certain subjects is often reflected on their academic achievements and thus, positive attitude is essential for encouraging effective learning and improved academic outcome.

This study revealed significantly positive correlation ($r= 0.68$, $p<0.01$) between students' attitude towards learning Biology and students' academic achievement. This finding indicates that those students with positive attitude to the subject can perform better than those with negative attitude towards Biology. It is found that the positive attitude can influence student's active participation, critical thinking, improved interaction and communication skill. On the other hand, it is found that negative attitude discourages students from learning. This finding is in line with the study carried out by Dinah (2013) who noted that learners with positive attitude towards a subject perform better than those with negative attitude. Those with positive attitude are motivated to work hard with better academic achievement as evident from the good marks scored in the examination.

The similar positive correlation between positive attitude of learners and academic achievement are reported by Faaz and Khan, (2017); Funke et. al. (2016); Shah et al. (2013). With the similar findings, a study by Cracker (2006), suggested students to have positive attitude towards the learning subject.

According to Çimer, (2012), one of the reasons why students find Biology difficult is mainly because they possess negative attitude towards learning Biology. Additionally, Khan & Ali, (2013) concluded that a negative attitude towards a certain subject can make future learning difficult. Thus, helping students to develop positive attitude towards Biology course should be considered as an important step in science education.

The study also found that the lack of interest and enthusiasm for the subject impedes learning, thereby contributing to the low academic achievements. Additionally, Adesoji, (2008) pointed out that the attitude has an effect upon students' selection of different subjects and also on their interest and achievement in the scientific knowledge. Similarly, in this study, student 5 during face-to-face interview opined that "most of them are interested in studying arts and commerce subjects because of their interest and their future ambitions which is completely unrelated to Biology. Thus, they are not interested to study biology". This finding is consistent with Funke et. al. (2016), who revealed existence of significant positive relationship between the students' attitude and their interest in learning Biology which ultimately impacts students' academic achievement. Thus, attitude seems to explain why some students engage actively in learning science while others do not (Aydeniz and Kotowski, 2014).

Thus, this study concluded that, attitude as a factor impedes biology learning and influenced to low academic achievement of grade ten students in Biology. Therefore, it is a necessity for students to build positive attitude towards Biology to enhance academic learning and achievement.

5.5 Academic Achievement in relation to Study Habit of Students.

The study on students' study habit revealed that, there is existence of strong positive correlation ($r = 0.631$, $p < 0.01$) between students' study habit and their academic achievement in Biology. This finding indicates that, if the students possess good study habit, it will facilitate better learning and boost academic achievement. On the other hand, bad study habit of the student will lead to low academic achievement. These findings are consistent with the study done by Syiem (2018) at Ri Bhoi District of Meghalaya, India with class nine students of different schools. The findings of the study revealed significant positive relation between study habit and achievement in science subject. Similarly, Anwar (2003);

Chand, (2013); Omotere (2011); Rabia et. al. (2017); Sharma (2012); and Sinha (2020) also found positive correlation between study habit and academic achievement of the students.

Further, Gyeltshen, (2019) revealed that the high achiever students possess good study habits featured by better time management skills, high concentration, positive attitude towards examination, teachers and assignments. On contrary, low academic achievers were found to have low study habits with poor time management skills, low concentration, lack of proper preparation for the examination as well as irresponsible class behaviours and inappropriate attitude towards teachers. It is found that the low achievers mostly spend their time in social activities rather than focusing on studies. Additionally, Mark and Howard, (2009), highlighted that low study habits are the most common challenge for the students. Therefore, to establish effective study habit, students require study skills, motivation, time management skills, and study attitude (Crede and Kuncel, 2008).

Thus, the aforementioned finding of this study implies that, study habit play a noteworthy role in the academic achievement. It is marked as significant contributor towards one's academic achievement as study habit has a positive and significant impact on academic performance of school going students. Hence, it is of paramount importance to build effective study habit in secondary school. Siahi and Maiyo (2015), also stated that study habit needs a significant attention to improve academic achievement.

5.6 Academic Motivation versus Students' Academic Achievement.

This study revealed the presence of significant positive correlation ($r=.78$, $p<0.01$) between intrinsic motivation and students' academic achievement. This finding indicates that students who are intrinsically motivated performs better in Biology. Intrinsically motivated students have capabilities of monitoring their own set of goals which lead them to be persistent with appropriate learning behaviours that eventually boost their learning outcome. These findings are consistent with the findings of studies by Burton et. al. (2006); Eymur and Geban (2011); Tahiroğlu and Aketepe, (2015) that reported significant positive correlation between intrinsic motivation and learners' academic achievement. They further claimed that intrinsically motivated students are passionate about learning and have high desire to learn with curiosity and overcome the challenges. Furthermore, students driven by intrinsic motivation have shown to achieve higher learning quality such as deeper understanding, and

can persistent longer when dealing with difficult task, compared to the students motivated by extrinsic factors motivation (Deci and Ryan, 2000).

This study also found the prevalence of significant negative correlation (r = -0.616, p=0.001) between students' academic achievement in Biology and students' amotivation. This indicates that students with high degree of amotivation tend to achieve lower grades in Biology. It means that unmotivated students have low academic achievement. In the same line, study by Amos (2014), found that motivated Biology students in all its ramification performed far better than unmotivated Biology students. Further, Deci and Ryan (1985), claimed that students with high grades have low degree of amotivation. A similar finding was deduced in a study carried out by Nilsson (2016).

Consequently, this study concludes that academic motivation has positive influence in their academic achievements of the students. Which Ugur (2015), also reported that academic motivation of students does predict their academic achievement and further, explained that the motivation of students is a significant variable in students' academic success. These findings cohere with the findings of Wang et al. (2007) whose study on factors affecting high school students' level of learning Biology concepts, found that attitude and motivation of students affect learning of Biology concepts: individuals with high motivation and a positive attitude towards Biology have higher levels of learning concepts of Biology. Thus, students need to be motivated both intrinsically and extrinsically to have better academic achievement in biology learning.

5.7 Language Proficiency in English in Relation to Student's Academic Achievement in Biology.

Language proficiency is defined as the ability of students to use the English language to make and communicate meaning in spoken and in written contexts. The findings of this study revealed that there is a significant positive correlation (r = 0.514, p<0.01) between students' language proficiency in English and students' academic achievement in Biology. These findings indicate that, students' language proficiency in English influences the academic achievement of grade ten students in Biology subject. It is found that if students are proficient in English language, they would be able to comprehend the concepts, express those concepts in most appropriate manner especially while taking notes and during the examination which

would ultimately, enhance higher academic achievement. Similarly, a study conducted by Tuan and Mai (2015) concluded that the proficiency in English ensures students' success as it enables them to communicate their ideas and feelings appropriately. On the other hand, Falayajo (1997) stated that the language inefficiency invariably leads to low academic achievement. The study found that most of the learners are found not proficient in English because of which they face difficulty in expressing their ideas and views while answering the questions. For instance, teacher 2 opined that "Students find difficulty in writing answer", as a result, the academic achievement of the students is found to be hampered by the low proficiency in English.

The similar findings of the significant positive relationship between students' academic achievement in science and mathematics, and language proficiency was reported in a study conducted at Philippine Science High School Campus (Racca and Lasaten, 2016). The study found that the majority of the students who had good level of science and mathematics, had good proficiency in English. Furthermore, study by Javier (2001) also claimed that more the students are proficient with the English language, they are more likely to perform well in their academic subject. These findings are consistent with that of Aina et al. (2013); Fakeye (2014); Wilkinson & Silliman, (2008); Wilson and Komba (2012).

Therefore, this study concludes that the language proficiency does influence the academic achievement of the grade ten students in Biology. Thus, based on the present findings abetted by Fakeye and Ogunsiji (2009), the study recommends that effort should be geared towards making the students proficient in English language as a way to improve the academic achievement.

5.8 Summary

This findings of this study revealed that, if student possesses positive attitude towards the subject, with high motivation and good study habit, can significantly influence the academic achievement of the students, assisted by proficiency in english language. Furthermore, if parents are involved in guiding and supporting their children in academic tasks, followed by good instructional strategies from teachers in school can enormously enhance grade ten students' academic achievemnt in Biology.

Discussion | Chapter 5

CHAPTER 6: CONCLUSION

6.1 Introduction

This chapter presents the overview of the study by presenting the summary of the result. Based on those results and discussions (refer Chapter 3 and 4), recommendations for concerned authorities along with its limitations of the study are mentioned. This section also proposed the recommendations for future studies.

6.2 Conclusion

This study revealed the existence of positive correlation between parents' education qualification and grade ten students' academic achievement biology. Higher the level of education qualification of parents, students had more advantage over their academic achievement. This is mainly attributed to the three significant impacts of educated parents: Firstly, those parents provided enough support and guidance to their children. Secondly, they equipped their children with all the necessary resources required for their studies. Finally, parents with higher level of education are found more confident in their ability to help their children, which would ultimately, contribute in enhancing the academic ability of their children.

The findings on teacher competence revealed the significantly positive correlation between the teacher competence and academic achievement of the grade ten students in biology. It is found that teacher's usage of various instructional methods in classroom improve students' learning and correspondingly, contribute to the better academic outcomes. Hence, the study felt the need of incorporating different approaches to teaching, rather than sticking to same approach throughout, in order to raise the academic performance of individual students. Study also revealed that teachers' provision of individualized attention to weak students has a significant effect on academic achievement in secondary schools. Therefore, biology teacher should plan the lesson based on practices which are innovative to facilitate student learning and assess student learning as well as to create better learning community for students.

The study revealed a strong positive correlation between students' attitude to subject (Biology) and their academic achievement. Vehemently, student with positive attitude to the

biology can bring about good results while negative attitude may bring low achievements. This is because, an individual with positive attitude towards any subject concentrates on it, is interested in it and takes all the actions necessary to succeed in learning about it. Furthermore, those with positive attitude are always motivated to work hard. On contrary, those students with negative attitude towards biology, find the subject difficult to learn. Thus, helping students to develop positive attitude towards biology course should be considered as an important step in science education.

This study found significantly strong positive correlation between students' study habit and their academic achievement in biology. This finding indicates that, if the students possess good study habit, it will facilitate better learning and boost academic achievement. On contrary, bad study habit of the student, leads to low academic achievement. Thus, it is crucial to help students to build effective study habit.

The study also revealed existence of a positive correlation between academic motivation and academic achievement of the students in biology. It is found that there is a significant positive correlation between intrinsic motivation of the students and students' academic achievement. This indicates that students with high intrinsic motivation tends to perform better in biology. On the contrary, the significant negative correlation between students' performance in biology and students' amotivation was prevalent. This indicates that students with high degree of amotivation tends to achieve lower grades in biology. Therefore, students need to be motivated by all the concerned stake holders.

This study also revealed the significant positive correlation between students' language proficiency in English and students' academic achievement in biology. It is found that the students who are proficient in English were able to comprehend, analyse and express themselves fully while responding in the process of teaching and learning, which is a necessity to have elevated academic achievement. Therefore, high priority should be given to enhance English language proficiency.

6.3 Significance

This present study has profound contributions: firstly, this present study contributed the empirical research data in science education in Bhutan, as this study is first of its kind in Bhutanese context to report on the factors that influenced grade ten students' academic achievement in biology, based on student, teacher and parent factor. The study also contributed in understanding the influence of attitude towards the subject and motivation to study, and how it can be transformed into positive attitude and with strong motivation for better learning outcome. Furthermore, this study contributed in understanding the importance of having good study habit of students at home and in school. Furthermore, it contributed in importance of teacher competence and understanding value of new innovative teaching strategy, not just to enhance self-learning but also to build positive attitude to subject and motivate learners.

6.4 Limitation

The study gives good understanding about the factors influencing low academic achievement of grade ten students in Biology. However, the study was limited to small sample size and not all the schools with grade ten under Samtse Dzongkhag was involved, which other-wise would make the study more robust.

6.5 Recommendation

This study presents the factors influencing the low academic achievement of grade ten students in Biology under Samtse Dzongkhag. Thus, this study provides significant insight in understanding the factors that impedes students' academic learning and achievement. The present study revealed that teacher competence, students' attitude to subject, study habit, academic motivation and language proficiency of students influenced to low academic achievement. Based on these findings, following recommendations are made.

6.5.1 Recommendation for Students

The study revealed the existence of positive correlation between students' academic achievement, academic motivation, study habit, attitude towards the subject and English language proficiency. Therefore, to enhance their academic achievement, students are

recommended to intrinsically build positive attitude towards the subject by being determined towards academic task, expending more effort and self-regulating one's thoughts, beliefs and actions. Similarly, students can introspect on their self-learning strategy and skill, and choose the most appropriate method to boost their learning and make this an unswerving habit for studying. In line with it, low academic achievers are also recommended to follow and emulate the study habits of higher achievers. In addition, students must build good reading and writing habit for effective and efficient skills on reading comprehension and writing strategy.

6.5.2 Recommendation for Teachers

The study revealed the existence of correlation between teacher competence and students' academic achievement in Biology. Therefore, teachers are recommended introspect and use innovative instructional strategies, assessment and feedback strategies in teaching. Furthermore, teachers must provide more attention and proper guidance to develop the positive study habit of those children who are unable to meet standards of achievement. Thus, teacher needs proper exposure and orientation to understand students' developmental and intellectual progress in study habits.

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