

FACTORS INFLUENCING ON STUDENTS' ACADEMIC ACHIEVEMENT IN LEARNING BIOLOGY

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Abstract

The main purpose of this study is to investigate the factors that influence on students' academic achievement in learning biology. Specifically, this study aimed at investigating school based factors and student factors that influence on students' academic achievement in learning biology. Quantitative research methodology was mainly used to gather required data. The design adopted in this study was a descriptive research design. Sixteen high schools were selected from Yangon Region. A sample of (50) biology teachers and (640) Grade Ten science students was used. The school based factors considered in this study include: teaching methods, teaching and learning resources, and principal's instructional supervisory role. The student factors considered in this study include: teacher- student relationship, students' attitudes towards biology, students' motivation towards biology, students' study habits and parental involvement. A pilot study was conducted to test the reliability of the measuring instruments. Three sets of instruments were used to collect data. These included the students' questionnaire, the teachers' questionnaire and an achievement test. Descriptive Statistics such as mean, standard deviation and Pearson product – moment correlation coefficient were used to analyze data using Statistical Package for the Social Sciences Programme (SPSS) version 25. The finding indicated that the correlation between school based factors and students' biology achievement was $r = .819, p < .01$ and the correlation between student factors and students' biology achievement was $r = .889, p < .01$. The results of this study revealed that school based factors and student factors were positively correlated with students' biology achievement.

Keywords: learning, biology, academic achievement, factor.

Introduction

Education is the process of instructions aimed at the all-round development of the individual, facilitating realization of self-potential and latent talents of an individual (Anderman, Maehr & Midgley, 1999). Education starts with the birth of an individual and then it goes on till the last day of the individual. Education equips the individual with social, moral, cultural and spiritual aspects and thus makes life progressive, cultured and civilized. About education, P.O. Bannerji said, "It is the development of the power of adaptation to ever changing social environment" (Rather, 2004). In this modern era, science has become the backbone for the prosperity in each and every field of life. A broad science education for the entire population is therefore more vital today than ever. Biology is one of the cornerstones of science. In many areas, biological knowledge can be applied in general improvement of man's well-being as evidenced in Medicine, Agriculture and Industry. From this point of view, biology is fundamental and important of all the other subjects of science. So educators need to consider how to teach to develop students' biological literacy and how to promote students learning in biology and which factors are important for attaining students' academic achievement in learning biology.

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Background of the Study

All people are living in the age of knowledge explosion and knowledge economy. Knowledge is power. Those nation and their citizens who are successful in knowledge creation can really rule the world. Every citizen of this world must know and understand himself or herself in relation to the environment, various processes of life, plants, animals and their interaction and interdependence. Only after understanding these, one can preserve, enrich and endeavor to create a better environment to live in. Biology deals with plants, and animals, their biological processes, interactions, interdependence, and the role of biotic factors in the environment (Ahmad, 2011).

In the era of globalization, the world faces many social, economic, and environmental challenges as well as ethical problems. Biology is undoubtedly a key discipline in understanding and responding to some of these pressing issues of the day from the many challenges arising from population growth, human impacts on ecosystems and services to climate change and sustainability (Kim & Diong, 2012). Many biologists are working on problems that critically affect people's lives such as the world's rapidly expanding population, global warming and diseases. The knowledge that biologists are gaining is of fundamental importance to people's ability to manage the world's resources in a suitable manner, to prevent or cure diseases, to control population growth rate and to improve the quality of humans' lives and those of their children and grandchildren. All of these improvement meet human needs and so these times have been considered as "the Age of Biology". Because the activities of biologist alter people's lives in so many ways, an understanding of biology is becoming increasingly necessary for any educated person (Raven & Johnson, 1988). Therefore, a foundation in biology is considered to be critical for the 21st century students since many of decisions require on understanding of biology (Keysar & PasQuale, 2006, cited in Samikwo, 2013). In addition, educating people in science especially Biology has been widely acknowledged as a way of promoting economic development, eliminating poverty and introducing social welfare. Thus, biology plays a role in everyone's lives and touches almost every aspect of human existence in some ways. Because of the indispensability of biology, much emphasis must be placed on biology achievement at the upper secondary school level. Therefore, this study sought to investigate factors influencing students' academic achievement in learning biology.

Purposes of the Study

The primary purpose of this study is to investigate the factors that influence on students' achievement in learning biology.

Objectives of the Study

The study intended to achieve the following specific objectives:

- To investigate the school based factors that influence on students' academic achievement in learning biology.
- To investigate the student factors that influence on students' academic achievement in learning biology.
- To investigate the students' academic achievement in biology.
- To give suggestions to improve the achievement of students in learning biology.

Research Questions

This study was guided by the following questions:

- Is there a relationship between school based factors and students' biology achievement?
- Is there a relationship between student factors and students' biology achievement?

Scope of the Study

This study has its own particular limitations. The first limitation is related to the fact that the participants of the study come from only Yangon Region. Sixteen Basic Education High Schools were included in this study. Participants in this study were (50) biology teachers and (640) Grade Ten Science Students from the sixteen selected schools within academic year (2018-2019). The second limitation is that this study specifically focused on the school based factors (teaching and learning resources, teaching methods, principal's instructional supervisory role) and student factors (teacher-student relationship, students' attitude towards biology, students' motivation towards biology, students' study habits, and parental involvement) that influence on students' biology achievement. Besides, there has been many other factors influencing students' biology achievement but this study did not try to find out other factors that influence on students' achievement in learning biology at the upper secondary school level. As a result the finding of this study may not exactly bring out the influence of such other factors.

Definition of Key Terms

Learning: Learning is the acquisition of new behavior or the strengthening or weakening of old behavior as the result of experience (Smith, 1962, cited in Mangal, 2007).

Biology: Biology is the study of living things and their vital processes (Sarojini, 2010).

Academic achievement: Academic achievement means the extent to which the learner is profiting from instruction in the given area of learning i.e. achievement is reflected by the extent to which skill and knowledge has been imparted to him (Crow & Crow, 1969).

Factor: A factor is defined as one of the elements contributing to a particular result or situation (Costello, 1992, cited in Mutinti, 2018).

Significance of the Study

There is no country that would develop without the use of science and technology because it is considered as the backbone of national development. Biology is one of the largest and most important branches of science. The 21st century has been called a Biology century because of the many advances in humankind's understanding of the basic processes and component of life (Kim & Diong, 2012). The main goals of science education are to develop understandings of biological systems, the methods of scientific inquiry, prepare students to make responsible decisions concerning science-related social issues and inform students about possible science careers (Bybee, Carlson-Powell & Trowbridge, 2007, cited in Kim & Diong, 2012). To develop science education, it is also important to know factors that influence students' achievement in learning biology. Therefore, school based factors and students factors are important aspects to consider also in school biology education.

Review of Related Literature

School Based Factors Influencing on Students' Biology Achievement

According to Onyara (2013, cited in Mutindi), school based factors are those within school control that can influence students' academic achievement in schools. They include; teaching methods, teaching and learning resources and principal's instructional supervisory role.

Teaching Methods

Early educators such as Dewey (1964), Montessori (1968) and Froebel (1974) believed that, effectiveness of teaching and learning are determined by the type of teaching strategies applied in classroom. A teaching method is characterized by a set of principles, procedures or strategies to be implemented by teachers to achieve desired learning in students (Liu & Shi, 2007, cited in West Wood, 2008). These principles and procedures are determined partly by the nature of the subject matter to be taught, and partly by their beliefs or theories about how students learn. Anene (1999, cited in Caleb, 2015) stated that teaching methods are pedagogical strategies designed and adopted by the teacher to facilitate teaching on the teacher's part and learning on the learner. According to him, for effective teaching and learning to take place, the skillful teacher needs to use many different methods at his disposal.

Teaching and Learning Resources

According to Coombs (1970), education consists of two components. He classified these two components into inputs and outputs. According to him, input consists of human, physical facilities and material resources and output are the goals and outcomes of the educational process. Teaching and learning resources which are educational inputs are important to the teaching of any subject in the school curriculum. Teaching and learning resources comprises basically three components: material resources, physical facilities and human resources. Availability of teaching and learning resources enhances the effectiveness of schools as they are the basic resources that bring about good academic performance in the students (Atieno, 2014).

Principal's Instructional Supervisory Roles

Principals in schools are the people entrusted with the responsibility of ensuring that educational strategies are put in place that support effective teaching and learning for all students in their schools (Makau, Ronoh & Tanui, 2016). Principals are the chief instructional supervisors. Their key responsibility is to promote the learning and success of all students by ensuring that effective instruction is done (Alig-Mielcarek, 2003, cited in Makau, Ronoh & Tanui, 2016). Instructional supervision is a collegial, collaborative way of offering help to improve instruction (Olivia & Pawlas, 2004, cited in Makau, Ronoh & Tanui, 2016). Therefore, instructional supervision is primarily concerned with improving instructional practices for the benefit of students. According to Okumbe (1998), the instructional supervision aspect involves helping in the formulation and implementation of lesson plans, notes, and schemes of work, evaluating the instructional programmes and overseeing modification, delivery of instructional resources, helping in conducting and coordinating staff in- servicing, advising and assisting teachers involved in instructional programmes.

Student Factors Influencing on Students' Biology Achievement

Student factors have an effect on academic achievement of students. In this study, student factors such as teacher- student relationship, students' attitudes towards biology, students' motivation towards biology, students' study habits and parental involvement were studied.

Teacher- Student Relationship

On average, students spend six hours at school each day for 170 days throughout the year. Therefore, it comes as no surprise that teachers have an enormous amount of influence on their students. This influence, or power, can significantly impact the learning environment, which, in turn, affects a student's achievement in school. The most powerful weapon teachers have, when trying to foster a favorable learning climate, is a positive relationship with their students (Boynton & Boynton, 2005, cited in Varga, 2017).

Teachers who take time develop positive relationships with their students will see improvement in their students both academically, behaviorally, and emotionally. Students who have positive relationships with their teachers tend to put forth more effort in class and as a result improve their academic achievement. Teachers also see improvement in their student behavior when they take the time to develop positive relationships with their students. Positive relationships between students and teachers have positive academic affects (Pianta, 1999, cited in Varga, 2017).

Students' Attitudes towards Biology

Attitude is generally defined as an individual's tendency to react positively or negatively towards a stimulus (Fishbein and Ajzen 1977, cited in Karadag, 2017). Reid (2006) notes that attitudes translate people's evaluation of things to certain behaviors toward something or someone. Indeed, they shape people's ways of thinking and behavior and, therefore, assume great importance. Attitudes are highly complex and can affect learning extensively. A learner's attitude relates to all the facets of education. For example, the attitude of a learner towards biology will determine the measure of the learner's attractiveness or repulsiveness to biology. Attitudes associated with biology appear to affect students' participation in biology as a subject and impact performance in biology (Linn, 1992, cited in Jebson & Hena, 2015). It is generally believed that students' attitude towards a subject determines their success in that subject. In other words, favorable attitude result to good achievement in a subject.

Students' Motivation towards Biology

According to Ertem (2006, cited in Karadag, 2017), motivation is an inner state uncovering individuals' behavior and directing them to these behaviors. In an educational context, motivation may be described as a student's desire, intention and behaviors directed to learning and achieving their optimum educational outcome. It involves students' energy and drive to learn, work effectively and achieve to their potential at school, and the behavior that follow from this energy and drive (Martin, 2003, cited in Woolfolk & Margetts, 2013). Especially educational researchers and practitioners express that motivation is one of the most important factors in student achievement and in ensuring continuous achievement (Karadag, 2017).

Students' Study Habits

Study is a part of life for anyone who goes to school or college and every person studies in different ways to some degree or the other. According to Crow & Crow (1948) study can be interpreted as a planned program of subject matter mastery. It is essential to learning and fundamental to school life. Its chief purposes are (1) to acquire knowledge and habits which will be useful in meeting new situations, interpreting ideas, making judgments, and creating new ideas, and in the general enrichment of life; (2) to perfect skills: (3) to develop attitudes.

Habits help the individual to do something with less effort and thought. They are important and play a crucial role in shaping the personality of the individual. In the field of education habits of thinking regularly, proper reasoning, concentration on study, punctuality etc., help the students in their proper adjustment and learning. According to Percival and Ellington (1984, cited in Osa-Edoh & Alutu, 2012), study habit refers to the method or techniques of effective learning which in turn involve a set of study skills as organization of time, effective use of time, reading skills, essay writing, report writing skills, note-taking, examination techniques and even job-hunting skills.

Parental Involvement

Parents are essential in children's daily lives and they play a significant role in their children's education. In the more economically developed countries, parents are actively involved in their children's education at all ages. Parental involvement can be defined as any interaction between parents and children at home or with the school to ensure that the children's academic performance is going in a positive way. Most commonly, parental involvement is categorized in home-based and school based involvement (Hoover-Dempsey & Sandler, 1997, cited in Jaiswal & Choudhur, 2017).

Home based involvement includes strategies like communication between parents and children, creating a learning environment at home, monitoring and helping in homework, talking with them about school related activities and academic issues, monitoring their progress, encouraging school success. Parents school based involvement refers to parents' participation in school activity such as Parent Teacher Organisation (PTOs), volunteer work, attending school events and conference, visit to classroom and interaction with class teachers.

Research Method

This study is concerned with the factors that influence on students' academic achievement in learning biology. The factors such as school based factors (teaching methods, teaching and learning resources, and principal's instructional supervisory role), and student factors (teacher-student relationship, students' attitudes towards biology, students' motivation towards biology, students' study habits and parental involvement) are investigated to be able to determine whether these factors influence on students' biology achievement or not. Research design and procedure, instruments, population and sample, and data analysis are presented to address the research questions.

Research Design

The research design for this study was descriptive research design, in which this study seeks to determine whether, and to what degree, a relationship exists between two or more

quantifiable variables (school based factors, student factors and students' biology achievement). Quantitative method was used to collect the required data for this study.

Procedure

Firstly, the problem concerning students' academic achievement in biology learning was formulated. Secondly, the related literature for the study through books, journals and internet sources was gathered. The third procedure for this study was the questionnaire and achievement test were developed under the careful guidance of the supervisor.

The instruments for the study were reviewed by six experienced teachers from Methodology Department, Yangon University of Education. After modifying these instruments, a pilot study was carried out with two biology teachers and fifty science students from No. (1) Basic Education High School, Hmawbi Township, Yangon Region. Necessary modifications were made again under the supervision of the supervisor. After pilot testing, the questionnaires were distributed to the total of (640) students from Grade Ten and (50) biology teachers and the achievement test was administered to the total of (640) students from Grade Ten, High School level on November, 2018.

Instruments

In this study, two types of questionnaire (questionnaire for teacher and questionnaire for student) and an achievement test for Grade Ten students were used as the instruments. Questionnaire for teaching methods used by biology teachers was mainly based on "Teaching of Life Science" (Sharma, 2009) and "The Act of Teaching" (Cruickshank, Jenkins & Metcalf, 2009). The questionnaire for teaching and learning resources was based on "The World Educational Crisis: A System Analysis" (Coombs, 1970). The questionnaires for principal's instructional supervisory role was based on "Educational management: Theory and practice" (Okumbe (1998). Questionnaire developed by Fisher, Fraser, & Cresswell (1996) was adapted to investigate teacher- student relationship. Questionnaire for students' attitudes towards biology was mainly based on "Slovakian Students Attitudes toward Biology" (Prokop, Tuncer, Chuda, 1970). Questionnaire developed by Glynn, Koballa, et al (2006) was adapted to investigate students' motivation towards biology. The questionnaire for students' study habits was mainly based on "Study Habits Inventory" (Patel, 1976) and the questionnaires for parental involvement was based on "A review of the relationship between parental involvement and students' academic performance" (Jaiswal & Choudhuri, 2017). The total items were (72) on a five point Likert-type scale of (1) to (5) to explore school based factors and student factors. The achievement test was based on the content area of Grade Ten Biology textbooks prescribed by the Curriculum and Textbook committee, Ministry of Education, Myanmar. True/false items, completion items, multiple choice items, short answer and long answer items were used for this study. There were totally items (39) were included in the test. The items in the test were constructed according to Bloom's Taxonomy.

Population and Sample

This study was conducted in Yangon Region. The research area was divided into four parts (East, North, West and South in Yangon Region). Two townships from each part were randomly selected for study. Selection of schools was based on simple random sampling technique. Two schools from each township were selected for this study. Sixteen high schools

were selected as representative schools for this study. Participant students for this study were selected by using random sampling technique. The number of teachers and students were (50) and (640) respectively.

Data Analysis

The data was analyzed by using descriptive statistics (mean, standard deviation and correlation). The descriptive analysis: the mean, standard deviation, maximum and minimum scores were used to describe the mean scores of each factor by schools. Pearson Correlation Analysis was conducted to provide information about the relationship between the selected factors and students' biology achievement.

Findings

Findings of School Based Factors in the Selected Schools

In order to find out the school based factors, a questionnaire for biology teachers was used. The average mean score is (97.54) and standard deviation is (8.669). The scores for school based factors ranged from (72) to (113) (See Table 1).

Table 1 Mean Scores of School Based Factors in the Selected Schools

School	Number of Teacher	Mean	Std. Deviation	Minimum	Maximum
BEHS1 South Dagon	2	97.50	4.950	94	101
BEHS2 South Dagon	4	100.00	2.944	97	104
BEHS1 Thingangyun	4	91.50	4.726	85	95
BEHS Thuwana	4	102.00	4.761	99	109
BEHS1 Mayangone	2	95.00	14.142	85	105
BEHS2 Mayangone	4	106.50	4.509	103	113
BEHS2 Hlaing	4	92.50	13.435	83	102
BEHS4 Hlaing	2	81.00	12.728	72	90
BEHS1 Thanlyin	4	109.00	1.826	107	111
BEHS2 Thanlyin	4	101.50	2.887	98	105
BEHS1 Kyauntan	2	97.50	9.192	91	104
BEHS2 Kyauntan	2	94.50	2.121	93	96
BEHS2 Insein	4	101.00	2.828	99	105
BEHS1 Insein	4	87.25	4.924	81	93
BEHS1 Mingalardon	4	85.00	7.071	80	90
BEHS5 Mingalardon	4	99.00	3.651	95	103
Average/ Total	50	97.54	8.669	91.38	101.63

Findings of Student Factors in the Selected Schools

In order to find out the student factors, a questionnaire for students was used. average mean score is (168.01) and standard deviation is (20.355). The scores for student factors ranged from (95) to (221) (see Table 2).

Table 2 Mean Scores of Student Factors in the Selected Schools

School	Number of Student	Mean	Std. Deviation	Minimum	Maximum
BEHS1 South Dagon	40	164.78	23.958	95	202
BEHS2 South Dagon	40	170.35	19.453	125	219
BEHS1 Thingangyun	40	167.00	19.077	128	205
BEHS Thuwana	40	175.80	20.313	126	208
BEHS1 Mayangone	40	162.68	17.607	129	193
BEHS2 Mayangone	40	176.27	16.742	130	205
BEHS2 Hlaing	40	163.67	20.633	118	201
BEHS4 Hlaing	40	153.33	15.488	128	188
BEHS1 Thanlyin	40	182.75	11.584	159	216
BEHS2 Thanlyin	40	163.97	21.016	104	191
BEHS1 Kyauntan	40	170.72	17.161	137	210
BEHS2 Kyauntan	40	172.20	20.386	112	204
BEHS2 Insein	40	174.35	19.127	137	221
BEHS1 Insein	40	172.90	17.862	127	203
BEHS1 Mingalardon	40	154.30	22.008	114	197
BEHS5 Mingalardon	40	163.08	19.502	114	199
Average/ Total	640	168.01	20.355	123.94	203.88

Findings of Students' Biology Achievement in the Selected Schools

In order to measure the students' biology achievement in the selected schools, a test that is comprised of (39) items from five chapters of the Grade- 10 Biology textbook with the help of table of specifications was constructed. The average mean score is (33.95) and the standard deviation is (6.092) (See Table 3).

Table 3 Mean Scores of Students' Biology Achievement in the Selected School

School	Number of Student	Mean	Std. Deviation	Minimum	Maximum
BEHS1 South Dagon	40	34.37	6.815	20	45
BEHS2 South Dagon	40	37.70	6.509	23	48
BEHS1 Thingangyun	40	35.18	6.271	20	45
BEHS Thuwana	40	38.00	6.987	23	47
BEHS1 Mayangone	40	34.63	6.720	20	43
BEHS2 Mayangone	40	38.40	5.848	23	47
BEHS2 Hlaing	40	34.12	3.844	24	41
BEHS4 Hlaing	40	31.13	6.398	22	42
BEHS1 Thanlyin	40	41.05	4.728	24	47
BEHS2 Thanlyin	40	35.82	6.968	20	44
BEHS1 Kyauntan	40	37.75	5.952	25	47
BEHS2 Kyauntan	40	37.00	6.222	20	45
BEHS2 Insein	40	37.52	5.316	24	48
BEHS1 Insein	40	38.13	5.730	23	47
BEHS1 Mingalardon	40	31.83	7.150	20	43
BEHS5 Mingalardon	40	32.35	6.015	20	44
Average/Total	640	33.95	6.092	21.93	45.19

Relationship between School Based Factors and Students' Biology Achievement

To examine the relationship between school based factors and students' biology achievement, Pearson product-moment correlation was used. It was found that there was a significant correlation $r = .819, p < .01$. The result shows that there was a significant correlation between school based factors and students' biology achievement. The result shows that the direction of correlation was positive. Table 4 shows the correlation between school based factors and students' biology achievement.

Table 4 Correction between School Based Factors and Students' Biology Achievement

Correlation			
		School Based Factors	Students' Biology Achievement
School Based Factors	Pearson Correlation	1	.819**
	Sig. (2-tailed)		.000
	N	16	16
Students' Biology Achievement	Pearson Correlation	.819**	1
	Sig. (2-tailed)	.000	
	N	16	16

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

After that, the correlation between the respective areas of school based factors and students' biology achievement is presented in Table 5.

Table 5 Correlation between Respective Areas of School Based Factors and Students' Biology Achievement

Correlation					
		SBA	TM	TLR	PISR
Students' Biology Achievement (SBA)		1	.705**	.708**	.691**
Teaching Methods (TM)			1	.754**	.503*
Teaching and Learning Resources (TLR)				1	.546*
Principal's Supervisory Instructional Roles (PISR)					1

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

* . Correlation is significant at the 0.05 level (2-tailed).

Relationship between Student Factors and Students' Biology Achievement

To examine the relationship between student factors and students' biology achievement, Pearson product-moment correlation was used. It was found that there was a significant correlation $r = .898, p < .01$. The result shows that there was a significant correlation between student factors and students' biology achievement. The result shows that the direction of correlation was positive. Table 6 shows the correlation between student factors and students' biology achievement.

Table 6 Correction between Student Factors and Students' Biology Achievement

Correlation			
		Student Factors	Students' Biology Achievement
Student Factors	Pearson Correlation	1	.898**
	Sig. (2-tailed)		.000
	N	640	640
Students' Biology Achievement	Pearson Correlation	.898**	1
	Sig. (2-tailed)	.000	
	N	640	640

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

After that, the correlation between the respective areas of student factors and students' biology achievement is presented in Table 7.

Table 7 Correlation between Respective Areas of Student Factors and Students' Biology Achievement

		Correlation					
		SBA	TSR	SAB	SMB	SH	PI
Students' Biology Achievement (SBA)		1	.611**	.621**	.704**	.771**	.700**
Teacher-Student Relationship (TSR)			1	.412**	.412**	.420**	.409**
Students' Attitudes towards Biology (SAB)				1	.593**	.462**	.377**
Students' Motivation towards Biology (SMB)					1	.624**	.481**
Students' Study Habits (SSH)						1	.563**
Parental Involvement (PI)							1

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

Summary of the Research Findings

The summary of the research findings of this study are presented as the following.

- For school based factors, the average mean score is (97.54) and standard deviation is (8.669).
- For student factors, the average mean score is (168.01) and standard deviation is (20.355).
- For students' biology achievement, the average mean score is (33.95) and standard deviation is (6.092).
- According to the table (4), there was a significant correlation ($r = .819, p < .01$) between school based factors and students' biology achievement.
- According to the table (6), there was a significant correlation ($r = .898, p < .01$) between student factors and students' biology achievement.

Conclusion

Discussion

The purpose of this study is to investigate the factors that influence students' academic achievement in learning biology. According to the Table 4, the correlation between school based factors and students' biology achievement was found that the correlation $r = .819, p < .01$. This result shows that the direction of correlation was positive and it was pointed out if the function of school based factors are high, students' biology achievement is also high. So, this finding was revealed the research question: Is there relationship between school based factors and students' biology achievement?

From the research findings Table 6, the correlation between student factors and students' biology achievement was found that the correlation $r = .898, p < .01$. This result shows that the direction of correlation was positive and it was pointed out if the functions of student factors are high, students' biology achievement is also high. So, this finding was support the research question: Is there relationship between student factors and students' biology achievement?

Suggestions

The students' academic achievement plays an important role in producing the best quality students who will become great leader and manpower for the country thus responsible for the country's economic and social development. The social and economic development of the country is therefore, directly linked with students' achievement. Academic achievement gives students an opportunity to develop their talents, improve their grades and prepare for the future academic challenges. Mastery of academic content serves as the basis for higher order thinking skills as well as the impetus for improved interpersonal and intrapersonal competencies. In today's world having strong background in science subjects, especially in biology seems very crucial in getting into many careers and occupation such as medicine and economic areas. In the advancement of science in this rapidly changing world, the role of biology is highly pronounced. To insure this, students' achievement in science field particularly in biology should be high.

According to the Table 5, the use of teaching methods by teachers has a significant influence on students' biology achievement. The method in any teaching and learning situation is very important because it affects the responses of students and determines whether they are interested, motivated and involved in a lesson in such way as to engage in a good learning. The students face many difficulties in learning biology. Because biology subject involves many abstract concepts and terms such as metabolism, adaptability, cell, tissues. To overcome these barriers, teachers need to utilize various teaching methods. Therefore, teachers should also increase their knowledge of various instructional strategies in order to keep students engaged and motivated throughout the learning process. Since individual students differ in regard to their specific needs according to their personality patterns, the biology teacher should select appropriate teaching methods to the pupils in his class, and to the subject he is teaching. In addition, Ministry of education, curriculum developers should outline appropriate instructional methods for use by teachers to teach any topic highlighted in the biology curriculum. This will gear towards enhancing students' achievement potentials in schools.

According to the Table 5, teaching and learning resources significantly influence on students' biology achievement. Nowadays, student-centered approaches to learning are being

officially encouraged by the Ministry of Education. However, the success of these approaches will be affected by the availability of teaching and learning resources. Biology as a branch of science has interconnected series of concepts. This has been necessary to demystify teaching of difficult concepts by intensifying the use of material resources in the teaching of biology. Besides, biology subject requires a lot of practical works, so inadequate teaching and learning materials and physical facilities may lead to passive learning with profound effects on learners' academic achievement. Even though how good a curriculum may be, absence of teaching and learning resources (teaching and learning materials, physical facilities and human resources) can jeopardize its effective implementation. Therefore, adequate teaching and learning resources should be provided by the Ministry of Education for effective teaching and learning of biology in schools. For the betterment and improvement of biology achievement, country should further invest in teaching and learning resources for the better achievement of the students.

According to the Table 5, there is an improvement in the students' achievement in the biology when principals monitor the teaching learning process. Therefore, principals should supervise, evaluate and coordinate the instruction process to ensure that it is in line with the set goals. This can be done by meeting with individual teachers to encourage them on the effective use of instruction time and new teaching skills and also with students to discuss their performance at given times. Principals should be available in the school to both teachers and students. They should visit teachers in classrooms and laboratory to encourage the teachers and ensure the provision of teaching and learning resources.

Besides, the school principals should ensure that they check on the teachers' lesson plans, teachers' records of work, and students' exercise books and carry out the conferences with the teachers regularly to ensure that the process of instructional supervision in schools is effective. Principals should monitor students' progress by discussing their academic achievement with teachers. Moreover, the principal should intensify classroom observations with the aim of ensuring efficiency as the teachers are able to provide the students with the necessary knowledge and no time is lost or wasted. By doing so, students' academic achievement will improve significantly. Therefore, principals should be setting time for instructional supervision in schools because it is one of the roles that influence students' academic achievement positively.

According to the Table 7, teacher- student relationship has a significant influence on students' biology achievement. In order to build a positive relationship between teacher and student, the teachers should care their students' needs and strengths, holds a supportive relationship with their students, and give them the same chances and opportunities to participate in the learning process. These opportunities make students feel comfortable and free to interact in the classroom and improve their academic achievement. Furthermore, the teacher should establish a supportive and warm classroom climate, and encourage students to behave well in classroom and to be motivated. To build caring and respectful teacher-student relationships, the teacher should praise students' academic progress, encourage low achievers, reinforce positive behaviors, convey respect and establish trust in students.

According to the Table 7, students' attitudes towards biology significantly influence on students' biology achievement. Attitudes influence performance in a subject because it provides students with the drive to participate in the learning process. Therefore, biology teacher should use modern methods of teaching including use of computers and audio visual aids in presenting biology lessons to facilitate students understanding and sustain their interest in the subject. These

will help foster a more positive attitude of students towards biology. In addition, biology teachers should create interesting and non-threatening environments in their classroom and model enthusiasm for the teaching and learning of the subject. This may go a long way to help students develop positive attitude towards the biology subject, learn it without any inhibition and hence improve their academic achievement. Furthermore, the curriculum planners, the teachers and parents should articulate well on the usefulness and applicability of biology in general so that students create positive minds towards the subject and subsequently strive to improve in the subject. According to the Table 7, student's achievement greatly relies on their motivation of learning. The teachers of biology should try as much as they could to motivate their students during the course of instructions. In order to motivate students, the teacher should use reward and incentive appropriately during his delivery of instruction and give praise to students for their effort and being active participants in classroom activities. Besides, active participation of learners increases motivation. Therefore, the teacher should utilize student-centered instructional strategies such as discovery learning, cooperative learning, discussion method, etc. in teaching biology. These strategies encourage students to collaborate and learn from each other. So, these strategies improve students' active and interactive learning. Moreover, teachers should also build good interpersonal relationships with students and this enhances achievement motivation as well as proper academic engagement for academic success. Furthermore, the desirable physical learning environment can motivate students' biology learning. Hence, the government and Ministry of Education should provide well equipped biology laboratory with numerous specimens, adequate microscopes and the necessary materials to do practical work and the classroom with adequate teaching aids.

According to the Table 7, it can be easily seen that how a student takes his or her studies, greatly determines his level of academic achievement. Therefore, teachers, schools and parents should pay attention to the study habits of learners. Teachers should guide students to understand and develop in them the desirable study habits, while parents should understand the significance of good study habits and monitor their children towards that.

According to the Table 7, parental involvement has a significant influence on students' biology achievement. Thus parents should play a leading role in supporting their children's education. Parents should set high and realistic expectations for their children's educational attainment. These high and realistic expectations will motivate their children to perform well academically. Parents should ensure home supervision by establishing and enforcing the rules and regulations regarding school and home activities as well as providing opportunities and environment conducive for learning. Parents should also assist students in doing homework, discuss with children about what they are doing in school, monitor progress and encourage school success. As school involvement, parents should attend in parent teacher conference, participate in school events and communicate with the teacher in order to know their children academic and learning progress, and teaching learning condition. Parents should also participate in their children's school by joining Parent Teacher Association. Parent Teacher Associations (PTAs) should be strengthened in all schools to support improved student learning.

Conclusion

In today's global economy a nation's success depends fundamentally on the knowledge, skills and competencies of its people. Countries which invest in education are likely to reap

substantial long-term benefits, such as greater economic and social prosperity (MOE, 2016). Education at upper secondary school levels is supposed to be the bedrock and the foundation towards higher knowledge in tertiary institutions or university. It is an investment as well as an instrument that can be used to achieve a more rapid economic, social, political, technological and scientific development in a country. Science and technology is now widely considered as the pillar of any country's development. Science education is imperative for useful living in any society and it is at the centre of producing resources necessary for socio-economic, scientific and technological development needed for advancement of any nation.

In the current scenario, biology has a pivotal role to play in the economic and social development of any nation. According to Ajelayemi (1990, cited in Owiti, 2009) the knowledge of biology is the major potent source for social and economic changes in the contemporary history of mankind. It has contributed so much and still continues to contribute to make life comfortable for people, whether in urban or rural areas, both in developed and developing countries. Everyday, each person is called upon to make decisions concerning personal and societal issues involving biology. Such decisions are likely to be difficult to make. They may be the wrong decisions if there is little or no understanding of biological information or scientific awareness (Franyo, 2007, cited in Owiti, 2009). Therefore, it becomes very important that each member of the society should develop an understanding of biology. Biology education also modifies the habitual attitude of imagination, creativity, feelings of the learners and humans' thoughts of the purposes of life and how to improve it to a sufficient extent. Bearing in mind the importance of biology, it is the need of the hour to promote the biology achievement of students, who form the concrete foundation for the country's progress. There are numerous factors that contribute an important part in enhancing the academic achievement of students in learning biology.

According to the research findings, it can be concluded that there is a relationship between school based factors and student factors and students' biology achievement. According to this study, these factors are important and significantly influence on the students' biology achievement. On the basis of this research, students, teachers, parents and principal need to form joint efforts to promote students' academic achievement in learning biology.

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