

A STUDY OF THE RELATIONSHIP BETWEEN LEARNING STYLE AND BIOLOGY ACHIEVEMENT OF GRADE NINE STUDENTS

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Abstract

This study explored the relationship between learning style and Biology achievement of Grade Nine students. The study adopted a descriptive research design and employed a quantitative method. The target population in this study was Grade Nine students who chose the subject combination of Chemistry, Physics and Biology, and 415 participants were selected as sample from selected high schools in Sagaing Township. Data were collected by using a questionnaire based on Fleming's (2015) VAK learning styles which include 45 items. The results revealed that the students in this study could be classified into six learning styles: unimodal; Auditory learning style (A) 44.1%, Visual learning style (V) 34.22%, Kinesthetic learning style (K) 12.77%, bimodal; Visual-Auditory (VA) 6.02%, Visual-Kinesthetic (VK) 2.17% and Auditory-Kinesthetic (AK) 0.72%. To measure students' Biology achievements, Biology achievement test was designed by the researcher based on the content area of Chapters (1 to 3) from Grade Nine Biology textbook. Independent samples *t*-test showed no significant difference in Biology achievement by gender. One-way ANOVA showed that there are significant differences in Biology achievement by school level. Chi-Square test showed a statistically significant association between Gender and Learning Style preference. Pearson's Correlation analysis showed no significant relationship between learning style and achievement in Biology subject.

Keywords: learning, learning style, biology achievement

Introduction

Learning style is essential in academic environment because it can help students to gain the academic goals. Students are assumed academically capable of understanding lessons and assignments. The majority of them do pass, but the blame falls on the academic standards or teaching methods for those who fail. However, little consideration is given to the ways that students learn and the students' learning styles. Ideally, the way teachers teach should match the way students learn, as well as how they prefer to learn. Teachers must adapt their teaching approaches to suit the ways students learn and their learning styles. An awareness of learning style can help teachers to be more flexible in the ways they present information and design courses and learning objects (Mestre, 2010). Utilizing awareness of learning style within the educational background promotes more effective learning and hence improved academic achievement (Nzesei, 2015).

Orhun (2007, cited in Bosman, 2015) supported this view by adding that when students are taught by means of approaches that complement their learning styles, and when they become aware of their own learning styles, their academic achievements significantly increase. Cassidy (2004) and Reese (2002) also stated that learning styles have turned to have a real effect on the achievement of students (cited in Moayyeri, 2015). There have been so many researches to find out the impact of learning style and academic achievement on various subjects with a view to upgrading the teaching-learning processes to be more fruitful. But in the history of Myanmar education, not many studies on this issue can be found. To fill this gap, what students preferred learning styles are and how they relate to their academic achievement, focusing on Biology students of Grade Nine from high schools in Sagaing Township, were investigated.

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Purpose of the Research

The main purpose of this research is to investigate the relationship between learning style and Biology achievement of Grade Nine students in Sagaing Township.

Specific Objectives

The specific objectives of this study are as follows:

- To identify learning style preferences of the students in the Sagaing Township
- To explore the difference in Grade Nine students' learning styles by gender and school level
- To find out the difference in Biology achievement of Grade Nine students by gender and school level
- To give suggestions and recommendations based on result of the study

Research Questions

1. What are the learning style preferences of the students in the Sagaing Township?
2. Is there any significant difference in Grade Nine students' learning styles by gender and school level?
3. Is there any significant difference in Biology achievement of Grade Nine students by gender and school level?
4. Is there any relationship between Biology achievement and learning style of Grade Nine students in Sagaing Township?

Definition of Key Terms

Learning - Learning is the acquisition of novel information, behaviors, or abilities after practice, observation, or other experiences, as evidenced by change in behavior, knowledge, or brain function (VandenBos, 2015).

Learning Style - Learning style is the way the students concentrate, and their method in processing and obtaining information, knowledge, or experience psychologically (Jantan & Razali, 2002, cited in Othmana & Amiruddinb,2010, p. 653).

Biology Achievement - Biology performance of students as measured by the grades taken from the Biology Achievement Test (BAT) used in the study (Ozkan, 2003, p. 9).

Scope of the Study

A total of 415 Grade Nine students (179 male students and 236 female students) were selected from six high schools in Sagaing Township in 2018-2019 academic year by using a stratified sampling technique. In this study, VAK Learning Style Model developed by Fleming (2015) was used to measure the learning style of students. Three types of learning styles: visual, auditory and kinesthetic were used to measure the learning style of students.

Review of Related Literature

Learning Style

In the 1960s, there arose the belief of learning styles that everyone had his own learning style but significantly different in time to catch up, the way of learning new knowledge and experience and the storage and retrieval of the new knowledge (Reid, 2005). It is very essential for teachers to help learners figure out their own learning strategies and provide positive

feedback on weakness and strength of their learning styles. Those who teach students also need to respect their learning style and encourage their development while at the same time growing possibilities for the learners to test with different approaches of learning (Farajolahi & Nimvari, 2014).

Felder (1996) stated that “students have different learning styles, characteristic strengths and preferences in the ways they take in and process information”. Affective learning styles include (1) conceptual level (2) locus of control, (3) achievement motivation, and (4) social motivation. Moreover, physiological learning styles have to do with visual, auditory, tactile and kinesthetic preferences of the learner, as well as health-related behaviour, biorhythms, individual need for mobility, and preferences for certain environmental components (Sims & Sims, 1995, cited in Canipe, 2001).

Honey and Mumford Learning Style Model

Honey and Mumford (1992, cited in Salman, 2006) defined the term “learning styles” as ‘a description of the attitudes and behaviours which determine an individual’s preferred way of learning’. The models of learning style are presented.

Activists : Activists are people who learn by doing. They like to involve themselves in new experiences, and will ‘try anything once’. They tend to act first and consider the consequences afterwards.

Reflectors : Reflectors learn by observing and thinking about what happened. They like to consider all the possible angles and implications before coming to a considered opinion. They spend time listening and observing, and tend to be cautious and thoughtful.

Theorists : Theorists like to understand the theory behind the actions. They need models, concepts and facts in order to learn. They like to analyze and synthesize, and feel uncomfortable with subjective judgments.

Pragmatists : Pragmatists are keen on trying things out. They look for new ideas that can be applied to the problem in hand. They like to get on with things and tend to be impatient with open-ended discussions; they are practical, down-to-earth people.

VAK Learning Style Model

The present study is embedded on the VAK [Visual (V), Auditory (A) and Kinesthetic (K)] theory originally developed by Fleming (2001).

Visual (V) learners: Visual learners need to see the teacher’s body language and facial expression in order to fully understand the content of a lesson. They like to sit at the front of the classroom and they may think in pictures as they need to see a mental model of the learning material (visual information is processed and stored in the occipital lobe at the back of the brain) (Simsek, 2014).

Auditory (A) learners: They learn best through verbal lectures, group discussions, radio, email, using mobile phones, speaking, discussion boards and web-chat. Such students may repeat what has already been said, or ask an obvious and previously answered question. They often need to say it themselves as they learn through saying it their way (Fleming, 2015).

Kinesthetic (K) learners: They are quite active and cannot stand still in their places in the class. They always want to be the ones who do the tasks in the class such as cleaning the board, opening the window, closing the window and bringing chalk. They might fail to understand what is going on in the lesson if they are forced to sit for a long time. They usually cause problems in the class if they are not engaged in the right tasks. As such, they are generally affected negatively

by the schooling system and might be declared as naughty, lazy and unintelligent. They make the least use of 'chalk and talk' teaching (Jones, 1998, cited in Simsek, 2014).

Need and Significance of Learning Biology

According to Michael (2012), Biology is one of the important science subjects and is taught in senior secondary schools. It is basically the study of life and also one of basic Science subjects which play a fundamental role in economic development of a country. As it facilitates learners to cover more about the world, it is necessary to provide effective learning activities for learners. Adesoji and Olatunbosun (2008) stated that this will lead to the attainment of scientific and technological greatness. In addition to the effectiveness of learning activities, teacher is of very important ones who determine the success of learning goals. Therefore, it is very important to recognize the personality of Biology teachers training to demonstrate, expand, and deliver Biology contents to learners.

Academic Achievement and Learning Style

The importance of learning styles is being not only necessary, but also important for individuals in academic settings. Most students favour to learn in particular ways with each style of learning contributing to the success in retaining what they have learnt. As Chuah Chong-Cheng (1988) stated that students retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say as they do something (cited in Abidin, Rezaee, Abdullah & Singh, 2011). These facts revealed that each learning style has its own strengths and weaknesses. Moreover, Woolhouse and Blair (2003) also stated that an understanding of individual learning styles and knowledge pertaining to these styles are used in many educational establishments to aid students' academic success and increase class attendance (cited in Ercan, Ural & Kurtulmus, 2015). And, learning styles play an important role in students' academic achievement. Therefore, the more different activities of learning styles teachers used, the higher students' achievement were.

Research Method

This research was conducted employing a survey descriptive design and the quantitative method. In this study, it was determined to seek whether and there exists difference between two or more quantifiable variables (learning styles, gender, school level and Biology achievement) or not and to investigate relationship between learning style and Biology achievement.

Population and Sample

All participants were Grade Nine students especially those chose the subject combination: Chemistry, Physics and Biology. First, all the Basic Education High Schools in Sagaing Township were categorized into three levels according to the pass percentage of the matriculation examination held in March 2018. Then, the schools were selected by using the stratified sampling technique. Two schools for high level, two schools for moderate level and two schools for low level were randomly selected. A total of 415 Grade Nine students (179 males and 236 females) from six high schools in Sagaing Township participated in this study. The selected number of students and schools are presented in Table 1.

Table 1 Number of Selected Schools and Students in Sagaing Township

School Level	Name of School	No. of Selected Student		
		Male	Female	Total
High	BEHS (1) Sagaing	53	80	133
	BEHS (Branch) Nyaung Gone	20	25	45
Moderate	BEHS Sa Taung	39	56	95
	BEHS (2) Sagaing	29	27	56
Low	BEHS (3) Sagaing	19	24	43
	BEHS Naung Bin Wen	19	24	43
Total	6	179	236	415

Instrumentation

In this study, VAK Learning Style Model developed by Fleming (2015) was used to measure the learning style of students. This model includes three types of learning styles: visual, auditory and kinesthetic. Each learning style contains fifteen items.

In the questionnaire, there are forty-five items developed on five-point Likert-scale; strongly disagree, disagree, undecided, agree and strongly agree. In order to measure the Biology achievement of the students, an instrument based on the content area of Chapter 1,2 and 3 from Grade Nine Biology text book prescribed by the Planning and Training Department, Ministry of Education in 2018-2019 AY was constructed. The test item consists of 13 items for true or false, 12 items for completion, 13 items for multiple choice and 12 items for matching type. Each correct answer for each item was scored one mark and the score for every wrong answer for each item was zero according to the marking scheme developed by the researcher.

After preparing the questionnaire and the test, experts' review was conducted by five expert judgments. After that, the questionnaire and the test were modified. Then to find the reliability of the test, the pilot testing was done with a sample of (100) students from Basic Education High School, Ywar Thit Kyi and Ohn Daw. The internal consistency for the questionnaire and that for the test were determined to be (0.861) and (0.835) using Cronbach's Alpha.

Procedure

First, in order of collecting required data, the questionnaire of Fleming's VAK Learning Style Model (2015) was translated into Myanmar version. Content validity was determined by expert judgment. After getting the validity of these instruments, a pilot testing was conducted. The pilot testing for the instruments was conducted in July 2018. The modified instruments were distributed to all participants of the six sample schools and administered with the help of the teachers of those schools in August, 2018. After two weeks all the responses were collected, and then the data were entered into a computer data file and were analyzed using the Statistical Package for the Social Sciences (SPSS 20).

Data Analysis

The data were analyzed by using descriptive statistics. Moreover, one-way ANOVA, independent samples *t*-test and Pearson's Product-Moment correlation were used to analyze student's learning style and their biology achievement.

Findings

Analysis of Grade Nine Students' Learning Style Preferences in the Selected Schools

Table 2 Mean Scores and Standard Deviations of Students' Learning Style Preferences in the Selected Schools

Learning Style	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
1. Visual	142	47	75	62.39	5.075
2. Auditory	183	47	72	61.40	5.189
3. Kinesthetic	53	52	72	61.98	4.713
4. Visual-Auditory	25	51	74	61.28	5.624
5. Visual-Kinesthetic	9	52	65	60.89	4.372
6. Auditory-Kinesthetic	3	56	65	60.33	4.509

Note. N= Numbers, Min=Minimum, Max= Maximum, M=Mean, SD=Standard Deviation

Firstly, descriptive statistics were analyzed for means and standard deviations, minimum and maximum scores of sub-scales related learning style in order to investigate learning styles the students preferred. As shown in Table 2, most of the students in this study preferred auditory. Auditory learning style (A) had the highest number of students 183(44.1%) compared to the other learning style types. Visual learning style (V) was the next common category with the number of students of 142(34.22%) and kinesthetic learning style (K) had the number of students of 53(12.77%). In bimodal learning styles, visual-auditory learning style was the highest number of students of 25 (6.02%), visual-kinesthetic learning style was the number of students of 9 (2.17%) and the least preferred learning style dimension was the auditory-kinesthetic modalities (AK), 3 (0.72%). Figure 1 represented six learning styles of the sample students.

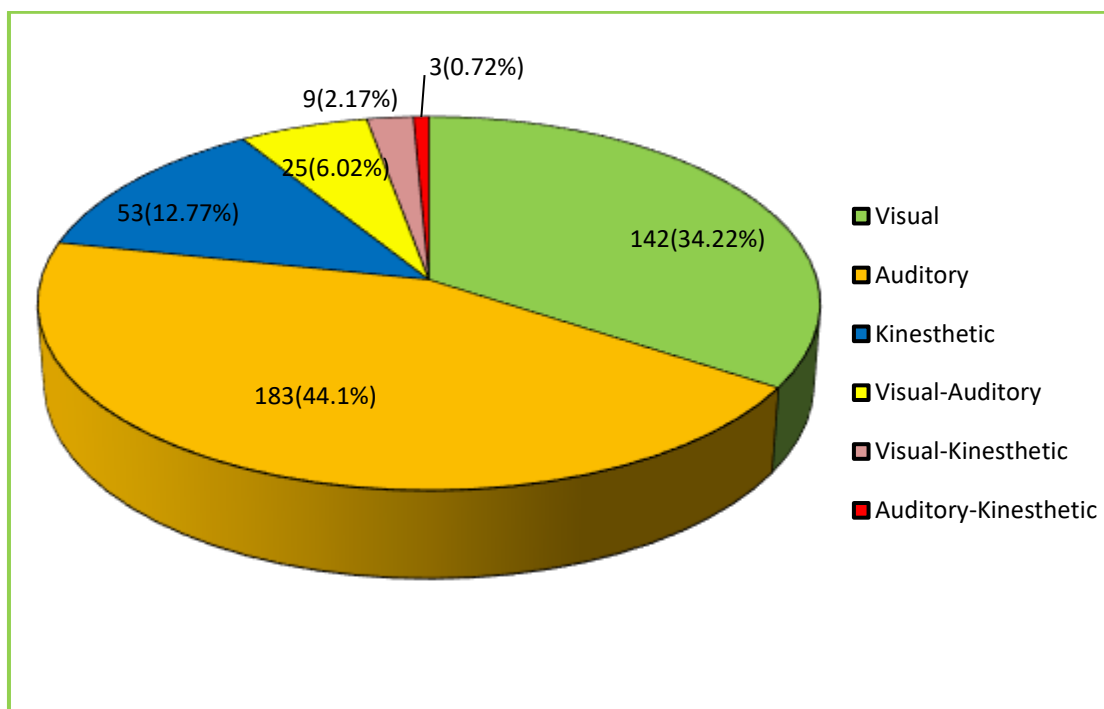


Figure 1 Students' Preferred Learning Style

Learning Style Preferences by Gender

Table 3 Descriptive Statistics of Learning Style Preferences by Gender

Learning Style	Gender	N	M	SD
1. Visual	Male	69	61.77	5.364
	Female	73	62.99	4.748
2. Auditory	Male	56	60.98	5.196
	Female	127	61.58	5.195
3. Kinesthetic	Male	41	62.17	5.152
	Female	12	61.33	2.807
4. Visual-Auditory	Male	7	58.86	7.581
	Female	18	62.22	4.583
5. Visual-Kinesthetic	Male	5	60.60	5.320
	Female	4	61.25	3.594
6. Auditory-Kinesthetic	Male	1	56.00	-
	Female	2 (0.8%)	62.50	3.536

When examined through a gender perspective, there was a slight difference in the percentage of the students who prefer various learning styles except single auditory learning style and kinesthetic learning style (see Table 3). There were highly differences in the mean scores of auditory learning style and kinesthetic learning style by gender. It can be seen that, although female students with auditory learning style were significantly higher than male students, male students with kinesthetic learning style were significantly higher than female students. Graphically presented, the learning styles between male and female students groups were shown in Figure 2.

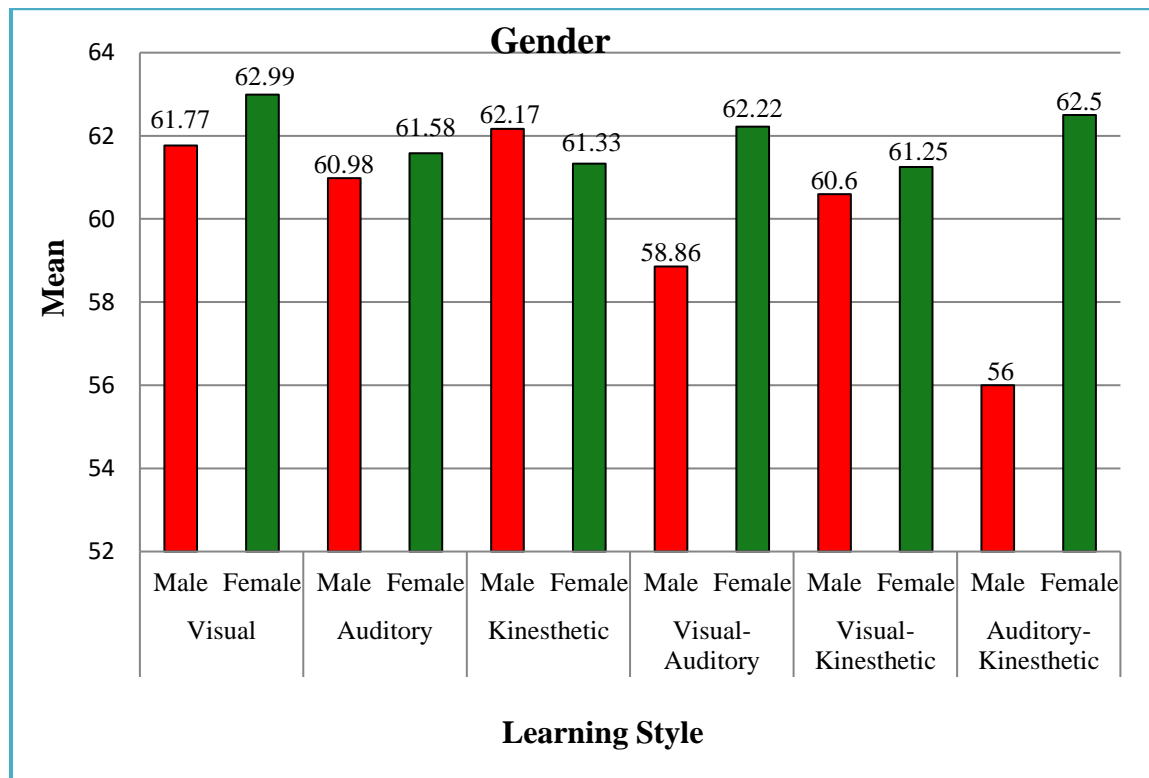


Figure 2 Learning Style Preferences by Gender

Correlation of Learning Style Preferences by Gender

Table 4 Chi-Square Analysis of the Preferred Learning Style by Gender

Gender	N	Learning Style						χ^2	P
		Visual	Auditory	Kinesthetic	VA	VK	AK		
Male	179	69	56	41	7	5	1	41.771	.000***
Female	236	73	127	12	18	4	2		
Total	415	142	183	53	25	9	3		

Note. *** $p < .001$

Table 4 reveals that the results analyzed by "Chi-Square" test to scrutinize whether there were significant differences between male and female students with regard to their preferred learning styles. The Chi-Square results indicated that male and female students were significantly different on which they have the preferred learning style ($\chi^2 = 41.771$, $df = 5$, $p < .001$). Cramer's V which indicates the strength of the association between two variables is 0.317 and thus the effect size is considered to be moderate to typical according to Cohen (1988, cited in Leech, Barrett & Morgan, 2005).

Correlation of Learning Style Preferences by School Level

Table 5 Chi-Square Analysis of the Preferred Learning Style by School Level

School Level	N	Learning Style						χ^2	P
		Visual	Auditory	Kinesthetic	VA	VK	AK		
High	178	63	72	24	13	5	1	12.611	.246
Moderate	151	58	64	15	8	4	2		(ns)
Low	86	21	47	14	4	0	0		
Total	415	142	183	53	25	9	3		

Note. ns=not significant

Since the sample of participants was selected from the different schools from three levels in Sagaing Township, the differences in the learning styles of Grade Nine students were analyzed. Chi-Square test was used again to examine whether or not there is significant difference in the learning styles of Grade Nine students by school level. The result of the Chi-Square test ($\chi^2 = 12.611$, $p = .246$) indicated that there is no significant difference in the learning styles of students by school level (see Table 5).

Comparison of Students' Biology Achievement by Gender

Table 6 Independent Sample *t*-test Result for Biology Achievement by Gender

Gender	N	M	SD	MD	t	P
Male	179	35.53	8.114	-.229	-.282	.778
Female	236	35.75	8.276			(ns)

Note. ns=not significant

According to Table 6, the mean scores for Biology achievement of male and female students were (35.53) and (35.75). From the two groups' means, it indicated that the average mean score of Biology achievement of the female students was slightly higher than that of the male students. An independent samples *t*-test was conducted to compare Biology achievement score for males and females. There was no significant difference in scores for males and females, $t(413) = -.282$, $p = .778$.

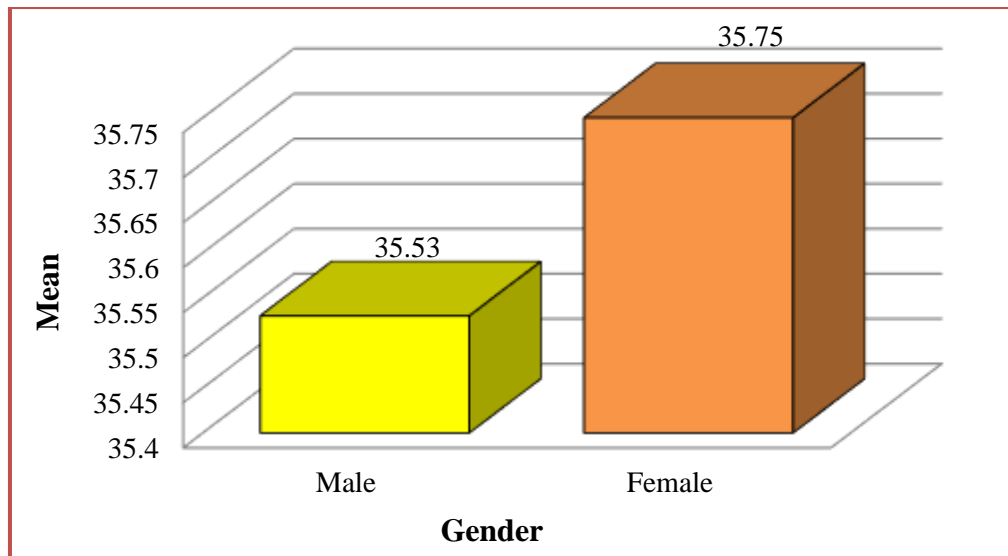


Figure 3 Biology Achievement by Gender

Figure 3 illustrated the comparison of mean scores for the male students’ Biology achievement and the female students’ Biology achievement based on the result of *t*-value.

Analysis of Grade Nine Students’ Biology Achievement in terms of School Level

Since the participants were selected from the different schools of three levels in Sagaing Township, the differences in Biology achievement of Grade Nine students were analyzed. For this purpose, the descriptive statistics was used.

Table 7 showed that the mean score of Biology achievement is 34.84 for High level schools, 37.85 for Moderate level schools and 33.49 for low level schools. The mean score of Biology achievement for moderate level schools was the highest among the three school levels.

Table 7 Descriptive Statistics of Biology Achievement by School Level

School Level	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
High	178	15	49	34.84	7.908
Moderate	151	18	48	37.85	7.553
Low	86	15	48	33.49	9.039

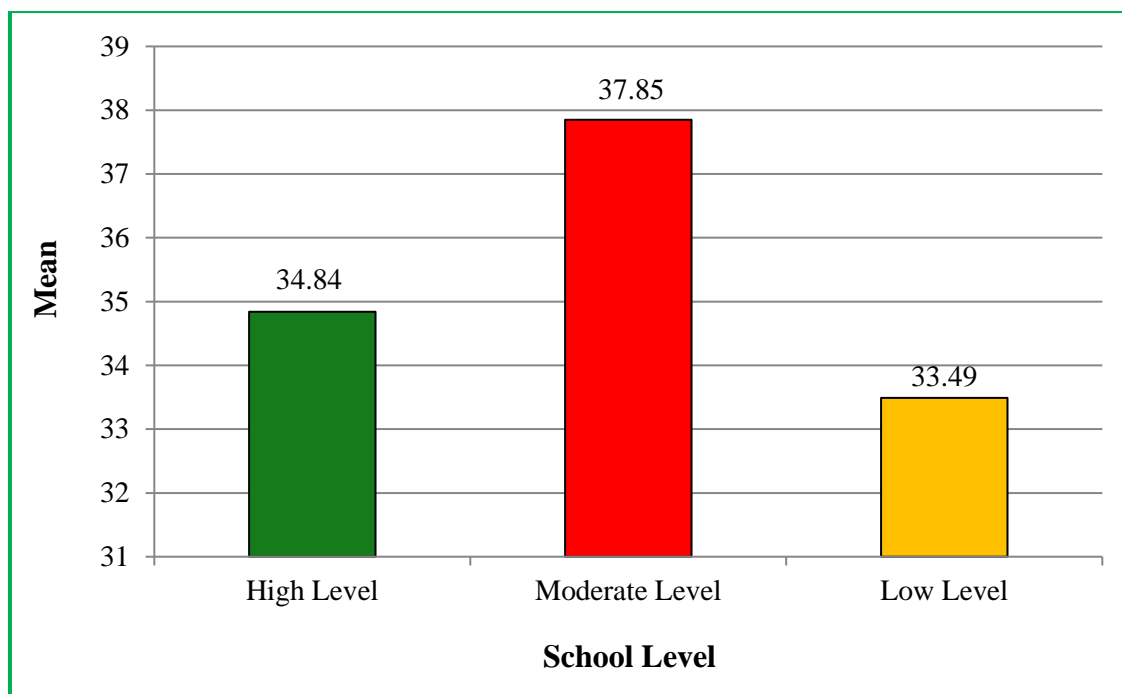


Figure 4 Comparison of Mean Scores for Biology Achievement by School Level

Figure 4 presents the mean scores of all the selected schools. This might be concluded that the students from Moderate level schools were more likely to perform better than those from other levels in Biology scores.

Comparison of Biology Achievement of Grade Nine Students by School Level

According to Figure 4, it can be seen that students from Moderate level schools perform better than those from other levels in Biology achievement. In order to find out whether there was any significant difference or not in Biology achievement by school level, one-way ANOVA was conducted (see Table 8).

Table 8 One-way ANOVA Result of Biology Achievement by School Level

Variable		Sum of Squares	df	Means Squares	F	P
Biology Achievement	Between Groups	1247.145	2	623.572	9.669	.000***
	Within Groups	26570.581	412	64.492		
	Total	27817.725	414			

Note. *** $p < .001$

According to the results from Table 8, there was a significant difference in Biology achievement by school level at the 0.001 level. To obtain more detailed information of which level had significant differences, Post-Hoc Test was executed by using Scheffe test (see Table 9).

Table 9 The Result of Post Hoc (Scheffe) Multiple Comparisons for Biology Achievement by School Level

School Level (I)	School Level (J)	Mean Difference (I-J)	Sig.
Moderate	High	3.005	.004**
	Low	4.359	.000***

Note. ** $p < 0.01$, *** $p < .001$

From these results, it can easily be seen that the students from moderate level schools were significantly difference to the students from high and low level schools according to the mean scores of Biology achievement.

Effects of Learning Style on Biology Achievement

In order to determine the effect of learning style of Grade Nine students on Biology achievement, descriptive analysis and one-way ANOVA were used (see Table 10). According to Table 10, the mean score of Biology achievement of visual-kinesthetic was the highest among the other learning styles. It might be concluded that students who had visual-kinesthetic learning style were more likely to perform better in Biology achievement than the students who had the other learning styles.

Table 10 Descriptive Statistics of Biology Achievement by Learning Style

Variable	Learning Styles	N	M	SD
Biology - Achievement	Visual	142	35.46	8.223
	Auditory	183	35.90	8.174
	Kinesthetic	53	34.42	8.677
	Visual-Auditory	25	35.60	8.292
	Visual-Kinesthetic	9	40.00	5.385
	Auditory-Kinesthetic	3	39.33	3.055
	Total		415	35.66

Figure 5 presents the comparison of Mean Scores for Biology Achievement by Learning Style.

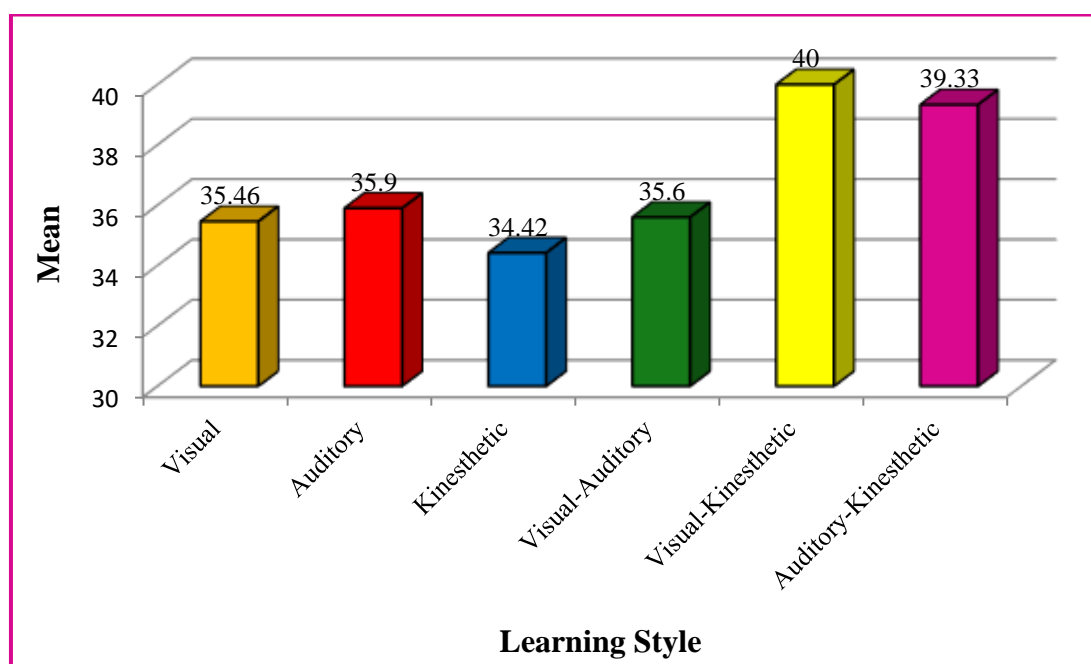


Figure 5 Comparison of Mean Scores for Biology Achievement by Learning Style

According to the results of Table 11, no statistically significant difference was found among six different learning styles on Biology achievement, $F(5, 409) = .915, p > 0.05$. In other words, learning styles had no significant effect on the Biology achievement.

Table 11 ANOVA Results of Biology Achievement by Learning Style

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	307.839	5	61.568	.915	.471
Within Groups	27509.886	409	67.261		(ns)
Total	27817.725	414			

Note. ns= not significant

Relationship between Learning Styles and Biology Achievement

Table 12 The Result of Pearson Correlation for Learning Style and Biology Achievement

		Learning Style	Bio Achievement
Learning Style	Pearson Correlation	1	.035
	Sig. (2-tailed)		.478
	N	415	415
Bio Achievement	Pearson Correlation	.035	1
	Sig. (2-tailed)	.478	
	N	415	415

Then, to examine the relationship between learning style and Biology achievement, Pearson's correlation was calculated (See Table 12). There was no relationship between learning style and Biology achievement score, which was not statistically significant ($r = .035, n = 415, p > 0.05$). It can be concluded that there is no effect of learning style on Biology achievement of Grade Nine students from selected schools in Sagaing Township.

Discussion

According to the results of descriptive statistics analyses, the most preferred learning style is auditory learning style followed by visual learning style as the second place and the kinesthetic learning style as the third position and the others are bimodal learning styles. The least preferred learning style is the bimodal, auditory-kinesthetic modalities. The predominant learning styles among the students in the selected schools were auditory learning style and visual learning style. A few students preferred bimodal learning style. This research finding indicated that the majority of students in Sagaing Township are auditory learners; they enjoy the oral-aural learning channel. Thus, they want to engage in discussions, conversations, and group works.

The second majority of students in Sagaing Township are visual learners. Therefore, they prefer to learn via the visual channel and they like to read a lot, which requires concentration and time spent alone. For visual learners, visual aids, diagrams, demonstrations, and videos as well as Power Points with additional embedded visual pictures, animations can enhance their learning. According to Nel and Nel (2013, cited in Bosman & Schule, 2018), visual learners are generally the largest group in a classroom.

As for the relationship between gender and learning style, a statistically significant difference was observed in gender. **Chi-Square** test showed that both males and females do not equally prefer the same learning style. There is a significant difference by gender in auditory and kinesthetic learning style. This means that the female students more preferred auditory learning style than the male students in Sagaing Township. The result is in line with the findings of

Bosman (2015). The female students tend to prefer an auditory learning style than male students. Therefore, it may be concluded that female students learn from hearing words spoken and from oral presentations and they can recall information by reading aloud or moving their lips as they read.

There was a significant difference in kinesthetic learning style between males and females. The male students more preferred kinesthetic learning style than female students in the six schools studied in Sagaing Township. The result is consistent with the finding of Bosman (2015) that showed male students were more inclined to be kinesthetic learners than female students. It was found that female students generally used auditory learning style while male students preferred kinesthetic learning style. It can be concluded that, male students learn through experience and being involved physically in the classroom and tend to remember information well by actively participating in activities, role plays in the classroom and field trips. In this study, it was concluded that gender effects on learning style.

Upon Chi-Square test analysis of the differences between school levels and learning styles, it can be seen that there is no statistically significant difference between school level and learning style preference; that is, students in all school levels; high, moderate and low, equally prefer learning style. In this study, it can be concluded that there was no effect of school level on learning styles.

According to the independent samples *t*-test, there was no significant difference in Biology achievement of male and female students. Consistently, Tambaya, Sabitu and Mataza (2016) revealed in their study that there was no significant difference in Biology achievement for male and female students.

The One-way ANOVA result also showed that there was a significant difference in Biology achievement by school level. To observe more detail information, Post-hoc Scheffe multiple comparisons was conducted. The result showed that the students from moderate level schools are significantly difference to the students from high and low level schools according to the mean scores of Biology achievement. In Sagaing Township, the students from moderate school level have the highest Biology achievement.

According to Pearson's correlation coefficient result, there was no significant correlation between Biology achievement of students and different learning styles. The result is consistent with the finding of Awang, Samad, Faiz, Roddin and Kankia (2017). Their result showed no significant correlation was found between learning style preferences and academic achievement in Malaysian Polytechnic schools. It can be concluded that there is no effect of learning style on Biology achievement of Grade Nine students from selected schools in Sagaing Township. This is particularly clear that these two variables have no relationship. These facts reveal that each learning style has its own strengths and weaknesses.

Suggestions

The present study had other necessities because of its scope and selected sample. It was suggested that the future research need to conduct a replication of this study for different grade levels, different schools, different townships, different districts and different regions in Myanmar. Furthermore, the future researchers should conduct the study with larger sample size from different states and regions to be more generalized, reliable and valid. Moreover, it would be advisable that the future researchers should focus on the influence of the students' background on their academic learning. Impacts of their affective and cognitive variables on student's academic achievement can also be investigated in future studies.

The present study has yielded some important insights into learning style preferences among students and the recommendations are given as follow.

1. Teachers / Instructors need to take into account their students' diverse learning styles, design instructional methods that meet diversity and remain sensitive of such during the instruction process;
2. Teachers should also help their students to understand their learning style preferences and make use of them to be life-long learners; and
3. School administrators need to provide various learning materials which can bring diversity in the classroom through using visual, auditory and kinesthetic materials such as the use of technology and students' project writing and presentation.

Conclusion

Based on the findings of the present study, it can be concluded that students' learning style preferences are not influenced by school level. The auditory style had the highest percentage among the single-mode learning styles, followed by the visual style. The results of this study provide useful information for proposing reductions in passive lecture hours and preparing a more problem-based curriculum using active learning strategies. Teachers should take cognizance of such information when planning and executing their lessons if they want to improve the learning and academic achievement in their classes. Based on the findings, the study also recommended ways to prepare for effective teaching. Moreover, teachers should know the effective way of teaching to come closer in order to provide optimal learning environment for most students in their classrooms. Thus, the researcher believes that this research will make a valuable contribution of new knowledge with regard to teaching and learning in Biology subject.

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