

AN INVESTIGATION INTO RELATIONSHIP BETWEEN SELF-CONCEPT AND SCIENCE ACHIEVEMENT OF HIGH SCHOOL STUDENTS

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Abstract

The primary purpose of this study was to investigate the relationship between self-concept and science achievement of high school students. Then, to investigate whether there would be significant differences between gender, school and district on Grade 10 students' self-concept and science achievement were next interest. Descriptive survey research method and quantitative data analysis were used in this study. As a research instruments, Self-Concept Inventory (SCI) developed by Fleming (2007) was applied. Self-Concept Inventory (SCI) consisted of eight subscales with 61 items of 5-point Likert scale. The internal consistency coefficient (Cronbach's Alpha) of self-concept was 0.882. The data used to represent the science achievement of participants were the results of Grade 10 students' first semester test scores including three science subjects (Physics, Chemistry and Biology). This test was held in October, 2015. A total of 820 Grade 10 students from four Government Schools and eight Private Schools in four districts of Yangon Region participated in this study. The data collection was completed in the second week of January, 2016. In the analysis of data, descriptive statistics, independent sample t-test, Post Hoc test and one-way ANOVA were used in this study. The result of this study revealed that significant differences in science achievement were found with respect to gender, school and district. The finding revealed that there was positive relationship between students' self-concept and science achievement. It could be concluded that the higher the students' self-concept, the higher his or her science achievement. This result generally supported the "reciprocal effect" model concerning the relation between self-concept and science achievement. Students' self-concept was the best predictor for their science achievement.

Keywords: self-concept, science achievement

Introduction

Self-concept is a person's perception of his or her own strengths and weaknesses. Self-concept is also defined as a self-evaluative dimension with regard to perceptions and judgments about one's capacities and skills in different domains: (Marsh, Byrne, & Shavelson, 1988; Marsh & Shavelson, 1985). Self-concept originates in the early years of life and is molded and remolded through the repeated experiences, particularly with significant others because self-concept is learned and no one is ever born with self-concept. A person's self-concept is being revised during early adolescence because adolescence is a period of significant physical, intellectual, social and emotional development. So, self-concept is important for high school students who are adolescents. An improvement of self-concept will lead to improve academic performance (Barker et al., 2005). One's self-concept is an important factor on the effective learning process, especially, on science achievement.

In an increasingly globalized world, studying science subjects is very important and very basic for the students in order to access the latest technology and also to reach the modern developed country. High school science subjects are important to well-rounded education and understanding them can be beneficial for students. Life in modern societies relies on science and its techniques. Science is one of the best vehicles for educating the child by helping him to

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sharpen his sense of curiosity, critical thinking and the use of scientific methods for identifying and solving students' scientific literacy. Dambudzo declares that it is important to investigate the relationship between self-concept and academic achievement in order to rescue those students who may be victims of their own negative beliefs about themselves (Dambudzo, 2009). So, it is necessary to study self-concept and science achievement of Myanmar high school students and whether there is a relationship between self-concept and science achievement of students.

Purpose of the Study

The main purpose of this study is to investigate the relationship between self-concept and science achievement of high school students.

Definitions of Key Terms

Self-concept: Self-concept is defined as the accumulation of knowledge about self, such as beliefs regarding personality traits, physical characteristics, values, goals and roles (Lewis, 1990).

Science achievement: Science achievement refers to the scores obtained from the results of the first semester test of Grade 10 science subjects held in October, 2015.

Review of Related Literature

Self-concept is generally viewed as one's awareness of personal characteristics, attributes and limitations and the way in which these qualities are both like and unlike others. Self-concept is one's perceptions of one's unique attributes or traits. Self-concept is a crucial component of life. An individual's self-concept can be grouped into two main categories, namely; positive self-concept and negative self-concept. A person who possesses positive self-concept has harmonious and balanced personality. He always behaves calmly and ready to face challenges. A person who possesses negative self-concept has unbalanced personality and a certain degree of inferiority complex. He is passive and does not like to mix or cooperate with others. A positive self-concept can contribute to good academic achievement by student's optimistic personal expectations about himself or herself. Children who possess positive self-concept always appreciate themselves. People who know how to appreciate themselves are the one that can see all the good and positive things within them and other people. They will work hard to involve in all learning activities in their surroundings. Children with a negative self-concept come to view the world they do not know as even worse than the world they are familiar with.

Self-concept trait is expected to have been molded from experiences with the environment and from self-reflections, as adolescence experience life at home, at school and in the community. Self-concept is considered to comprise various dimensions, areas or facts, some of which are more related to certain personality aspects (physical, social, emotional) while others appear to be linked to academic achievement. Shavelson et.al. (1976) created a multi-dimensional, hierarchical model of self-concept, called the Shavelson model. There are two levels: a general academic self-concept of how good we are overall and a set of specific content-related self-concepts that describe how good we are in mathematics, science, arts, etc. In Shavelson Model, these self-concepts are divided into academic and non-academic.

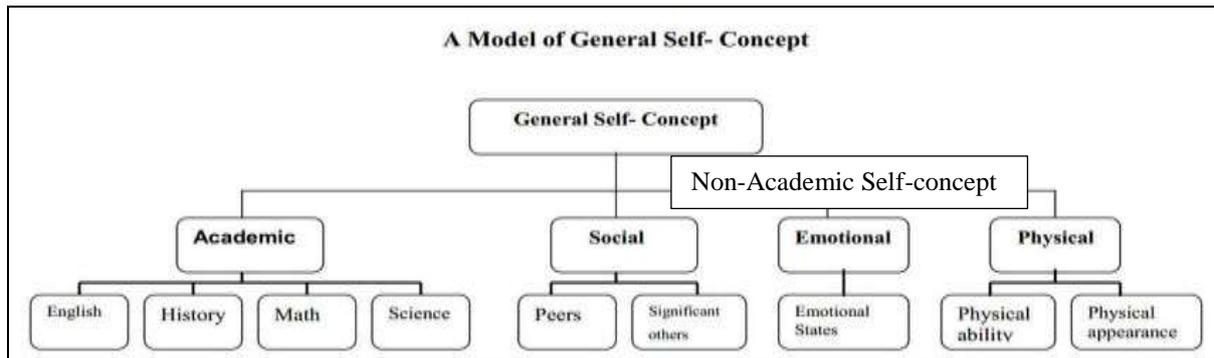


Figure:1 Shavelson (1976); Multidimensional Structure of Self-concept

According to the research conducted by educational experts, self-concept is important factor to achieve success in academic and co-curricular fields. So, teachers are of tremendous importance in shaping children’s basic attitudes towards themselves in relation to school. Teachers should emphasize students to improve positive self-concept in order to academic achievement especially in science achievement because science education must meet the challenge of improving the scientific literacy of future citizens and society as a whole (Jacobs and Harvey, 2005).

Previous Research Review

Darja Kobal and Janek Musek (2001) tested that hypothesis that academic achievement affects different components of self-concept. They showed the significant correlation between academic achievement and self-concept. John Steve Oliver et al., (2005) showed the significant relationship between self-concept and science achievement. Zambudo (2005) conducted a study about the relationship between learner’s self-concept and achievement in secondary schools in Zimbabwe. He showed a positive and reciprocal relationship between learner’s self-concept and academic achievement (secondary students, urban and rural, government and non-government).

Method

Sampling

By using random sampling technique, 410 Grade 10 students from four Government Schools and 410 Grade 10 students from eight Private Schools were chosen. So, total sample is 820 Grade 10 students in this study. Detailed lists of participants were presented in the following Table 1.

Table 1. Numbers of Participants from Selected Schools

No.	Districts	Schools		Male	Female	Total
1	East	Government School	School (1)	62	47	109
2		Private School	School (2)	12	24	36
3			School (3)	27	22	49
4	West	Government School	School (4)	46	45	91
5		Private School	School (5)	16	38	54
6			School (6)	37	26	63

No.	Districts	Schools		Male	Female	Total
7	South	Government School	School (7)	55	46	101
8		Private School	School (8)	15	20	35
9			School (9)	36	18	54
10	North	Government School	School (10)	33	76	109
11		Private School	School (11)	43	45	88
12			School (12)	17	14	31
Total				399	421	820

Research Method

In this study, descriptive survey research method and quantitative data analysis were applied.

Research Instrumentation

In order to identify self-concept of participants, Self-Concept Inventory (SCI) developed by Fleming (2007) was used. SCI comprised eight subscales: Self-Regard, Social-Acceptance, Verbal Ability, Physical Appearance, Physical Ability, Parental Acceptance, Social Anxiety and Academic Ability. A total of 61 items were involved in the Self-Concept Inventory. Students were asked to respond on five-point Likert scale. The items were adapted to Myanmar version. After preparing the items for each category, experts' review was conducted for face validity and content validity by 14 experts who have special knowledge and close relationship with the field of Educational Psychology at Yangon University of Education. The data used to represent the science achievement of participants were taken from the results of Grade 10 students' first semester test scores including three science subjects (Physics, Chemistry and Biology). This test was held in October, 2015. Then, pilot study was done with a sample of 60 Grade 10 students (30 males and 30 females) from B.E.H.S (2) Behan on December 3, 2015 in order to determine the relevancy, appropriateness and clarity of the items included in the survey questionnaires. After the pilot study, the reliability analysis of the instrument was done by calculating the internal consistency coefficient. The internal consistency (Cronbach's alpha) of self-concept was 0.882. Thus, the computation of Cronbach's alpha showed that Self-Concept Inventory (SCI) can be used as the reliable and valid research instrument for this study.

Data Analysis and Findings

Students' Self-Concept from all Selected Schools

To investigate the students' self-concept, descriptive and inferential statistics were carried out.

Table 2. Descriptive Statistics for Students' Self-Concept

Subscales of Self-Concept	N	Minimum	Maximum	Mean	Mean%	SD
Self-Regard	820	24	100	37.1	67.46	11.296

Subscales of Self-Concept	N	Minimum	Maximum	Mean	Mean%	SD
Social Acceptance	820	20	100	17.17	57.24	17.710
Verbal Ability	820	28	220	14.62	58.48	11.418
Physical Appearance	820	230	100	15.23	60.92	15.005
Physical Ability	820	24	92	16.94	56.47	11.108
Parental Acceptance	820	28	100	16.53	66.10	9.836
Social Anxiety	820	28	96	21.91	62.60	10.338
Academic Ability	820	41	87	52.08	65.10	5.797
Total (SC)	820	44	95	224.3	73.55	7.973

According to the results, the mean percentage (67%) for the students' self-regard among the subscales of total self-concept was the highest. The mean percentage (66.1%) for parental acceptance was the second highest. The mean percentage (65.1%) of academic ability was third highest. But the mean percentage (56%) of physical ability was the lowest. So, it could be said that students enabled to consider themselves well and received warmth, affection, care, comfort, nurturance and love from their parents. Moreover, they had abilities to perform age-appropriate school activities especially science subjects. But they had less performance in physical activities. School should emphasize not only academic achievement but also physical activities of children.

Comparison of Students' Self-Concept by Gender

To find out the differences in the self-concept with regard to gender, descriptive statistics and *t*-test were applied. The results were mentioned in Table 3.

Table 3. Descriptive Statistics and Results of Independent Sample *t*-test for Students' Self-Concept by Gender

Subscales of Self-Concept	Gender	N	Mean	Mean%	SD	<i>t</i>	<i>p</i>
Self-Regard	Male	397	36.59	66.53	12.204	-2.289*	.022
	Female	423	37.59	68.34	10.309		
Social Acceptance	Male	397	16.84	56.12	16.272	-1.762	.078
	Female	423	17.49	58.29	18.920		
Verbal Ability	Male	397	14.53	58.12	10.845	-.894	.371
	Female	423	14.71	58.83	11.933		
Physical Appearance	Male	397	15.38	61.52	15.379	1.117	.264
	Female	423	15.09	60.35	14.641		
Physical Ability	Male	397	17.32	57.73	11.486	3.164**	.002

Subscales of Self-Concept	Gender	N	Mean	Mean%	SD	t	p
Parental Acceptance	Female	423	16.59	55.29	10.618	-2.960**	.003
	Male	397	16.27	65.06	9.634		
	Female	423	16.77	67.08	9.934		
Social Anxiety	Male	397	22.02	62.92	10.545	.851	.395
	Female	423	21.81	62.31	10.143		
Academic Ability	Male	397	51.45	64.31	6.070	-3.822***	.000
	Female	423	52.67	65.84	5.431		
Total (SC)	Male	397	223.1	73.13	7.588	-1.463	.145
	Female	423	225.5	73.94	8.308		

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, SC= Self-Concept

The mean percentages of selected female students were higher in self-regard, social acceptance, parental acceptance and academic ability than those of selected male students. But the mean percentages of selected male students in this study were higher in physical appearance and physical ability than those of selected female students. There were no differences in the mean percentages of verbal ability, social anxiety and total self-concept. The result of *t*-test showed that there were significant differences in self-regard at 0.05 level, in physical ability, parental acceptance at 0.01 level and in academic ability at 0.001 level by gender. But significant differences were not found in social acceptance, verbal ability, physical appearance, social anxiety and the total self-concept.

Comparison of Students' Self-Concept by School

In this study, the sample students were selected from Government Schools and Private Schools. So, the differences in self-concept with regard to school were calculated. The results were mentioned in Table 4.

Table 4. Descriptive Statistics and Results of Independent Sample *t*-test for Students' Self-Concept by School

Subscales of Self-Concept	Schools	N	Mean	Mean%	SD	t	p
Self-Regard	Government	410	36.71	66.75	11.335	-1.808	.071
	Private	410	37.49	68.18	11.226		
Social Acceptance	Government	410	16.73	55.75	16.191	-2.405*	.016
	Private	410	17.62	58.72	19.013		
Verbal Ability	Government	410	14.55	58.19	12.611	-.746	.456
	Private	410	14.69	58.78	10.091		
Physical	Government	410	14.92	59.68	15.006	-2.371*	.018

Subscales of Self-Concept	Schools	N	Mean	Mean%	SD	t	p
Appearance	Private	410	15.54	62.16	14.919		
Physical Ability	Government	410	16.83	56.09	11.322	-.993	.321
	Private	410	17.06	56.86	10.889		
Parental Acceptance	Government	410	16.33	65.32	9.819	-2.292*	.022
	Private	410	16.72	66.89	9.803		
Social Anxiety	Government	410	21.70	62.01	10.286	-1.650	.099
	Private	410	22.12	63.20	10.368		
Academic Ability	Government	410	51.73	64.66	5.519	-2.183*	.029
	Private	410	52.43	65.54	6.037		
Total (SC)	Government	410	225.3	73.89	7.403	1.231	.219
	Private	410	223.3	73.20	8.500		

Note. * $p < 0.05$, SC= Self-Concept

The result showed that mean percentages of selected Grade 10 students from Private Schools were higher in self-regard, social acceptance, physical appearance, parental acceptance, social anxiety and academic ability than selected Grade 10 students from Government School. But there were no differences in the mean percentages of verbal ability, physical ability and total self-concept. From the result of *t*- test, there were significant differences in social acceptance, physical appearance, parental acceptance and academic ability at 0.05 level. But significant differences were not found in self-regard, verbal ability, physical ability, social anxiety and total self-concept.

Comparison of Students' Self-Concept by District

Since participants were selected from four districts in Yangon, differences in self-concept of Grade 10 students among districts were analyzed. For this purpose, the descriptive statistics and one-way ANOVA were conducted. (See in table 5).

Table 5. Descriptive Statistics and ANOVA Results for students' Self-Concept by District

Subscales of self-concept	Districts	Students	Mean %	SD	F	p
Self-Regard	East	194	68.31	11.836	6.774***	.000
	West	208	64.48	11.497		
	South	190	68.17	10.416		
	North	228	68.88	10.918		
Social Acceptance	East	194	58.80	17.704	.834	.475
	West	208	56.77	17.958		
	South	190	56.06	17.279		
	North	228	57.32	17.862		
Verbal Ability	East	194	59.28	10.929	.509	.676

Subscales of self-concept	Districts	Students	Mean %	SD	F	p
	West	208	58.04	14.816		
	South	190	58.61	9.742		
	North	228	58.11	9.420		
Physical Appearance	East	194	60.82	15.585	3.054*	.028
	West	208	60.04	15.218		
	South	190	63.66	14.550		
	North	228	59.51	14.470		
Physical Ability	East	194	57.46	11.521	4.741**	.003
	West	208	54.60	11.427		
	South	190	58.38	10.392		
	North	228	55.75	10.755		
Parental Acceptance	East	194	66.85	9.780	1.401	.241
	West	208	65.02	11.243		
	South	190	66.63	9.287		
	North	228	66.02	8.881		
Social Anxiety	East	194	63.13	11.013	.649	.584
	West	208	61.79	10.794		
	South	190	62.56	10.148		
	North	228	62.86	9.463		
Academic Ability	East	194	65.33	6.160	.845	.469
	West	208	64.57	6.100		
	South	190	65.11	5.427		
	North	228	65.37	5.491		
Total Self-Concept	East	194	73.11	8.002	3.447*	.016
	West	208	72.49	8.273		
	South	190	74.95	6.964		
	North	228	73.71	8.322		

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

According to ANOVA results, there were significant differences in self-regard at 0.001 level, in physical appearance at 0.05 level and in physical ability at 0.01 level. There were no significant differences in social acceptance, verbal ability, parental acceptance, social anxiety and academic ability.

To obtain more detailed information of which district had significant differences, post hoc test was conducted by Turkey's multiple comparison procedure. (See in table 6).

Table 6. Results of Post-Hoc Analysis for Self-Concept by District

Subscales of self-Concept	(I) Districts	(J) Districts	Mean Difference (I-J)	p
Self-Regard	West	East	-3.829**	.004
		South	-3.688**	.006
		North	-4.396***	.000
Physical Appearance	South	North	4.154*	.025

Subscales of self-Concept	(I)Districts	(J) Districts	Mean Difference (I-J)	p
Physical Ability	West	East	-2.868*	.046
		South	-3.783**	.004
Total Self-Concept	West	South	-2.463**	0.01

Note. * $p < 0.05$, *** $p < 0.001$, ** $p < 0.01$

From the results, Self-Regard of students from West District was lower than those of students from other three Districts. Physical appearance of students from South District was higher than those of students from North District. Physical abilities of students from West District were lower than those of students from South and East Districts. In total self-concept, students from South District were higher than students from West District. But there were no significant differences among other districts.

Students' Science Achievement

Descriptive statistics was conducted to determine the science achievement of Grade 10 students from Yangon Region. (See in table 7).

Table 7. Descriptive Statistics for Students' Science Achievement

Variable	N	Minimum	Maximum	Mean	SD
Science Achievement	820	14	149	95.49	30.417

The result showed that the mean and standard deviation of sample Grade 10 students were 95.49 and 30.417. The highest score in science achievement was 149 and the lowest score was 14. It could be said that most of Grade 10 students from Yangon Region achieved in science subjects.

Comparison of Students' Science Achievement by Gender

To find out the differences in science achievement with regard to gender, descriptive statistics and independent sample *t-test* were applied. The results were described in table 8.

Table 8. Descriptive Statistics and Results of Independent Sample *t-test* for Students' Science Achievement by Gender

Variable	Gender	N	Mean	SD	t	p
Science Achievement	Male	397	89.14	29.827	-5.913***	.000
	Female	423	101.45	29.785		

Note. *** $p < 0.001$

According to the result, the mean scores of selected Grade 10 female students were higher than that of selected Grade 10 male students in science achievement. The independent sample *t-test* indicated that there was significant difference in science achievement by gender at 0.001 level. So, it could be concluded that selected Grade 10 female students from Yangon Region were better in science subjects than selected male students. They got high marks in science subjects than male students.

Comparison of Students' Science Achievement by School

By using descriptive statistics and independent samples *t*-test, school difference in students' science achievement was conducted. The results were described in table 9.

Table 9. Descriptive Statistics and Results of Independent Sample *t*-test for Students' Science Achievement by School

Variable	Schools	<i>N</i>	Mean	<i>SD</i>	<i>t</i>	<i>p</i>
Science Achievement	Government	410	91.46	31.442	-3.826***	.000
	Private	410	99.52	28.836		

Note. ****p* < 0.001

The result showed that the mean scores of selected Grade 10 students from Private Schools were higher than that of Grade 10 students from Government Schools in science achievement. According to the independent samples *t*-test, there was significant difference in science achievement by school at 0.001 level. So, it could be interpreted that selected Grade 10 students from Private Schools were better in science subjects than selected Grade 10 students from Government Schools.

Comparison of Students' Science Achievement by District

To investigate difference by district in science achievement of Grade 10 students, the descriptive statistics and one-way ANOVA were conducted. The findings were mentioned in table 10.

Table 10. Descriptive Statistics and ANOVA Results of Students' Science Achievement by District

Variable	Districts	No. of Students	Mean	<i>SD</i>	<i>F</i>	<i>p</i>
Science Achievement	East	194	91.71	29.602	5.068**	.002
	West	208	91.58	31.709		
	South	190	96.68	30.504		
	North	228	101.28	28.988		

Note. ***p* < 0.01

From the results, there were significant differences in science achievement at 0.01 level. Students from North District had the highest mean score in science achievement in comparing with students from other districts. To obtain more information of which district had significant differences, post hoc test was conducted by Turkey's multiple comparison procedure. (See in table 11).

Table 11. Results of Post-Hoc Analysis for Science Achievement

Variable	(I)Districts	(J)Districts	Mean Difference (I-J)	<i>p</i>
Science Achievement	North	East	9.565**	.007
		West	9.699**	.005

Note. ***p* < 0.01

According to the results, there were significant difference among North District, South District and West District. Students from North District were better in science subjects than students from East and West Districts.

Relationship between Self-concept and Science Achievement

Table12. Inter-correlations between Subscales of Self-Concept and Science Achievement

Variables	SR	SA	VA	PA	PAB	PTA	SAX	AB	SAM
SR	-	.019	.240**	.228**	.194**	.172**	.087*	.383**	.077*
SA		-	.117**	.080*	.170**	.300**	.261**	-.107**	-.107**
VA			-	.210**	.215**	.128**	.130**	.372**	.060
PA				-	.302**	.181**	.140**	.270**	-.060
PAB					-	.158**	.193**	.326**	-.086*
PTA						-	.251**	.322**	-.028
SAX							-	.362**	-.125**
AB								-	.052
SAM									-

Note. *p<0.05, **p<0.01,

Note.SR=Self- Regard, SA=Social Acceptance, VA=Verbal Ability, PA= physical Appearance, PAB= Physical Ability, PTA= Parental Acceptance, SAX= Social Anxiety, AB= Academic Ability and SAM= Science Achievement

In the inter-correlation of students’ science achievement and each subscale of self-concept, science achievement was positively correlated with self-regard. So, it could be said that the higher the student’s self-regard, the higher his or her science achievement. But science achievement was negatively correlated with social acceptance, physical ability and social anxiety. So, the higher the student’s social acceptance, physical ability and social anxiety, the less he or she achieve in science. Moreover, almost all the subscales in self-concept were correlated with one another. Therefore, to investigate the predictive power of each subscale of self-concept to science achievement of Grade 10 students, regression analysis was conducted. The results were described in table 13.

Table 13. Summary of Regression Analysis for the Predictive Contribution of each Subscale of Self-Concept to Science Achievement

variables	B	Beta	t	R	R ²	Adj R ²	p
(Constant)	88.876		7.095***	0.232	0.054	0.044	.000
SA	-.160	-.093	-2.544*				.011
PAB	-.277	-.101	-2.700**				.007
SAX	-.372	-.126	-3.308***				.001
AB	.683	.130	2.981**				.003

Note. *p <0.05, **p <0.01, ***p <0.001,

Constant= Science Achievement, SA=social Acceptance, PAB= Physical Ability, SAX=Social Anxiety, AB=Academic Ability

The result showed that science achievement was positively correlated with academic ability. Academic ability was a significant predictor of science achievement in positive direction (beta=0.130, $p < 0.01$). So, it could be interpreted that the higher the students' academic ability, the higher his or her science achievement. But science achievement was negatively correlated with social acceptance, physical ability and social anxiety. Social acceptance, physical ability and social anxiety were significant predictors of science achievement in negative direction, (beta=0.126, $p < 0.01$). So, it could be interpreted that the higher the students' social acceptance, physical ability and social anxiety, the lower his or her science achievement. The model equation to predict the science achievement from students' self-concept was as follows;

$$SAM = 88.876 - .160SA - .277PAB - .372SAX + .683AB$$

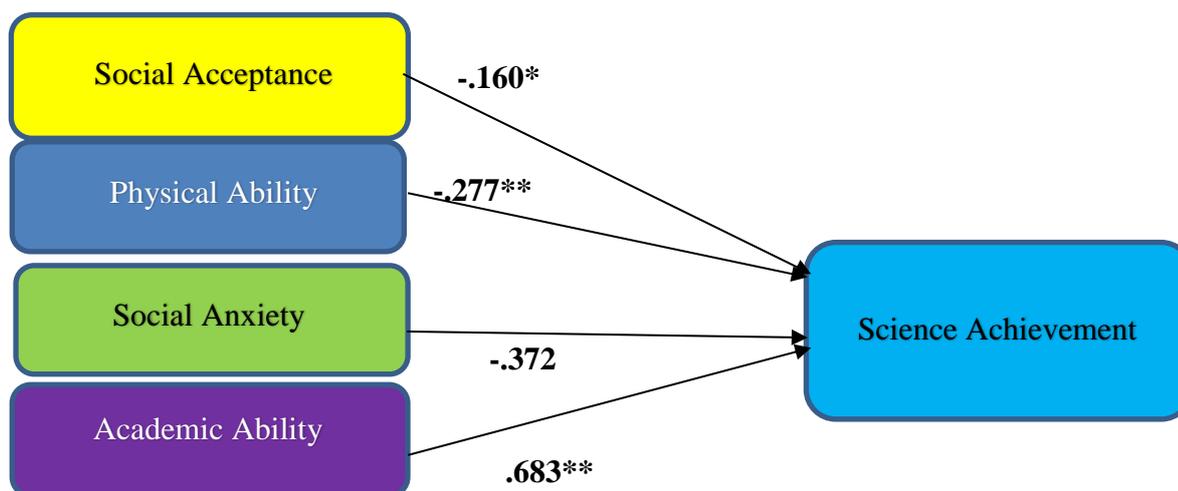


Figure 2. Predictors powers of Subscales of Self-Concept on Science Achievement

Table 14. The relationship between Self-concept and Science Achievement of Grade 10 Students

Variables	SC	SAM
SC	-	.260**
SAM	.260**	-

Note. ** $p < 0.01$, SAM= Science Achievement, SC=Self-Concept.

The purpose of this study was to investigate the relationship between self-concept and science achievement. In this study, it could be observed that there was a positive relationship between self-concept and science achievement. So, students with high self-concept tend to have high achievement in science. Therefore, in order to investigate the extent of prediction in science achievement from self-concept, multiple regression analysis was conducted.

Table 15. Summary of Regression Analysis for the predictive contribution of Self-Concept to Science Achievement

variables	<i>B</i>	Beta	<i>t</i>	<i>R</i>	<i>R</i> ²	Adj <i>R</i> ²	<i>P</i>
(Constant)	3.226		.458	0.289	0.084	0.081	.647
SC	.494	.194	5.155***				.000

Note. ****p* <0.001, Constant= Science Achievement, SC= Self-Concept

$$SAM = 3.226 + .494SC$$

The result showed that self-concept was positively correlated with science achievement. It could be interpreted that the higher the students' self-concept, the higher his or her science achievement. Finally, based on the findings, a diagram was drawn by describing how there were significantly relationship between self-concept and science achievement.

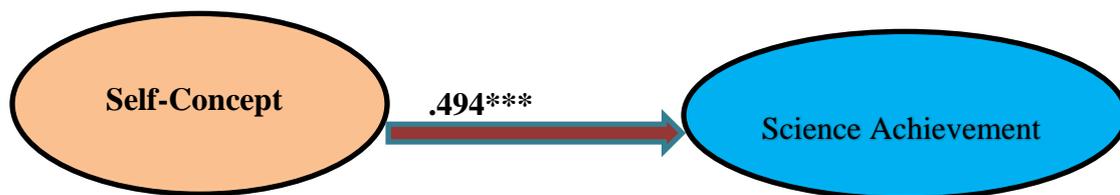


Figure 3. Model Summary of Relationship between Self-Concept and Science Achievement

Conclusion

According to results, selected Grade 10 students from Yangon Region enabled to consider themselves well and they had own interest and self-respect. Their parents cared and encouraged children's education. Most of the children received more warmth, care, nurturance and love from their parents. Children had abilities to perform age-appropriate school activities related to writing, reading and problem solving especially in science subjects. They got high marks in science subjects. But most of their times were used in schools and tuition classes. They had less free time to perform physical activities. Therefore, their physical abilities were weak. So, teachers should emphasize not only academic achievement but also physical activities of children and teach physical education according to the time-table.

In this study, the mean percentages in each subscale of self-concept were calculated. Although a slight variation of mean percentage was found in all factors of self-concept, significant differences were found to be only on students' self-regard, physical ability, parental acceptance and academic ability by gender. Female students get parents' care, warmth, nurturance more than male students. So, parents should care and give same opportunities without discrimination of gender. In this study, female students are more able to consider themselves well and have own interest and self-respect. They have more abilities to perform age-appropriate school science activities. However, in total self-concept, there was no significant difference by gender.

In science achievement, there was significant difference by gender. Female students' marks in science subjects are higher than those of male students. It can be seen that male students

have low interest in their science learning. In Myanmar, most of science learning was based on rote memorization. So, teachers should teach science with practical activities to encourage the interest of high school students. In addition, parents should care their sons as well as their daughters in order to reduce wasting time and to improve their education.

School difference was found in each subscale of self-concept. Significant differences were found to be only on social acceptance, physical appearance, parental acceptance and academic ability by school. According to the results, Grade 10 students from Private schools can attempt to look and act like other people or group of people and have confidence about the appearance than Grade 10 students from Government Schools. Moreover, they have more abilities to perform activities related to science subjects. So, their marks in science subjects are higher than those of students from Government Schools. This finding was the same with the previous research conducted by Kavyakishore (2013) which showed that students studying in Private Schools have better achievement in science than students studying in Government Schools. Moreover, socioeconomic statuses of parents from private schools are higher than that of parents from Government schools. Therefore, parents of students from Private Schools can concentrate only on their children's education and encourage children's self-concept more than parents of students from Government Schools.

In total self-concept, there was significant difference by district. From the results, self-concept of students from South district higher than those of students from West districts. But there was no significant difference among other districts. In science achievement, students from North district were better than students from East and West districts.

Finally, the impact of self-concept on science achievement of Grade 10 students was explored. Students' self-concept was positively correlated with their science achievement. From this result, the researcher concluded that students' self-concept was important for students' science achievement. For children and adolescent, school represents the most critical context for the development of self-concept outside the family (Purkey, 1970). So, educators and teachers should be aware the importance of students' self-concept. Teachers, educators and parents should carefully shape children to improve positive self-concept and reduce negative self-concept. For science achievement, teachers should motivate students' interest in their science learning by using inquiry-discovery method. The principals should also manage teachers' teaching styles and students' participation. Government should provide adequate facilities for science learning.

Limitations

Although the results provided the objectives of the study, there were some limitations in this study. Results of this study were limited to Grade 10 students in Yangon Region and to science subjects. Therefore, the results may not be generalized other grades. Although this research was based on science achievement, it should be conducted across the different subject achievements. Science questions' difficulty level was different from one school to another. So, students' science achievement test should be constructed by researcher. At first, researcher constructed the science achievement test and examined students from some schools. But some of the schools couldn't give enough time to answer this test. So, researcher took students' science scores from first semester test as their science achievement. Demographic variables such as father's education, mother's education and annual income of family were asked. But completed responses were not obtained. So, these variables were not considered in this study. If the

researcher studied students from many regions based on all academic subject achievements with standardized test, these data will be more accurate.

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