THE IMPACT OF STUDENTS' MOTIVATION ON THEIR ACADEMIC ACHIEVEMENT IN SCIENCE AT THE MIDDLE SCHOOL LEVEL

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Abstract

The purpose of this study was to investigate the impact of students' motivation on their academic achievement in science at the middle school level. The design adopted in this study was a descriptive research. The participants were (1043) Grade-seven students from four middle schools and four high schools. The instruments used for this study were a questionnaire for students' motivation to learn science and science achievement test. The questionnaire was based on Tuan, Chin and Shich, (2005) which contains six dimensions. The questionnaire included (35) items of five-point Likert-scale by five responses: strongly disagree, disagree, cannot understand, agree and strongly agree. Science achievement test was based on the content area from Chapter (1) to (4) in Grade Seven General Science Textbook. It included objective items, short questions and long questions items. A descriptive statistics was used to study the impact of students' motivation to learn science and their academic achievement in science. Moreover, Pearson-product moment correlation was used to study the impact of students' motivation to learn science and their academic achievement in science. It was found that students' motivation to learn science is moderately correlated to their academic achievement in science. It means that highly motivated students perform better than lowly motivated students on science achievement test.

Keywords: science, motivation, science achievement

Introduction

Education is the process of receiving or giving systematic instruction, especially at a school or university. Teachers are trying to improve the achievement of their students. However, the academic achievement of students is not always the same. This may be due to their difference in motivation to learn. Motivation is an inner force that activates and provides direction to our thought, feelings and actions. Science teachers should try to help students to become highly motivated students so that they become high achievers.

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Purposes of the Study

The main purpose of this study is to investigate the impact of students' motivation on their academic achievement in science at the middle school level.

The specific objectives are as follows:

(a) To investigate Grade-seven students' motivation to learn science.

(b) To explore the relationship between Grade-seven students' motivation and their academic achievement in science at the middle school level.

Research Hypothesis

(a) There is a relationship between students' motivation of self-efficacy and their achievement in science.

(b) There is a relationship between students' motivation of active learning strategies and their achievement in science.

(c) There is a relationship between students' motivation of science learning value and their academic achievement in science.

(d) There is a relationship between students' motivation of performance goal and their academic achievement in science.

(e) There is a relationship between students' motivation of achievement goal and their achievement in science.

(f) There is a relationship between students' motivation of learning environment stimulation and their academic achievement in science.

Definitions of the Key Terms

Science: Science is an ordered knowledge of natural phenomena or processes and the interrelations between them. (Dampier, cited in Hodes, 1974)

Motivation: Motivation is usually defined as an internal state that arouses, directs, and maintains behavior. (Woolfolk, 1998).

Science achievement: Achievement test score represents science achievement of the students.

Review of Related Literature

Teaching and Learning science

Science education must meet the challenge of improving the scientific literacy of the future citizens and of society as a whole. Without a broad-based understanding of science, it is likely that science teachers will place heavy emphasis on science as a body of knowledge, teaching and testing for factual information. Students must learn factual information, but, more important, they must discover ideas for themselves through laboratory activities, field studies, and library work (Collette &Chiappetta, 1989).The word 'Science' is originated from a Latin word 'Scientia' which means to know. Therefore, an originated effort to know about the things and happening in the nature is science (Singh, 2010).

Motivation

Motivation is an internal power which arouses, directs and controls the human interest and behavior (Woolfolk, 1990 cited in Sang, 2003). Its existence is due to the human physiological or psychological need. It is not inherited and does not exist naturally. It is an incentive to achieve a certain pre-determined goal. The level of motivation is directly proportional to the rate of desire. The stronger the desire to achieve a certain goal, the higher the level of motivation will be (Sang, 2003).

Types of Motivation

Psychologists classify motivation into intrinsic motivation and extrinsic motivation. Bruner (1996 cited in Sang, 2003) considered intrinsic motivation as natural instinct of desire to know and drive to achieve efficiency processed by pupils who just begin their primary education in school. In contrast, extrinsic motivation comes from external stimulus with the aim of encouraging people to carry out a certain activity which is beneficial to them (Woolfolk,1998).

Strategies to Enhance Students' Motivation

(a) Building Confidence and Positive Expectations

1. Begin work at the students' level and move in small steps.

2. Make sure learning goals are clear, specific and possible to reach in the near future.

3. Stress self-comparison, not comparison with others.

4. Communicate to students that academic ability is improvable and specific to the task at hand.

5. Model good problem solving, especially when the teacher have to try several approaches to get a solution.

(b) Seeing the Value of Learning

1. Tie class activities to student interests in sports, music, current events, pets, common problems.

2. Arouse curiosity.

3. Make the learning task fun.

4. Make use of novelty and familiarity.

(c) Staying Focused on the Task

1. Give students frequent opportunities to respond through questions and answers, short assignments or demonstrations of skills.

2. Have students create a finished product.

3. Avoid heavy emphasis on grade and competition.

4. Reduce task risk without oversimplifying the task.

5. Model motivation to learn for the students (Woolfolk, 1998).

Research Method

The purpose of this study was to investigate the impact of students' motivation on their academic achievement in science at the middle school level.

Research Design and Procedure

The research design of this study was a descriptive research design in which the researcher seeks to determine the correlation between students' motivation on their academic achievement in science at the middle school level. Students were selected by using a simple random sampling technique from four high schools and four middle schools in Yangon Region. First of all, the researcher explored the relevant literature with the research. Secondly, the researcher constructed the instruments under the guidance of the supervisor. Expert validity of the questionnaire and achievement test items were obtained from a retired associate professor and two lecturers. After getting the validity of these instruments, a pilot test was conducted. Based on the pilot test, some items were modified to adapt to the students' understanding. After the pilot test, the major survey was conducted on 15th, November, 2016. The modified questionnaires were distributed to all the participants of the eight sample schools and administered with the help of the teachers of those schools.

Instruments

(1) Questionnaire for Students' Motivation to Learn Science

The questionnaire for students' motivation to learn science was consisted of 35 items with a five point Likert-Scale. According to experts' suggestions, the questionnaire for students' motivation to learn science was modified again. The Cronbach alpha for the entire questionnaire was 0.89.

(2) Science Achievement Test for Students

The achievement test was based on the content area from chapter one to four in Grade Seven General Science Textbook prescribed by the Department of Educational Planning and Training, Republic of the Union of Myanmar (2012). The table of specifications was prepared including number of items according to the content areas.

The achievement test consisted of true/false items, completion items, matching items, short question items and long question items. According to experts' suggestions, the achievement test items were modified again. The allocated time for this achievement test was (1:30) hours. The marking

scheme for the achievement test was presented. After the pilot test had been administered, discrimination indices and difficultly indices were computed by using U-L index method by John Stocklein (1957 cited in Sevilla, 1992). The difficulty indices and discrimination indices are within the acceptable ranges of 0.20 to 0.80 and 0.30 to 0.80.

$$Df = \frac{Pu+}{2}$$

$$D_s = Pu-Pl$$

Where D_f = Difficulty index

D_s = Discrimination index

P_u = Proportion of the upper 27 percent group who got the item right

P_l = Proportion of the lower 27 percent group who got the item right

Population and Sample Size

The sample for the descriptive design was selected from eight schools in Yangon Region.

No.	Strata	Township	School	Population	Sample Size		
					Male	Female	Total
1	Inner-City	Dagon	BEHS 2	244	91	53	144
2	Inner-City	Dagon	BEMS 1	274	57	43	100
3	Inner-Suburb	Hlaing	BEHS 2	288	69	81	150
4	Inner-Suburb	Hlaing	BEMS 6	178	55	60	115
5	Outer-Suburb	Mayangone	BEHS 2	635	71	75	146
6	Outer-Suburb	Mayangone	BEMS 5	182	62	56	118
7	Satellite	North Dagon Myothit	BEHS 3	578	71	79	150
8	Satellite	North Dagon Myothit	BEMS 3	211	54	66	120
	Total			2379	530	513	1043

Note: BEHS=Basic Education High School

BEMS=Basic Education Middle School

Data Analysis

The data were analyzed by using the Statistical Package for the Social Science (SPSS 23). The Pearson product-moment correlation was used to indicate the degree of strength and direction of relationship between students' motivation and achievement in science.

Findings and Interpretations

In this study, the total number of Grade-seven students is (1043).Students who had motivation score between (137 - 175) can be regarded as highly motivated students and those who had (64 - 136) as lowly motivated. The motivation score and mean of lowly motivated students were 119.71 and 32.17 and that of highly motivated students were 147.64 and 40.49 respectively.

The means of different factors influencing motivation to learn science are (76.60%) in self-efficacy, (77.08%) in active learning strategies, (79.48%) in science learning value, (68.60%) in performance goal, (83.80%) in achievement goal and (71.27%) in learning environment stimulation respectively.

Students' motivation to learn science and their academic achievement in science were moderately related at 0.01 level (see Table 4.1 and 4.2).

Table 4.1: Correlation of Students' Motivation to Learn Science and their Academic

Achievement in Science at the Middle School Level

Students' Position	R	p
Lowly Motivated Students	.511**	.000
Highly Motivated Students	.523**	.000

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

Table 4.2: Correlation of Factors Influencing Students' Motivation to Learn Science and their Academic Achievement in Science at the Middle School Level

Different Factors	r	p
Self-efficacy	.563	.000
Active Learning Strategies	.626	.000
Science Learning Value	.554	.000
Performance Goal	.461	.000
Achievement Goal	.455	.000
Learning Environment Stimulation	.514	.000

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

To sum up,

- Students were less motivated by performance goal and learning environment stimulation. They had moderate self-efficacy and they liked active learning strategies in learning science. The students were more motivated by achievement goal and science learning value.
- There is a significant difference between lowly motivated and highly motivated students' motivation to learn science in terms of the means of students' motivation to learn science.
- For students' achievement in science, there is a significant difference between lowly motivated and highly motivated students' achievement in science in accordance with the means of students' achievement in science.
- The achievement of highly motivated students is significantly higher than that of lowly motivated students.
- The students' motivation to learn science has moderately correlated with their academic achievement in science.
  According to the results mentioned above, students' motivation to learn science has an impact on their academic achievement in science.

Discussion and Conclusion

Discussion

According to the results of this study, it was found that students differ significantly in their academic achievement in science based on the extent to which they are motivated in classroom setting. In a classroom, students differ in their family background, parents' income, parents' education, interest, intelligence, motivation and many others. Among these factors, the impact of motivation to learn science on their academic achievement in science was investigated. In the study, (49.57%) of the students were more motivated to learn science than (50.43%) of the students. Students who got motivation scores of (64 - 136) are regarded as highly motivated students and those who got (137 - 175) as lowly motivated students. The means of motivation and standard deviations of lowly and highly motivated students were (119.71), (16.53), (147.64) and (7.75) respectively. It was found that there was a significant difference in students' motivation to learn science.

This result is consistent with the findings of (Tella, 2007) that highly motivated students perform better academically than lowly motivated students. In school, most teachers and students are likely to think that intelligent or bright students can be top students and only these students can be high achievers. Empirical findings are available that highlighted the significance of motivation for students' achievement in different subjects. According to the earlier studies, the relationship between students' motivation to learn science and their academic achievement in science is an important consideration in learning science.

Another finding was that the means of students in different factors influencing motivation to learn science were (26.81) in self-efficacy, (30.83) in active learning strategies, (19.87) in science learning value, (13.72) in performance goal, (20.95) in achievement goal and (21.38) in learning environment stimulation respectively. Thus it was found that students were less motivated by performance goal and learning environment stimulation. They had moderate self-efficacy and they liked active learning strategies in learning science. The students were more motivated by achievement goal and science learning value. In schools, students learn scientific facts, concepts, scientific laws and theories by heart. This may be one of the weak points of

students in learning science. They cannot know how to approach and learn science and how to motivate themselves to learn science. They can use some motivational techniques such as setting goals, drawing timetable and studying lessons according to the timetable, providing rewards and incentives to themselves, seeing the value of learning and competing with themselves than with the others.

Another finding was that the results of Pearson product-moment correlation described the degree of strength and direction of relationship between students' motivation to learn science and their academic achievement in science. Highly motivated students got more high scores in science achievement test than lowly motivated students. In this study, students' motivation to learn science and their academic achievement in science were moderately related at 0.01 level. This result is consistent with the findings of Abdurrahman &Garba (2014). They summarized that highly motivated students perform academically better than the lowly motivated students. The study of Amrai, Motlagh, Zalani & Parhon (2011) indicated a significant relationship between academic motivation and academic achievement. Early studies investigated that there was a relationship between students' motivation and their academic achievement.

Conclusion

Motivation, according to Schunk (1990 cited in Driscoll, 2005) refers to the process whereby goal-directed behavior is instigated and sustained. Human behavior is hardly possible without motivation which is a most important factor in learning. Motivation in education means inculcating and stimulating interest in studies and other such activities in pupils. It involves the understanding and use of natural urges of the child and also assisting him in acquiring new desirable motives (Kuppuswamy, 2002).

Motivation involves the forces that energize and direct behavior. The study of motivation is the study of all the forces that create and sustain students' effortful, goal-directed action. One's motivation to learn determines one's achievement (Donnell, Dobozy, Bartlett, Bryer, Reeve & Smith, 2012).

Motivation is an important factor in determining a student's achievement at school. It may be the main reason of getting high or low achievement of students. Although students can have the same level of intelligence, their achievement can be different. This may be due to their difference in level of motivation to learn. A   student's motivation can be measured by dimensions such as interest, attitude, self-efficacy, use of active learning strategies, learning value, performance goal, achievement goal and learning environment stimulation.

Motivated students develop self-regulatory skills to set their own goals and manage their own learning and performance (Driscoll, 2005). Achievement goals set by learners influence their task persistence and problem-solving efforts (Elliot &Dweck, 1988; Meece, 1994 cited in Driscoll, 2005) as well as their study behaviors and what they remember (Nolen & Haladyna,1990 cited in Driscoll, 2005).

A strong source of motivation comes from learners' beliefs about themselves in relation to task difficulty and task outcome. Bandura (1997 cited in Driscoll, 2005) proposed self-efficacy as a belief system that is causally related to behavior and outcomes. It can be said that motivated students possess high self-efficacy level and they know what they need to do, to which extend they can achieve and how to manage themselves. Needs are based on some deficit within the person. Drive, though certainly based on needs, have the added feature of an observable change in behavior (Sprinthall, Sprinthall & Oja, 1994).

In order to consider the concept of motivation, reinforcement should not be missed. Reinforcement can motivate behavior. Early researchers called this extrinsic motivation. Children's early experiences at home may affect their motivation. Regardless of the family's socioeconomic level, cognitively stimulating home environments encourages academic intrinsic motivation through early adolescence. Conversely, parental reliance on extrinsic motivational practices to promote achievement may lower academic intrinsic motivation (Fleming, & Gottfried, 1998 cited in Bohlin, Durwin & Weber, 2012). Extrinsic rewards may not be necessary in early childhood because children at this developmental level generally are curious, inquisitive and motivated to learn new things (Harter, 1978 cited in Bohlin, Durwin & Weber,

2012). Students tend to become less intrinsically motivated as they move from upper elementary grades through middle and high school (Lepper et al., 2005; Spinath & Spinath, 2005 cited in Bohlin, Durwin& Weber, 2012). So stimulation from teachers and parents is necessary for adolescence.

In order to become successful learners, they need to become active learners, in turn highly motivated learners. To become effective teachers, it is necessary not only to be good at teaching but also to be proficient at motivating students to learn. Motivation leads learners to reach where they intent to achieve and encourage them to participate in learning process actively. Therefore, motivation is an essential and fundamental component of learning.

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