

Attitude towards Physics Lessons and Physics Experiments of Secondary & Preparatory School Students: The Case of Wolaita Sodo Town, Ethiopia

Merneh Mandado

College of Natural and Computational Science, Wolaita Sodo University

Abstract

In order that students can develop critical thinking, problem solving and decision making skills, so that they become lifelong learning individuals, they should be improved regarding their knowledge, understanding and attitude towards natural sciences. Attitudes towards physics lessons and physics experiments of secondary and preparatory students of Wolaita Zone have been examined for this purpose. Population of the study which consists purposely selected two secondary and preparatory school students (9th and 11th grades) of Sodo Town administration. Students were selected among the population by random sampling. Collected data have been analyzed by using SPSS 16.0 software. Appropriate statistical methods were used for examination of data distribution. Finally the result was obtained and shows that students have a negative attitude toward learning of physics lesson and doing physics experiments.

Keyword: Secondary & preparatory school student, attitude, Physics lesson, Physics Experiment

Introduction

As a science, Physics plays an important role in explaining the events that occur in the universe. In all events that around us can be found physical laws and principles. The developments in physics in the 20th century, it has been extremely successful in that it also greatly benefited to the other basic and applied sciences from these developments (Fishbein 1975). Although physics is in every area in our life and facilitate our lives, national and international studies show that success in physics education is lower than other disciplines (Gok and Silay 2008).

In physics education, various methods and techniques can be used according to the content. Laboratory methods, which are the mostly used method that provides permanent learning, is an educational method encouraging mental activities and allowing students to work individually or in groups (Stack 1995). Laboratory methods ensure that students learn ways to use the knowledge with this method rather than memorizing it. Students improve their skills to better understand of concepts, laws and physical principles and adapt them to daily life as well as their personal skills, and it provides a positive attitude towards physics lessons (Algan 1999, Stack 1995).

Education in general is viewed as development of life process and universal practice of human learning resulting from man's interaction with his social and natural environment. In line with this, Tegene and Tsegaye (1999) discussed education as a process and practice engaged in by different societies at all stage of development and geared toward shaping an all rounded personality by a harmonious and integrated development of the mental, physical, social, moral, spiritual, aesthetic etc. power of human being.

Science education in particular provides good standards for people and leads to cultural developments. Also scientific development is the most affective factor in enabling on fewer developing countries in to the main stream contemporary technology and commerce. In Ethiopian context, the Government has recently introduce policy of 70:30 percent professional mix in annual enrolment, with 70% of intakes allocated in to science and technology streams and 30% in to the social science and humanity steams. The rationale behind this initiative is the belief that science and technology are the engines of development and that Ethiopia's prospect hinges on the availability of sufficient stock of national expertise in these fields by its higher institutions (FSS, 2009). This shows that, the country has intended to reduce its dependence on the imported expertise and technology.

However, the teaching and learning of physics in the secondary schools of the country in general and the Wolaita Zones in particular have been encountered by many problems. From my experience in teaching physics in high schools of Wolaita zone, lots of problems were observed especially students interest toward physics lesson and experimentation in the teaching and learning of physics. I observed that, the majority of students in the high schools, especially in grade 9 and 10 had no interest to learn physics and resulted the low achievement in national examination. In addition to this, the students in the preparatory grades (11 and 12), had also low interest in physics when compared with other science subjects. Majority of preparatory students choose natural science stream only to join health related fields when they will be admitted to higher educational institutes, because they assume that, they cannot cope up physics dominated fields like engineering and technology.

Also statistics shows that majority of students scored very poor result in the entrance examination to higher educational institutions, besides this, teachers in these schools had low motivation to teach physics, the

reason could be due to some attitude problems toward physics. Hence, it is necessary to study these problems in order to recommend solution.

The objective of this study is to investigate the attitude of high school students towards Physics lessons and physics experiments. These problems need special attention to get reliable solutions. Thus, the researchers extremely interested to identify problems in teaching and learning physics in Wolaita zone secondary and preparatory schools, and to suggest possible solution.

This paper was organized into four parts. The first part presents introduction. The second part describes methodology used to achieve the objectives. The third part presents Presentation, Analysis and Interpretation of Data. The last part includes conclusion.

2. RESEARCH METHODOLOGY

2.1 Description of Study Area

Wolaita Sodo town is one of three town administration in Wolaita Zone. The capital city of the Zone is Wolaita Sodo which is situated at 378 km to the South of Addis Ababa which is the capital city of Ethiopia. The total number of urban households is 100,755 out of which 52.78% are men headed and 47.22% are women headed households. The total number of secondary and preparatory students in Wolaita Sodo town is 2181 Males and 4685 Females. As a result, income from non-farm and off-farm activities is the second most important source of livelihood. Especially, small trading plays an important role in generating income. Apart from trading, income from daily labor and seasonal workforce movement during harvest time is another source of income to the farmers. Source (WZFEDO 2015).

2.2 Sampling Technique

In the study area, numbers of students are responsible for making day to day decision on class work and laboratory related activities. Thus, students were the basic sampling unit. A multi-stage sampling technique was used to generate the required primary data. At the first stage, Sodo Town Administration was selected purposively because it is one of the largest numbers of secondary schools found in the town. In the second stage, out of four Secondary schools, schools (-Sodo comprehensive school and Bogale Walelu secondary schools) were selected by simple random sampling techniques.

2.3. Sample Size Determination

To determine appropriate sample size simplified formula which developed by Yamane (1967) was used.

$$n = \frac{N}{1+N(e^2)} \dots\dots\dots (1)$$

A probability proportion to size was employed to determine sample size from each Secondary school and finally 120 students were selected by using systematic random sampling without replacement technique (Table 1).

$$n = \frac{N}{1+N(e)^2} = \frac{2578}{1+2578(0.09)^2} = 120$$

Where, assume n=required sample size; e =degree of accuracy expressed as a proportion of (0.09); and N= total population of the division.

Table 1: Sampling Technique

Town	Name of schools	Numbers of students			Sample Size		
		Males	Females	Total	Males	Females	Total
Sodo Town	Sodo comp.	858	685	1543	39	33	72
	Bogale W.	549	486	1035	26	22	48
	Total	1407	1171	2578	65	55	120

Source: Sodo town Administration education office (2015/16)

2.4 Data Sources and Methods of Data Collection

Both qualitative and quantitative data were collected from primary and secondary sources. Quantitative data from primary sources were collected through questionnaire while qualitative data were collected through key informant interview, focus group discussions and personal observations. The relevant data were collected from 120 sample students. An interview schedule was prepared in English during the data collection. The interview schedule was pre-tested before going to actual data collection and made necessary corrections. Two enumerators were recruited based on their proficiency, educational background and prior exposure to similar activities. Short term training was given to enumerators on the content of the interview schedule and procedures to follow while conducting.

Data Analysis Method

Acquired data were analyzed by using Statistical Package for Social Science 16.0 (SPSS 16.0) program. In this analysis, primarily descriptive statistics (frequency, percentage, mean, standard deviation) was calculated and the

distribution characteristics have been revealed. For each question in the survey, students' level of participations was rated as [(1) strongly agree, (2) agree, (3) neutral, (4) disagree, (5) strongly disagree.

Presentation, Analysis and Interpretation of Data

This part deals with presentation, analysis and interpretation of the data gathered from students of the two schools. The gathered data was presented in the table below.

Table 1. Attitude distribution of participating students towards physics lessons

Responses	AQ ₁		AQ ₂		AQ ₃		AQ ₄		AQ ₅	
	f	%	f	%	f	%	f	%	f	%
SDA	29	24.17	64	53.33	40	33.33	70	58.33	10	8.33
DA	50	41.67	27	22.5	41	34.17	17	14.17	12	10.00
NANDA	32	26.67	7	5.83	13	10.83	14	11.67	8	6.67
AG	2	1.67	11	9.17	10	8.33	5	4.17	33	27.50
SAG	7	5.83	11	9.17	16	13.33	14	11.67	57	47.50
Total	120	100	120	100	120	100	120	100	120	100
Mean	4.38		2.32		2.34		1.97		3.96	

Responses	AQ ₆		AQ ₇		AQ ₈		AQ ₉		AQ ₁₀	
	f	%	f	%	f	%	f	%	f	%
SDA	40	33.33	10	8.33	45	37.50	40	33.33	18	15.00
DA	50	41.66	6	5.00	42	35.00	50	41.67	13	10.83
NANDA	7	5.83	14	11.67	7	5.83	12	10.00	4	3.33
AG	8	6.67	59	49.17	12	10.00	6	5.00	52	43.33
SAG	15	12.50	31	25.83	14	11.67	12	10.00	33	27.50
Total	120	100	120	100	120	100	120	100	120	100
Mean	2.23		3.79		2.23		2.17		3.58	

SDA = strongly disagree = 1, DA = disagree = 2, NANDA = neutral = 3, AG = agree = 4, SAG = strongly agree = 5

1. AQ₁ = we learn interesting things in physics lessons
2. AQ₂ = I look forward to physics lessons
3. AQ₃ = I would like to have more physics lessons at school.
4. AQ₄ = I like physics lessons more than the others.
5. AQ₅ = Physics lessons are boring.
6. AQ₆ = Physics lessons are exiting.
7. AQ₇ = I only fail in physics lessons.
8. AQ₈ = I get good marks in physics lessons
9. AQ₉ = I could easily learn physics topics.
10. AQ₁₀ = I feel helpless when doing physics homework's.

As can be seen from table 1, students who participated to the survey and responded to questions of 1st, 2nd, 6th, 8th and 9th which are a positive attitudes items such as AQ₁(7.5%), AQ₂ (18.34%), AQ₆ (19.17%) AQ₈ (21.67%) and AQ₉ (15%) respectively in low rates opinions of "Strongly Agree" or "Agree". On the other, students replied to questions of 5th, 7th and 10th are negative attitude items such as AQ₅ (75%), AQ₇(75%), and AQ₁₀ (70.83) respectively in somehow high rates reported opinion "SAG" or "AG".

Similarly regarding attitudes items such as 3th and 4th, the students' opinions and percentages of "SAG" and "AG" were as follows: AQ₃ (21.66%) and AQ₄ (15.84%) respectively.

As a result of this questionnaire with 10 attitude items that could be maximum 50 points, the average of student attitude scores was calculated as \bar{X} = 28.97. In addition, the attitude scores of students in the lowest 10, highest was 40 points. When it is considered that in a scenario of entirely indecisive population the average score should be 30, it can be concluded from these results that students are in an almost negative attitude towards physics lessons, and they have a low rate of interest, expectation and success in physics lessons. All of the students, even if indecisive, the average score should be around 30, these results show that students have negative attitudes towards learning of physics lessons, and also interests in physics classes, is understood to be low expectations and achievements.

Table 2. Attitude distribution of participating students towards Physics Experiments

Responses	AQ ₁		AQ ₂		AQ ₃		AQ ₄	
	f	%	f	%	f	%	f	%
SDA	48	40.00	46	38.33	10	8.33	42	35.00
DA	46	38.33	34	28.33	58	48.33	50	41.66
NANDA	7	5.83	10	8.33	8	6.67	12	10.00
AG	12	10.00	16	13.33	27	22.50	9	7.50
SAG	7	5.83	14	11.67	17	14.17	7	5.83
Total	120	100	120	100	120	100	120	100
Mean	2.03		2.32		2.86		2.08	

Responses	AQ ₅		AQ ₆		AQ ₇		AQ ₈	
	f	%	f	%	f	%	f	%
SDA	32	26.67	30	25.00	52	43.33	7	5.83
DA	60	50.00	50	41.66	37	30.83	9	7.50
NANDA	4	3.33	5	4.17	6	5.00	8	6.67
AG	13	10.83	15	12.50	10	8.33	36	30.00
SAG	11	9.17	20	16.67	15	12.50	60	50.00
Total	120	100	120	100	120	100	120	100
Mean	2.26		2.54		2.16		4.11	

SDA = strongly disagree = 1, DA = disagree =2, NANDA = neutral = 3, AG = agree = 4, SAG = strongly agree = 5

APEQ₁ = Physics experiments are exiting.

APEQ₂ = I like physics experiments because I don't know what will happen

APEQ₃ = Physics experiments are useful, because I can work with my friends

APEQ₄ = I like physics experiments, because I can decide what to do for myself

APEQ₅ = I would like to have more experiments in the physics lessons.

APEQ₆ = We learn physics lessons better when we do physics experiments.

APEQ₇ = I look forward to doing experiments in physics lessons.

APEQ₈ = Physics experiments in the physics lessons are boring.

In order to determine the participating students' attitude towards physics experiments, 8 attitude items were asked to the students. Frequency and percentage values of the respondents for each attitude items are given in Table 2 above. As revealed in Table 2, students who participated in the survey replied to attitude items of answered affirmative questions such as APEQ₁ (15.83%), APEQ₂ (25%), APEQ₃ (36.67%), APEQ₄ (13.33%), APEQ₅ (20%), APEQ₆ (29.17%) and APEQ₇ (20.83%), respectively in low rates reported opinions of SAG or "AG". On the other hand, students replied to 8th attitude item APEQ₈ (80%) was replied opinion of "SAG" or "AG".

An overall view of the responses of students' regarding attitude towards physics experiments, as shown in Table 3, most of the students think that physics experiments are *boring* and *not exciting*.

Students' attitude scores towards physics experiments were calculated in the same way of the attitude scores towards physics lessons. As a result of this questionnaire with 8 attitude items that could be maximum of 40 points, the average attitude scores towards physics experiments of student was calculated as $\bar{X} = 20.36$. When it is considered that in generally view to entirely indecisive students the average score attitude scores towards physics experiments should be 24, from the statistical results, it can be concluded that students have negative interest and attitude towards physics experiments, is understood to be low rate of interest, expectation and success in physics experiments.

Conclusion

This study reveals that there is some factors that affects students attitude regarding physics lesson and experimentation. Physics lessons being held in the classroom on the sole theoretical basis seems to be one of the factors that influence attitude of the students toward these lessons in a negative manner. Thus, physical topics that consist of abstract concepts, theories, laws and principles should be lectured in the basis of students' daily life activities, together with simulations, animations and other videos to keep the attention of the students alive.

Learning by discovery is better than passive listening, so it should be shown how to associate physical concepts, laws and principles with their daily life of the students. Physics experiments which may be executed with effective, attract attention with simple materials should be developed. Studio physics which is a method of teaching that provides an integrated learning environment with hands-on lab measurements coupled with active student problem-solving should be apply in the physics lessons. In order to make physics lessons more

interesting, physics instructors should convince students that physics helps to study every scientific world. Physics instructors should spend more efforts to associate physics–technology– daily life. Physics instructors should update themselves with the existing technology, respect and like their profession and reflect this to others.

On the other hand school management bodies should play a vital role in planning and providing simple laboratory equipment’s organize science training for instructors, recruit well trained (skilled) laboratory technicians.

References

- Azizoğlu N , Çetin G, (2009) Six And Seventh Grade Students’ Learning Styles, Attitudes Towards Science And Motivations, *Kastamonu Education Journal*, 17, 171-182.
- Hasan Kaya and Uğur Büyük (2011). Attitude towards Physics Lessons and Physical Experiments of the High School Students
- FSS (Forum for Social Study), (2002E.C). A.A 7. Getenet Demisse Bitew, (2008). Using “plasma TV”Broadcast in Ethiopian Secondary Schools: A brief survey. *Australian Journal of Educational Technology* 2008, 24(2), 150-167
- Osborne, J., Simon, S., & Collins, S. (2003). Attitude towards science: a review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079.
- Tegene & Tesegaye, (1999). Handout of Social Foundation of m Education.(Unpublished) AAU.
- Fishbein, M. & Ajzen, I. (1975). Belief, attitude, intention, and behavior: an introduction theory and research. Reading, MA: Addison-Wesley
- Gök, T. & Sılay, I. (2008). The effects of problem-solving strategies teaching on problem solving attitude, in the cooperative learning groups in physics education. *Journal of Theory and Practice in Education*, 4 (2), 253-266
- Staeck, L.,(1995). Perspectives for biological education-challenge for biology instruction at the end of the 20th century. *Hacettepe University Journal of Education*, (11), 29–35
- Craker DE (2006). Attitudes toward Science of Students Enrolled in Introductory Level Science Courses at UWLa Crosse, UW-L Journal of Undergraduate, IX
- Algan, g.(1999). The Effect of physics lessons supported by lab experiments to student's success and modern mathematics and science programmes conducted in Turkey between 1962-1985. *Master Thesis, Gazi University Institute of Science, Ankara.*