

A Comparative Study of Students' Learning Achievement in General Science, Physics, Chemistry & Biology

Aijaz Ahmed Gujjar¹
Dr Muhammad Ramzan²
Dr Naeemullah Bajwa³
Dr Ghazala Shaheen⁴

Abstract

The main purpose of the study was to compare the achievements of the students, over a period of three years, from grade 8 to grade 10 in the subjects of General Science, Biology, Physics and Chemistry. To achieve the desired end, 40 female students were selected as sample that got admission in school and passed their matriculation exam (Grade 10) from the selected school. Their marks in the subject of General Science, Biology, Physics and Chemistry were taken which they had achieved over a period of three years from grade 8 to grade 10 and analyzed by calculating mean and applying paired sample t-test and ANOVA. The study was led by twelve null hypotheses. The findings of the study were based on observed values as well as by applying statistical treatments. The result of this study indicated that the students in grade 8 performed significantly better in general science than in Biology in grade 9. The students in grade 8 performed significantly better in general science than in Biology in grade 10. The students in grade 8 and grade 9 performed equally in General Science and Chemistry. The students in grade 8 performed significantly better in general science than in Chemistry in grade 10. The students in grade 9 performed significantly better in general science than in Chemistry in grade 10. The students in grade 8 and grade 9 performed equally in General Science and Physics. The students in grade 8 performed significantly better in general science than in Physics in grade 10. The students in grade 9 and grade 10 performed equally in General Science and Physics. Students' performed better in General Science in grade-8 as compared to Biology, Chemistry and Physics in grade-10. The students in grade 8 and grade 9 performed equally in General Science, Chemistry and Physics while in Biology students performed better in grade -8 as compared to grade-9 and over all students performance decline in grade 10 in all the science subjects.

Introduction

Science is a study that appeals to students due to its subject matter, curiosity of students, variety of activities that can be done and the sense of achievement gained from what ever has been done or learnt. The academic achievement can be listed as: 'the development of expression in writing, speaking, reading and calculation, recording and organizing information in tables and graphs. In laboratories, manipulation of equipments at basic level. Academic achievement at secondary level are considered as the bases of solution of those questions which are framed to usually cover the central concepts, themes emphasized in the text and are meant to check if learning is accruing or not'.

Education is a teaching learning process. Learning theorists and researchers have not arrived at a universally accepted, precise definition of learning; how ever most agreed that learning is a change in individuals' knowledge or behaviour that results from experience (Mazur, 1997; Salvin, 2003; Woolfolk, 2005). Learning can be seen in the form of academic achievements. Students get opportunity to learn science concepts and principles acquire reasoning and problem solving abilities and develop inquiry skills in each of the discipline (physics, chemistry, biology and general science). The science subjects engage students in depth learning experiences that enable them to develop a deep understanding of the ideas of science and ability to apply them appropriately. The coin of realm in education today is student's achievements, its measure and its relationship to school accountability. An almost singular emphasis is placed on students' achievement in 'core' academic areas. Perhaps most importantly in today's information age, thinking skills are viewed as crucial for educated persons to cope with rapidly changing world. Many educators believe that specific knowledge will not be as important to tomorrow's workers and citizens as the ability to learn and make sense of new information (Gough, 1991).

¹ Lecturer Federal College of Education H-9, Islamabad, Pakistan

² Associate Professor, Dept of Education, Karakoram International University Gilgit, Pakistan

³ Principal, Dept of Education, Govt of Punjab, Pakistan

⁴ Assistant Professor, dept of Management Sciences, Federal Urdu University of Arts, science and Technology, Islamabad, Pakistan

Thinking skills are necessary tools in society characterized by rapid change, many alternatives of actions and numerous individuals and collective choices and decisions (Beyth-Marom, et al, 1987). The societal factors that create a need for well-developed thinking skills are only part of the story. However, another reason that educators, employers and others call for more and better thinking skills instruction in schools is that educated people in general, do not show an impressive level of skill in critical or creative thinking. Likewise, Robinson (1987) noted that the importance of cognitive development has become wide spread; students' performance on measures of higher-order thinking ability has displayed a critical need for students to develop the skills and attitudes of effective thinking.

Thinking skills, critical thinking, higher-order thinking is used interchangeably. These terms cannot be considered in casual manner.

For example critical thinking has been defined as:

- Reflective and reasonable thinking that is focused on deciding what believe or do.
- The disposition to provide evidence in support of one's conclusions and to request evidence from others before accepting their conclusions (Hudgins, 1985).
- The process of determining the authenticity, accuracy and worth of information or knowledge claims (Beyer, 1985).

Instruction in thinking skills promotes intellectual growth and fosters academic achievement gains. Instructional approaches found to promote thinking skills development include redirection, probing and reinforcement, asking higher-order questions during classroom discussions. Computer-assisted instructions and many commercially available thinking skills instructional programs can show improvements in students' performance on intelligence and achievement tests. Teachers' training programs in thinking skills are associated with students' achievement gains. The success of thinking skills instruction also depends upon other factors like administrative support and appropriate match between the students and instructional approach selected. Infused thinking skills and curricula, both are often used together, with beneficial results. Direct teaching and inferential learning can enhance students' academic achievements. For thinking skills instruction classroom climate should be established to maintain a positive, stimulating, encouraging classroom climate, in which students feel free to experiment with new ideas and approaches. In both school settings and in the world outside school, it is crucial for people to have ' skills in questioning, analyzing, comparing, contrasting and evaluating, so that will not become addicted to being to what to think and do (Freshman, 1990).

Traditionally in our education system teachers and students focus their all energies in transmitting and acquiring knowledge. So much has been known about the natural world that the information content of science has become enormous. This is so well known that the science educators and the science book writers came to believe that they must seek to transfer as much factual information as possible in the time available. Textbooks grew larger and curricula become more concentrated, students were expected to memorize and learn increasing more material. Acquisition of scientific facts and information took precedence over learning scientific methods and concepts. Inevitably the essential accompanying task of transmitting the methods of correct investigation, understanding and evaluation of all scientific data (that is critical thinking) was lost by the roadside. This situation became severe in primary and secondary education and a well-known decline has been occurred in the math and science in our country as compared to other industrialized countries.

Objectives of the Study

This study was based on the following objectives:

1. To measure the achievements of the students in the subjects of General Science, Physics, Chemistry and Biology over a period of three years.
2. To compare the achievements of students in the subjects of General Science, Physics, Chemistry and Biology among three classes (class 8th, 9th and 10th).
3. To compare the achievements of individuals in the subjects of General Science, Physics, Chemistry and Biology in class 8th, 9th and 10th.

Research Methodology

Population and Sampling

The population of the study consisted of all the female students studying at secondary level in F G girls secondary schools under the administrative control federal directorate of education, Islamabad .Forty students from FG girls secondary school I-10/4, Islamabad were taken as sample all these 40 students remain the student of the above mentioned school for three years from 2005-2007.

Research Tool Development and Data Collection

Specific proformas were developed in order to collect the scores/ marks obtained by the students in the subject of General Science, Physics, Chemistry and Biology from class 8th to class 10th examinations conducted by federal directorate of education and F.B.I.S.E Islamabad

Administration of Research Tool

Head of school/ institution was approached in order to get the scores of the same students, which they obtained in the subjects of General Science, Physics, Chemistry and Biology from 8th to 10th class.

Data Analysis

The data collected through proformas were fed into SPSS-12 and mean scores were calculated, independent sample t-test and ANOVA was run in order to find the differences in the achievements of the students in different classes.

Findings

Table: 1 showing the mean difference between the achievements of students in the subject of General Science, Physics, Chemistry and Biology in class 8th and 9th

Subjects	Classes	Mean	N	Std. Deviation	Std. Error Mean	df	t-value	p-value
Physics	Class8	52.75	40	10.015	1.583	39	1.434	0.160
	Class9	49.73	40	15.579	2.463			
Chemistry	Class8	52.75	40	10.015	1.583	39	0.085	0.933
	Class9	52.55	40	17.575	2.779			
Biology	Class8	52.75	40	10.015	1.583	39	3.589	0.000
	Class9	45.13	40	15.068	2.382			

It is evident from above table that there is no significant difference between the achievements of students in class 8th and 9th in the subject of General Science and Physics as well is in the subjects of General Science and Chemistry but there is a significant difference between the achievements of students in class 8th and 9th in the subject of General science and Biology. The achievements of students in General Science in class 8th are significantly better than their achievements in Biology in class 9th. So, it can be concluded from the above table that students' achievements in Biology declined in class 9th with comparison to their achievements in General Science in class 8th but remained same in the subjects of Physics and Chemistry.

Table: 2 showing the mean difference between the achievements of students in the subject of General Science, Physics Chemistry and Biology in class 8th and 10th

Subjects	Classes	Mean	N	Std. Deviation	Std. Error Mean	df	t-value	p-value
Biology	Class8	52.75	40	10.015	1.583	39	7.403	0.000
	Class10	39.00	40	10.813	1.710			
Chemistry	Class8	52.75	40	10.015	1.583	39	2.920	0.006
	Class10	47.85	40	11.394	1.802			
Physics	Class8	52.75	40	10.015	1.583	39	2.228	0.032
	Class10	48.03	40	13.360	2.112			

It is evident from above table that there is a significant difference between the achievements of students in class 8th and 10th in the subject of General Science and Chemistry, Physics and Biology. The achievements of students in General Science in class 8th are significantly better than their achievements in Physics, Chemistry and Biology in class 10th. So, it is concluded from the above table that students' achievements in Physics, Chemistry and Biology declined in class 10th with comparison to their achievements in General Science in class 8th.

Table: 3 showing the mean difference between the achievements of students in the subject of Biology, Physics and Chemistry in class 9th and 10th

Subjects	Classes	Mean	N	Std. Deviation	Std. Error Mean	df	t-value	p-value
Biology	Class9	45.13	40	15.068	2.382	39	3.172	0.003
	Class10	39.00	40	10.813	1.710			
Chemistry	Class9	52.55	40	17.575	2.779	39	2.159	0.037
	Class10	47.85	40	11.394	1.802			
Physics	Class9	49.73	40	15.579	2.463	39	0.767	0.448
	Class10	48.03	40	13.360	2.112			

It is evident from above table that there is a significant difference between the achievements of students in class 9th and 10th in the subject Physics, Biology and Chemistry.

The achievements of students in Biology and Chemistry in class 9th are significantly better than their achievements in Biology and Chemistry in class 10th while on the other hand there is no significant difference between the achievements of students in the subject of Physics in class 9th and 10th. So, it is concluded from the above table that students' achievements in Biology and Chemistry declined in class 10th with comparison to their achievements in Biology and Chemistry in class 9th, while their achievements remain constant in the subject of Physics.

Table: 4 Showing ANOVA on the achievements in the subject of General science and Biology among the classes 8th, 9th and 10th

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3796.250	2	1898.125	12.818	.000
Within Groups	17325.875	117	148.084		
Total	21122.125	119			

Above table shows that there is a significant difference among the groups on achievements in the subjects of General Science and Biology. So, it was decided to run POST HOC multiple comparisons.

Table: 5 Showing the multiple comparisons among the groups on achievement in the subject of General Science and Biology

Classes	Mean Difference	p-value
Class 8 vs Class 9	7.625	.006
Class 8 vs Class 10	13.750	.000
Class 9 vs Class 10	6.125	.026

It is quiet clear from the above table that there is a significant difference between the achievements of 8th and 9th classes, and the achievements of students in 8th class are significantly better than in 10th class and achievements of students in 9th class are also significantly better than in 10th class. So, it can be concluded from the above table that students performed better in 8th class and gradually their achievements went down in the higher classes, students achievements in 8th class are significantly better and in 10th class significantly lower during their three years performance.

Table: 6 Showing the gain/loss in achievements in the subject of General Science and Biology individual wise in comparison to 8th and 9th class

Student ID	Class 8	Class 9	Change	Change%	Gain/Loss
1	43	35	-8	-18.6047	Loss
2	65	76	11	16.92308	Gain
3	50	48	-2	-4	Loss
4	55	41	-14	-25.4545	Loss
5	44	33	-11	-25	Loss
6	44	36	-8	-18.1818	Loss
7	40	39	-1	-2.5	Loss
8	64	64	0	0	Nil
9	60	47	-13	-21.6667	Loss
10	67	48	-19	-28.3582	Loss
11	49	35	-14	-28.5714	Loss
12	63	53	-10	-15.873	Loss
13	50	41	-9	-18	Loss
14	50	35	-15	-30	Loss
15	60	68	8	13.33333	Gain
16	59	60	1	1.694915	Gain
17	63	35	-28	-44.4444	Loss
18	52	45	-7	-13.4615	Loss
19	52	33	-19	-36.5385	Loss
20	45	47	2	4.444444	Gain
21	39	55	16	41.02564	Gain
22	36	35	-1	-2.77778	Loss
23	57	33	-24	-42.1053	Loss
24	37	35	-2	-5.40541	Loss
25	60	33	-27	-45	Loss
26	54	33	-21	-38.8889	Loss
27	57	69	12	21.05263	Gain
28	67	69	2	2.985075	Gain
29	38	40	2	5.263158	Gain
30	70	81	11	15.71429	Gain
31	55	36	-19	-34.5455	Loss
32	52	83	31	59.61538	Gain
33	46	39	-7	-15.2174	Loss
34	64	45	-19	-29.6875	Loss
35	60	47	-13	-21.6667	Loss
36	54	35	-19	-35.1852	Loss
37	58	33	-25	-43.1034	Loss
38	25	28	3	12	Gain
39	55	27	-28	-50.9091	Loss
40	51	30	-21	-41.1765	Loss

Above table shows that when achievement of 8th class and 9th class was compared individually, then it was found that student no. 2, 15, 16, 20, 21, 27, 28, 29, 30, 32 and 38 gain their marks in 9th class with comparison to their marks in 8th class and over all 27.5% students have gain in their marks and gain was from 1.69% to 59.61%. While on the other side student no.1,3,4,5,6,7,9,10,11,12,13,14,117,18,19,22,23,24,25,26,31,33,34,35,36,37,39 and 40 lose their marks in 9th class with comparison to their marks in 8th class and over all 70 % students lose their marks in 9th class and loss was from 2.50 % to 50.90 %. On the other side student no. 8 is on the static position with out any change.

Table: 7 Showing the gain/loss in achievements in the subject of General Science and Biology individual wise in comparison to 8th and 10th class

<i>Student ID</i>	<i>Class 8</i>	<i>Class 10</i>	<i>Change</i>	<i>Change%</i>	<i>Gain/Loss</i>
1	43	25	-18	-41.8605	Loss
2	65	55	-10	-15.3846	Loss
3	50	29	-21	-42	Loss
4	55	28	-27	-49.0909	Loss
5	44	25	-19	-43.1818	Loss
6	44	31	-13	-29.5455	Loss
7	40	39	-1	-2.5	Loss
8	64	46	-18	-28.125	Loss
9	60	48	-12	-20	Loss
10	67	66	-1	-1.49254	Loss
11	49	38	-11	-22.449	Loss
12	63	40	-23	-36.5079	Loss
13	50	44	-6	-12	Loss
14	50	45	-5	-10	Loss
15	60	45	-15	-25	Loss
16	59	41	-18	-30.5085	Loss
17	63	41	-22	-34.9206	Loss
18	52	28	-24	-46.1538	Loss
19	52	43	-9	-17.3077	Loss
20	45	40	-5	-11.1111	Loss
21	39	40	1	2.564103	Gain
22	36	40	4	11.11111	Gain
23	57	38	-19	-33.3333	Loss
24	37	33	-4	-10.8108	Loss
25	60	38	-22	-36.6667	Loss
26	54	30	-24	-44.4444	Loss
27	57	39	-18	-31.5789	Loss
28	67	52	-15	-22.3881	Loss
29	38	28	-10	-26.3158	Loss
30	70	43	-27	-38.5714	Loss
31	55	37	-18	-32.7273	Loss
32	52	72	20	38.46154	Gain
33	46	28	-18	-39.1304	Loss
34	64	39	-25	-39.0625	Loss
35	60	55	-5	-8.33333	Loss
36	54	25	-29	-53.7037	Loss
37	58	26	-32	-55.1724	Loss
38	25	43	18	72	Gain
39	55	32	-23	-41.8182	Loss
40	51	25	-26	-50.9804	Loss

Above table shows that when achievement of 8th class and 10th class was compared individually, then it was found that student no. 21, 22, 32 and 38 gain their marks in 10th class with comparison to their marks in 8th class and over all 10 % students have gain in their marks and gain was from 2.56 % to 72 %. While on the other hand student no.1,2,3 4, 5, 6, 7, 8, 9,10, 11, 12,13, 14, 15,16, 17, 18, 19,20,23, 24, 25,26, 27, 28, 29, 30, 31, 33, 34, 35, 36, 37, 39 and 40 lose their marks in 10th class with comparison to their marks in 8th class and over all 90 % students lose their marks in 10th class and loss was from 1.49 % to 55.17 %. On the other hand no student is on the static position with out any change.

Table: 8 Showing the gain/loss in achievements in the subject of General Science and Biology individual wise in comparison to 9th and 10th class

<i>Student ID</i>	<i>Class 9</i>	<i>Class 10</i>	<i>Change</i>	<i>Change%</i>	<i>Gain/Loss</i>
1	35	25	-10	-28.5714	Loss
2	76	55	-21	-27.6316	Loss
3	48	29	-19	-39.5833	Loss
4	41	28	-13	-31.7073	Loss
5	33	25	-8	-24.2424	Loss
6	36	31	-5	-13.8889	Loss
7	39	39	0	0	Nil
8	64	46	-18	-28.125	Loss
9	47	48	1	2.12766	Gain
10	48	66	18	37.5	Gain
11	35	38	3	8.571429	Gain
12	53	40	-13	-24.5283	Loss
13	41	44	3	7.317073	Gain
14	35	45	10	28.57143	Gain
15	68	45	-23	-33.8235	Loss
16	60	41	-19	-31.6667	Loss
17	35	41	6	17.14286	Gain
18	45	28	-17	-37.7778	Loss
19	33	43	10	30.30303	Gain
20	47	40	-7	-14.8936	Loss
21	55	40	-15	-27.2727	Loss
22	35	40	5	14.28571	Gain
23	33	38	5	15.15152	Gain
24	35	33	-2	-5.71429	Loss
25	33	38	5	15.15152	Gain
26	33	30	-3	-9.09091	Loss
27	69	39	-30	-43.4783	Loss
28	69	52	-17	-24.6377	Loss
29	40	28	-12	-30	Loss
30	81	43	-38	-46.9136	Loss
31	36	37	1	2.777778	Gain
32	83	72	-11	-13.253	Loss
33	39	28	-11	-28.2051	Loss
34	45	39	-6	-13.3333	Loss
35	47	55	8	17.02128	Gain
36	35	25	-10	-28.5714	Loss
37	33	26	-7	-21.2121	Loss
38	28	43	15	53.57143	Gain
39	27	32	5	18.51852	Gain
40	30	25	-5	-16.6667	Loss

Above table shows that when achievement of 9th class and 10th class was compared individually, then it was found that student no. 9, 10, 11, 13, 14, 17, 19, 22, 23, 25, 31, 35, 38 and 39 gain their marks in 10th class with comparison to their marks in 9th class and over all 35% students have gain in their marks and gain was from 2.77 % to 53.57 %. While on the other hand student no. 1,2,3,4,5,6 , 8, 11, 12, 15, 16, 18, 20, 21, 24, 26, 27, 28, 29, 30, 31, 32, 33,34, 36, 37 and 40 lose their marks in 10th class with comparison to their marks in 9th class and over all 65 % students lose their marks in 10th class and loss was from 5.71 % to 46.91 %. On the other hand student no. 7 is on the static position with out any change.

Discussion

- Significant difference was not found between the achievements of students in class 8th and 9th in the subject of General Science and Physics as well is in the subjects of General Science and Chemistry. It means that students in 8th and 9th class had the same level of learning. They could not improve or decline in next grade. But on the other hand significant difference was found between the achievements of students in class 8th and 9th in the subject of General science and Biology. It seems that they could not made any progress in next grade in the subject of biology and their score decreased in next grade because score in general science is greater than biology which show the ill attention on the part of the students or teachers concerned. There can be other reasons as well (table. 1).
- When the difference of students was compared in four subjects in 8th and 10th class. It was found that there is a significant difference between the achievements of students in class 8th and 10th in the subject of General Science and Chemistry, Physics and Biology. The achievements of students in General Science in class 8th are significantly better than their achievements in Physics, Chemistry and Biology in class 10th.

It can be said that students were better in 8th class in the subject of general science as compared to their score in class 10th in the subjects of Chemistry, Physics and Biology. These greater achievements in general science in 8th class can be a credit for the teachers or parents. Other reasons may be there. Results shows that students were better in class 8th as compared to 10th class (table.2).

- Comparison of the students in class 9th and 10th shows that students were better in class 9th in the subjects of Biology and Chemistry. And their score decreased in class 10th class. And the significance difference was found in this regard. It can be said that there may not the relevancy in the subjects of both the classes and students found the subjects difficult in next grade. On the other hand there is no significant difference between the achievements of students in the subject of Physics in class 9th and 10th. It may be said that students have interest in the subject of physics they maintain their score or level of achievement in 9th and 10th class. Students' achievement in any subject also depends on teachers' teaching. And the environment and facilities provided to the students in the subject. If the students get higher score in any subject it means some elements are playing their role (table.3).
- A significant difference was found in the subjects of General Science and Biology among the classes 8th, 9th and 10th. It can be said that students were better in one class than other regarding their learning achievement. To check how much the students are better and in which class their score was greater than other. Further analysis shows that the achievements of students in 8th class are significantly better than in 10th class and achievements of students in 9th class are also significantly better than in 10th class. So, it can be concluded that students performed better in 8th class and gradually their achievements went down in the higher classes, students achievements in 8th class are significantly better and in 10th class significantly lower during their three years performance. It should be studied that what are the reasons behind students decreasing scores. These types of situations are a question mark for the teachers especially. Why the students are losing interest or attention in studies? (table.4, 5).
- If we compare the scores of the students individually in the subjects of General Science and Biology in class 8th and 9th. It was seen that 70% students are losing their scores. It is a very declining situation regarding the achievement of the students according to the results. It means we are wasting much of our sources and unable to produce desired youth. If our students' score is indicating this condition. On the other hand only 27.5% students could get increase in their scores and there is only one student which was able to maintain his score in 9th class same as in 8th class. If we compare the whole situation of the students' learning achievement in both the classes the situation is depressed according to the results. And it needs to be improved and should be taken into account (table. 6).
- Comparative analysis of the students in the subjects of General Science and Biology in class 8th and 10th shows that only 10% students could get increase in score in class 10th. It seems a very depressing situation according to the results regarding students learning achievement in both the classes. It was also found that over all 90 % students lose their marks in 10th class which is quite amazing situation on the part of the students or the teachers of the specific subjects. There was not a single student who could be able to maintain his score in next class. We can say that there are some faults in our system. Either we are unable to provide the students with the environment required for the studies or due to other reasons a declining score is in front of us. It must be considered by the concerned authorities to improve the situations (table. 7).
- General Science and Biology individual wise score in comparison to 9th and 10th class shows that only less than 50% students (35%) were able to improve the score in next grade over all 65 % students lose their marks in 10th class. On the other hand only one student is on the static position with out any change. It can be said that according to the results of this study we are facing a very declining condition. Because more than 50% students could not improve their grades in next class. Either they could not understand the requirements of the subjects or there may be the problem of relevancy of the subjects (table.8).
- Gain/loss in achievements in the subject of General Science and Chemistry individual wise comparison to 8th and 9th class shows that over all 50% students have gain in their marks and over all 47.5 % students lose their marks. On the other side only one student is on the static position with out any change. Chemistry is considered comparatively difficult subjects by most of the students as compared to biology. But the results are very different in this subject when was compared in class 8th and 9th regarding students' learning achievements. It was found that 50% students are gaining score in next grade and less than 50% students were not able to increase their scores in this subject in next grade. There is also one student who could not get increase or decline in scores. On the other hand if we compare the students in class 8th and 10th.

The situation is quite different. Over all 35 % students have gain in their marks from class 8th to class 10th. But over all 65% students lose their marks. It means students found chemistry difficult in 10th class more than class 9th because their score is reasonable in class 9th but it got decline in class 10th.

- achievements in the subject of General Science and Chemistry individual wise in comparison to 9th and 10th class indicates that the situation here is also declining as compared to class 8th and 9th score. over all 42.5 % students could get increase in marks in class 10th. Over all 55 % students lose their marks in 10th class it is also not indicating a good condition of the students. Over all it can be said that chemistry was found quite difficult subject for the students' not easy one. Because the results are continuously in declining condition except class 8th to 9th the score of the students shows low learning achievement.
- Learning achievement of the students depends on many factors which can affect it easily. Factors may be related to teachers, parents, students themselves, policy makers and environment in which students are learning. Achievements in the subject of General Science and Physics individual wise in comparison to 8th and 9th class. Physics is also considered quite difficult subject by the students. Analysis by comparing the scores show that over all 40% students have gain in their marks over all 57.5 % students lose their marks in 9th class on the other side one student is on the static position with out any change in his score. Analysis also verifying the perceptions of the students that physics is comparatively difficult one for them as compared to other subjects.
- There are different types of requirements of different subjects. Especially science subjects need a sophisticated environment fully equipped with all types of helping aids / instrument. But it is seen in institutions that they are not provided with science laboratories to fulfill the requirements of these subjects. Comparative achievements in the subject of General Science and Physics individual wise in the class 8th and 10th class indicates that over all 35 % students have gain in their marks and over all 62.5% students lose their marks in 10th class. Now we can say that the situation is our institutions may be poor and not fulfilling the requirement of the students and the subjects as well.
- Gain/loss in achievements in the subject of General Science and Physics individual wise in comparison to 9th and 10th class indicates that over all 55 % students have gain in their marks over all 42.5 % students lose their marks in 10th class. Here the situation is better as compared to other classes. Because the score of students got increase in 10th class. Only 42.5% students faced problem in this subject in next grade. Now it can be concluded that physics is comparatively difficult subject for the students especially when they step forward in 9th class. There may be different problems with different students regarding different subjects. But teachers' attention and environment of learning can contribute a lot in this regard.

Conclusions

- Students' achievements in Biology declined in class 9th with comparison to their achievements in General Science in class 8th but remained same in the subjects of Physics and Chemistry.
- Students' achievements in Physics, Chemistry and Biology declined in class 10th with comparison to their achievements in General Science in class 8th.
- Students' achievements in Biology and Chemistry declined in class 10th with comparison to their achievements in Biology and Chemistry in class 9th.
- Students' achievement in general science was better than biology. But it got decline as they stepped forward in next classes. 70% students' scores were decreasing in 9th class and 90% in 10th class.
- Students' studies biology in 9th class and again in 10th class their score got decreased in range of 65% students.
- 65% students lose their marks in chemistry with comparison to general science in class 8th and 10th. 55 % students lose their marks in 10th class. When they were compared with 9th class.
- Over all 57.5 % students lose their marks in 9th class when general science and physics were compared in class 8th and 9th. 62.5% students lose their marks in 10th class. When compared with class 8th. But the scores got increase when they were compared in class 9th and 10th.

Recommendations

- There should be relevancy in curriculum in general science and other science subjects. So that students may not suffer the problem of the difficulty in class 9th and 10th.
- Teachers should try to find out the reasons of students' decline in scores in next grades.
- Institutions should be provided with the facilities as requirement of science subjects.
- Science teachers should be appointed to fulfill the needs of science subjects. Because only those teachers can create science learning environment.

- The science teacher teaching general science in 8th class should continue his/her class in next grade as well. Then he/ she will be able to understand the level of the students.
- There should be a proper system to check the performance of the teachers. And the teachers performing well should be given incentives.
- Only those students who are interested in science subjects should be enrolled in science classes.

References

- Alvino, J. (1990) A Glossary of thinking skills terms. Learning 18/6.
- Beyth – Marom, R; Novik, R; & Sloan, M. (1987). Enhancing Children's' Thinking Skills. An Instructional Model for Decision- making under Certainty. Instructional Science, 16/3.
- Beyer, B.K. (1985). Critical Thinking: What is It? Social Education. 49/4.
- Freshman, R. D. (1990). Improving Higher- order Thinking of Middle School Geography Students by Teaching Skills Directly. Fort Lauderdale, FL Nora University.
- Gough, D. (1991). *Thinking about Thinking*. Alexandria, VA. National Association of elementary School Principals.
- Hudgins, B & Edelman, S. (1986). Teaching critical Thinking Skills to fourth and fifth Graders Through Teacher-led Small Group Discussions. Journal of Educational Research. 79/6.
- Mazur, J. (1997). *Learning and Behaviour*; 4th Ed. Englewood Cliffs, N.J.. Prentice Hall.
- Norris, S.P. (1985). Synthesis of Research on Critical Thinking; Educational Leadership. 42/8.
- Robinson, I, S. (1987). A Program to Incorporate High- order Thinking Skills into Teaching and Learning for Grades K-3. Fort Lauderdale, FL Nora University.
- Slavin, Robert. (2003). *Educational Psychology: Theory and Practice*, 7th Ed. Boston. Allyn and Bacon.
- Woolfolk, Anita. (2005). *Educational Psychology*: 9th Ed. Boston: Allyn