

# Learning Difficulties In Senior Secondary Students: A Case Study Of Sfs College, Nagpur

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## **Abstract**

*Education makes a person transform from living individual to thinking and behaving individual. For School Education, the National curriculum earlier included subjects like, languages, Mathematics, Science and social science. Science during primary schooling is to be studied as an integrated subject. At higher level, it becomes separated into Physics, Chemistry and Biology. Of these Biology was earlier studied as a descriptive subject and had no bearing on the society. It was considered as a secondary subject; however with the researches carried out in the middle of nineteenth century, with its coherence in natural sciences recognized, only then Biology gained importance in school education. The way Biology is being preferred by gradually less and less number of students was a matter of concern for the researchers. Using the regular class allocated for teaching with 50 students making a purposive sample, the possible cause/s around this fact were tried to be explored and one of them was focused through this action research to arrive at conclusion.*

**Keywords:** *Biology, technical words*

## **INTRODUCTION**

Education is important in every one's life. It makes the person transform from living individual to thinking and behaving individual. During ancient times, education was afforded by a few of the elite class. In India, for taking education, pupil had to go and stay with Guru in Gurukul system. During efforts for independence, the national leaders like, Tilak, Gokhale, Ranade felt that education is a must for every person if we have to become independent from British ruling. Although these leaders preached for education, all were not able to take formal education. Women were prohibited from going to schools for formal education. Later on after independence, the government made several efforts to see that majority of the people can take some formal education. Also the government has made primary education free and compulsory. Education now has become the basic need of every one's life.

The National curriculum for School Education earlier included subjects like, languages, Mathematics, Science and social science. Science in primary schooling is to be studied as an integrated subject,

which at higher level becomes separated into Physics, Chemistry and Biology. Of these Biology was earlier studied as a descriptive subject and had no bearing on the society. It was considered as a secondary subject; however with the researches carried out in the middle of nineteenth century, people started realizing the importance and utility of Biology. When coherence in natural sciences was recognized, only then Biology moved a step forward in gaining importance in school education.

Later in twentieth century, Biology gained much importance as there was a rising craze for medical, pharmaceutical and agricultural professions. Still it remained a last option for many as it was not very lucrative in terms of teaching-learning and qualifying the examinations. The craze for Biology seems to have gone down for the employability approach of Biology and Biology-related professions.

**Rationale:**

The least preference given to subject Biology by gradually less and less number of students, is a matter of very serious concern, from the point of view of the teachers of biology and the students' inability not to be able to appreciate the nature and various natural phenomena occurring around us. What could be the possible cause/s around this fact was a matter of concern for the researchers and it was decided to work on this issue right from the basics. Initial needs analysis of students' difficulties found various reasons such as teachers' attitude towards subject, non-availability of proper explanation from teachers, non-lucrative nature of subject and the most cited reason-the difficult terms used in the subject. So the researchers decided to work in this direction through action research. "When teachers have convincing evidence that their work has made a real difference in their students' lives, the countless hours and endless efforts of teaching seem worthwhile."- Richard Sager

## **Working Definitions of terms:**

The terms involved in this action research title have been defined as follows-

**Study:** This study was a kind of survey

**Difficulties:** Trouble or problems faced by Biology students in understanding, memorizing and applying the Biological terms

**Technical terms:** subject-related words

**Biology:** One of the important and major subjects in secondary and post-secondary education

**Senior Secondary:** A stage in education after secondary school leaving examination

**Senior Secondary Students:** A group of students who have qualified secondary school leaving certificate examination and have enrolled for senior secondary that is- standard XI /XII

### OBJECTIVES OF THE STUDY

The study was focused on the following objectives-

To identify the words that are not understood or explained by the students, with the help of pre-test

To find out the appropriate solution on the students' needs/difficulties

To observe the effects of the solution employed through post-test

### REVIEW OF LITERATURE/RESEARCHES

With the help of Google search and research gate, a few researches related to learners' difficulties were identified as follows-

Atilla Çimer(2012): What makes biology learning difficult?

The study carried on 207 11<sup>th</sup> grade Turkey students found that learning difficulties were the nature of the topic, teachers' style of teaching, students' learning and studying habits, students' negative feelings and attitudes towards the topic and a lack of resources. To overcome these difficulties and make their biology learning more effective, the participants suggested strategies such as teaching biology through the use of visual materials, teaching through practical work, reducing the content of the biology curriculum, using various study techniques, teaching biology through connecting the topics with daily life, making biology learning interesting, and increasing the number of biology questions in the university entrance examination.

Din-Yan Yip (2007): Identification of misconceptions in novice biology teachers and remedial strategies for improving biology learning

The study revealed that novice biology teachers held a number of conceptual errors which were prevalent among secondary school students. They showed serious misunderstandings in cellular metabolism, the nutritional process, gaseous exchange, the circulatory system, homeostasis, reproduction and variation. The problem has been attributed to inadequate mastery of subject knowledge and imprecise use of terminology.

Specific teaching strategies were suggested to prevent the propagation of these misconceptions in students.

M. Bahar, A. H. Johnstone &M. H. Hansell (2010 ): Revisiting learning difficulties in biology

Water transport in plants and genetics were two main topics perceived difficult by Scottish students fifteen years before. The researchers proved that the topic of water transport has been largely disappeared, but the difficulties in Genetics are still persistent.

Pavol Prokop, Matel Prokop &Sue Dale Tunncliffe(2010): Is biology boring? Student attitudes toward biology

The interests and attitudes of school students toward biology: through their interest in out-of-school activities and their attitude towards lessons as measured by interest, importance and difficulty were studied. Zoology lessons were found to be more popular. Girl students showed greater interest as compared to that of boys. Biology-related hobbies, films and books received greater attention (10-21%) than other activities and were significantly related. However, fifth grade students (both boys and girls) exhibited difficulties in learning botany. Interest in biology decreased with age.

Reuven Lazarowitz & Sofia penso (2010): High school students' difficulties in learning biology concepts

The gap existing between the formal reasoning level demands of the learning material and students' cognitive development were identified as the learning difficulties of biology concepts cells, organelles, organs and physiological processes, hormonal regulation, oxygen transport, controlled experiments and the principle of structure and function, in high school students.

These studies done world over suggest that students face difficulties in study of Biology because of improper attitude, study habits, teachers' novice, concepts included in course. The researchers thought that it would be appropriate to identify the difficulties faced by students in India.

### METHODOLOGY

The nature of present research could be decided as that of Action research. Concept of action research was put forth by Kurt Levin first during 1945. Levin says that it is a cyclical process. It starts with planning, action, observation and feedback. If the problem is not solved, then again a new planning has to be done. Therefore it is called a cyclical process. It is helpful in solving day to day problems faced by teachers or school heads. It can be related to interactions between students, teachers or other human elements, or teaching-learning process, teaching methods, evaluation procedure, curriculum, school subjects, curricular or co-curricular activities. As stated by Best et. al (2012) “ It does apply

scientific thinking and methods to real life problems and represent a great improvement over teachers' subjective judgments, and decision based on folklore and limited personal experiences." (p 22)

The main issue in action research is an action that is planned for resolving the problem. The effect of action is evaluated to say if it was a right solution. The problem in present action research was related to the students and the problems faced by them.

**Methodology in present research**

In the present action research, methodology used was a survey method. In the first stage information was collected from students preparing a pre-test using their Biology text books to identify the biological terms they were unable to explain, the second stage was invested in giving explanation of biological terms they have learnt so far. The third stage was used to prepare post-test and collecting information from students after explanation.

**Research Design**

The research design used in the present research was single group, pre-post- test design. This action research was based on difficulties in learning technical terms of Biology. For this all the XI/XII standard students from one of the local junior Colleges, being easily accessible, were considered. The information was collected from them through questionnaire that served the purpose of pre-test. It had 50 different biological terms enlisted and students were asked to give the meaning as they understand. After their difficulties were identified through their scores in pre-test, a solution in the form of explanation of terms with relevant examples was put forward to the students in a separate time-slot out of routine Time-Table. Then they were given the same list of words but not with the same order as before. This served the purpose of post-test.

**Population**

The population for this kind of research was all the XI - XII standard students from all local junior colleges amounting to 70,000 in the district and some 18,000 in the city of Nagpur. However, only those 50 studying in one of the local Colleges were selected as sample, as it was easy to access and it was the difficulty faced by these students, thus making it a purposive sample.

**Sample size**

The sample for the present action research was in the form of all 50 students from a class/section of the local Junior college. It was thus a purposive sample. All the data was collected with the help of pre-test and post-test.

**Tool used**

For this action research the tool used was self-made pre and post- test. Each test included 50 different

words from their Biology text books that the students have been learning from standard IX upto XI/XII.

**Statistical Techniques**

The data was processed using simple descriptive Statistical Technique such as percentages. For comparison in pre-test and post-test performance mean, Standard Deviation and critical ratio were calculated. The data collected has been presented in the following table-

**Table 1: Table showing the scores of students in the pre-test**

Size of sample	Mean	Standard Deviation
50	10.85	5.95

Considering the lower score of the students in general, it was decided to find out if there were any gender wise differences. They have been computed and have been presented in the table below-

**Table 2: Table showing the scores of Female and male students in the pre-test**

Size of Sample	gender	Mean scores	Standard Deviation
35	female	11.42857	5.60087
15	male	9.428571	6.767732

Comparing the mean score differences gender wise, it was decided to calculate t value. It was found to be **1.18** which was not significant at any level of confidence. As per Garrett et. al, The difference was not inherent; it was due to sampling error.

When the difference in the mean scores of females and males was not found to be significant, it was decided to consider the achievement of these students in their previous qualifying examination that was S.S.C. examination. The observations on this aspect have been recorded in the following table-

**Table 3: Table showing the scores of students in previous examination**

Size of sample	Mean	Standard Deviation
50	62.81633	9.932425

Considering these scores of the students in general, it was decided to find out if there were any gender wise differences as in case of pre-test. They have been

computed and have been presented in the table below-

**Table 4: Table showing the scores of Female and male students in previous examination**

Size of sample	gender	Mean	Standard Deviation
35	Female	62.33333	9.480808
15	Male	62.78571	12.08418

Comparing the mean score differences gender wise, it was decided to calculate t value. It was found to be **0.13** which was not significant at any level of confidence. According to Garrett et. al -The difference was not inherent; it was due to sampling error.

Thus the scores obtained in the previous examination were found to be not contributing to the low scores in pre-test, as the high scorers in the previous examination scored low in pre-test and vice versa.

**Action plan**

Looking at the results of the pre-test, the researchers decided to follow the action plan. The plan included selection of 10 words per day-giving their origin, their meaning and example with explanation. This was followed till all 50 words in the list selected in pre-test were covered.

This was followed by post-test. The results of the post-test have been summarized in the following table-

**Table 5: Table showing the scores of students in the post-test**

Size of sample	Mean	Standard Deviation
50	25.28571429	11.04347469

Efforts were also made to find out gender wise differences in case of post- test. They have been recorded as follows-

**Table 6: Table showing scores of Female and male students in the post-test**

Size of sample	gender	Mean scores	Standard Deviation
35	female	26.6	10.87685
15	male	22	11.16313

This was followed by calculations related to t-test. The value of t-was found to be 1.22 and it was also not found significantly different in female and male students.

The researcher then tried to compare the results of pre-test and post-test for the entire sample and then gender wise. It has been indicated in the following tables-

**Table No. 7: Table showing comparative values of pre-and post-tests**

Test	Size of sample	Mean	Standard Deviation
Pre-test	50	10.85714286	5.954690028
Post-test	50	25.28571429	11.04347469

It was apparent from the above table that the performance of students in post-test was better as compared to that in pre-test as indicated by the mean. The standard deviation of the pre-test scores is comparatively small in value, indicating that the scores are less dispersed. In post-test the mean is greater than that of pre-test scores, but the scores are more dispersed. The difference in the pre- and post-test mean scores was computed for critical ratio and it came to be 8.15. It was found to be significant at 0.01 level of confidence.

Comparison of students’ performance in pre- and post-test in biological terms’ explanation has been presented in the following table, in terms of calculating percentage. As stated by Garrett et. al. “...this exhibits certain behaviour or possesses certain attitude or other characteristic when it is difficult or impossible to measure these attributes directly.”(p197)

**Table No.8: Table showing students’ percentages in correct explanation during pre and post-test**

A Biological terms	Pre test %age	Post test %age
Inanimate	14%	36%
Autotrophic	3%	43%

Fillial	0%	4%
Analogous	1%	10%
Heterotrophic	3%	39%
Oxybiotic	2%	44%
Assimilation	8%	11%
Cytostome	1%	45%
Egestion-	13%	18%
Cytopharynx	1%	38%
Photosynthesis	3%	32%
Cyclosis	1%	5%
Aerobic	10%	20%
Trichocyst	2%	4%
Anaerobic	14%	17%
Amylase	9%	22%
Annelids	6%	26%
Endocrine glands	1%	10%
Gustatory	5%	25%
receptors	2%	10%
Exocrine	10%	30%
Olfactory	9%	16%
Arthropods	7%	41%
Morphology	12%	18%
Binary fission	14%	27%
Anatomy	1%	10%
Regeneration	10%	19%
Vestigial organs	14%	24%
Notochord	2%	11%
Nemathelminthes	5%	36%
Echinodermata-	0%	36%
Totipotancy	5%	14%
Mitochondria	28%	36%
Syncytial	2%	12%
Coenocytes-	6%	12%
Haemocoel	4%	20%
Peristalsis	15%	35%
Dentition	17%	32%
Exoskeleton	14%	35%
Diphodont	8%	11%
Antagonistic	2%	11%
Osteoporosis	6%	14%
Saltation	3%	12%

Pithecus	2%	15%
Syndrome	4%	25%
Polycythemia	2%	11%
Nephrolithiasis	12%	14%
Hormones	5%	19%
Arboreal	7%	13%
Natality	3%	13%

It was evident from the above table that the students' response in giving explanation of biological terms was improved in post-test. The above table also indicates that the explanation given by the researchers was beneficial to the students as they could give correct explanation to all the terms; however, there was no biological term that was correctly answered by all 100 % students.

Since majority of terms were learnt by them in standard IX, the explanation given then might not have been sufficient, or it could not have been supported by examples. Also the teacher then might not have given them sufficient time to revise them or to test them. Although the students are habituated to memorize or rote learning, why this point of remembering the explanation of biological terms that they would be constantly using in their future academic years was not seen in them? Probably this was not emphasized by their teachers.

### Conclusion

From the present action research, it could be concluded that the students are not given the explanation of biological terms supported with proper examples. If at all this is done, the students are not frequently asked about their explanation. In fact such a wider use of these terms well-known would enhance their literary abilities and they would be able to use these terms effectively in their literary write-up.

### Suggestions and Recommendation:

#### A) Suggestions to the teachers

- The biology teachers should try to explain the subject matter with technical terms such that the students would be able to understand them properly. For this they should give suitable examples so that the students would be able to remember them always.
- The teachers could give them quiz based on this activity.
- The teachers could make word grids and ask students to complete them.

#### B) Suggestions for students

- Students should be attentive whenever they come across new biological terms.
- If the teachers fail to explain them, students should take initiative to ask their teachers the explanation and examples for new terms.
- In their leisure time, students should revise these terms by asking their explanation to their classmates.
- They could also check spellings by asking their classmates to fill in the gaps.
- They should pay attention to the Greek or Latin origin of the term explained by the teacher.

It could be inferred that initially there was no difference in the students' understanding of subject content knowledge and medium of instruction. After the explanation with examples the students were bit comfortable as most of their concerns and issues were addressed by the extra time utilized in explaining these biological terms. It could also be further inferred that the explanation with examples was an appropriate solution for the problem of these students. The effect of explanation with examples as a solution was seen in their improved understanding and improved performance in post-test also; however the time invested for action plan was short. With more time on action, the result would have been further improved. In this context the researchers are of the opinion that a short course on study of Greek and Latin language for teachers should be organized by the stake holders. Also the dictionary of Greek and Latin languages should be placed in school / college Library.

It could thus be concluded that students' inability is reflected in their behaviour as they are not able to appreciate the nature and various natural phenomenon occurring around them. This very trend is harmful to the Herculean efforts the government is doing to make the younger generation understand the importance of conservation of biodiversity, so that there will be something left for the coming generations to appreciate and to know that the animals are very much helpful for the crop production as well as other livelihood items. It is now well understood that, what is taught is well understood, what is well understood is loved and what is loved is conserved very well.

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