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### Perspectives of Students, teachers and Parents towards Higher Studies in Basic Science

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**Abstract :** *In the present scenario, the applied sciences have become the first choice for most of the science students. The higher education in basic sciences has gone much lower in the list of options for them. In a global, knowledge-driven economy the keys to economic success for nations are well-educated workforce, technological capability, capital investment and entrepreneurial zeal. The developed and developing nations*

*throughout the world are investing in human capital and knowledge infrastructure that is more oriented towards engineering and applied sciences. The present study tries to infer empirically the state of the perspectives of students, teachers and parents towards the basic sciences and the reason behind them. The study found the lacunae in teaching-learning processes of sciences in schools, which has ultimately led to fading interest of students towards basic sciences in higher education. Even though majority of students chose sciences in Std. XII for their interest in the subject, they disagreed to pursue them for their higher studies or it was the last option for them. The reasons they perceived for their choice were the ill-equipped science teaching in schools, absence of sufficient number of science teachers in schools as well as in colleges, long duration of course to pursue to get a good job, limited job scope and uninspiring environment and bad management of the colleges.*

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## Introduction :

Career in basic sciences is constantly losing appeal in Indian context. The science students are inclined towards applied sciences for early job and high salary. The separation of the institutes of research from university is one of the reasons behind it. The students lack role models for a career in basic sciences, as the Basic Scientists are doing research in organizations that are remote to the students. This has created an unnatural scientist-academician divide. The institutions like Tata Institute of Fundamental Research enjoy autonomy. In order to make the life of a typical research scientist 'hassle free' these institutions were delinked from universities or constituted separately so that teaching undergraduate or postgraduate students does not come 'in the way' of doing research. This may sound something like the utopia for a scientist but it has a catch. The research got progressively to the back seat in universities and teaching became noticeably absent from the research institutions. While this has created a general uninspiring environment for studying basic sciences in academic institutions, there are other factors which make the career in applied sciences as obvious choice for students.

The twenty-first century has brought with it profound challenges for the nature, values and management of higher education all over the world. Societal expectations and public resources for higher education are undergoing fundamental shifts. In a global, knowledge-driven economy the keys to economic success for nations are well-educated workforce, technological capability, capital investment and entrepreneurial zeal. The developed and developing nations throughout the world are investing in human capital and knowledge infrastructure that is more oriented

towards engineering and applied sciences.

Science education at school-level onwards, suffers due to the lack of reasonable experimental facilities, absence of quality teachers with dedication, inadequacies in curricula and lack of flexible subject and course combinations. Classroom demonstrations are very rare. Teaching tends to be exam-oriented, which further stifles the joy of learning. After the school stage, the brilliant and meritorious students are more inclined to pursue professional courses like engineering, medicine etc. rather than Basic and Pure Sciences. The reasons for this are the poor quality of science education at graduate and post-graduate levels in colleges and universities and the general perception about lack of opportunities for those who take up careers in basic sciences. About 16 lacs students finish their B.Sc. degree every year in India, but very few of them pursue careers in sciences. At the beginning of the year 2004-2005, the total number of students enrolled in the formal system of education in universities and colleges was 104.81 lakhs comprising of 13.88 lakhs in university departments and 90.93 lakhs in the affiliated colleges. Eighty three percent of the total enrolment was concentrated in the three faculties of Arts (45.12), Science (20.44) and Commerce (17.99) while remaining 17 percent was in the professional subjects. Enrolment at the degree level has been 89.09 percent (93.15 lakhs), at the P.G. level – 9.41 percent (9.86 lakhs) and the remaining at the research and diploma/certificate levels. (PIB, Dec, 2006)

UGC has started many programmes for promoting science education at tertiary level like Universities with Potential for Excellence; Centre with Potential for Excellence; College with Potential for Excellence; Assistance for Strengthening of Infrastructure in Science and

Technology (ASIST); Special Assistance Programme (SAP); Major/Minor Research Projects for Teachers; Research Scientist; Research Awards; Junior Research Fellowship; Post-doctoral Fellowships etc.

A major step has been to set up of Indian Institutes of Science Education & Research (IISERs) to attract young, meritorious students to career in sciences. The Indian Institutes of Science Education and Research (IISERs), and the related National Institute of Science Education and Research (NISER) are developing into a group of premier science education and research institutes in India. But the information regarding these developments is yet to be disseminated among the common people.

Sanyal and Martin (2006) have identified seven key factors that would affect the new funding trends for higher education: The massive expansion of enrollment; the incapacity of the state to fund such an expansion; the vigorous emergence of the private higher education; the tendency to cost sharing by students and their parents; the importance of accountability; the emergence of new providers; and the need for funding by the states to reduce growing inequalities. The high investment of money has made the applied sciences a preferred career for the science students at class XII. The higher education in Basic Sciences has gone much down the list of options for them.

There are changes both within and outside the academy that are altering its character- its students, faculty governance, curriculum, function and its very place in the society. Right from the school, when a student opts for science stream, s/he is mostly encouraged to struggle for a place in medicine, engineering, information technology and in the field of other applied sciences. Many studies

conducted in India showed that students in India attend university primarily to get better jobs, and an important reason given for choosing a particular subject studied is its career potential. This demonstrates that students would generally give more importance to employability. A general decline in interest in Basic Sciences can be perceived. The other reason is the lack of intensive engagement with the subject. As the position paper on Teaching of Science reiterates "The theoretical component of higher secondary science should strongly emphasize problem solving, awareness of conceptual pitfalls, and critical interrogation of different topics." (NCERT, 2006)

It is in this context that the present study is undertaken to infer empirically the state of the Perspectives of Students, Teachers and Parents towards Higher Study in Basic Sciences.

### **Objectives of the study :**

The following objectives were proposed for achievements in this study:

O<sub>1</sub> To find out the perspective of the science students of class 12 of Patna Nagar towards a career in Basic Science

O<sub>2</sub> To find out the prevailing method of teaching science in schools of Patna

O<sub>3</sub> To find out the perspective of teachers towards the higher education in Basic Science.

O<sub>4</sub> To find out the perspective of parents towards the higher education in Basic Science.

### **Definitions:**

In this study Basic Science means all the traditional subjects like Physics, Chemistry, Biology and Mathematics excluding its applied forms that have become independent subjects like Bio-technology, Engineering etc. *Higher education is the stage of education after 10+2.*

### Delimitations of the study

The study is focused on the Plus Two schools that are situated in Patna.

The study is oriented towards opinion and perspectives of the students, teachers and parents towards the study of Basic Science subjects like Physics, Chemistry and Biology after Senior Secondary level.

### Method of the study :

**Population and sample of the study :** All the students of class XII pursuing Sciences in the academic session 2012-2013 studying in the senior secondary institutions functioning in Patna were the population of the study. A list of all the premier government and private plus 2 schools of Patna was prepared and arranged alphabetically. Five institutions were randomly selected out of 25 listed institutions. From each of the institutions 40 students were selected from various sections. For this a list of random roll no. was prepared and used. 5 parents and 5 teachers from each of the five institutions were purposively selected. A total of 200 responses of students 25 of the parents and 25 of the teachers were collected.

**Table 1: Breakup of the study sample**

S. No.	Name of School	Sample Size (Students)	Sample Size (Teachers)	Sample Size (Parents)
1.	Army School, Danapur Cantt.	40	5	5
2.	Carmel High School	40	5	5
3.	Notre Dame Academy	40	5	5
4.	Miller High School	40	5	5
5.	Shastri Nagar Girls High School	40	5	5

**Tools of the study :** For the collection of relevant data three different questionnaires for students, parents and teachers were developed under the guidance of the supervisor.

Questionnaire for the students was divided into two sections, opinion (12 questions) and attitude (17 questions). In the questionnaire for the parents and teachers mainly opinions were sought.

**Table 2: Description of the student's questionnaire**

Purpose	No. of Questions
To get personal information	5
To get the opinion of students towards need and importance of basic science in society	7
To measure the attitude/perspective of students towards basic sciences	17

**Table 3. Description of the questionnaire of the teachers**

Purpose	No. of Questions
To get the attitude of teachers towards need and importance of basic science in society	11

**Table 4. Description of the questionnaire of the parents**

Purpose	No. of Questions
To get the personal information and attitude of parents towards need and importance of basic science in society	13

### Data analysis and interpretation :

#### General Observations

It can be observed in Figure 1 that 126 students out of 200 had chosen science as their subject of study for Plus 2 because of their interest in the science subject. But there was a substantial number of the students (74 out of 200 or 37%) who have chosen it for some other reasons.

**Figure 1: Reasons for choosing science as a subject of study in Plus 2**

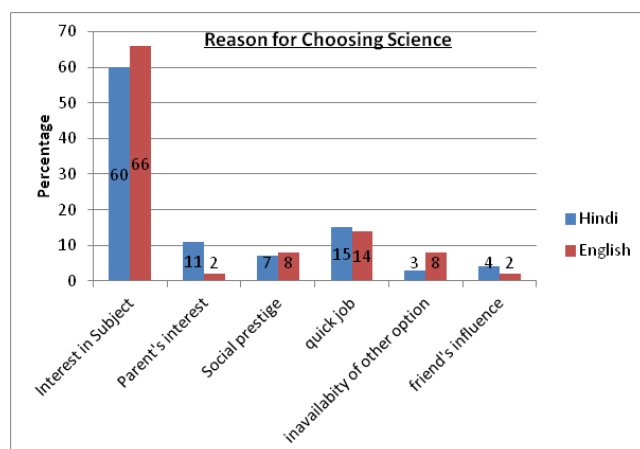
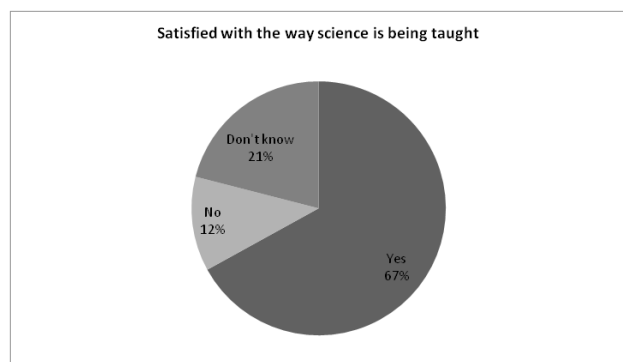


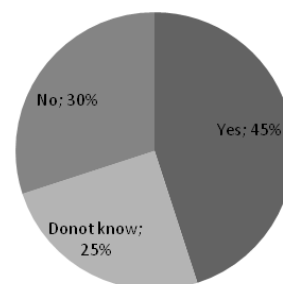
Figure 2 and 3 depict that for English medium schools (representing the mostly the private schools) 67% of the students were satisfied with the pattern of science teaching but there was still 27% of students who were not satisfied with the pattern. In Hindi medium schools (representing Government Schools) only 45% were satisfied and 30% of students who were not satisfied. In fact the students' satisfaction with the teaching may not related to whether the science is being taught in interesting way or otherwise. They are more about whether the teaching of sciences helps them in preparing for the annual examinations. Generally dictating notes are satisfying way of teaching for the students.

**Figure 2: Satisfied with the way Science is being taught in English Medium**

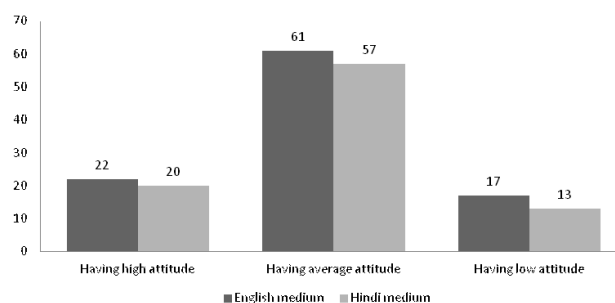


**Figure 3: Satisfied with the way Science is being taught in Hindi medium**

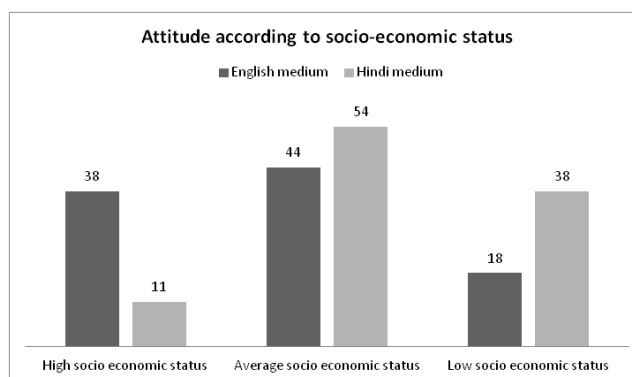
Satisfaction with the way science is being taught in Hindi Medium



**Figure 4: Scientific attitude of the students of Hindi and English Medium**



**Figure 5: Scientific attitude across socio economic status of the students**



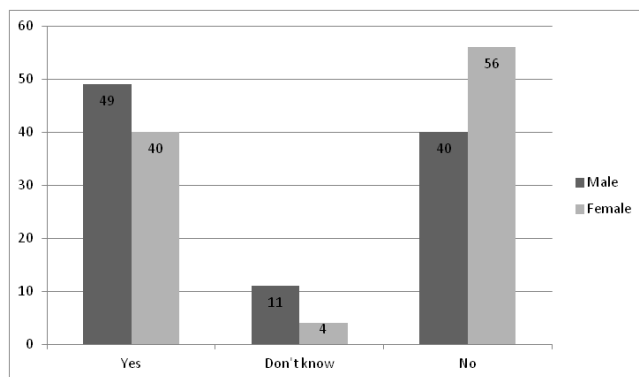
Measuring of the scientific attitude of the students across the mediums (Figure 4) showed that there was no substantial difference between the scientific attitude of Hindi and English medium students. But the socio-economic status (defined



here as annual income as reported by the students) seemed to influence the scientific attitude of the students (Figure 5). In high income group the students of English Medium are more in number.

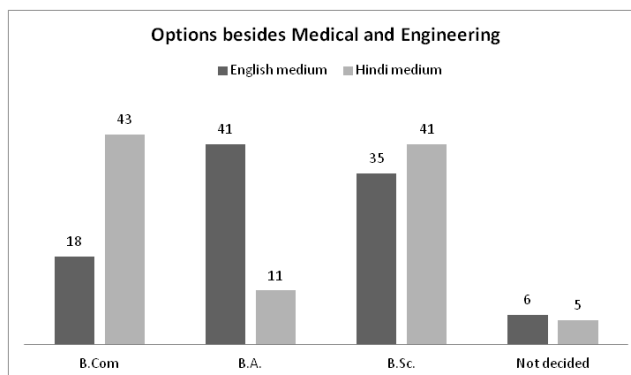
**Objective 1 :** The first objective of the study was to find out the perspective of the students of class 12<sup>th</sup> towards a career in Basic Science. This is checked by asking the questions about career they would choose after passing the 12<sup>th</sup> Examination. Figure 6 shows that out of the total males and females 40% of the males would not opt for Basic Sciences as a career after 12<sup>th</sup>. In case of females 56% of them would not opt Basic Sciences as a career after 12<sup>th</sup>. There seems to be a substantial disparity among the genders regarding the selection of science as a career.

**Figure 6: Basic Science as a Career after 12<sup>th</sup>**



The investigators also asked whether they would choose Basic Sciences as second option. Figure 7 depicts the percentage of the students who would opt basic science as a second option for career if they fail to qualify the examinations to get admission in Applied Sciences. The English medium students gave B.Com. (43%) and B.Sc. (41%) as their preferred option, whereas the Hindi medium chose B.A. (41%) and B.Sc. (35%). The attraction of Civil Services and poor curriculum of Commerce may be a reason behind this difference. It gives some credit to the distinction on the basis of medium. The English medium students were more career oriented and would prefer to go for Commerce and other management streams rather than the sciences.

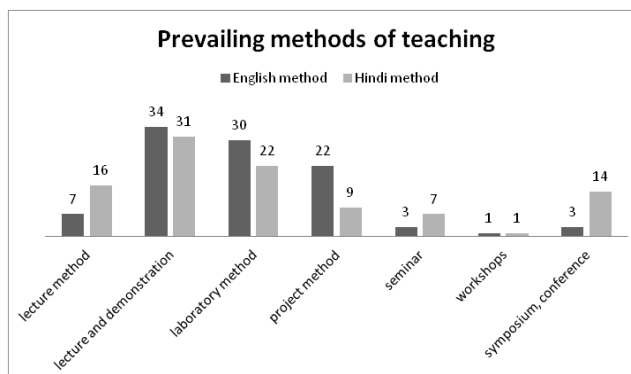
**Figure 7: Second option for the career in higher studies**



As the graph shows most of the English medium students would choose a career in arts as their second option while in Hindi medium students would choose a career in commerce as their second option. Only 35% of students in the English medium would choose Basic Science as a career after 12<sup>th</sup>. Only 41% of students in Hindi medium would choose a career in Basic Sciences after 12<sup>th</sup>.

**Objective 2 :** The second objective was to find out the prevailing method of teaching science in schools of Patna. As we can see in Figure 8 lecture and demonstration method was the most prevailing method in both the mediums which makes science quite a boring subject which may be an important reason for decreasing interest of the students towards Basic Sciences.

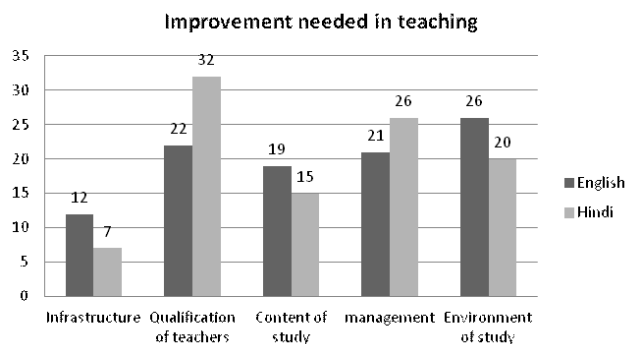
**Figure 8: Prevailing Methods of teaching science in schools**



But the students of twelfth class were of the opinion that a number of things of the prevailing

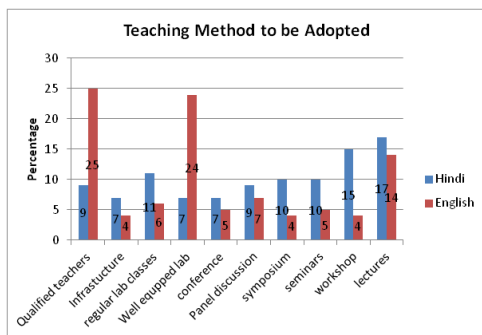
science teaching needed to be changed (Figure 9). Hindi method students were more dissatisfied with the quality of the teachers and the management of institutional facilities in the schools (mostly Govt. Schools), whereas in English medium schools the students were more concerned about the environment of studying science, which was uninspiring.

**Figure 9: Improvement needed in teaching of science**



There were differences in opinion of the students as depicted in Figure 10 about what should be added in the institutional facilities for teaching science. The highest number of the students was of the opinion that in their schools and the colleges they intended to study, the quality of the teachers, management of the institution and environment for learning should be enhanced. This indicates a sense of dissatisfaction with the present state of the quality of teachers. It may also indicate a reason for disorientation towards Basic Sciences.

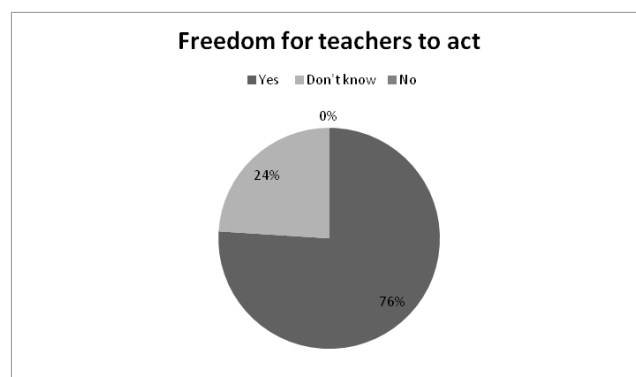
**Figure 10: Teaching method to be adopted for a better teaching environment**



**Objective 3 :** The third objective was to find out the perspective of teachers towards the higher

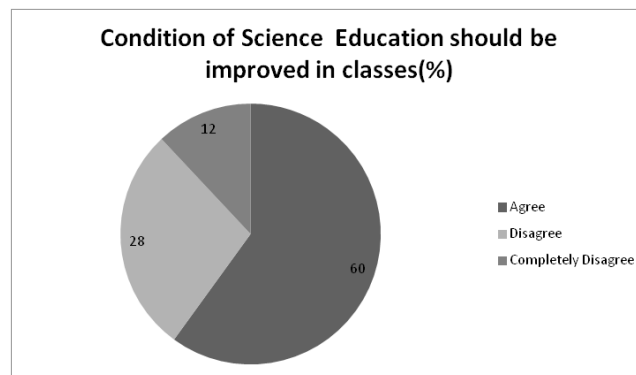
education in basic science. The teachers were asked whether they had sufficient freedom to transact the curriculum as they perceived it fit (Figure 12). 76% of the responding teachers said that they had sufficient freedom to transact the curriculum.

**Figure 11: Freedom to transact curriculum as perceived by the teachers**

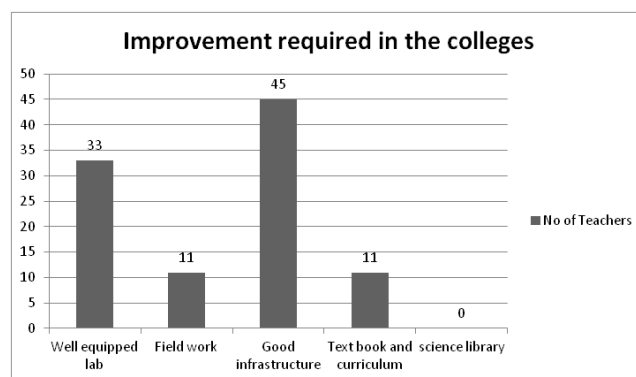


40% of the teachers were of the view that the condition of teaching of Sciences was bad and it was one of the reasons for the disinterest of the students (Figure 13).

**Figure 12: Condition of colleges for basic science**



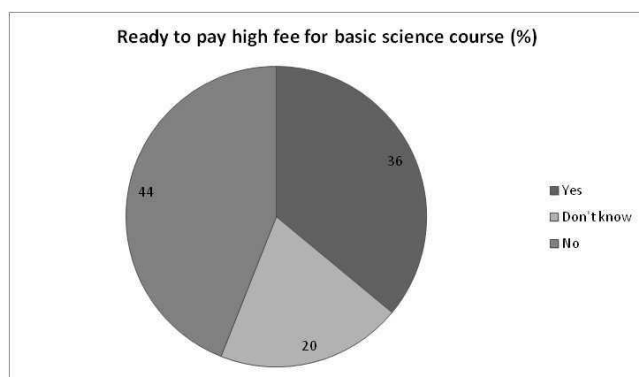
**Figure 13: Improvements required for an effective science education**



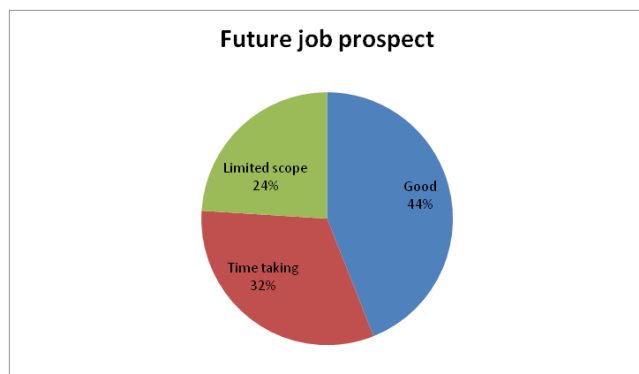
45% of them suggested that infrastructure should be improved and 33% considered well equipped laboratory as important.

**Objective 4 :** The fourth objective was to find out the perspective of parents towards the higher education in Basic Science. The parents were asked if they would pay a high fee for their ward for admission in a Basic science course. They were of the opinion that the job prospects in basic sciences were not good. The 32% of the respondent said that it was time taking and 24% of the respondents considered it having limited options.

**Figure 14 : Paying high fee for Basic Sciences**



**Figure 15: Basic Science in terms of future job prospects**



## Conclusion and Discussion :

The higher education in Basic Sciences is facing the challenge of negligence, disinterest and loss of quality. The number of students pursuing higher education in basic sciences is declining day

by day in almost all the colleges. There are several reasons for such a situation. This study has tried to shed some light on the perspective of science students of std. XII towards higher education in Basic Sciences and opinion of science teachers and parents towards the same. The results should be seen in the light of the ground realities of teaching-learning process of sciences in schools and universities of Bihar. In Hindi medium Schools as well as in English medium schools, students chose to study sciences not only because of their interest in sciences but also due to parental pressure and friends' influence. Majority of students are not satisfied with the pattern of teaching-learning of sciences in their schools.

Large classrooms, lack of science teachers, absence of well equipped laboratory are some other reasons which led to the decrease in interest of students towards higher education in basic sciences. If the students unfortunately failed to qualify for competition they find it much better to choose arts or commerce for higher education rather than Basic sciences because pursuing basic science is perceived as a late and limited career option.

Even though the scientific attitude is there in majority and socio economic status of parents does not affect the decision significantly yet students only wish to go for higher education in Basic Sciences when there are no other choices. Though the parents perceive Basic Sciences as the base of science, majority of them want their wards to go either for medical or engineering. The poor infrastructure of colleges, environment and management of colleges, limited job opportunities has led to the decline in positive attitude of students towards basic sciences.



### **Limitations of the Study :**

After retrospective view of the whole study, the investigators find that there were a few limitations that constricted the area of generalization of this study.

The limitations were as given below :

- Due to paucity of time and resources a sample of only 25 science teachers and 25 parents from the population was taken which restricted the scope of generalization in their respective groups.
- There are many variables which may affect the attitude of the students towards Basic Sciences like the environment of the school, socio-economic variables, maturity level of students and so no. Though these variables were included in the study, they were not used in the analysis anyway.
- Since the perspective of the students was measured on the basis of fixed responses, the students might have given socially accepted responses instead of giving correct responses.
- Only limited number of schools were randomly selected in this study that limits its generalization.
- Only the students of std. XII of science stream were taken in the sample.

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