CHANGING TRENDS IN SCIENCE AS A CAREER

सत्यं शिवं सुन्दरम्

PROJECT SPONSORED
BY

NSTMIS DIVISION
DEPARTMENT OF SCIENCE AND TECHNOLOGY
GOVERNMENT OF INDIA

PRINCIPAL INVESTIGATOR
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PROFESSOR & HEAD
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FACULTY OF SCIENCE
THE M.S. UNIVERSITY OF BARODA
VADODARA – 390 002

SEPTEMBER-2004

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PREFACE

In the recent times, there has been a debate on the decline of science education in India. The decline in interest in science education is not restricted to India alone; it's a worldwide phenomenon. The reasons differ from country to country. Science rules in every sphere of human life. This is one area, which cannot be neglected, and any country can keep pace with global development only if it encourages the development of Science & Technology.

The paradox is we derive so much benefit from science but we don't seem to value it. The sheer joy of doing good science should also retain a fair number in science. Some how this message is not getting across. This is a serious problem that needs to be checked.

NSTMIS division of Department of Science and Technology, New Delhi realized the need of study on changing trends in science as a career. After describing the problematic pattern of students enrollment in science, the study tries to explore the 'reasons' for this changing trend. The present study covers North-Western region of our country, Thirteen cities across five states have been covered. This report attempts to summarize the collected information (primary data) in the form of tables and graphs multivariate statistical techniques are employed to bring out the respective contribution of the possible reasons influencing the choice of students for a particular stream.

The out come of this project analyses the situation for 'changing trends' in science. Why has science lost its attraction for many young people and what might be done to remedy this situation? **7705** students from various schools and colleges participated in this study via directly filled-up questionnaire. If it is accepted that these problems of declining interest, and altitude towards, changing values are deeply embedded in a wider social context, then these are not amenable to easy one-off solutions. It is hoped that the result of this small piece of work (whose concern is all over the globe) will contribute to the important information useful to the Government, administrators, policy makers, educationists, and to those who have been expressing concern over the status of science in our country. The study is acronymed as 'TISAC' (Trends in science as a career).

Suggestions, pointers, lacunae and flaws in this endeavour will be highly appreciated.

(Rakesh Srivastava)
Principal Investigator

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EXECUTIVE SUMMARY

The present study 'changing trends in science as a career' is based on the responses of students in various schools (11th standard) and in colleges (first year of the under-graduate level) studying in the North-Western region of our country across **five** states, covering **thirteen** major cities in these states.

Following some standard statistical techniques a sample of **7705** (Seven Thousand seven Hundred and Five) students, which includes: boys and girls both, at school level as well as college level was selected. The student's sample included schools from : Kendriya Vidyalayas (Central Schools), Public schools, Government and semi-government schools and private schools. The colleges were selected covering: boys colleges, Girls colleges and co-educational colleges. In the cities included in survey, these schools and colleges were selected randomly within the 'strata' in which they fall.

Out of the total sample the sample size of students for schools is: **4877** and that for colleges is: **2828**. In the above samples the number of boys is: **4256** and the number of girls is: **3449**. These students have been contacted **personally** by the members of the investigating team, to obtain the data on a structured printed questionnaire. The findings presented below are based on the extensive statistical analysis of this data.

1.   The TOTAL sample analysis gives an estimated decline of 38% among the students (of 11th standard) for opting science stream, at the first year college level.

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2. 'CHANGE' in trend for opting science stream is to the tune of 27%. This indicates that the students studying science at present are opting 'Arts Stream' and 'Commerce stream'. This percentage also included the choice for management courses.

3. A total of 35% of the students studying in science stream will continue to study science stream. This percentage includes those students also who are opting for courses in Applied Sciences (such as course in : Bio-technology, Bio-chemistry, Microbiology etc.).

4. DECLINE in **Gujarat state**, observed to be 38% where as given a chance 49% of the students (11th standard) would like to CHANGE their science stream to commerce or Arts stream, including Management courses. ONLY 13% of students studying in science stream would like to continue with their stream, but this is motivated by the fact that they can opt for Applied Science courses at the college level.

5. DECLINE is **lowest** in **Rajasthan state** where 46% of the students continue with their science stream (including courses in Applied sciences) where as the estimated decline is 26% and the remaining 28% of the students would like to change their stream from science to 'Arts' stream and 'commerce' stream, inclusive of choice for management course.

6. DECLINE is **highest** and estimated to be 44% in **UTTRANCHAL (U.A.) state**, where these many students do not opt science from school level to college level. 30% of the student continue with their science stream at college level, which mostly includes courses opted in Applied sciences. 26%

of the students are estimated to change their stream from science to 'commerce' (including management courses) stream and 'Arts' stream.

7. In **UTTAR PRADESH (U.P.) State** a decline of 37% is estimated for students opting for Science stream, where as 34% of the students would continue with their science stream (including Applied Sciences) and it is 29% of the students, who would change their science stream to either 'Arts' or 'Commerce' stream (including management courses).

8. In **DELHI State** a decline of 35% is estimated for opting science stream. A considerable percentage of 37% of students would change their stream from science to 'Arts' stream and 'commerce' stream (including the management courses) 28% of the students would opt for NO change in science stream i.e. they would continue with the same (including Applied Science Courses).

9. Highest 'decline' in estimated is UTTARANCHAL with a lowest in Rajasthan.

10. 'CHANGE' is estimated to be maximum in Gujarat and minimum in UTTARANCHAL.

11. Maximum NO change is estimated in RAJASHTAN where as minimum is observed in Gujarat.

(STRENGTHS)

12. Total sample analysis show that **three** most important reasons for opting science stream are 'Better career goals' (4907), 'Natural liking' (7624) and 'To pursue higher studies & research' (8277).

13. **Three** most important reasons for **NOT** opting science stream are : Tough syllabus (28174), Amount of labour & time (29911) and expense in terms of coaching fees (37267), this is for total sample of 7705 students.

(OPPURTUNITIES)

14. For total sample of students **three** most important reasons for **opting ARTS** stream were found to be: Helps in competitive examinations (5760), personal liking (6846) and Diversified career opportunities (7755).

(THREATS)

15. Across the five states and thirteen cities, surveyed in this study, the **three** most important reasons for opting commerce stream are obtained as: Better career options (7042), professional degrees offered (9148) and job opening available (10998).

16. Total sample analysis for **MALES** (whose number is **4256**) (i.e. 55% of the total data) revealed that: Better career goals (2862), Natural liking (4518) and To pursue higher studies & research (4881) are the three most important reasons for **opting** science stream.

17. **MALE** student's sample analysis shows that, the three most important reasons for **NOT** opting science stream are: Amount of labour & time (15979), Tough syllabus (16172) and expense in terms of coaching fees etc. (19658).

18. **MALE** students data analysis gives that the **three** most important reasons for opting **ARTS** stream as: Helps in competitive exams: (2529), personal liking (3341), and Diversified career opportunities (3909).

19. **Three** most important reasons for **MALE** students to opt for **commerce** stream are found to be: Better career option (4183), professional degrees offered (5222) and job opening available (6297).

20. The total sample analysis for **FEMALES** (whose is number is: 3449 i.e. 45% of the total data) shows that: Better career goals (2045), Natural liking (3106) and To pursue higher studies & research (3396) are the **three** most important reasons for opting science stream.

21. Tough syllabus (12002), Amount of labour & time (13932) and expense in terms of coaching fees (17699) are **three** most important factors for **not** opting the science stream, according to the **FEMALE** students.

22. Most favorable (important) **three** reasons for **FEMALES** to opt for **ARTS** stream are: Helps in completive exams. (3231), personal liking (3505), and Diversified career opportunities (3846).

23. Most important reasons for **FEMALE** to change their stream to **commerce** stream are: Better career option (2859), professional degrees offered (3926) and job openings available (4701).

24. It is to be noted that the difference between **MALE & FEMALE** data analysis for, **not** opting science relates to 'Tough syllabus' and 'amount

of labour & time' in the analysis these ranking interchanged i.e. for MALE students, Amount of labour & time is most (No. 1) important reasons while 'tough syllabus is next i.e. No. 2 but in the case of **FEMALE** it is the tough syllabus which is No.1 and the amount of labour & time is next (i.e. No. 2) most important reasons for NOT opting science.

25. (TOTAL DATA SET) Principal Component Analysis findings suggest that these changing trends may be attributed to the reasons: amount of labour & time and tough syllabus, poor school teaching and not many respectful job, openings these reasons contribute 18.099%, similarly comparative economic return is less and study with job is not possible contribute 13.744% to the total variance explained possibly these are the highest contributor towards the reasons for not opting science. However, Better Career goals, natural liking, honour in society and motivation by teacher contribute 16.588% towards the total variance explained.

26. Impact of Commerce stream on Science stream is due to the factors: Amount of labour & time, Not many respectful job openings and poor numerical ability & these reasons contribute 19.448% (negatively) while professional degrees offered, job openings available, study with job is possible and poor assessment &result of 12th standard contribute 13.176% towards the total variance explained for the reasons for opting Commerce stream vis-a-vis not opting Science stream.

27. Reasons for opting Arts Stream when compared with the reasons for not opting Science stream include: Diversified career opportunities, study

with job is possible, easy course contents and personal liking contribute 13.072% towards the total variance explained, whereas: Amount of labour & time, tough syllabus, NOT many respect job opening contribute (Negatively) 18.748% for the reasons responsible for not opting Science stream.

28. OVER ALL analysis of total data (7705) students when asked: what should be done to 'Revert' the declining trend their suggestions included: To provide more facilities (1402), Revise syllabus (1350) and to improve school teaching (1303).* Figures within parenthesis represent the counts.

29. (Strengths) Analysis of data for **DELHI** state gives the following reasons for opting science stream: Better career goals (723), Natural liking (1119), To pursue higher studies & research (1124).

30. (Weakness) The reasons responsible for not opting science have their own impact but **three** most important reasons out of these are: Tough syllabus (4071), Amount of labour & time (4928), and expense in terms of coaching fees etc. (5860). The contribution of these factors put together is 24.057% towards the total variance.

31. (Opportunities) Reasons responsible for opting Arts, **three** most important of them are: Helps in competitive exams (1086), personal liking (1339) and Diversified career opportunities.

32. (Threats) from commerce stream to science stream involve these **three** most important reasons: Better career options (1161), Professional

degrees offered (16126), and job openings available (1816). These factors contribute 25.169% towards the total variance explained which is 61.246%.

33. WHAT SHOULD BE DONE: (**DELHI**): The changing trend in science is observed due to the above mentioned reasons: student's response indicate that if: more facilities are provided (402), syllabus is revised (350) and the school teaching is improved (303), it would be possible to 'revert' the declining trend. ('Figures within parenthesis represent the counts).

34. In <u>NORTH DELHI</u> the three most important reasons for opting science are: Better career goals (137), Natural liking (225), To pursue higher studies & research (249). Whereas the most important factors responsible for NOT opting science in this region are: Tough syllabus (1021), Amount of labour & time (1061) and expense in terms of coaching fees (1364).

35. The contribution of these factors put together towards the total variance explained for reasons for opting science is (19.505%) whereas the factors amount of labour & time, though syllabus and expense in terms of coaching fees contribute (29.822%) (negatively) towards the total variance explained.

36. Most important reasons motivating choice for ARTS stream are: Helps in competitive exam, (364), personal liking (381), Diversified career opportunities (414). The contribution of helps in competitive exams and

diversified career opportunities is (23.592%) towards the total variability explained for the reasons responsible for opting Arts stream.

37. Three most important reasons for opting the commerce stream are: Better career options (234), Professional degrees offered (350), and Natural liking (411) of which the contribution of the reason, Better career options and Professional degrees offered is maximum (21.996%), towards the total variance explained for the reason for opting Arts Stream in comparison to science stream.

38. Most of the students felt that in order to revert the declining trend in science stream can be reverted if we: revise the syllabus (179), provide proper guidance (178) and give more facilities (160). (Figures within parenthesis represent the counts).

39. In **SOUTH DELHI** the three most important reasons for opting science stream are: Better career goals (220), To pursue higher studies & research (339) and the Natural liking. The contribution of these factors put together for this happening is: (17.865%) factors responsible for NOT opting the science stream are: Tough syllabus (839), Amount of labour & time (1048), expense in terms of coaching fees etc. (1667), their contribution towards the total variance explained for the reasons for NOT opting science is to the tune of 31.143%.

40. Factors motivating to opt for ARTS stream are: Helps in competitive exams : (84), Personal liking (144) and diversified career opportunities (200). The contribution of these factors towards this happening is 30.648%. Out of total variance explained.

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41. Factors responsible to opt for COMMERCE stream are : Better career options (346), Professional degrees offered (533) and the job openings available (584). These are responsible to the extent of 28.969% out of the total variance explained for opting commerce stream in comparison to science stream.

42. To revert the trend (for not opting science) suggestions from the students include: More facilities (239), Revise syllabus (192) and to provide proper guidance (173). (Figures represent the counts).

43. **EAST DELHI** shows a declining trend in science stream due to the factors: Tough syllabus (1185), Amount of labor & time (1363) and expense in terms of coaching fees etc (1378). Positive reasons for opting the science stream include among the Top-3. Better career goals (187), to pursue higher studies & research (289) and the Natural liking (312). The contribution of these Negative factors (responsible for NOT opting science) is: 15.109% where as the positive factors (for opting the science stream) contribute a 21.695% towards the total variance explained.

44. Inclination towards ARTS stream in comparison to the science stream is due to: Helps in competitive exams (301), personal liking (328), easy course contents (340) with a total contribution of 28.967%.

45. COMMERCE stream attracts more students because of Better career options (317), Professional degrees offered (383), and job opening available (482). The contribution of these factors towards the reasons

responsible for opting commerce stream in comparison to science stream is 29.822% towards the total variance explained.

46. The students of **EAST DELHI** felt that if more facilities are provided (208), School teaching is improved and the syllabus is revised (152) then it is possible to 'revert' the declining trend in science stream. (Figures represent count).

47. <u>WEST DELHI</u> students gave maximum weightage to: Better career goals (179), Natural liking (215) and to pursue higher studies & research (247) as the factors responsible for opting science stream and put together their contribution is 16.319%. Factors responsible for NOT opting science stream are: Tough syllabus (1026), expense in terms of coaching fees (1451), and Amount of labour & time (1456). A contribution of 20.678% is due to these factors towards the total variance explained for the factors responsible for TISAC. (Trends in science as a career).

48. Factors responsible for opting **ARTS** stream include: Helps in competitive examinations (337), easy course contents (401) and diversified career opportunities (461) contribution of these factors for choosing this stream is 19.335%.

49. Commerce stream attracts more & more students due to: Better career goals (264), job opening available (325) and professional degrees offered (360). A total of 15.832% is contributed by these factors, which are responsible for opting commerce stream

50. In response to: what should be done? So, as to attract the students towards science stream suggestions include: To provide more facilities (171), To revise the syllabus (167) and to import proper guidance (158). (Figures with parenthesis represents the counts).

GUJARAT STATE

51. An over all decline of 38% in students enrolling for science stream is observed in Gujarat with an alarming 49% of the students willing to change their stream. The reasons responsible for this happening include: Tough syllabus (6927), Amount of labour & time (7212) and poor assessment & result of the 12th standard (7908) with a contribution of 17.207% (Negatively). Factors motivating to opt for Commerce stream include: Better career options, professional degrees offered and study with job is possible, with their contribution of 16.103%.

52. Reasons like: Helps in competitive exams, diversified career opportunities, easy course contents and study with job is possible have a positive contribution of 20.002% towards the total variance explained (which is 58.593%) for the reasons for opting Arts Stream compared to the reasons responsible for not opting Science stream.

53. To 'revert' the declining trends in science students suggested: To improve the school teaching (430) Reduce the cost (369) and to provide the proper guidance (278). (Figures represent count).

54. **RAJKOT** (Capital of Saurashtra): Reasons for opting the science stream include (Top-3) Better career goals (234), Natural liking (336) and to pursue higher studies & research (401) and the contribution of these factors is to the tune of 17.554%. Reasons responsible for NOT opting science are: Tough syllabus (1702), Amount of labour & time (1826) and poor assessment & result of 12th standard (1913), their contribution put together is: 17.975%.

55. Reasons responsible for opting **ARTS** stream are: Personal liking (176), Diversified career opportunities (207), to pursue higher studies & research (233). The contribution of these factors is 23.455%.

   Commerce stream has the major attractions due to the reasons: Better career options (522), Professional degrees offered (613) Job opening available (722). The positive contribution of these factors is: 17.681%.

56. To bring back students towards science stream it was suggested: To improve school teaching (179), To reduce the cost (168) and to revise the syllabus (150) (Figures with parenthesis represents the counts).

57. **SURAT** (The diamond city) includes three major reasons for NOT opting science stream as: Tough syllabus (2160), Amount of labour & time (2171) and expense in terms of coaching fees etc. (2338). A negative contribution of 26.484% is due to these factors. Factors responsible for opting science stream are: Better career goals (399), Natural liking (568) To pursue higher studies & research (784), they contribute 19.329%

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towards the total variance explained for reasons responsible for changing trends in science.

58. ARTS stream is popular due to: personal liking (106), study with job is possible (115), To pursue higher studies & research (147) their contribution is 30.867% COMMERCE stream attracts most of the students because of: Better career options (602), Professional degrees offered (712) and Natural liking (950), the contribution of these factors is: 25.859%.

59. To 'revert' the declining trend students suggested (1) Improve school teaching (179), (2) Revise the syllabus (150) (3) Provide proper guidance (121). (Figures with parenthesis represents the counts).

60. **VADODARA** (The cultural capital) students are attracted towards science stream due to : Better career goals (280), Natural liking (424) and To pursue higher studies & research (459). The contribution of these factors is: 15.565%. whereas; Tough syllabus (1117), Amount of labour & time (1244), Poor assessment of result of 12th standard (1635) are the factors responsible for NOT opting science and their contribution is 14.878%.

61. IMPACT of commerce stream on science stream is due to: Better Career options (288), Professional degrees offered (363), Job opening available (402) with a contribution of 19.219%.

62. ARTS Stream has an edge over science stream due to: Personal liking (133), study with job is possible (175), Diversified career opportunities (181). The contribution of these factors is: 20.271%.

63. Revise the syllabus (288), Provide more facilities (274) and improve school teaching (255) are the key factory to bring back the students towards the science stream(Figures with parenthesis represents the counts).

64. **AHMEDABD** (the metro city of Gujarat). Better career goals (348), Natural liking (526) and To pursue higher studies & research (542), contribute 15.342% towards the reasons for opting the Science stream where as a negative contribution of 24.968% is due to tough syllabus (1931), poor assessment & result of 12th standard (1948) & Amount of labour & time (1971). The contribution (negative) of these factors put together is 15.515% towards the reasons for NOT opting science as a career.

65. Three major reasons for opting the '**ARTS**' stream are: personal liking (158), Helps in competitive exam (167) and study with job is possible (184). The positive contribution of these factors put together towards the reasons responsible for opting the stream is: 18.442%.

66. Three major reasons for opting the 'COMMERCE stream' are: Better career options (581), Professional degrees offered (667) and the job is opening available (946) these reason put together account for 17.202% towards the total variance explained for opting the Commerce stream.

67. In response to the suggestions: What should be done? Students felt that: By revising the syllabus (798), by improving the school teaching (466) and by providing the proper guidance (186) the students can be brought back to opt for Science stream.

68. Overall impression in Gujarat State is that students are opting for 'Commerce' stream in preference to any other stream.

UTTAR PRADESH (U.P.)

69. The total sample of U.P. was of 2400 students (1500 school students & 900 college students) which registered a decline of 37%. It was 29% of the students who wanted to change their stream from 'Science' to some other stream and it was only 34% students who wanted to continue with the Science stream. The reasons for this changing trend is attributed to positive (for opting) & Negative (for NOT opting) factors. The three most important reasons for **opting** Science stream turned out to be: Better career goals (1354), To pursue higher studies & research (2294) and Natural liking (2309) where as the three most important reasons for NOT opting Science stream are: Tough syllabus (7847), Amount of labour & time (8096), expense in terms of coaching fees (9158).

70. Most important reasons for opting the **'ARTS'** stream are: Helps in competitive exam (2046), personal liking (2561) and the diversified career opportunities (3009) where as the most important reasons for opting Commerce stream are: Better career options (1360), Professional degrees offered (2487) and the job opening available (2895). The contribution of 'factors' for opting Arts is to the tune of 15.349%

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similarly the contribution of factors responsible for opting Commerce is 19.247%.

71. What should be done in order to attract the students to opt for science stream, the response of the students from U.P. revealed that : They should be provided with more facilities (1968), improve school teaching (1577) and reduce the cost (1253). (figures within parenthesis represents the count).

72. **VARANASI** (Internationally famous city of Lord SHIVA) TOP-3 reasons for opting science include: Better career goals (353), To pursue higher studies & research (542) and the Natural liking (635), where the three most important reasons for NOT opting science were : Amount of labour & time (1952), Tough syllabus (2136), and the expense in terms of coaching fees etc. (2516). The contribution of these positive & negative factors are: 17.885% & 19.362% respectively.

73. Top-3 Reasons for opting '**ARTS**' stream are: Helps in competitive exam (422), personal liking (603) and the diversified career opportunities (714), the contribution of factors put together is: 23.658% where as the most important (three) reasons for opting **Commerce** stream are found to be: Better career options (471), Professional degrees offered (667) and the job opening available (769) these reasons have a positive contribution of 36.847% towards the total variance explained.

74. The response of students to check the declining trends in Science include: more facilities (351), Improve school teaching (271), reduce the cost (26) (figures within parenthesis represent the count).

75. **LUCKNOW** (The **HISTORIC CITY**)

Students in this city in this city find that: Better career goals (759), Natural liking (1132), To pursue higher studies & research (1262) are the three most important reasons for opting the science stream. The positive contribution of these factors this happening is 15.379%. The three most important reasons for NOT opting Science the Science streams are: Tough syllabus (4165), Amount of labour & time (4498) and the expense in terms of coaching fees etc. (5005). The negative contribution of these factors put together is: 17.128% .

76. Reasons for responsible for opting **'ARTS'** stream are: Helps in competitive exam (1180), personal liking (1452) and study with job is possible (1589). The positive contribution of these factors put together is: 15.046% where as the three most important reasons for opting **Commerce** stream are: Better career options (956), Professional degrees offered (1398) and the job opening available (1594) the contribution of these factors put together is 15.476%.

77. In order to 'revert' the declining trend student's suggested that we should provide: more facilities (577) and improve the school teaching (434) and at the same time cost must be reduced (334).

78. **ALLAHABAD** (The **SANGAM CITY**)

Most important reasons for opting Science stream in this city are: Better career goals (242), To pursue higher studies & research (490) and Natural liking (542), the contribution of these factors turns out to be 15.284% whereas the reasons responsible for NOT opting Science stream are: Tough syllabus (1546), Amount of labour & time (1646) & Poor school teaching (1751). Their contribution is: 18.712% towards the total variance explained.

79. Reasons for opting Arts Stream include: Helps in competitive exam (444), personal liking (506) and Diversified career opportunities (592) with a contribution of 19.006%. The top-3 reasons for opting **Commerce** stream are: Professional degrees offered (422), Better career options (433), job opening available (536) & their contribution is: 14.332%.

80. Students expected that: More facilities (300) improvement in school teaching (252) & the proper checking (196) could help to 'revert' the declining trend in Science stream.

81. **U.A.** registers a decline of 44%, with of the students willing to change their stream from Science stream to Commerce, Arts and applied sciences 30% of the students at the school level wanted to continue with their Science stream.

82. Three most important reasons for opting Science stream are: Better career goals (634), Natural liking (881) and to pursue higher studies & research (930). The contribution of these factors put together is: 11.764%.

The contribution of Tough syllabus (2593), Amount of labour & time (3073) & poor assessment & result of 12th standard (4300) is negative in the sense that these are responsible for NOT opting science & their contribution put together is: 19.989%.

83. Top three reasons which attract students to opt for Commerce stream are: Better career options (519), Professional degrees offered (769) & job openings available (769) the contribution of these factors is: 12.816%.

84. Reasons, which students feel that are most important for opting '**ARTS**' stream are: Helps in competitive exam (441), personal liking (580) and study with job is possible (695). Their contribution put together is: 15.127% towards the total variance explained for the reasons responsible to opt for Arts stream.

85. Maximum number of students (224) fell that by improving school teaching, providing more facilities (175) and with proper guidance (156), it would be possible to 'revert' the declining trend of students for opting the Science stream (Figures with parenthesis represents the counts).

86. **DEHARADOON** (The **CAPITAL OF U.A**.)
This capital city shows a declining trend in Science stream due to the factors. Tough syllabus (1028), Amount of labour & time (1231), poor assessment & result of 12th standard (1945) with a calibration of 15.255% while students opting for Science stream attribute it to: Better career goals (281), Natural liking (398) and to pursue higher studies & research

(436) with a contribution of 16.009% towards the total variance explained.

87. Students observe that: Better career options (243), job openings available (379) and Natural liking (394) are the factors due to which students are tuned towards Commerce stream, with a contribution of 14.237%.

88. 'ARTS' stream: Helps in competitive exam (212), personal liking (306), study with job is possible (356) are the three factors with a contribution of 15.511% towards the total variance explained for happening.

89. To attract students to opt for Science stream, students of Dehradoon felt that: by revising syllabus (210), providing more facilities (196) & By improving the school teaching (112) can help, to check the declining trend.

90. NANITAL (the city famous for Public Schools) students opting for Science stream, attribute this to: Better career goals (353), Natural liking (483) and to pursue higher studies & research (494). The contribution of these factors towards the total variance explained is: 18.549% where as the reasons for NOT opting science and poor school teaching (2264) the contribution of these factors towards NOT opting for Science is: 16.458%.

91. Commerce stream remains attractive due to: Better career options (276), Professional degrees offered (373) & Job opening available. These factors contribute 23.504% towards the total variance explained for reasons responsible for opting stream vis-a-vis opting Science stream.

92. Students opting for ARTS Stream vis-à-vis not opting for Science stream ARTS Stream as: Helps in competitive exam (229), personal liking (274) and Diversified career opportunities (336) with a contribution of 19.824%.

93. To check the declining trend in student to opt for Science stream it was suggested that: improve school teaching (226), Revise syllabus (226) and provide proper guidance (174).

94. **RAJASTHAN** state registered a decline of 26% where as 46% did not want to change, it was 28% of the students wanted to change their Science stream to some other stream.

95. Three most important reasons for opting Science stream are: Better career goals (935), Natural liking (1461), To pursue higher studies & research (1743). The contribution (positive) of these factors is: 11.627%. And the three most important reasons for NOT opting Science stream are: Amount of labour & time (6602), Tough syllabus (6736), expense in terms of coaching fees etc. (9257), the (negative) contribution of these factors is : 18.907%.

96. Students opted for Commerce stream vis-à-vis Science stream due to: Better career options (1509), Professional degrees offered (1911), Job opening available (2258) with a contribution of 14.746% towards the total variation explained 'Arts' stream attracted students due to: Helps in competitive exam (1404), personal liking (1793) and diversified career opportunities (1832) the contribution of these factors put together is : 18.435%.

97. To check the declining trend in science as career students of Rajasthan suggested to provide : (i) revise the syllabus (542), (ii) more facilities (520), and (iii) proper guidance (468) (Figures with parenthesis represents the counts).

98. **JAIPUR** (The PINK CITY & STATE CAPITAL): The students of this city find that : Better career goals (408), Natural liking (693) and To pursue higher studies & research (756) are the reasons responsible for opting Arts, the (positive) contribution of these factors is : 16.021% where as the reasons for NOT opting science are : Amount of labour & time (3022), Tough syllabus (3270) and poor school teaching with a (negative) contribution of : 14.827% towards the total variance explained.

99. Positive impact of Commerce stream is due to: Better career options (720), Professional degrees offered (923) and Job opening available (1000) the positive contribution of these factors is to the tune of : 17.803%.

100. **'ARTS'** stream has its impact vis-a-vis Science stream due to the reasons: Helps in competitive exam (609), Diversified career opportunities (826) and the personal liking (856) these reasons have a contributing of 14.041%.

101. The pink students suggested to provide: proper guidance (299), more facilities (257) and to revise the syllabus to check the declining trend of students in Science stream.

102. **UDAIPUR** (The zinc city). Students in city opted for Science stream due: Better career goals (273), Natural liking (308), To pursue higher studies &

research (404) the (positive) contribution of these reasons put together is: 19.783% where as the (Negative) contribution of Amount of labour & time (1721), Tough syllabus (1728) and expense in terms of coaching fees (2454) is: 18.899% towards the total variance explained.

103. Students opted for Commerce stream in comparison to Science stream due to: Better career options (431), Professional degrees offered (458) & Job opening available (582) with a positive contribution of: 20.294% towards the total variance explained.

104. The students choice for 'ARTS' stream in preference to Science stream is attributed to: Helps in competitive exam (340), personal liking (455) and diversified career opportunities (515)/The contribution of these factors put together is: 22.876%.

105. What should be done ? (To check the declining trend) The responses from the students suggest to provide: more facilities (186), Revise syllabus (120) and to provide the proper guidance (106). (Figures within parenthesis represent the counts).

106. **JODHPUR** (The **HEART OF RAJASTHAN**) : The changing trends in science include both positive/negative factors due to which students opt or do not opt the stream. Students opted for science due to the reasons: Better career goals (254), Natural liking (450) and to pursue higher studies & research (583), the (positive) contribution of these reasons put together is: 18.086% where as Amount of labour & time (1659), Tough syllabus (1738)

and poor school teaching (2594) and the (negative) contribution of these reasons put together is: 18.782%.

107. IMPACT of commerce stream vis-à-vis science stream is due to: Better Career options (358), Professional degrees offered (530), Job opening available (676) the (Positive) contribution of these reasons put together is: 20.596% towards the total variance explained.

108. The students preferred 'ARTS' stream in comparison to Science stream due to the reasons: Helps in competitive exam (455), personal liking (521) and diversified career opportunities (551). The positive contribution of these reasons is to the tune of 32.66% towards the variance explained.

109. What should be done in short-term/long term to attract bright students to opt for Science stream? In response to this question (section-3) the students suggested: To provide more facilities (277), to revise the syllabus (251) and to improve the school teaching (154). (Figures within parenthesis represent the counts).

" SALVAGE SCIENCE EDUCATION AND SAVE SCIENCE"

CHAPTER –1

0.0. INTRODUCTION:

No period in history has been more penetrated by and more dependent on the natural sciences than 20th century. Yet no period ……..has been less easy with it. This is the paradox with which the historians of the century must grapple. (Hobsbawm 1995, p.522) Science rules in every sphere of human life. This is one area which can not be neglected, and any country can keep pace with the global development only if it encourages the development of science and technology.

Presenting the scientific policy resolution to the parliament in 1958, binding not only his government but also the people and subsequent governments in the country pt. J.L. Nehru said: "it is an inherent obligation of a great country like India, with its tradition of scholarship and original thinking and its great cultural heritage to participate fully in the march of science which is probably the mankind's greatest enterprise today".

Science has not grown in India as a response to the societal needs and aspirations one must realize that in the alchemy of scientific research and technology development, science education plays an important role.

Since ancient times India has an illustrious tradition of scientific enquiry. Numerous fundamental scientific and mathematical concepts are attributed to ancient Indian scientist. They also developed applied knowledge in medicine, metallurgy, chemistry agriculture, textiles & other fields. But far important than these specific contributions of Indian scientists is their integral approach to knowledge and life. They explored all areas of Jnan and vijnan in a holistic way,

emphasizing that mankind's material and spiritual development should be pursued in a balanced manner, without ignoring one at the expense of the other.

It is no more rhetoric when one says that the future of this great country is being shaped in the classrooms and laboratories of our schools and colleges. It is essentially the 'quality' and motivation of the products that come out of our educational institutions that will determine the future of this country.

Speaking of education in India, sir Michael Sadler has very aptly observed that you must broaden base of the pyramid, but not whittle away the apex.

No doubt the science education have always enjoyed a great deal of attention of from students, policy manners, and other related spheres right from the early stages to the stages recent ones, promoting Science from Jai Jawan, Jai Kisan to Jai Vigyan & Jai Kisan.

But the situation has been changing in the recent past (Globally), in many countries (including OURS) recruitment to scientific studies is **falling** or at least not developing as fast as expected or planned for. This lack of interest (which in turn becomes responsible for, DECLINE or CHANGE) in science often manifests itself at school level at the age where curricular choices are made. In our country there is a noticeable <u>decrease</u> in number of students choosing the Science education.

The evidence for such claims is in part based on 'hard facts' (educational statistics relating to subject choice in schools, enrollment in tertiary education etc.). in part on recent–large scale (international) comparative studies like TIMSS, PISA and ROSE (described later in this chapter) and in part on research into and analysis of,

contemporary social 'trends'. The situation is described and analyzed in this study, for the North-Western region of our country covering five states across thirteen cities.

1.1 :   **TAXONOMY OF SCIENCE**

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                           │   SCIENCE    │
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        ┌─────────────────────────────────────────────────────────┐
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┌──────────────────┐                                    ┌──────────────────┐
│  BASIC SCIENCES  │                                    │ APPLIED SCIENCES │
└────────┬─────────┘                                    └──────────────────┘
         │                                                 *  ENGINEERING
         ▼                                                 *  MEDICINE
                                                           *  TECHNOLOGY
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┌──────────┐   ┌──────────┐   ┌──────────┐
│ SOCIAL │   │ NATURAL │   │ ABSTRACT │
│ SCIENCES │   │ SCIENCES │   │ SCIENCES │
└────┬─────┘   └────┬─────┘   └──────────┘

     * LOGIC
     * PHILOSOPHY
     * MATHEMATICS

┌──────────────┐   ┌──────────────────┐
│ MANAGEMENT   │   │ BEHAVIOURAL   │
│   │   │ SCIENCES   │
└──────────────┘   └──────────────────┘

     * ECONOMICS
     * POLITICAL SCIENCES
     * HISTORY ETC.

┌──────────────┐   ┌──────────────┐
│ LIFE   │   │ PHYSICAL   │
│ SCIENCES   │   │ SCIENCES   │
└──────────────┘   └──────────────┘

     * BOTANY   * PHYSICS
     * ZOOLOGY   * CHEMISTRY
     * PHISIOLOGY   * GEOLOGY
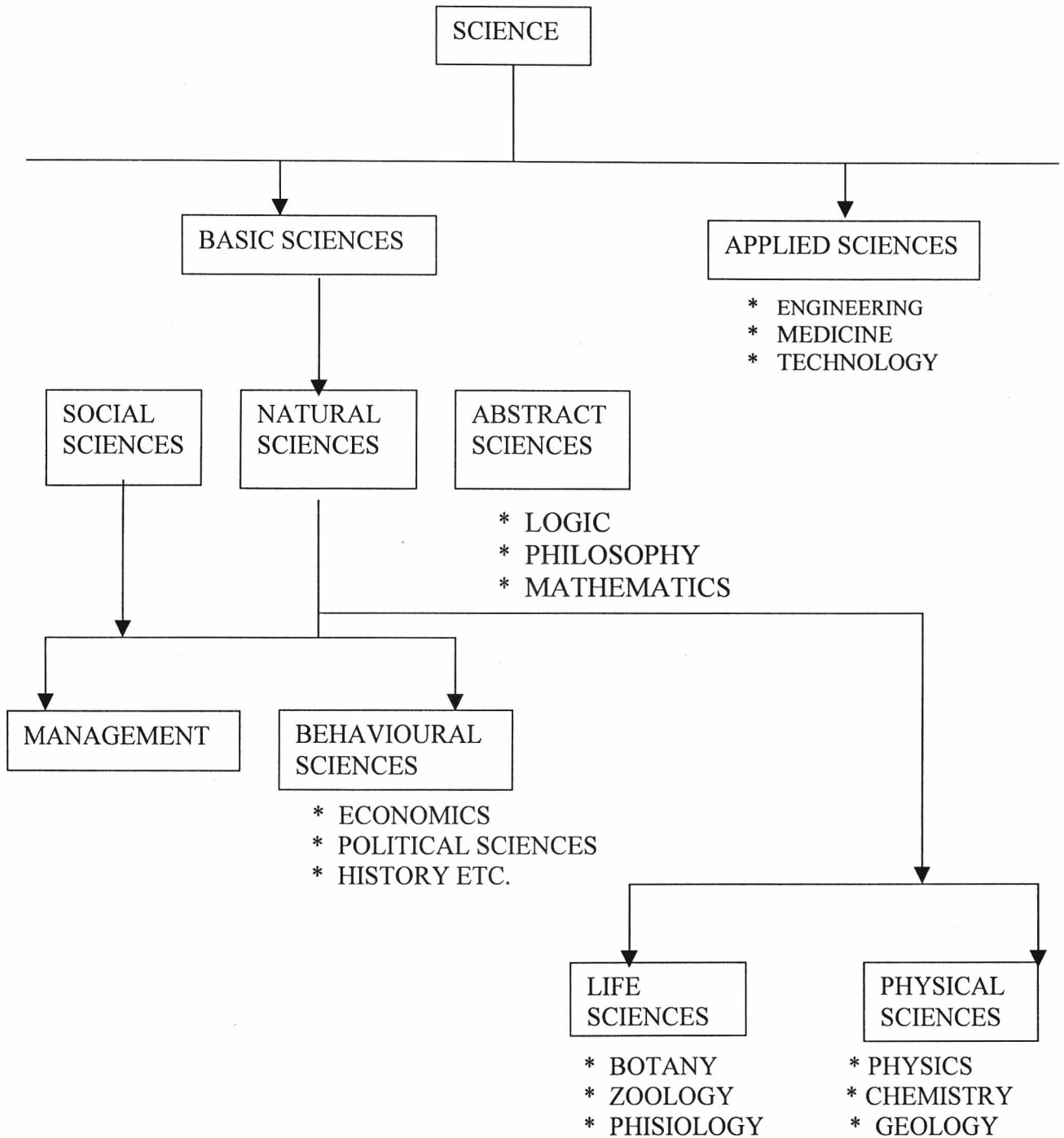
Science and Technology are different, but related as forms of knowledge and as forms of activities science in concerned about developing general and universal explanations of reality; Technology is concerned about finding workable solutions to practical problems technology is NOT same as applied Science, and scientific understanding does not always precede technology developments.

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1.2: DEFINING 'CHANGE:

In the present study 'change' refers to opting for different 'streams' other than the present stream of study.

MEASURING DECLINE:

Refers to opting for a different stream at present where as earlier the student(s) was studying **Science** in the past. Say at present a student is studying Arts/Commerce stream in the FY college level, whereas he/she was studying in science stream at 12th standard. This 'change' is the 'actual decline' from science stream to other streams.

IS THIS A DECLILNE ?

It is difficult to say in actual sense that the 'decline' is taking place in 'Science stream' at college level if the number of 'SEATS' in Science subjects is LESS THAN the number of students applying for the admissions, in that case the SEATS will be full and the enrollment figures of the student will **NOT** show any decline so, measuring decline on the basis of enrollment figures may not reflect the declining trend as the seats are no more vacant. As the admissions to various courses and different streams in colleges depends upon the results of 12th Boards (in science & general stream) so the cut-off percentages 'enrollment figures' in different courses will 'vary' from year to year and hence could not be considered as 'TRUE INDICATORS' of declining trends. Though many studies and surveys go by these 'indicators' to suggest a declining trend (which may some times even show that there is NO decline in opting for science stream as the cut-off percentage remained more or less same OR else students even could not get admission because of more applicants & less seat formula at and hence NO decline in facts

that's DEPRIVATION and not DECLINE may be that students want to continue in science stream but due to WANT of the seats they could not 'opt' for it).

A DIFFERENT APPROCH :

In the present study we have adopted a 'DIFFERENT' (probabilistic approach) approach to 'measure' the DECLINE which neither depends on the cut-off % nor depends on the enrollment figures for say 5-10 years. Off-course these are the obsolete ways to go by and just by having a 'TIME SERIES' type of data, where in we have some 'fluctuating figures' we tend to suggest that there is a decline or no declining trend among the students to opt for science stream.

In the present study we have collected the 'ACTUAL DATA' of decline by asking a question like : At present what is your stream (at college level) and what was your stream of study at the 'school level'. Difference in number of students who are studying any stream 'other than' science stream is the ACTUAL DECLINE which is reported in throughout the study at STATE LEVEL/CITY LEVEL and OVER ALL perception has been given.

CHANGE refers to the perception of student currently studying at 11th standard in schools. What would be their choice at the college level after 12th standard if they do not make it through with the engineering or medical profession. (the present study excludes engineering and /or medical profession from the 'SCIENCE STREAM').

This gives an idea of 'changing trends' in 'Science' because the present study analyses thoroughly that if the students leave Science stream then where they prefer to go and why? Extensive statistical analysis have been done to shed light on

underlying causes of this 'changing trend'. Emphasis is more on why has 'Science' lost its attraction for many young people and what must be done to remedy this situation? Rather than presenting some figures year wise/stream wise and statistically pointing out that there is a 'change'. We refer several studies to that have been done at small levels (current science 10+2 pattern analysis reference and several articles published in current science, which 'establish' that there is changing trend. This study also has the evidence of the same form the data collected during the years 2002-2004. Having understood that there is 'change' and 'declining trend' in science stream at various levels, our endeavour was to identify those (REASONS) responsible for this happening and to put forward their contribution towards the phenomena of declining interest in science stream.

1.3: UNDERSTANDING THE MECHANISM FOR 'CHANGE':

How can we best capture and comprehend the factors that influence an individuals choice towards career, we focus on science in this study. It is patently obvious that there are numerous considerations (which have been asked to and attempted by the students) besides those covered in the questionnaire some of them may be innate and shaped ability, stimulating experience, external motivating factors, socio economic and demographic background, facilities for further education case of entry into higher education job opportunities' (which are analyzed here) real and perceived, case of transfer from discipline to discipline (for example in Gujarat state the students opting science stream at 12th standard are NOT allowed to join commerce stream at college level, though they can join 'Arts' & some of the professional courses like CA/CS, CFA etc., retraining opportunity, motivational challenges, peer respect, special support mechanisms that encourage entry, level and form of societal demand etc.

Think of a sequential chain of events, critical stages (if it can) that to some extent leads to a clearer picture. However we should not be over deterministic in our interpretation with regard to these dependencies. Neverth less, there are some obvious points to be made. Thus if an in adequate level of instruction in science (poor school teaching), curricula deficiencies (Tough syllabus), insufficiency of resource-support occurs at an early stage (11th standard) it is <u>LESS</u> likely that a student will progress into further or higher education in that area. Similarly it there is little latent ability (Reasons for opting) it is equally un likely that an individual will follow 'science' as a career.

Further along the career-choice chain, if rates of pay, societal esteem, career progression possibilities or even the general 'feel' of a particular occupational setting are viewed in negative forms, then despite positive early educational experience, science may <u>not</u> be the 'career' choice. Sequential dependencies <u>do</u> therefore exist, to some extent. Indeed we may, with same rationale be even more mechanistic and note a hierarchical dependency. Thus, the more the conditions of the early stages are improved, the greater the number of individuals who <u>may</u> proceed to the next stage.

Thus, a student may in choosing his/her area of study have 'career' path in mind that <u>influences </u>the degree choice. This can lead to a looking in an important stage in the career selection process. Alternatively and more likely the student may select a degree (stream) for intrinsic reasons and not be committed at that stage to a career choice trajectory or future path.

However, we must also recognize that to talk of the overall population of students or individuals who might follow/or not a science career is inappropriate.

The total population is NOT homogeneous-different cohorts experience, different difficulties. They are subject to different social, economic, academic and intellectual pressures. This heterogeneity under-cuts the value of the simplistic sequential decision procedure and leads to the need of targeted and specialized policies.

FACTORS THOUGHT TO INFLUENCE THE 'CHANGE':

It should be recognized that the wider socio-economic circumstances, the wider environmental frame work within which an individual moves his or her decision or career choice 'change' from even from DECADE to DECADE. This goes beyond trade or business cycles. It is desirable to understand in much more subtle terms than more supply and demand curves how science, industry, commerce, research opportunity and types of scientific and technological activity 'change' in society and status overtime within this changing context science for example may seem unattractive at one time, more interesting and attractive at another. Similarly the actual and perceived opportunity for academic 'science' career fluctuates over two years-as do relative rates of pay and career progression opportunity thus there is not a social constancy in relation to the decision or choice procedure. Times change and hence, so do the factors.

Based upon detailed statistical analysis the present report tries to explore the 11th standard students and First year students at college students attitude to 'careers' in science and the 'REASONS' influencing their choices to pursue 'science' or turn to alternative non-science areas. Students choices and decision making patterns provide pointers for those in schools, colleges and government who wish to understand why this 'changing trend' is observed.

THE NATURE OR DECISION MAKING PROGRESS:

Here the data indicated that two major influences, perceived academic strength and enjoyment had affected both science & non-science students academic choices. The students were asked to reflect carefully on the 'REASONS' for opting Arts/Science/Commerce and those for NOT opting science. And the analysis of these responses have been presented in different chapters.

1.4: RELATED INTERNATIONAL STUDIES:

There are many excellent sources of up-to-date international information and analysis on education here are a few them. :

UNESCO is the body with a global responsibility in this field. It defines common indicators to facilitate valid international comparisons and collects the relevant data. These are published in comprehensive published statistical reports that are also available via the wed site http://www.unesco.org/ .

For Science & Technology (as well as for Mathematics) education, the TIMSS study (Third International Mathematics and Science study) has become very influential. TIMSS is one of the many IEA studies (International Association for the Evaluation of Educational Achievement). Background information as well as down loadable reports and data files are available at http://timss.bc.edu/. TIMSS has been followed up from 2002 although the acronym TIMSS gets a some what different meaning ('T ' for Trends instead of Third).

PISA (Programme for International Student Assessment) aims at assessing how far students have acquired some of the knowledge & skills that are essential for full

participation in society. Reports, background material and statistical data are available at http://www.pisa.oecd.org/.

In 2003, ROSE (Relevance of Science Education) is the extension earlier study conducted by sjbergs S.2002. SAS (Science and Scientist). Statistical data collected in most surveys, do not shed much light on the underlying causes of many of the present educational concerns why Science (& technology-though NOT the concern of present study) apparently lost their attraction for many young people, and what might be done to remedy this situation? Without some 'honest' answers to these questions, intervention programmes designed to increase interest in science are unlikely to succeed these studies have made it possible to make comparisons between different countries and regions.

INTERNATIONAL SCENARIO STATISTICAL INFORMATION AND LARGE-SCALE COMPARATIVE STUDIES:

At a regular intervals, UNESCO publishes more analytical global reports such as the world education report (UNESCO, 2000) together with more targeted and specific report on progress in the field of education. The OECD has a large education sector, and it publishes an important annual report 'EDUCATION AT A GLANCE' (i.e. OECD 2001 b). These as well as other reports, including underlying statistical annexes are available online at http:www.oecd.org/. Although the focus is on the OECD countries, the data as well as the research cover other countries as well.

The OECD has recently developed its own set of studies of students achievement under the acronym of PISA ((Programme for International Student Assessment) PISA covers same 30 OECD countries together with some non-OECD countries.

The first report (OECD 2000) presents evidence from the first round of data collection on the performance in reading, mathematical and scientific literacy of students, schools & countries. Reports, background information and statistical data are available at http://www.pisa.oecd.org/.

Such large-scale research projects do not emerge from an independent and critical research perspective, and one may use Ziman's concept of 'post academic science' Ziman (2000) to characterize them.

PUST: (Public Understanding of Science & Technology)

Projects like TIMSS & PISA describe the level of achievement of children at school age. However there is a comparable political concern about how the general public relates to 'science'. Acronyms like PUST have become indicators of growing unease about the situation. Academic journals are devoted to the relevant issues and several research institutions study the challenges involved in promoting the public understanding of science. In a series of studies dating back to the 1970^s, Miller defined and measured scientific literacy in the United States (miller 1983), and his approach is evident in research subsequently undertaken in this field in many other countries. e.g. the Influential Eurobarometer Studies (EU 2001).

Reports like bi-annual Science & Engineering indicators (NSB 2000) provide a wealth of information on many aspects of scientific and technological research in society and education. Reports such as the 2000 National survey of Science & Mathematics Education (at http://2000 survey. Horizon-research.com/) also provide valuable data as well as analysis and comparative insights. Based upon almost six thousand participating science and mathematics teachers in schools

across the united states. The study was sponsored by the National Science Foundation.

AN INTERNATIONAL CONCERN:

The growing importance, but increasingly problematic enrolments in, status of science and technology in many countries provides the obvious background to a growing political concern about S & T education in schools, higher education, media and the public.

In many counties, the situation has attracted political attention at the highest level and in some cases, projects and counter measures are planned or put in operation. The Swedish NOT-project (http://www.hsu.se/NOT) and the Portuguese Cimecia viva (http://www.ucv.met.pt) are examples of large scale national programmes.

Institutes of scientific and technological research, universities and industrial organizations have also established more or less co-ordinated intervention programmes organizations concerned with 'Big science' have also become involved. A prime example is the project physics on stage (POS http://www.estec.esa.nl/outresch/pos/) organized jointly by CERN (the European laboratory for particle physics), ESA (the European space agency) and the ESO (the European Southern Observatory). **But** POS, as well as many other such international programmes by professional bodies, have seldom undertaken a convincing analysis as to WHY they are facing the problem of FALLING enrolment. Some of their descriptions of the situations lack empirical evidence, and are more emotional then rational.

From the available studies in this field it also seems premature to claim that PUST is deteriorating one could however argue that the public understanding of science needs to be much <u>better</u> then it is, given the crucial role they play in contemporary society.

1.5 NATIONAL SCENARIO:

"In 1950^s & 1960^s, the best students choose to go for science. To day's bright students seem to be shying away from science. This issue needs to be addressed effectively imaginatively and comprehensively" – Mr. Atal B. Bajpai, Ex P.M. of India.

The then Prime Minister urged that S & T establishments, public & private industries and Govt. agencies to address this issue.

He also stressed that it was important to create employment opportunities for scientists in India. (July 2003, internet download).

Even the current Govt. has on its agenda the 'Education sector' as one of the major areas where Govt. is concerned about various issued and challenges that 'education' sector is facing.

<u>SOME INDICATORS :</u>
There are some significant signs that point out that there is less inclination of youths towards science subjects.

*   No takers for science subjects in the M.S. University of Baroda (Gujarat) seats lying vacant in the academic year 2002-2004. The cut off percentage

goes as low as to 35% to 40% to get the admissions in First Year B.Sc. courses. (Admissions records)

* While the cut-off percentage between 1999 to 2000 & in the subsequent years for commerce & Arts (humanities) has increased by 5% to 7%, for science it has decreased by 3% in the university of Delhi (Ref. News paper)

* The students registration for degree programmes in science has declined form 32% of total in 1971 to a less than 20% now. (UGC reports).

* At some places particularly in U.P. the number of seats available for admissions in the First Year B.Sc level is much <u>less</u> than the number of students seeking admissions, so virtually there is <u>NO</u> decline in science stream in Allahabad, Varanasi, Lucknow as the figures for the last Five (5) years of the students admitted to F.Y. level courses remained more or less same.

* According to the report of word Bank on scientific and technical manpower development in India, (1999-2000) the enrollment in science (& technology) education account for less than 2% or the age cohort.

* There have been quite a number of commentaries in the recent issues of current science (2000, 78, 381-382,1279, 1417-1418 etc.) Everyman's Science letter (July 2003) etc. on the status of S & T in India.

* Reports published in National Academy science letters. Annual reports 2002-2003.

* All these studies have one thing in common 'There is a declining trend in science stream and students no longer want to take up science.

SOME EVIDENT RESASONS :

* This is a major problem in creating strong groups for 'basic research'. Science needs creative minds with strong scholastic aptitude. At the same time academicians need **place** in the society and have needs like any one else. We do **not** provide enough financial incentives to those who want to take up science as a career. Approximately at an age of 28-30 years a scientist can aspire to join starting grade with gross salary of about 15,000/- (lecturer in a university/college, or scientist- (in govt. laboratory etc.) even this is **NOT** assured.

* One of the most important reasons for this decline is that career in science is not perceived attractive either by students (or their parents) many other professions 'appear' to offer greatest opportunities for instance even after obtaining a masters/Ph.D. degree in science the students do not get jobs, while an engineering graduate (for example) from a good institution gets a job thru campus recruitment. Thus, an engineering graduate theoretically settles after four years from + 2 examination, while this is not the case who opt for science. Hence, more and more students are opting for engineering course. Moreover in the year 2003-04 in 'Gujarat state' the admissions to various engineering colleges (Govt./semi govt./Self finance) were open for the student who scored as low as 35% to 40% in their 12th standard Board exam, so, IF A STUDENTS GETS ADMISSION IN ENGINNERING COLLEGE WHY HE/SHE SHOULD JOIN SCIENCE.

* So as the number of engineering colleges has 'mushroomed' even students with moderate academic attainment gets admission.

* Employment opportunities have also brightened for 'commerce' and some 'Arts' subjects due to the liberalization of economy.

* Gone are the days when a scientist was respected in the society for his deep involvement with the subject and dedication. 'THESE DAYS ONLY THE MASTERIAL ACHIEVEMENT MATTER'.

* Another disadvantage with scientist career is that there is NO accountability of the performance, good work goes unrewarded and non-performance or poor performances goes unpunished.

* So we 'need' to examine why a career in science is **not** considered worthwhile by so many of our talented students. Whatever the reasons (which this study aims to bring out) we must face this issue squarely (covered in the present study).

1.6   NEED OF THE STUDY: (BRIEF RATIONALE)

A broad public (which includes students) understanding of 'science' (and the science education) is crucial for the national economic development and to the life. Falling enrollment, recruitment and interests in science studies and careers are observed in many countries including ours. In many surveys and studies based on statistical data it has been reported that there is 'decline' in the number of students opting for 'science stream' or there are some changing trends observed these day

for 'science stream' but most of these studies do not shed light on underlying causes for this changing trends in science as a career. Why has 'science' lost its attraction for many young people, and what might be done to remedy this situation? WHY after all so much worry about the phenomena of 'changing trends' in sciences as a career. We have tried to list out under the heading of who needs science and why ?

WHO NEEDS SCEINCE AND WHY ?

The problems surrounding recruitment to science can be viewed from several different perspectives. These range from industrial and governmental anxiety about national, economic competitiveness to concerns about empowerment at the grass root level.

1.   SCHOOLS:

Need large numbers of well-qualified teachers. But many countries (including ours) face a problem of both quality and quantity in recruiting to the profession. The long–term effects of good science (and technology) teacher can be very damaging. Although they may not be so immediately evident as comparable shortage in industry and research.

2.   UNIVERSITIES & RESEARCH INSTITUTIONS:

Have a similar need for researchers (and teachers) to maintain research at a high national/international level and to train future generations of experts, researchers and teachers (Refer current science- is science in India or decline? A study using data   from Science Citation Index (SCI) covering a period of two decades, has shown that while the number of research papers has risen by a factor of 23 in

CHINA, those from India have declined. During this period our rank fell from 8th to 15th place in the works in terms of research output).

3. INDUSTRY:

Needs people with level of qualification in science. Modern industry is high teach, and it is often referred to as 'knowledge industry' The need here is for survival in a competitive global economy.

4. A MODERN LABOUR MARKET:

Requires people with qualifications in 'science stream' This need is great and growing fast, as knowledge and skills based on science (& technology) become prerequisites for employment in new or emerging sectors (Bio-technology, Bio-chemistry, Micro-biology dominated industries) lawyers and juries in court trials have to understand an critically judge the evidence and statistical arguments in which knowledge of science and considerations of probability and chance play an increasing role. So, a good grounding in science is important, since many questions can be answer with scientific background and knowledge.

A study report of the world bank on labour market for scientists, engineers & technicians in 1998 indicates one of the most alarming factor that there is a very high dropout and failure rates (over 40%) at the under-graduate level in science subject. Further due to limited job opportunities and inadequate exposure to challenges in science students do not pursue science as a career. The report says that it is not surprising in India to find science graduates working as office assistants.

5. FALLING ENROLLEMNT, INCREASING GENDER GAP:

In many countries, there is also growing gender gap in the choice of scientific (and technological) subjects at both school and tertiary level. Many countries have had a long period of steady growth in female participation in traditionally male fields of study, but this positive trend seems now to have been broken in some countries. It is a paradox that the break is most marked in some of the Nordic countries, where the gender equity has been a prime educational aim for decades. While these countries come out on top of all the countries in the world on the Gender empowerment measure, an indicator developed by UNDP (UNDP-2001), the same countries have very **low** female participation rates in science –and-technology-related occupation and studies.

In some countries the difficulties of sufficient number of **new** entrants to the teaching profession has become a matter of national concern. The concern is **not** confined to numbers. There is also a more or less identifiable fall in the QUALITLY of the new comers. Many institutions of higher education are unable to fill their places in science & technology with students of a 'satisfactory' quality.

1.7 GEOGRAPHICAL AREA UNDER STUDY:

In the preceding sections, need of the study and other related issues have been outlined. The present study covers the following geographical area. Though the problem of 'changing trends in science as a career' is matter of national concern,. This study is confined to the North-Western region of our country covering five states : Gujarat, Rajasthan, U.P (Uttar Pradesh), U.A. (Uttranchal) and Delhi ('GARUD') under the 'GARUD' 13 major cities have been covered, definitely including the 'state capitals' and other cities are included on the basis of their

educational, cultural, industrial and other related important features. State wise list of cities covered is as follows ;

1)	Gujarat	:	*Ahmedabad, Baroda, Surat & Rajkot
2)	Rajasthan	:	*Jaipur, Udaipur, Jodhdpur
3)	U.P.	:	*Lucknow, Allahabad, Varanasi
4)	U.A.	:	*Dehradoon & Nainital
5)	* Delhi	:	North Delhi, South Delhi, East Delhi & West Delhi

*indicates capital city

The present study has been acronymed as changing 'TISAC' (Trends in science as a career).

1.8 OBJECTIVES OF THE STUDY:

In view of the above discussions on the phenomena of 'changing trends' and its consequences (TISAC) The Present study has the following objectives :

1. To identify and analyze the reasons for declining interest of students in science stream.

2. To study the impact of other streams (Commerce & Arts) on the choice of science stream.

3. To study the trend of selection of streams on the basis of job opportunities.

4. To study the behaviour of boys and girls for selection of stream.

5. To study the intra-state trend of selection of stream.

6. To study the intra-state trend by selection of stream.

7. To make suggestion to 'revert' the declining trend in science stream.

1.9. FORMAT OF THIS REPORT:

The present study is spread out in 11-chapters First chapter is introductory and mainly devoted to defining the 'changing trend' in the second chapter we describe the target population, method of sampling, of contacting them and endeavours for receiving their responses. Third chapter deals with the method of data analysis and the following fourth chapter presents a socio-economic background of the students under study. Chapter-5 through chapter-9 deal with changing trends in science as a career in the states 'GARUD' in their respective order i.e. Gujarat, Rajasthan, U.P./U.A. and Delhi.

The Tenth-chapter is devoted to multivariate analysis of total data set and it tries to list out the 'factors' responsible for the 'changing trends' alongwith their respective contributions.

The last 11th chapter is fully devoted to inter-state comparisons.

The report ends with limitations of the present study (present study the critique) and concluding remarks.

1.10 HOW TO INTERPRET THE RESUTLS?

(A)   In all the chapters for the state (data) analysis. Two types of tables have been provided :

(i)   Tables for the general opinion of the students about 'REASONS' for changing trends in science as a career. The figures within the parenthesis against each reason(s) represent the 'RANK-SUM'. According to the technique of Kendall's-W, the lower the RANK-SUM, the more is the agreement of respondents to the reason.

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(ii)   In response to the question : what should be done? (WAYS FORWARD) the figures within parenthesis represent the COUNT (Frequencies) in this case, the <u>higher</u> the count is for a particular suggestion obviously that's the most important suggestion made by the students.

(iii)   The principal component analysis, which is applied to analyze the '<u>contribution</u>' of various reasons for changing trends in science as a career, gives its output in the form of total variance explained by various components (reasons) the larger is the variance explained by a particular component the more important component it is. The total variance is explained by rotation sums of squared loadings. In this analyses, we may have several components (say 20 or more) but only some of the components may have significant contribution towards the 'TOTAL variance explained' if it is of interest to note that total variance explained it is more than 60% then the analyses does not proceed to incorporate the contribution of all those components whose contribution may be marginal. In the next stage of analysis the Rotated component matrix is obtained and for each component(s) it is observed that where ever for one component or more than one components if the correlation is more than 0.5 then those component/components effects with their contribution are considered. In all the chapters several tables are dedicated to the analysis of these reasons. For example : if in a particular table the Reason or Reason(s) : Tough syllabus & Amount of labour and time contribute (say) 19.528% towards the total variance explained, (say) 69.877% then it implies that: Among all other reasons responsible for the variability present, the contribution of these two reasons is 19.528% which is maximum, so these reason or reason(s) are

most important. Similar, interpretations can be given to other (reasons) components which have next highest value(s) and so on.

REASONS EXPLAINED:

(A) FOR OPTING SCIENCE:

1. Better career options: Students studying Science stream at 11th standard (school level) have an option to go for engineering/medical courses. Even students in their first year college level continue with Science stream till they get selected (if at all) in every of the professional courses in that sense students have better career options.

2. Social pressure: Some times students are not willing on their part to pursue for Science stream but their parents or some relatives or friends suggest that they should opt for Science stream.

3. Natural liking: Students themselves have the liking for the stream (or the subjects in which they are interested).

4. To pursue higher studies & research: (Though very less) But student have their reasoning to pursue for higher studies & research.

5. Honour in society: Some of parents/student feels that it creates an 'impression' sort of the thing that they are studying 'science'.

6. Motivated by teacher: (which is very important in the early stages) if the students have proper motivation by the teacher, they are 'tempted' to opt for the Science stream

(B) FOR OPTING COMMERCE :

1. Better Career Options: Students having inclination towards Commerce stream fees that they can join as Financial consultants/Accountants/Management .... etc. at a 'higher' level. Where as at lower level also there may be some openings like 'salesman'. Accounts writing etc. small jobs in marketing and so on.

2. After 12th commerce students can go directly for some professional degrees like C.A./C.S./CFA etc. Simultaneously, while pursuing their B.com/M.com degree courses.

3. More job openings are available with commerce stream at different levels (say) Assistants job/clerks.

4. Students themselves wish to opt for Commerce stream out of their own choice. i.e. Natural liking for the subject.

5. To pursue higher studies & research, (this number may be very less) but some students wish to pursue higher studies & research out of their own reasoning/interest.

6. Parental business: If the family background is from 'business', students wish to help their parents by pursing a career, which will be helpful for them in their business.

7. Easy course contents: Compared to science subjects the course contents for commerce side are easy, and less time consuming.

8. At 12th standard the different board exam, results every year show different pas out percentages but (mostly) the board exam results for Commerce stream are highest in terms of PASS percentages. In that sense students tend to opt for Commerce stream for 'encouraging 12th exam board results'.

9. Most of the commerce/schools/colleges run in the morning shift due to availability of time students may do some job while pursuing their studies.

(C) FOR OPTING ARTS:

1. Generally students opting for 'ARTS' stream at the under-graduate (First year college) level find that various subjects in ARTS stream are quite scoring and easy to get selected in many STATE Level and India level administrative services exams, in that sense: It helps in competitive exams.

2. Personal liking: Students themselves wish to opt for 'Arts' Stream out of their own choice i.e. they have a personal liking for the subjects in 'Arts' stream without any other consideration.

3. Diversified career opportunities: students pursuing the 'languages' find that it helps them to get the job in media (print/electronic). Jobs of 'interpreters', jobs in companies as 'receptionists', 'call operators' etc. so, there are a lot of opportunities I various fields, walks of life offering them a 'job' which attracts more student to opt for this stream.

4. To pursue higher studies & research: some of the students wish to pursue higher studies in Humanities (Arts) stream out of their liking, interest and to contribute to the 'subject' by doing 'research' which requires higher studies.

5. Study with job is possible: In most of the schools and colleges, the regular study classes for 'ARTS' stream are held in morning session, so that the students after attending their schools/colleges may go for some 'part-time' jobs or may join a job as such, so that study with job becomes possible and they (students) may help their families or themselves.

6. Easy course contents: Those students who find science subjects & commerce subjects difficult to understand an follow, find that the subjects in 'ARTS' stream have easy and understandable course contents.

7. Poor Numerical ability (or pear of maths in particular) majority of the students who are not comfortable with MATHS, do opt for 'ARTS' stream.

(D) <u>**FOR NOT OPTING SCIENCE**</u>**: (14 Possible reasons)**

1. Amount of labour & time: Most of the students studying in 11rh & 12th science standard have to spend almost 14-16 hours a day, while studying in schools and various coaching classes to prepare for the competitive exams. (for medical/engineering) or to score High in 12th (in Gujarat state still the students are admitted to various medical and engineering colleges on the BASIS of their marks in the 12th standard) so, on a n average the student's perception is that if they opt for science stream they have to spent a lot of time along with labor. So, student do not opt for Science stream. In fact amount of labour & time becomes 'A' MOUNT of labour & time.

2. Tough Syllabus: The 'wide' gap of syllabus in Science stream from 10th standard & 12th standard makes student so afraid that many students drop the idea of taking-up science even at the 11th standard an are lured by easy syllabus of other streams. More over, the 'GRADIENT' of syllabus is so 'steep' that even teachers, teaching science subjects in 10th & 12th standard find it difficult to cope-up with it. Student's lose their interest because of the fact that if they do not get high scores due to tough syllabus (which they do not understand) they might not get admissions to professional courses or regular courses. EVEN after 12th standard, those who wish to continue the Science stream at the college level find it difficult BECAUSE OUR COURSES AT COLLEGE LEVEL ARE NOT IN A WAY, so that the students cross those STEEPNESS in the syllabus with EASE, hence at both levels (i.e. 11th standard & first year college) students find that TOUGH SYLLABUS is a MAJOR REASON FOR NOT OPTING SCIENCE level at either of the 'Change' points.

3. Poor school teaching: (Tough the present study does not study the impact of coaching etc. which could be one of the components of poor school teaching) (as we are not analyzing REASONS WITHIN REAOSN) Poor school teaching due to lack of qualified teachers (who needs science?), Impact of coaching or teaching might not have remained an attractive profession among the youths to pursue at SECONDARY/COLLEGE level may all of them (or even more factors) contribute 'towards' poor school teaching, out students face the dual problem of Tough syllabus and at the same time poor school teaching.

4. Expense in terms of coaching fees etc.: Majority of the students studying in 11th or 12th standard or even in colleges have to enroll themselves in one or more coaching classes to prepare for competitive exam. The figures may vary from state

to state or even from city to city, but student's parents have to shell-out a considerable amount of money in terms of coaching fess & other related expenditure.

5. Poor assessment & result of 12th standard: It is the 12th exam-board result pass percentage, which creates an impression among the student's that, results Science stream is 'poor' compared to General stream and a 'low' scoring result will <u>not</u> help them in any way, students out of some hypothetical fear some times do not opt for Science stream.

6. NOT many respectful job openings: After completing their studies with Science stream, students fees (and the reality is) that there are not many job openings with this stream i.e. job opportunities are less compared to other streams.

7. Lack of information about career in science: if the students do not make it through with medical or engineering side after their 12th or B.Sc exam. They are not aware about other careers in science. Even many of the parents are not familiar with 'other' options in Science stream so lack of information is very important reason because they (student as well as parents) do not see any 'future'.

8. Comparative economic return is less: students pursuing science as a career till the end of their studies (say pursuing masters or Ph.D.) find that the economic return is very less and even that is not assured. So, comparatively students with other 'options' are earning more. Young people also know that those trading in financial markets earn more money than the physicist in the laboratory. A white-coated, hard working and not very not a role model for students today. The social

climate, especially in developing country is not one which it is easy to convince young people that they should concentrate on learning Science at school or beyond.

9. Study with job is not possible: Mostly the classes in Science stream are there for the whole day (may be since morning to evening) and the students are engaged for all the time and they are not in a position to go for even a part-time job to help themselves or their family.

10. No encouragement for scientists in our country: Students felt that scientists are no longer the heroes of the society. In fact there is no encouragement, in the sense of same job security if they pursue science as a career.

11. Experience of family members: In the family history, if some of the 'bright' students could not make it, as desired by the family then it 'sets' an example in their mind and they tend to discourage other members of the family (may by younger brother/sisters/cousins etc.) to opt for Science stream.

12. Poor numerical ability: Students know that in order to pursue study with Science stream, they must have good numerical ability and understanding of mathematics, so anybody with poor numerical ability may not be comfortable with science or even may not be able to pursue the study.

13. Size of the family, plays an important role (at 11th standard) for students to opt for Science stream. As almost compulsorily the students have to go for coaching etc. which requires considerable expenditure, so it may happen that at the same time if 2-3 members of the same family wish to join coaching while studying, it

may <u>not</u> be possible to allow all of them due to finance constraints and the size of family.

14. It has been observed over a period of time that in the exams conducted by UPSC (Union Public Service Commission) and other state Public Service Commissions students clearing these exams come in large numbers from Humanities & other streams but not from Science stream, hence science subjects are not considered to be good optional subjects for various competitive (National/state level) exams. This also deters students to opt for Science stream.

CHAPTER –2

After giving an idea of some International studies on the topic similar to the present study in the previous chapter, we describe the target population under this study.

2.1 DEFINING THE TARGET POPULATION:

As mentioned in the introduction (section) the present study is concerned with the 'changing trends in Science as a career'. Students at the 'change' point (i.e. where the students have an option to 'change' their present stream) were thought to be included in the sample.

Students in 11th standard (At school level) and the students in the first year (at college level) fall in this category who opt for a particular stream. The present study is concerned with the students those who study 'science' stream at school level. It is expected that the students may CONTINUE with Science stream at college level. OR the students may change their present Science stream and opt of 'Commerce' or 'Arts' streams at the college level.

As there is no demarcation of streams as such up to 10th standard (in many states) for 'states' covered under the study. It is at the 11th standard where the students may opt for ARTS/SCIENCE/COMMERCE, hence the students at this stage are our target group. Once a student chooses a particular stream at 11th standard he/she has to continue it till 12th standard AND again at the first year level of college, the students may 'CHANGE' their present stream. The possibilities are: science (level '0'), Arts (1), Commerce (2) then: (i) 0→1, 0→2 & 0→0 (ii) 1→1 & 1→2 (iii) 2→1 & 2→2. We are more concerned about (i) i.e. student, 'leaving' Science

stream and opting for 'Commerce' or 'Arts' stream. As this is related to 'change'. Students opting for Applied Sciences courses at college level (such as: Bio-technology, Bio-chemistry, Microbiology etc.) are considered to be 'POSITIVE CHANGE'. Therefore, the students at college level F.Y. B.Sc (F.Y. B.A./F.Y. B.Com) are our target populations. The students sampled in the study were studying in different schools and college in the years 2002-2004.

As outlined in the introduction the 'TREND' here is interpreted as: 'general direction'.

Getting records from the offices of various schools & colleges for the last five or ten years was a difficult job (in the sense that no body was willing to share the information about the number of students in different disciplines). Also the objective(s) of this study include, to identify & analyze the reasons for the changing trends in science as a career. So, it was decided to take current sample informations from the students under TARGET POPULATION.

2.2. SAMPLING DESIGN: (STRATIFIED RANDOM SAMPLING)

(a) SCHOOL LEVEL : As the geographical area under study was North-Western region spread over 5 states : Gujarat, Rajasthan, U.P (Uttar Pradesh), U.A. (Uttaranchal) and Delhi ('GARUD') covering 13 major cities across these states the number of schools is very large. Say for example there are 1682 schools alone in LUCKNOW. There are different types (categories) of schools so, we stratified these schools as: (i) Kendriya Vidyalayas (Central Schools), (ii) Public schools, (iii) Government and semi-government schools (iv) Private schools. Though the number of schools is each of strata varied considerably in different cities. It was

decided to select at least one school at random from each of the stratum. The selection of schools was made with the help of a computer programme.

In the Brain storming session (BSS) held on 24th July, 2003 it was decide that the sample size should not be less than 6000+. Accordingly the number of schools (and thereby colleges) was decided. The number of students to be included in the sample was more or less fixed at 40 (FORTY) per school and 40 per college. This was also in tune with the international study 'ROSE' (Relevance of Science Education). Of-course the number of schools in different categories varied from city to city as per size/importance of the city in that particular state.

As it was decided to select students from each of the stream and also it was decided to have students from both the sexes (i.e. BOYS/GIRLS) the number of student per Stream/per school was approximately 15. In the actual survey it was found in many of the schools 'ARTS' stream is not offered. In this case, if any of the 'selected' school did not have a particular stream to be offered then we took of a sample of 20 students from each of the available streams.

(b) **AT COLLEGE LEVEL**: College have been categorized as: (i) Boy's college (ii) Girl's college and (iii) Co-educational colleges while selecting colleges it was kept in the mind that the selected colleges offer all the three streams under study (i.e. Arts/Science/Commerce) but again in some of the randomly selected colleges if it was a commerce/Arts college then the number of students selected were equally divided in the stream offered (i.e. 20:20) otherwise, again a sample of approximately 15 students were selected from each of the stream. Again the number of colleges sampled in a particular city varied depending upon the size/importance of the city.

2.3 CONTACTING STUDENT AT SCHOOL LEVEL:

All the schools which were included in, were contacted by mail and requested to provide the number of students studying in different schools at 11th standard in the ARTS/SCIENCE/COMMERCE stream (during last 5-10 years). Most of the schools did not provide the data. The schools which responded, were asked to provide a date & time schedule so that the members of the investigating team, could approach for the direct data collection in the structured questionnaire for this purpose. With the permission of the principals of the schools and the local help of some of the teachers at the schools, the students were asked to fill-up the questionnaire in the presence of the field investigators. So, that in case of any difficulty or clarifications etc. an immediate help could be provided to the students. In most of the schools and in many of the classes the numbers of students were more than the number of students to be sampled. Hence students, asked to till up the questionnaire were automatically selected at random, in that particular class.

Table 2.3.1. : DISTRIBUTION OF SCHOOL STUDENTS ACCORDING TO STREAMS (AT STATE LEVEL)

NAME OF STATE	NUMBER OF STUDENTS			
	SCIENCE	ARTS	COMMERCE	TOTAL
GUJARAT	468	186	387	1041
RAJASTHAN	577	144	287	1008
U.P.	505	495	500	1500
U.A.	176	165	168	509
DELHI	286	245	288	819
TOTAL	**2012**	**1235**	**1630**	**4877**

2.4 CONTACTING STUDENT AT COLLEGE LEVEL:

The colleges across all the five states, which were selected randomly in our study, were contacted by mail, and the principals of these colleges were requested to provide the data on the number of students studying in different streams during the last 5-10 years of the period. It was also, requested to provide the data on 'CHANGE' to groups after taking admission in a particular group in the first year (i.e. for example a student initially taking admission in one particular, then after some time, within same academic year 'drifting' to some other group). All the principals were requested to provide a date & time for personal contacts of the students by the members of the investigating team. A covering letter was also given to them briefly mentioning about the purpose of study and requesting them to provide the information in the questionnaire. Here also the number of students to be included in the sample was much less that the students strength so the students were selected at random and they were requested to fill-up the questionnaire in the presence of our field investigators, so that in case of an clarifications etc. the difficulties (if any) could be sorted out immediately.

Table 2.4.1.:   DISTRIBUTION OF COLLEGE STUDENTS ACCORDING TO STREAMS STATEWISE:

NAME OF STATE	SCIENCE	ARTS	COMMERCE	TOTAL
GUJARAT	179	211	209	599
RAJASTHAN	215	184	217	616
U.P.	315	270	315	900
U.A.	82	82	82	246
DELHI	198	129	140	467
TOTAL	**989**	**876**	**963**	**2828**

2.5   CONTACTING PRINICIPALS/HEADS/TEACHERS/PROFESSORS:

The most frequently cited reason for the decline of students (& youth's) interest is lack of employment (and to some extent lack of information about career in science) for the pass out of Science stream. Besides, global market forces, basic socialization is another way through which, one gets initial motivation for future career and education or the 'line' to pursue with. Therefore, the study of the factors influencing the student's attitude towards education and career is not complete without the study of societal impact. Society affects this process not only as a socialization agency but it also creates a kind of 'social pressure' (one of the reasons included in the question 2.4). So, opinion of the teachers/professors/ principals was sought keeping the following points in the mind.

- Opinion on 'what should be done to ask for the students to opt for Science stream?
- How do they regard science as a career ?
- Perception towards the career opportunity after studying science.

All the principals of schools/colleges were requested to provide their opinion on the issues cited above and their response were analyzed.

2.6 PREPARATION OF MAIN QUESTIONNAIRE:

Preparation of questionnaire for such type of study which included students at school level as well as college level was little bit difficult job. Also, the survey was across the states where English/Hindi/Gujarati, languages are used as medium of instruction an issue to be addressed carefully was the 'medium' in which the questionnaires should be printed so as to get the desired/required response from the respondandents.

As per the suggestion of DST (NSTMIS Division), a BSS was held on 24th July, 2003 at Saurashtra University, Rajkot (Gujarat) to standardize the methodology and accordingly to review the 'draft' questionnaire.

In corporating all the suggestions, the questionnaire was modified. Particularly questions are so framed and the responses are taken in such way that the perceptions of students about 'changing trends' is reflected clearly. Broad issues on which these students are asked questions, are as under:

- Was science education their first choice?

- What is their present stream of study? Would they like to continue the same stream?

- Reasons for taking up Science stream.

- Reasons for taking up Arts Stream.

- Reasons for taking up commerce stream.

- Reasons for NOT opting Science stream.

- Perception towards the career opportunity after studying science vis-à-vis studying Arts or Commerce stream.

The questionnaire was revised and the method of making responses was changed from SCORING pattern to RANKING pattern. (This was done after facing the difficulties in getting the responses from the students during our pilot survey).

The main questionnaire in the final form (enclosed in Appendix) has three sections. The following section gives the structure of questionnaire in brief.

2.6.1 STRUCTURE OF MAIN QUESTIONNAIRE:

SECTION 1 : contains questions on (A) Personal background (B) Economic background of the family (C) Educational background of the parents (D) Occupational background of the parents (E) Type of school/college in which the student is studying (F) Name of the Boards/university of the school/college (affiliated to) (G) Medium of instruction (H) Choice of the stream by students (I) 'Change of stream at school/college level.

SECTION 2 : contains questions on (A) Given a chance, attitude of the students (B) Job opportunities with each of the streams (C) Reasons for OPTING science stream (D) Reasons for OPTING Commerce stream (E) Reason for OPTING Arts Stream (F) REASONS FOR NOT OPTING SCIENCE STREAM.

SECTION 3 : is descriptive where students are asked : what should be done in short/term long term to attract bright students to opt 'for' Science stream ?

2.7.: PILOT SURVEY:

A pilot survey was conducted in some of the schools/colleges of RAJKOT city in Gujarat state. Approximately 268 students were contacted with questionnaire, in which students were asked to answer the questions in SCORING pattern on a 5(Five) points scale for section-2 of the questionnaire. But it was difficult to get the response from in this format from the SCHOOL level students. Even in many cases students from the COLLEGE level were also unable to answer the questions in the scoring pattern so, the whole questionnaire pattern for section-2 was changed into RANKING pattern i.e. the students were asked to read all the REASONS carefully for opting Science/Arts/Commerce and the REASONS for NOT opting science and they were simply asked to assign a rank in the order of preference in the boxes against each reason, '1' for the most important reason and so on '2', '3'…. etc. for the importance less than the earlier reason(s). So, pilot survey helped to modify the earlier questionnaire (used in pilot survey) and the final form is as provided in the Appendix. The result for pilot survey more or less tallied with the outcomes (results) of the final survey. Hence the findings are not presented separately. All the findings are given in the CHAPTER-5 (devoted to Gujarat state).

Fig. 1 : DISTRIBUTION OF <u>SCHOOL</u> STUDENTS WITH RESPECT TO THE CATEGORIES OF SCHOOL.
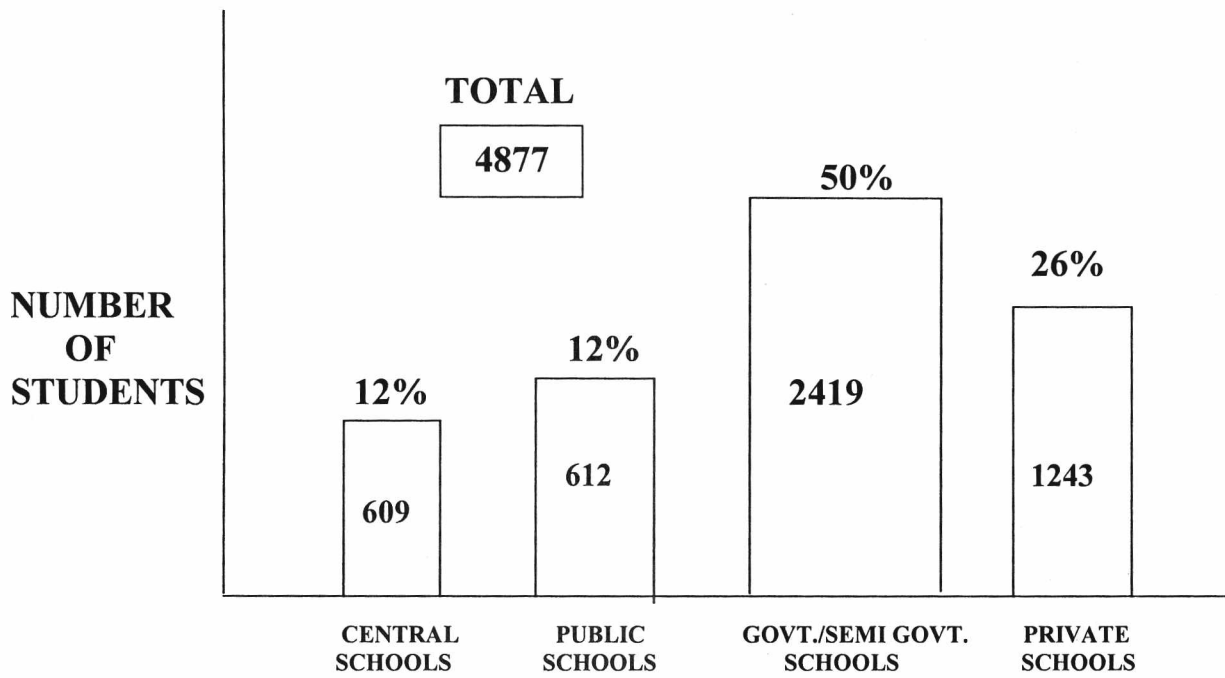
Out of the total sample of students approximately 12% students were sampled from central schools, an equal amount percentage i.e. approximately 12% of the students came from Public schools. Maximum number of students came from Government/Semi-Government schools approximately 50% (as the number of schools in this category was maximum). Finally around 26% of students came from the private schools.

Fig. 2 : DISTRIBUTION OF <u>COLLEGE</u> STUDENTS WITH RESPECT TO THE TYPE OF COLLEGE.
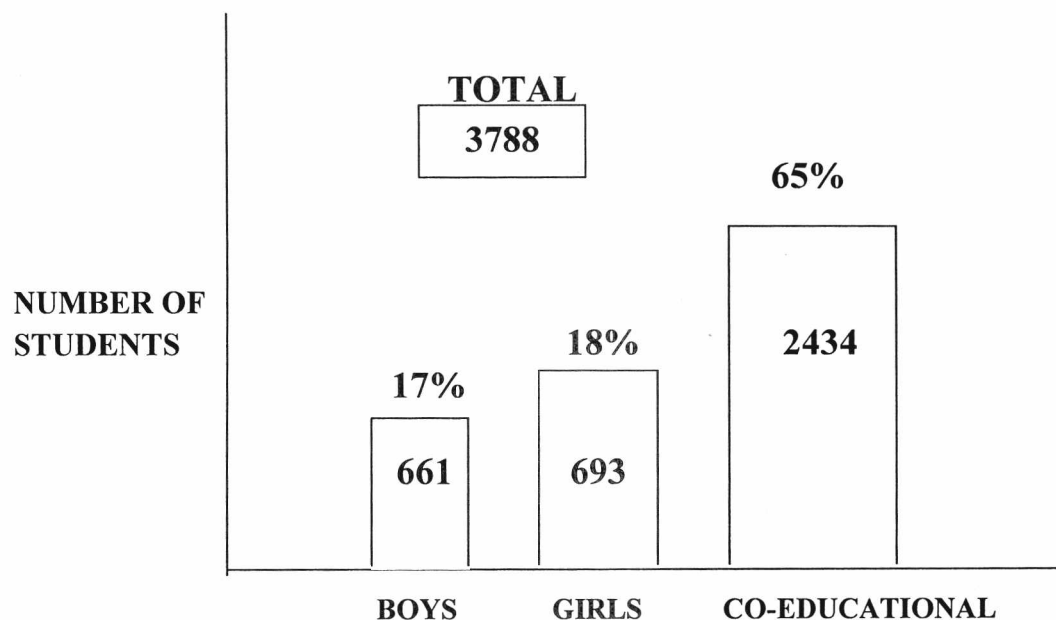
In the survey it was found that the number of co-educational colleges was maximum in every city, so highest percentage of students i.e. 65% of the total sample from college students came from this type of colleges. In many states (covered in the survey) and in the cities in those states, the number of girls colleges and boys colleges vary in numbers so, approximately 17% of the students constituted the sample from BOYS college and the remaining 18% of the students came from the GIRLS colleges.

CHAPTER –3

CREATING DATA FILES FOR STATISTICAL ANALYSIS

3.1 DATA ENTRY FROM QUESTIONNAIRE:

We have mentioned in the previous chapter, that the data has been collected on a structured printed questionnaire (see Appendix). The response in the questionnaire has been: qualitative/quantitative/Binary/text form data etc. As the types of data are different in nature and require proper arrangements to make data files in a form to enable the preparation of tables, graphs and to perform any statistical analysis. This has been done carefully and we have provided in the Appendix, the whole set-up for data structure.

3.2 DATA MANAGEMENT FROM QUESTIONNAIRE AT SCHOOL LEVEL/COLLEGE LEVEL:

The response received from all the students in different questionnaires has been codified so as to facilitate the statistical analysis using softwares at the top of every questionnaire there is a box like: identity code:

where the first two boxes represent the state, next two the city, one box for school/college students and the rest three for the serial number etc. for example

| G | J | R | J | S | 0 | 0 | 1 |

Represent a school student from Rajkot city in Gujarat state. Similarly

| R | J | U | D | C | 0 | 0 | 1 |

Represents a student from college from Udaipur city in Rajasthan state.

3.2.1. FILES FROM DATA:

Data collected from school/college students from the 3 sections of the questionnaire are entered in Microsoft EXCEL files, one for each section.

SECTION 1 is the largest section and has tables on several aspects under the heading 'personal information' ranging from educational, socio-economic background of the students family to occupational background of the parents. The EXCEL files contain variables in order of the column in a row and next come various columns of the next row in a table on printed questionnaire.

3.3. PREPARATION OF FORMAT FOR DATA MANAGEMENT:

The data given by students in the questionnaire as per the instructions contained there in are transferred in EXCEL and SPSS files to prepare the tables and to use for other statistical analyses (see Appendix-II).

3.4 SOFTWARES USED FOR STATISTICAL ANALYSIS:

MS-word, MS-EXCEL and SPSS (version 10th) have been used for preparation of tables. For the statistical analysis (Principal component, Kendall's W and X^2) SPSS is used.

3.5 STATISTICAL TOOLS:

(A) KENDALL'S COEFFICENT OF CONCORDANCE :

Kendall's coefficient of concordance, represented by symbol W, is an important non-parametric measure of relationship. It is used for determining the degree of association among several (K) sets of rankings of N objects (or individuals). This coefficient is considered an appropriate measure of studying the degree of

association among three or more sets of ranking. This descriptive measure of the 'agreement' has special applications in providing standard method of ordering objects according to consensus when we do not have an objective ordering of the objects.

BASIS : The basis of Kendall's coefficient of concordance is to imagine how the given data would look if there were <u>NO</u> agreement among several sets of rankings, and then to imaging how it would look if there were <u>perfect</u> agreement among several sets.

Significant value of W may be interpreted an understood as if the person ('Judges') are applying essentially the some standard in ranking N objects ('Reasons' her) under consideration, but this should <u>never</u> mean that the orderings observed are correct for the simple reason that all the persons (Judges) can agree in ordering objects because they all <u>might</u> employ 'wrong' criterion. Kendall, therefore, suggests that the best estimate of the 'true' rankings of N (reasons) objects is provided, when W is significant, by the order of various sums of ranks, Rj (say). If one accepts the criterion which the various persons (Judges) have agreed upon, then the best estimate of the 'true' ranking is provided by the order of sums of ranks. Best of 'agreement' is related to the <u>LOWEST</u> value observed amongst Rj.

(B) PRINCIPAL COMPONENT ANALYSIS (PCA) :

An approach to factor analysis that considers the total variance in the data. The diagonal of the correlation matrix consists of unities, and full variance is brought into factor matrix. PCA is found to be useful (recommended) when the primary concern is to determine the minimum of factors that will account for maximum

variance in the data, for use in subsequent multivariate analysis. The factors are called principal components.

- (i) **DETERMINATION BASED ON PERCENTAGE OF VARIANCE :**
  In this approach the number of factors extracted is determined so that the cumulative percentage of variance extracted by factors reaches a satisfactory level. What level of variance is satisfactory depends upon the problem. However, it is recommended that the factors extracted should account for atleast 60% (sixty)% of the variance.

- (ii) **ORTHOGONAL ROTAION** : Rotation of factors in which axes are maintained at right angles.

- (iii) **VARIMAX PROCEDURE** :
  An orthogonal method of factor rotation that minimizes the number of variables with high loadings on a factors, thereby enhancing the interpretability of the factors.

(C) χ^2 **TEST (S)** : Standard statistical tool.

CHAPTER – 4

BACKGROUND OF STUDENT

4.1 FAMILY BACKGROUND:

Student's family background plays an important role in selection of a particular stream by students, in the present study for family back-ground of the students, we have taken into consideration: Income of family (per month), occupational background of parents, educational background of the parents. In different sections of this chapter, we have presented various tables of distribution of students with respect to family background, also we have covered the distribution of students with respect to different categories of schools, various types of colleges and the different boards of examinations. All this information is collected from students in section-1 of the questionnaire.

Table 4.1.1.: DISTRIBUTION OF THE SCHOOL STUDENTS WITH RESPECT TO INCOME OF FAMILY PER MONTH

		NUMBER OF STUDENTS		
PRESENT CLASS 11th	**INCOME OF THE FAMILY**	**YES**	**NO**	**TOTAL**
	Below 10,000/-	77 (46%)	88 (54%)	166
	Between 10,000/- to 20,000/-	1229 (45%)	1443 (55%)	2674
	Between 20,000/- to 30,000/-	226 (54%)	192 (46%)	418
	30,000/- & above	187 (46%)	217 (54%)	405
	TOTAL	**2373**	**2499**	**4877**

Family income means earnings by parents (mother & father). The table 4.1.1 gives the frequency distribution of students with respect to family income and response to the question: was science education your first choice? (while deciding abut the

career) looking at the table it is observed that in almost all the income groups approximately 46% of the students preferred for Science stream and 54% of the students did not opt for Science stream. It is only the income group 20,000/- to 30,000/- where the percentages are 54% for opting science and 46% students said no for science as the first choice.

Table 4.1.2.: DISTRIBUTION OF <u>COLLEGE</u> STUDENTS WITH RESPECT TO INCOME OF FAMILY PER MONTH

FIRST YEAR COLLEGE	INCOME OF THE FAMILY (in Rs.)	NUMBER OF STUDENTS		
		YES	NO	TOTAL
	Below 10,000/-	870 (53%)	739 (37%)	1621
	Between 10,000/- to 20,000/-	363 (48%)	381 (52%)	748
	Between 20,000/- to 30,000/-	95 (39%)	142 (61%)	239
	30,000/- & above	54 (36%)	96 (64%)	150
	TOTAL	**1415**	**1394**	**2828**

The above table reveals that for the students whose parents fall in higher income group i.e. 30,000/- and above have less preference for science subjects only 36% answering in 'YES' to the response of the question about their 'First' choice as the Science stream.

Fig. 4.1.1.   **Income of family**

Number of school students

SCHOOL

166   2674   418   405

below 10000   10000-20000   20000-30000   30000 &above

Fig. 4.1.2   **Income of family**

Number of College students

below 10,000	10,000-20,000	20,000-30,000	30,000 &above
1621	748	239	150
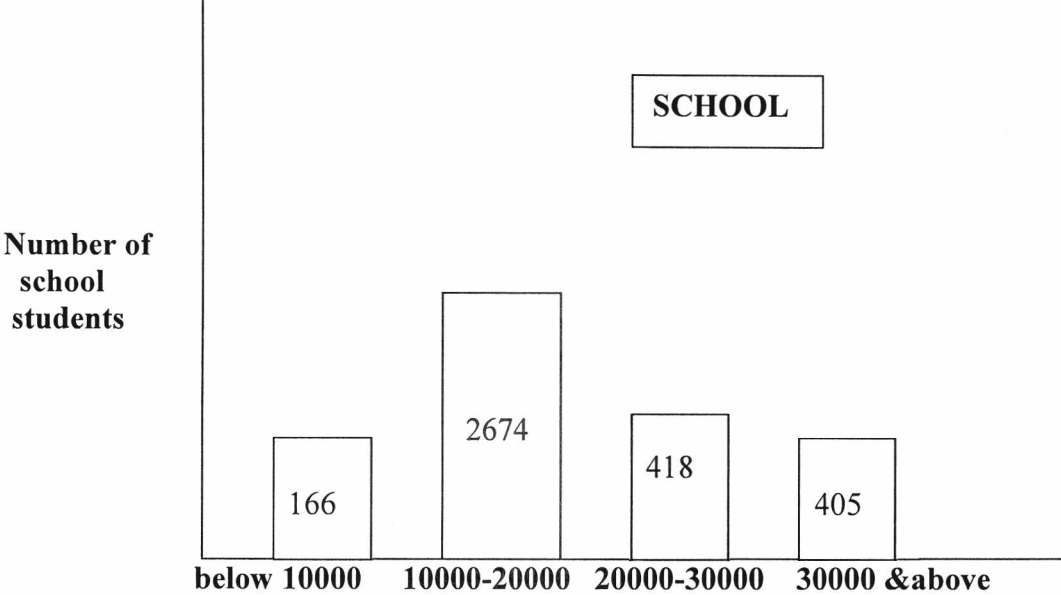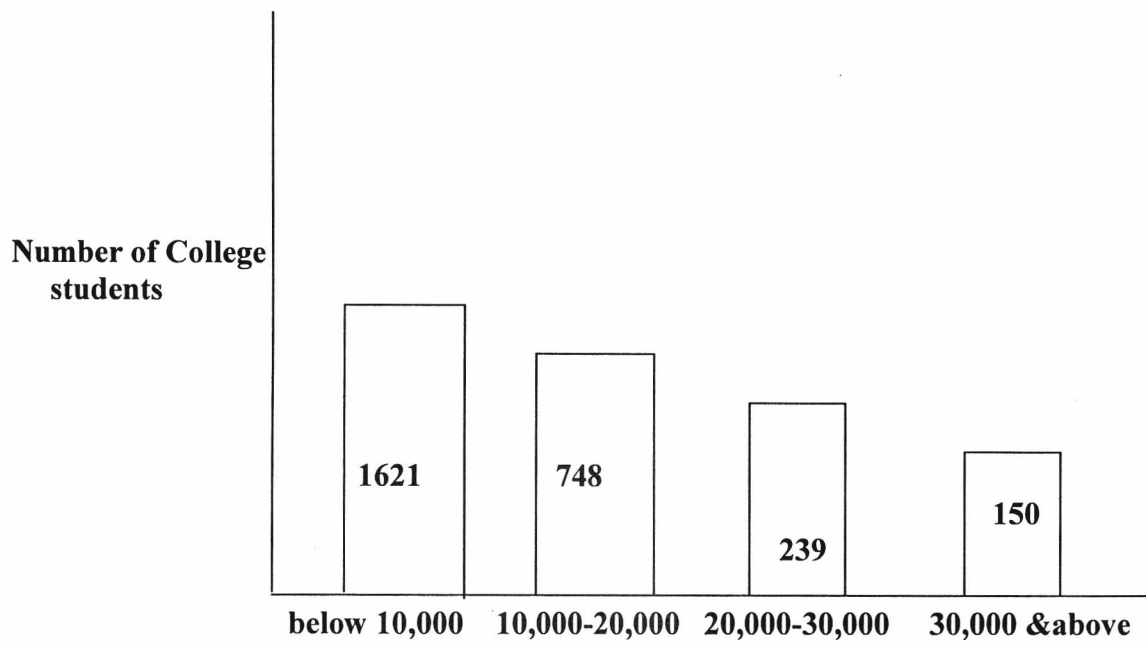
4.2.   EDUCATION OF FATHER/MOTHER

Table 4.2.1.: DISTRIBUTION OF STUDENTS WITH RESPECT TO EDUCATIONAL BACKGROUND OF PARENTS

			YES	NO	TOTAL
11th Standard	Educational stream of	Science	994 (63%)	566 (37%)	1561
	Father	Commerce	531 (39%)	824 (61%)	1356
		Arts	490 (46%)	551 (54%)	1043
		Others	306 (38%)	480 (62%)	786
		* included professional & technical lines			
		TOTAL	2373	2499	4877
	Mother	Science	272 (62%)	163 (38%)	435
		Commerce	308 (47%)	335 (53%)	644
		Arts	868 (49%)	891 (51%)	1760
	TOTAL	* Others	648 (44%)	817 (56%)	1466
		* Housewife, house hold works etc.			

From the above table it is observed that 63% of the students expressed their willingness to 'opt' for the Science stream whose father's stream was science whereas almost 62% of the students showed inclination towards Science stream. Whose mother had Science stream background. However for science education as the first choice of students had a considerable percentage of their parents with 'Arts' background. In totality students having parental background with science or Arts Stream had shown inclination 'towards' the Science stream.

Fig. 4.2.1. : PERCENTAGEWISE DISTRIBUTION OF STUDENT'S CHOICE FOR SCIENCE WITH RESPECT TO EDUCATIONAL STREAM OF MOTHER

MOTHER

No. of students

YES 62%		YES 4 9%	YES 44%
NO 38%	YES 47%	NO 51%	NO 56%
	NO 53%		

Science   Arts   Commerce   Others

Fig. 4.2.1. : PERCENTAGEWISE DISTRIBUTION OF STUDENT'S CHOICE FOR SCIENCE WITH RESPECT TO EDUCATIONAL STREAM OF FATHER

FATHER

No. of students

	Science	Arts	Commerce	Others
NO	37%	61%	54%	62%
YES	63%	39%	46%	38%
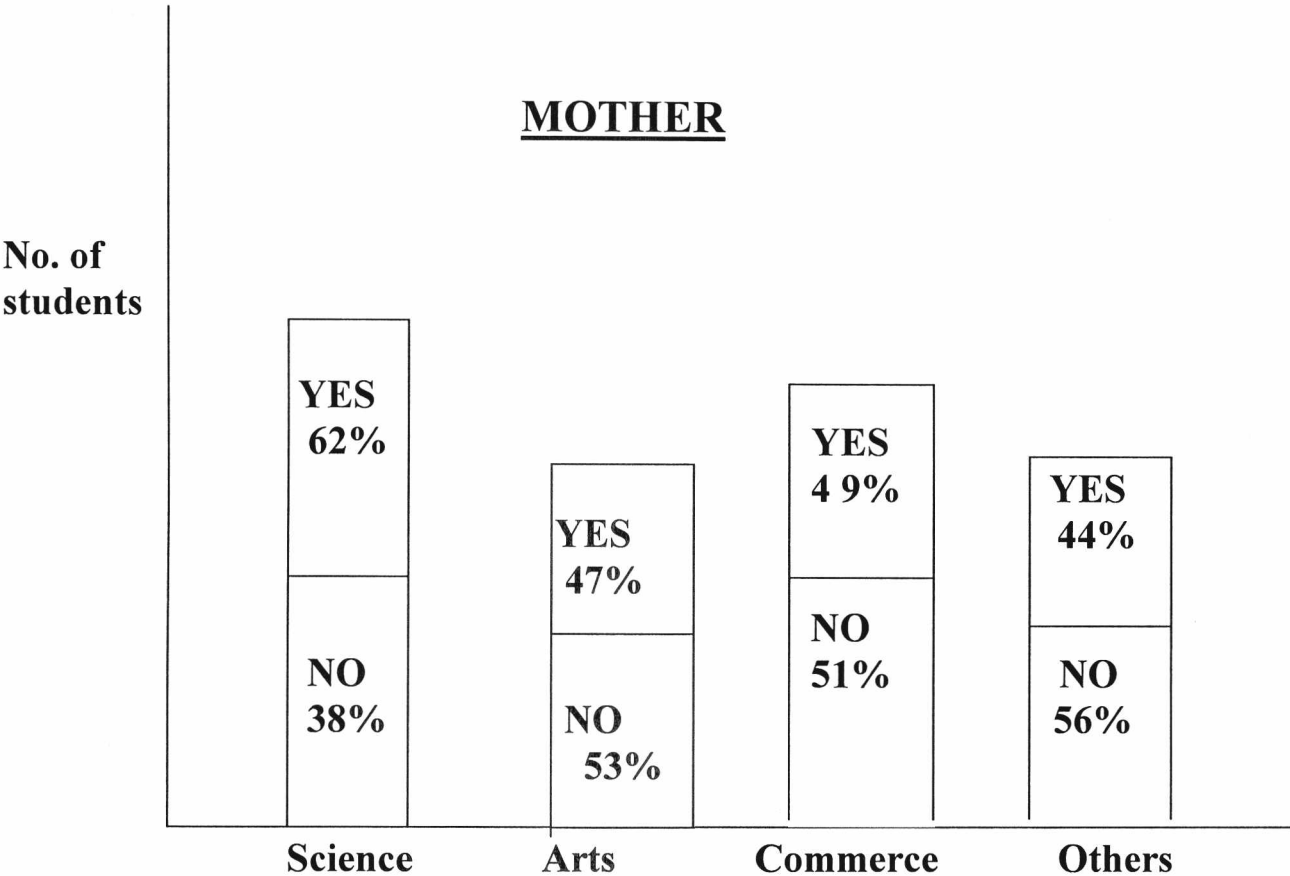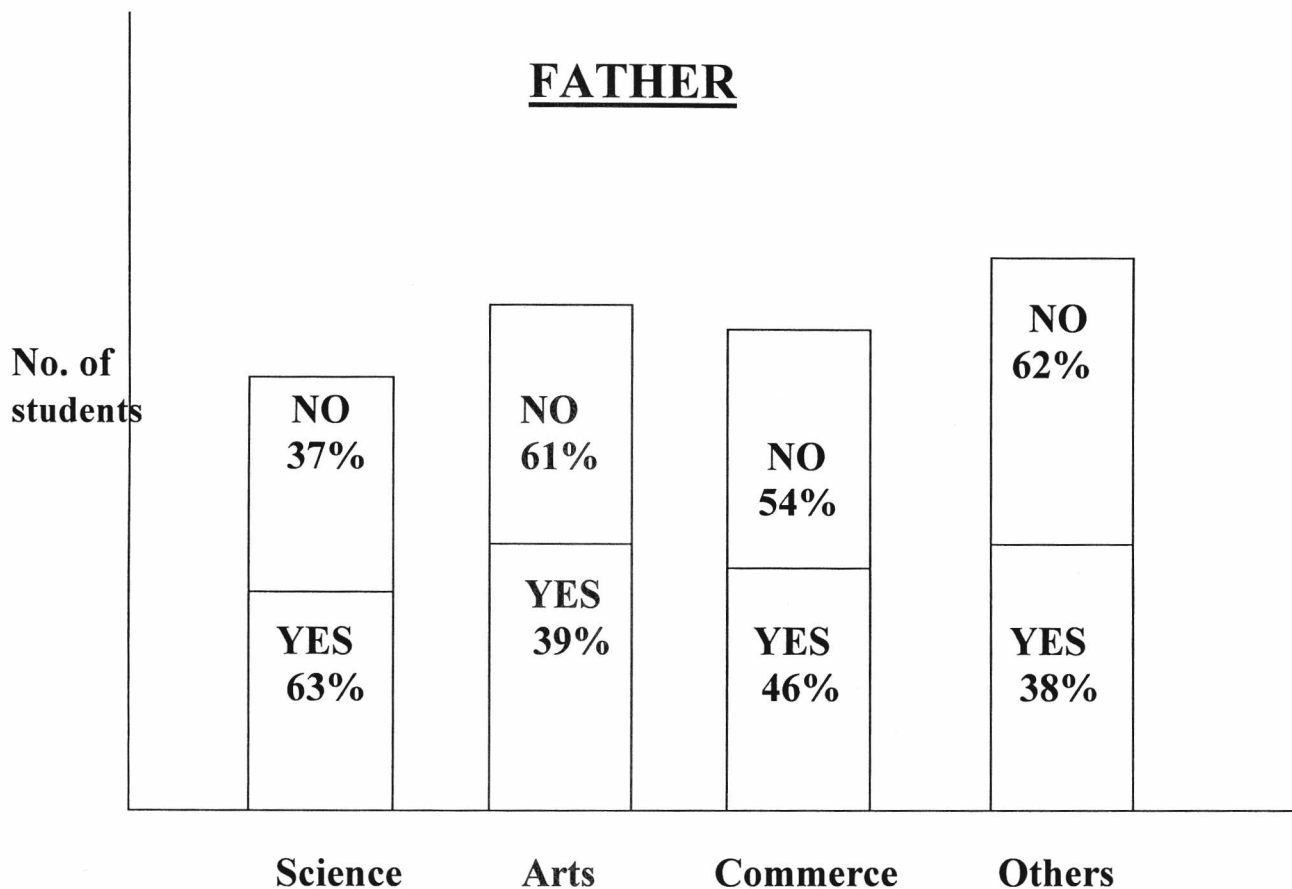
Table 4.2.2.:

			YES	NO	TOTAL
F.Y. COLLEGE	Educational stream of	Science	424 (55%)	341 (45%)	765
	Father	Commerce	277 (42%)	385 (58%)	662
		Arts	455 (53%)	408 (47%)	863
		Others	223 (52%)	205 (48%)	428
		TOTAL	**2373**	**2499**	**2828**
	Mother	Science	81 (45%)	98 (55%)	179
		Commerce	78 (40%)	113 (59%)	193
		Arts	595 (50%)	591 (50%)	1194
	TOTAL	*Others	437 (53%)	383 (46%)	827
		* included professional & technical lines			

From the above table it is observed that at the first year college 55% of the students pursuing science as a first choice of their career had their father's education stream as science while 45% of the students had their mother's educational background as the Science stream

DISTRIBUTION OF STUDENTS IN DIFFERENT STREAMS WITH RESPECT TO EDUCATION OF <u>FATHER</u>

Fig. 4.2.2 :
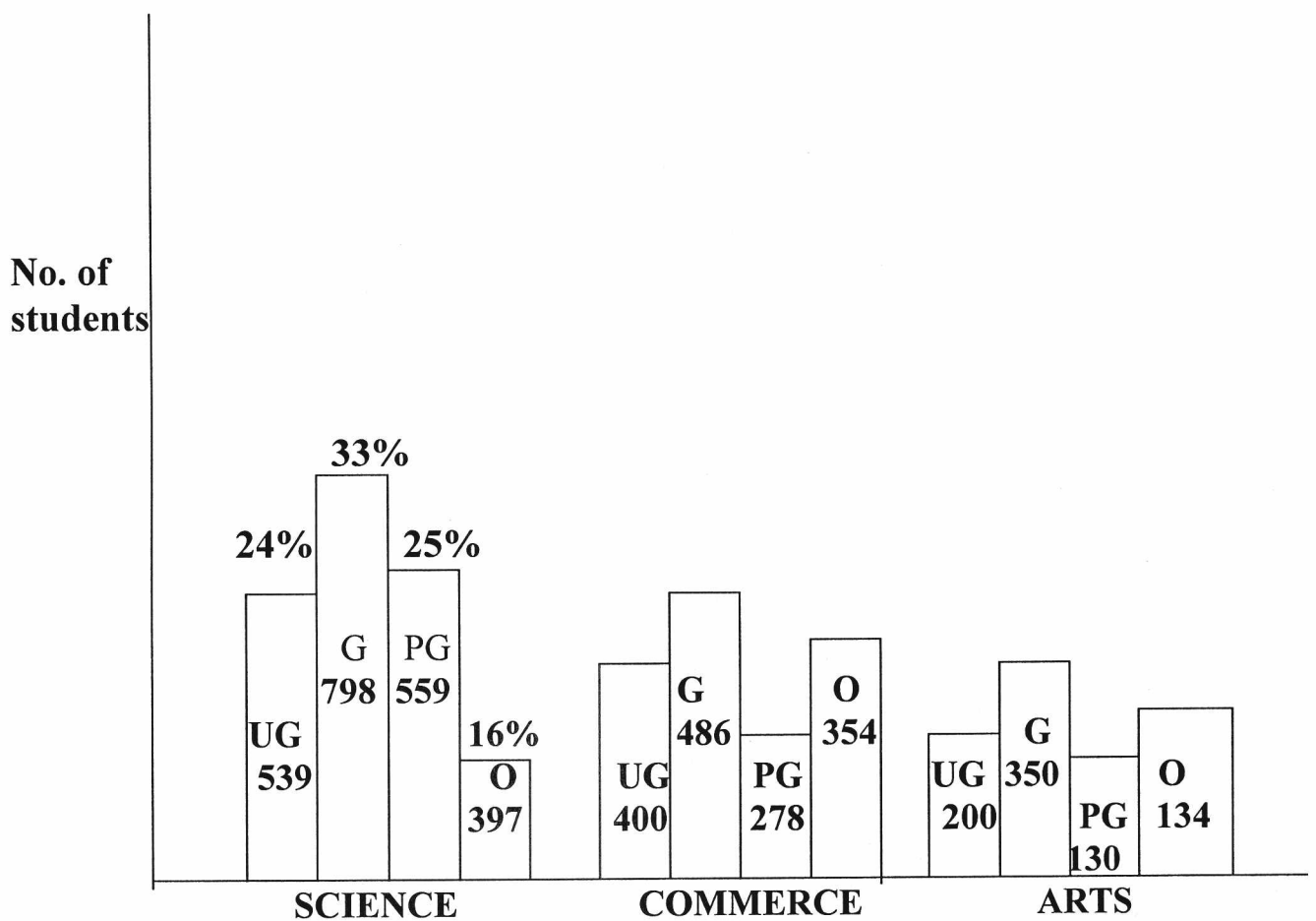
UG : Under graduate
PG : post Graduate
G : Graduate
O : Others

It is observed that 33% of the students with their father's science educational background offer for the science. This being highest % for graduate degree holders.

DISTRIBUTION OF STUDENTS IN DIFFERENT STREAMS WITH RESPECT TO EDUCATION OF <u>MOTHER</u>

Fig. 4.2.3
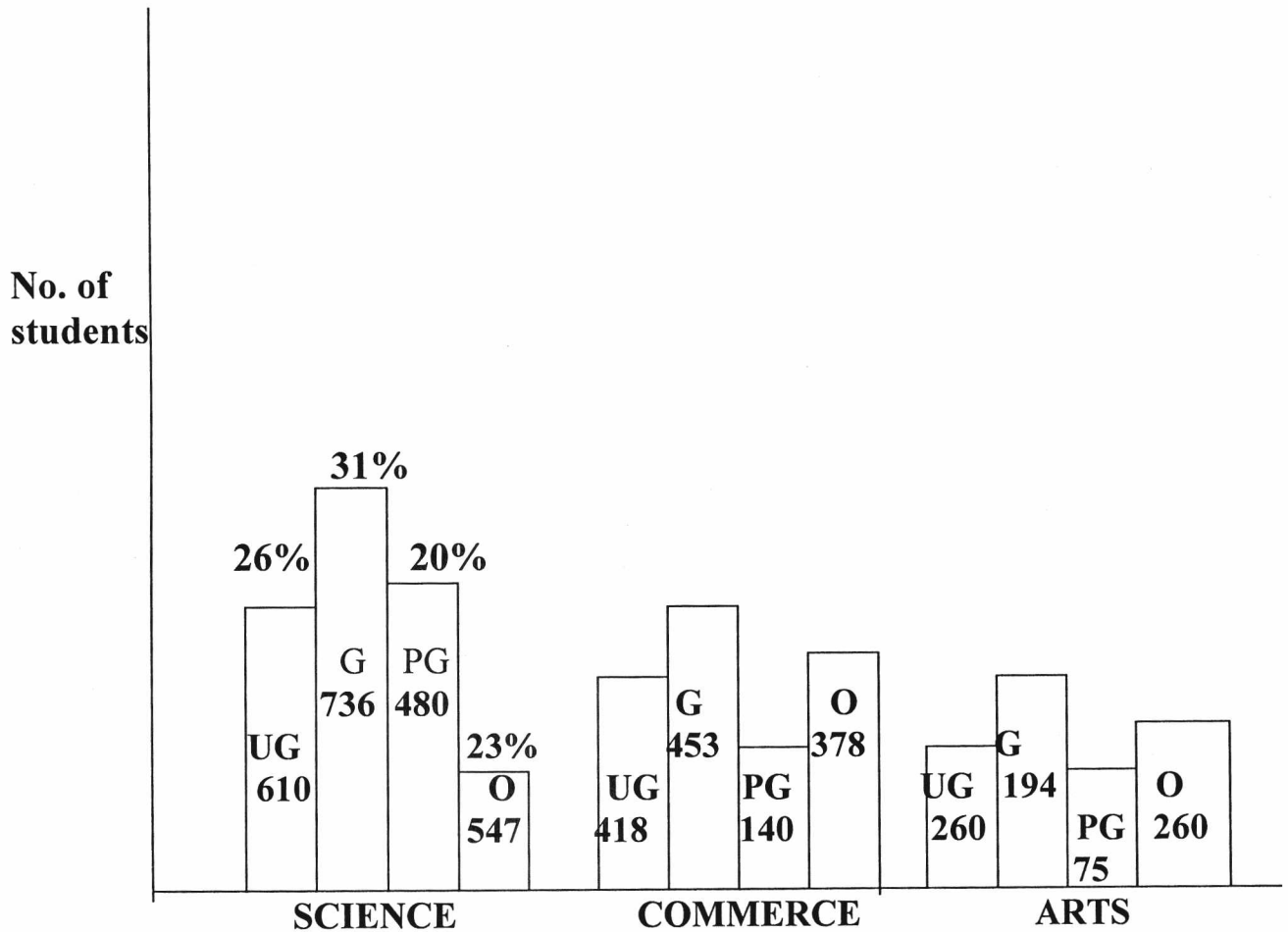
UG : Under graduate
PG : post Graduate
G : Graduate
O : Others

It is observed that 31% of the students opted for Science stream mothers were science graduates. It seems that the parent's education upto the GRADUATE level gives a proper guidance for their wards to select the Science stream.

4.3. DISTRIBUTION OF STUDENTS WITH RESPECT TO OCCUPATIONAL BACKGROUND OF THE PARENTS:

In this section we have classified the students with respect to their first choice for science education according to the occupation background of the parents. In this table the column for others incase of occupation father includes: Professionals, technical lines & semi-Govt. jobs etc. while, the other column in case of occupation mother includes: housewife, household works etc.

Table 4.3.1.:

		YES	NO	TOTAL
Occupation of Mother	Govt. Service	192 (62%)	113 (38%)	305
	Private Service	132	128	260
	Business	49	70	119
	Others	1701 (49%)	1745 (51%)	3446

Approximately 55% of the students willing to 'opt' for science stream had their father's occupation as: Govt. Service, while only 40% of the students having their first choice as science had a Business background for their fathers.

Occupation of mother as Govt. service encouraged almost 62% of the students to opt for Science stream only 41% of the students with their mother's occupational background as 'Business' were in favour of opting for Science stream as their first choice.

Fig. 4.3.1. : DISTRIBUTION STUDENTS WITH RESPECT TO OCCUPATIONAL BACKGROUND OF FATHER

NUMBER OF
STUDENTS

3111   1297   2143   1003

Govt. Service   Private   Business   Others
                 Service
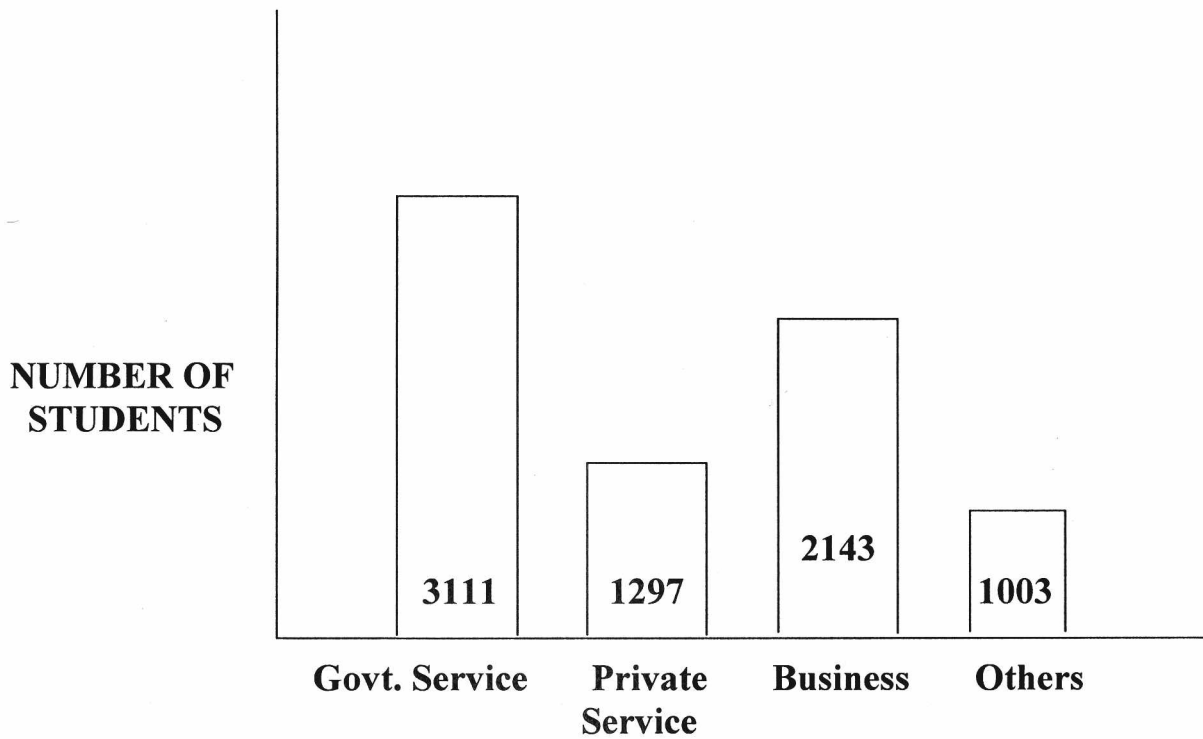
4.4 DISTRIBUTION OF STUDENTS WITH RESPECT CATAGORIES OF SCHOOL:

At 11th standard the students were selected from all the 5th states across 13(thirteen) cities the total sample of 4877 students were sampled this included both boys and girls from all the three streams (Arts/Science/Commerce), who opted for science as first choice. The following table provides the distribution of students with respect to school categories and Science stream as their first choice.

Table 4.4.1.:

11th Standard	SCHOOL CATEGORY	NUMBER OF STUDENTS		
		YES	NO	TOTAL
	Public School	293 (47%)	319 (53%)	612
	Central School	331(54%)	276 (46%)	609
	Govt./Semi Govt. School	1055 (43%)	1363 (57%)	2419
	Private	694 (56%)	541 (44%)	1237
	TOTAL	2373	2499	4877

From the above table it is clear that 56% students studying in private schools preferred to opt for science, next it was followed by the students studying in Central Schools 54% students opting for Science stream. (may be due to better facilities of laboratories/infrastructure of these categories of schools).

4.5 DISTRIBUTION OF STUDENTS WITH RESPECT TO TYPE OF COLLEGE:

At the first year college level students were sampled from the Boys/Girls/co-educational colleges. A total of 3788 students were selected. The following table gives the distribution of students with respect to their choice for Science stream.

Table 4.5.1.:

(FIRST YEAR) COLLEGE CATEGORY	YES	NO	TOTAL
BOYS	179 (63%)	103 (37%)	282
GIRLS	213 (39%)	319 (61%)	536
CO-EDUCATIONAL	1023 (50%)	972 (50%)	2010
TOTAL	**1415**	**1394**	**2828**

From the above table it is evident that 63% of students form BOY'S College (MALE) preferred opt for Science stream while 39% of the Girls college students expressed their willingness to opt for Science stream and hence 61% of the Girl's did not like to opt for Science stream. Whereas in the co-educational colleges it was approximately 50% of the students whose first choice was Science stream.

4.6 DISTRIBUTION OF STUDENTS WITH RESPECT TO BOARDS

The students at 11th standard appear in their exams with respective state boards of with a uniform pattern of CBSE. The following gives a distribution of the same. Here the state boards include Gujarat board/Rajasthan Board/U.P. Board/U.A. Board and CBSE pattern (and in same case ICSE Board) 43% of the students came from CBSE/ICSE boards and 57% of the students belonged to state boards. Fig. 5 gives a break-up of total 'school students'.

Fig. 4.6.1: PERCENTAGEWISE DISTRIBUTION OF STUDENTS WITH RESPECT TO BOARDS
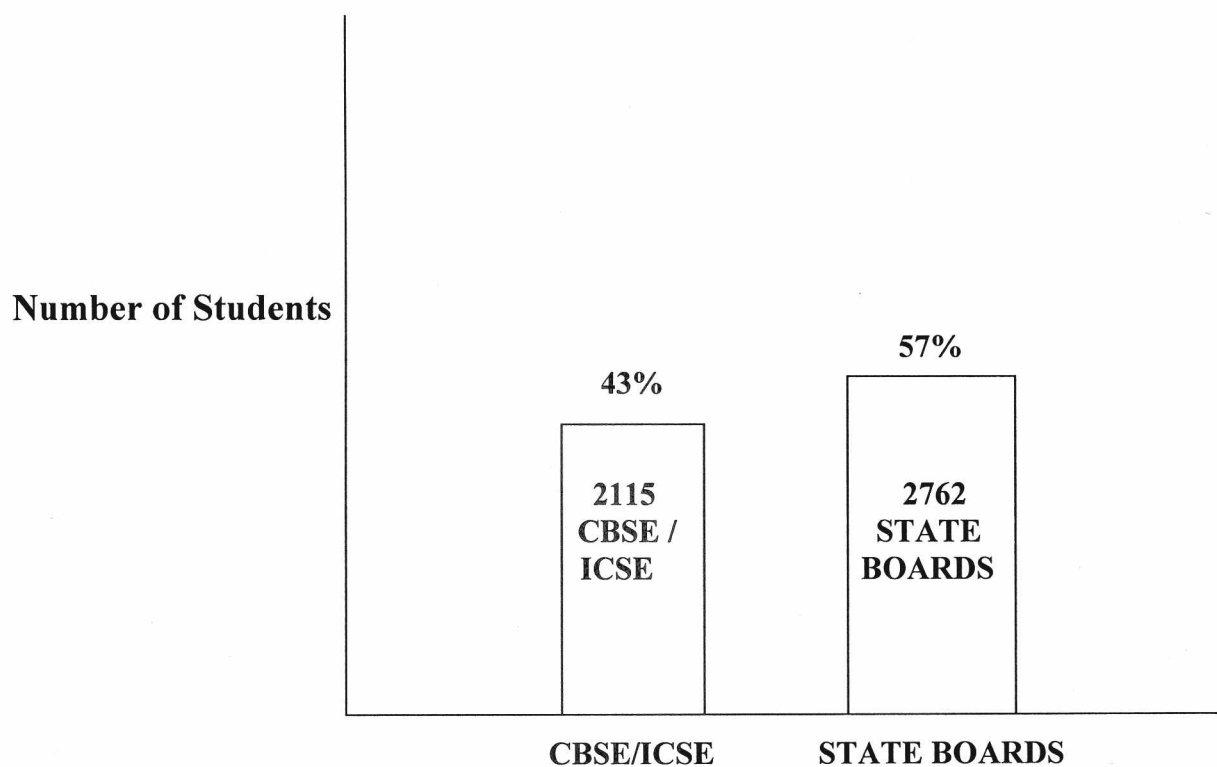
- CBSE/ICSE: Board only at some schools/places, particularly in the public schools of Uttranchal.

- State Boards: includes the boards of U.P./U.A./Gujarat/Rajasthan Boards.

CHAPTER –5

5.1 BRIEF STATE PROFILE: Gujarat is one of the most important state in western region of our country. It has a population of about 5 crores. Famous as the land of Gandhiji & Lord Krishna. This state has its unique character of worldwide connections in almost all the field including education. Following data is reproduced from the census of India. (www.censusindia.net.in). The state has 25 districts with some of its major cities: Ahmedabad, Surat, Baroda, Rajkot, Porbandar, Jamnagar, Bhavnagar etc. As outlined earlier that the present study covers some major cities within state. In the next section we have outlined the cities surveyed along with a list of school/colleges covered from these cities.

5.2 CITIES SURVEYED: As discussed in the introduction chapter we have selected some of the cities in the state. In Gujarat states the selected cities are: Ahmedabad, Surat, Baroda & Rajkot. The following table provides a list of schools & colleges. The students from these schools/colleges were selected according to the sampling design described in the introduction chapter for schools/colleges. A total of **1041** students from the schools & 599 students were selected from the colleges making a total of **1640** students in all from the whole state across four cities.

5.3.: DISTRIBUTION OF STUDENTS WITH RESPECT TO CHANGING TRENDS AT SCHOOL/COLLEGE LEVEL.

The tables 5.3.1. & 5.3.2 provide the distribution of students in schools and colleges of the four cities as regards to the quick measure of inclination of students towards Science stream the two tables summarize the response of students to the question: was Science education your first choice?

Table 5.3.1: DISTRIBUTION OF <u>SCHOOL</u> STUDENTS WITH RESPECT TO SCIENCE STREAM AS FIRST CHOICE

	NUMBER OF STUDENTS		
CITIES	YES	NO	TOTAL
AHMEDABAD	142	122	264
BARODA	144	57	201
SURAT	176	155	331
TOTAL	593 (58%)	447 (42%)	1041

From the above table it is clear that 58% of the students preferred science as their first choice and 42% of the students expressed, NO for their first choice.

Table 5.3.2: DISTRIBUTION OF <u>COLLEGE</u> STUDENTS WITH RESPECT TO SCIENCE AS FIRST CHOICE

	NUMBER OF STUDENTS		
CITIES	YES	NO	TOTAL
AHMEDABAD	85	96	182
BARODA	51	72	124
SURAT	74	76	152
TOTAL	269 (44%)	321 (56%)	599

44% of the students at college level expressed their yes with Science stream as 1st choice and 56% of the students expressed their unwillingness for science as first choice.

**Table 5.3.3.: INTRA STATE COMPARISON
(BETWEEN CITIES COMPARISON)**

City	11th Standard stream			First year college stream				
	Arts	Science	Comme-rce	Arts	Science	Appl. science	Manage-ment	Comme-rce
Ahmedabad	5%	42%	53%	4%	23%	15%	28%	34%
Baroda	4%	58%	38%	4%	28%	17%	17%	34%
Surat	6%	39%	55%	4%	30%	7%	10%	49%
Rajkot	13%	41%	46%	3%	29%	6%	17%	35%

The above table provides the declining trends from different streams at school level (11th standards to college level (F.Y. Level).

5.4. WOULD YOU LIKE TO 'CHANGE' YOUR PRESENT STREAM?

(A) This question relates to section-2 of the questionnaire where in question 2.1, it was asked to the students that: Given a chance would you like to change the present stream? If yes, were would you like to so? Fig. 5.4.1. gives a 'projection' of students CITYWISE, both at school level and as well as at the college level. This refers to change from: science to Arts/commerce. Commerce to Arts and from Arts/Science/Commerce to Management courses. Science to Applied Sciences etc.

(B) WOULD YOU LIKE TO 'CHANGE' THE CURRENT STREAM

AHEMADABAD

Fig. 5.4.1.

'CHANGE'

PRESENT STREAM

WOULD BE RELATES TO ONLY YES PART
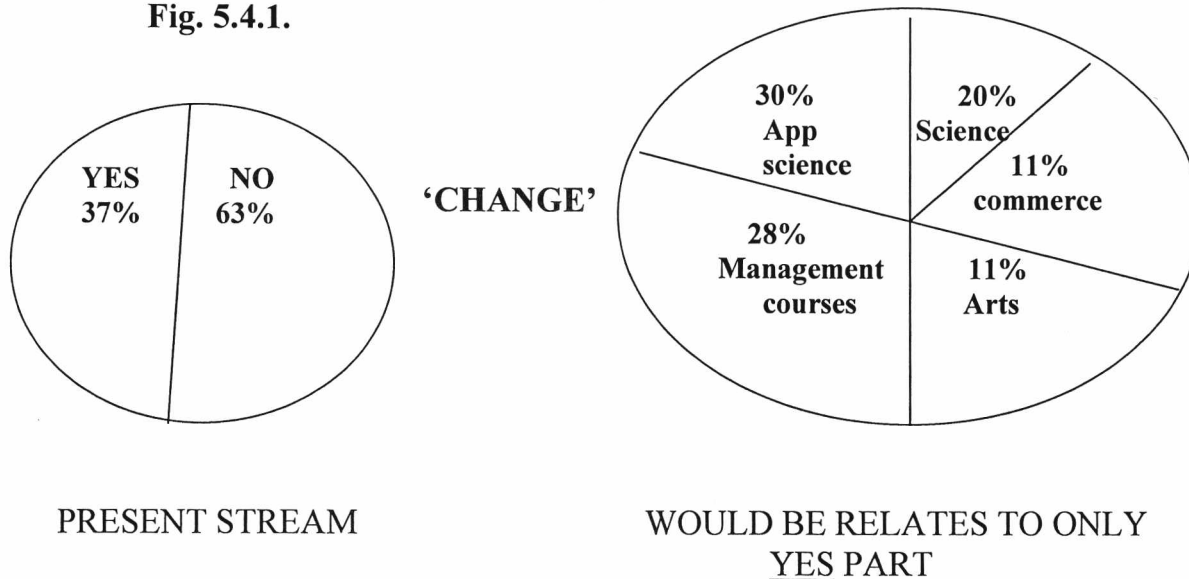
37% of change in distributed in above figure. The interpretation is that out of the 'change' 30% would opt for the Applied Science stream (say) in Ahmedabad the No. of students in colleges sampled is : 264 out of these 98 (approx) students would change the stream and 30% of this change i.e. approximately 30 students would opt of Applied Science courses, similarly around 28 students would opt for the Management courses.

Fig. 5.4.2:

BARODA

'CHANGE'

PRESENT STREAM

WOULD BE RELATES TO ONLY YES PART
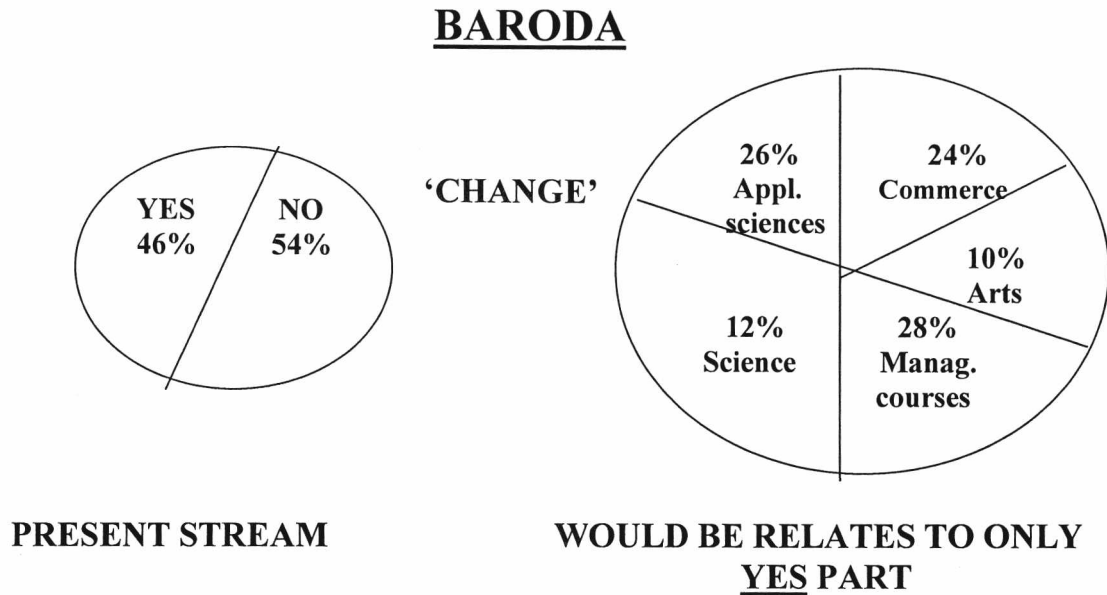
37% of change in distributed in terms of 100% to various branches. The interpretation is same.

Fig. 5.4.3.:   ## SURAT

PRESENT STREAM

WOULD BE RELATES TO ONLY YES PART
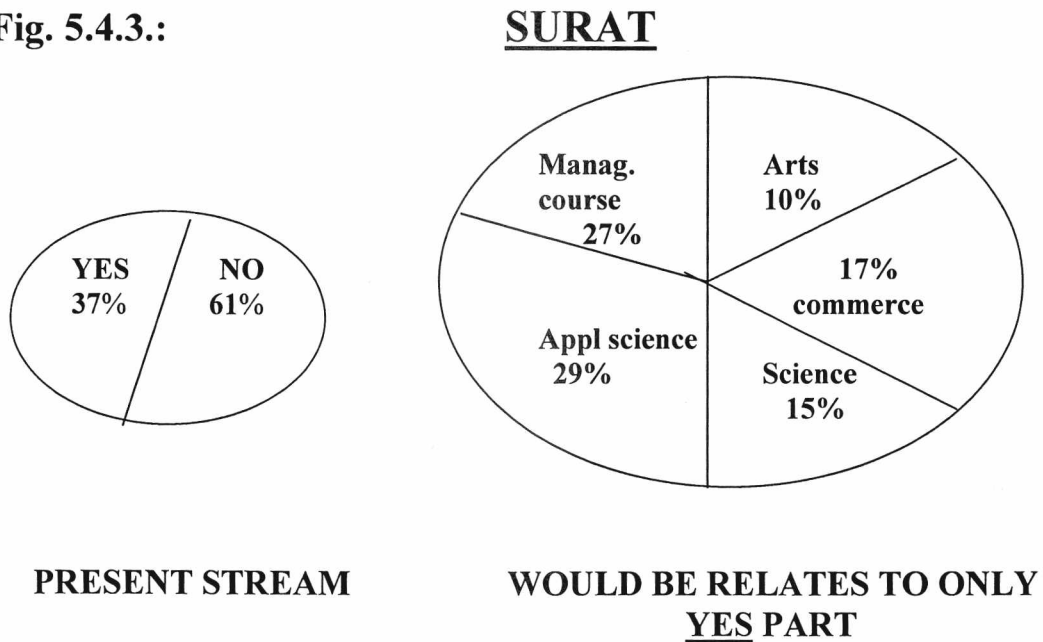
The students are willing to change their parent stream wish to join Applied science courses (29%) and to management courses (29%).

Fig. 5.4.4. :

RAJKOT

PRESENT STREAM

**WOULD BE RELATES TO ONLY
YES PART**
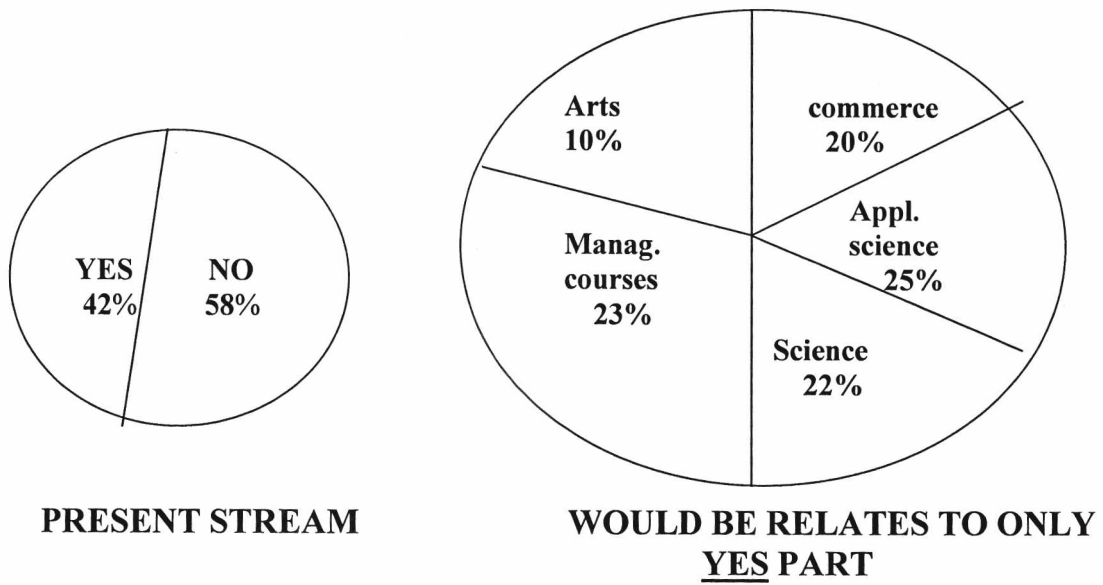
Maximum number of students are willing to join applied science courses (25%) followed by the option for the management courses.

5.5. DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT SCHOOL LEVEL

Fig. 5.5.1:

GUJARAT

| SCHOOL |

% OF STUDENTS

	SCIENCE STREAM	ARTS STREAM	COMMERCE STREAM
E	22%	12%	15%
G	38%	29%	34%
A	25%	37%	39%
P	15%	22%	12%

P : Poor
A : Average
G : Good
E : Excellent

DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT COLLEGE LEVEL

Fig. 5.5.2.

	COLLEGE	
% OF STUDENTS		

SCIENCE STREAM
E 14%
G 39%
A 23%
P 24%

ARTS STREAM
E 15%
G 35%
A 24%
P 26%

COMMERCE STREAM
E 18%
G 30%
A 41%
P 11%

P : Poor
A : Average
G : Good
E : Excellent
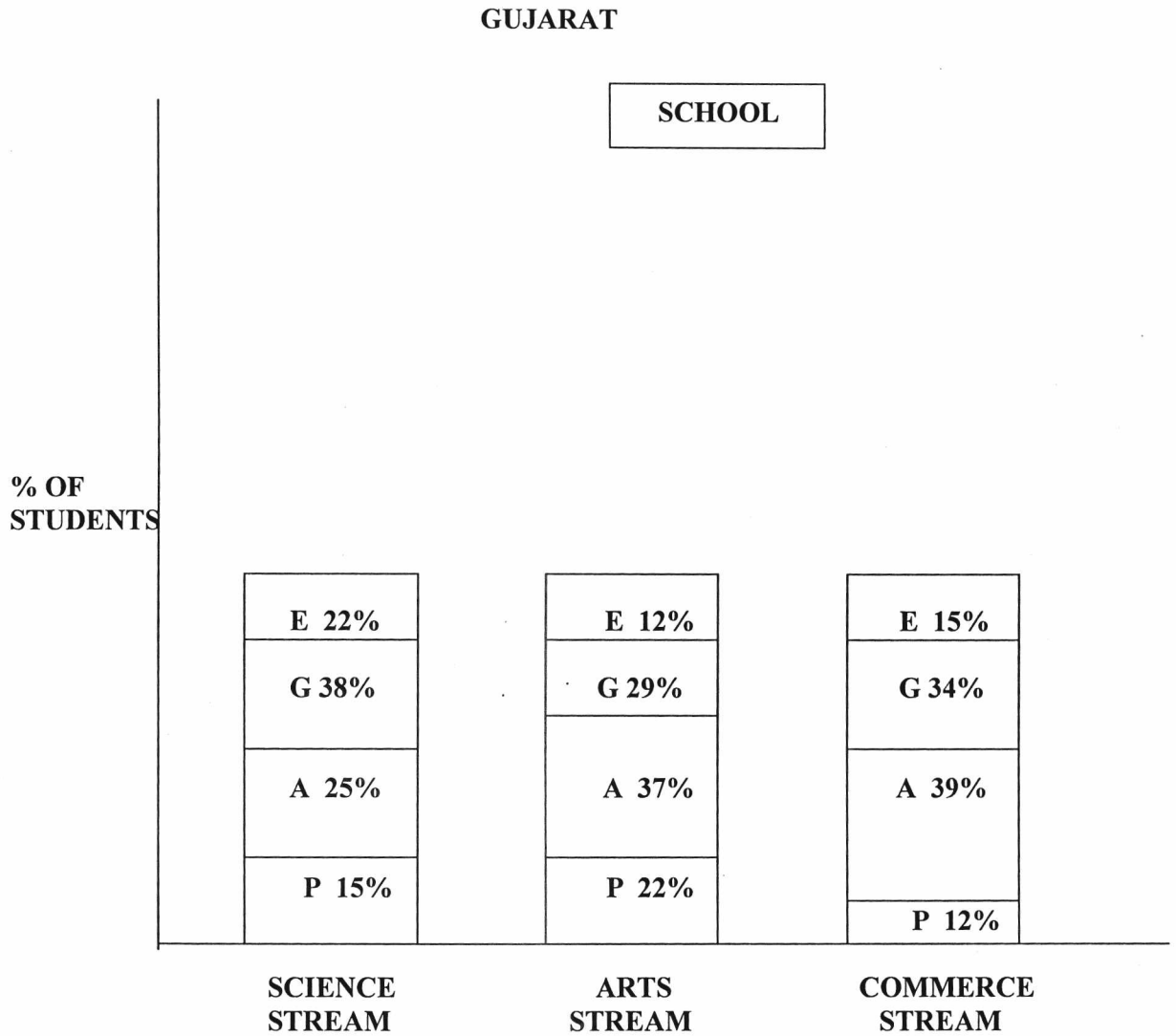
There is difference in the thoughts and perceptions of schools/colleges students with respect to job opportunities in different streams.

Only 15% students at school level feel that job opportunities are poor with Science stream, while this becomes 24% in the case of college students. Similar interpretations can be given to other steams at schools & college level.

5.6.: STATISTICAL ANALYSIS OF THE TOTAL DATA FOR GUJARAT STATE:

The following table gives a break-up of students at school/college level with respect to sex (Male/Female) in the various cities covered in this state.

TABLE 5.6.1:

CITY	11TH STANDARD			F.Y. COLLEGE		
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
AHMEDABAD	167	97	264	72	110	182
BARODA	109	92	201	44	80	124
SURAT	167	164	331	81	71	152
RAJKOT	106	19	245	42	99	141
TOTAL	549	492	1041	239	360	599 1640

The responses from these 1640 students were analyzed to find out 'reasons' responsible for the changing trends in science as a career. The main emphasis of this study is to identify the reasons for this happening and to analyze these reasons for their contribution towards this phenomena. For this the statistical tools of KENDALL'S W (coefficient of concordance) and the multivariate analysis of total data has been done using factor analysis (with principal component analysis approach) (1) Kendall's W is a technique which will help us to identify the most important reasons for the 'changing' trends. According to this a 'RANK SUM' is calculated for all the ranks given to different reasons from the students. The lower the Rank-sum, the more strong the reason. But this technique will not tell us about the respective contribution to the happening of 'CHANGE'. For this purpose help of multivariate technique (FACTOR ANALYSIS) is taken and this technique yields the percentage wise contribution to the TOTAL VARIANCE EXPLAINED According to the principal component analysis maximum variance explained by particular reason is the

highest contributor to the changing trend. We have analyzed the whole data for the STATE. It will be a matrix of the order (say) 19 X 1640 in response to the question (2.4) section-2 of the questionnaire. With the help of SPSS complete output of this analysis is produced here. From the analysis our findings are summarized in the following series of tables.

Table 5.6.2.: SHOWING THE DISTRIBUTION OF 'RANK SUM' FOR VARIOUS REASONS WITH RESPECT TO REASONS FOR OPTING SCIENCE

Sr. No.	REASONS	RANK SUM	
1.	Better Career goals	(1261)	Kendall's W = .490
2.	Natural Liking	(1854)	
3.	To pursue higher studies & research	(2186)	
4.	Motivated by teacher	(3441)	
5.	Social Pressure	(3800)	

The minimum rank sum in this table its for Better Career goals (1261). This implies that all the respondents agree to the reason 'Better career goals' as the most important reason for opting Science stream. Next, followed by Natural liking (1854) and so on for all the other reason.

The table above gives a complete list of all the reasons studied here with a hierarchical importance of these reasons. The highest 'RANK SUM' indicates that the 'concordance' of students is least for that reason i.e. most of the students 'differ' to agree that this reason is the most important one similarly the tables for other reasons are also given Kendall's W helps to get most important reasons but if does not fell us about the 'contribution' of these components (REASONS). Using THE PRINCIPAL COMPONENT analysis (PCA) and

applying varimax with Kaiser normalization, the rotated component matrix has been obtained in three different situations: (i) Applying the PCA approach to reasons responsible for opting science & reasons for NOT opting science (sections-2.4 & 2.7 of the questionnaire) (ii) Applying the PCA approach to the reasons responsible opting commerce stream & NOT the Science stream (sections 2.5 & 2.7) and (iii) Applying the PCA approach to the reasons responsible opting ARTS Stream and NOT the Science stream (section 2.6 & 2.7).

Table 5.6.3: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better Career Options	1993
2.	Professional degrees offered	2355
3.	Job Openings available	3256
4	Natural Liking	3362
5.	Encouraging 12th exam-board results	4009
6.	To pursue higher studies & research	4045
7.	Parental business	4045
8.	Easy course contents	4185

Kendall's - W = .266

Most important reason: Better career options

Table 5.6.4. : DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Personal liking	573
2.	Diversified career opportunities	728
3.	Study with job is possible	739
4.	Helps in competitive exams.	784
5.	To pursue higher studies & research	817
6.	Easy course contents	876
7.	Poor Numerical ability (Fear of maths)	1056

Most important reasons Personal liking
Kendall's W = .270

Table 5.6.5: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASONS	RANK SUM
1.	Tough Syllabus	6927
2.	Amount of Labour & time	7212
3.	Poor assessment & results of 12th standard	7908
4.	Expense in terms of coaching fees	8322
5.	Poor school teaching	10512
6.	Study with job is not possible	10727
7.	Lack of information about careers in science	11088
8.	NOT many respectful job openings	11190
9.	Experience of family members	11431
10.	Comparative economic return i.e. less	11831
11.	No encouragement for scientists in our country	11917
12.	Poor numerical ability	13408
13.	NOT good optional subjects for competitive exams.	14913
14.	Size of the family	14925

Most important reason (for this state): Tough syllabus
Kendall's - W = .218

TABLE 5.6.6.: PCA OUTPUT FOR DIFFERENT REASONS RESPONSIBLE FOR 'TISAC'

Sr. No.	REASONS (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career goals & Natural liking (+ve)	10.348%
2.	Amount of labour & time and tough syllabus	9.641%
3.	Social Pressure & Honour in society (+ve)	8.155%
4.	Poor assessment & result of 12th standard & poor school teaching (-ve)	7.566%
5.	To Pursue higher studies & research & motivated by teacher (+ve)	6.470%
6.	Study with job is not possible, lack of information about careers in science (-ve)	6.128%
7.	Expense in terms of coaching fees & NOT many respectful job openings (-ve)	5.636%
8.	Comparative economic return is less, experience of family members (-ve)	5.183%
	TOTAL VARIANCE EXPLAINED	**59.126%**

INTERPRETATIONS:

Components −1 (i.e. Better career goals & & Natural liking account for 10.348% towards the total variance explained) and so on. The total variance explained is : 59.126% i.e. out of the total 59.126% of happening to the phenomenon, these components put together explain the variability to the extent of 10.348% and rest of the unexplained variation may be due several other reasons (components) covered/not covered in the study. Positive (+) sign indicates an inclination towards the stream, whereas (-) Negative sign indicates the inclination 'away' from the stream. Poor assessment & results of 12th standard and poor school teaching alongwith, the study with job is not possible, Lack of information about career in science account negatively for 17.207% for NOT opting science.

Table 5.6.7.: PCA OUTPUT WITH RESPECT TO IMAPCT OF COMMERCE STREAM ON SCIENCE STREAM (TOTAL VARIANCE EXPLAINED

Sr. No.	RESONS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Expense in terms of coaching fees and poor school teaching (-ve)	11.939%
2.	Better career options and professional degrees offered (+ve)	8.730%
3.	Study with job is possible and study with job is not possible (+ve/-ve)	7.376%
4.	Easy course contents and tough syllabus & time (-ve)	6.964%
5.	Poor numerical ability and amount of labour & time (-ve)	5.994%
6.	Natural liking and job openings available (+ve)	5.235%
7.	Not many respectful job openings and NO encouragement for scientists in our country (-ve)	4.850%
8.	Lack of information about career in science (-ve)	4.657%
9.	Comparative economic return is less(-ve)	4.351%
	TOTAL VARIANCE EXPLAINED	**60.096%**

INTERPRETATIONS: Reason(s) responsible for opting Commerce stream are: Better career options and professional degrees offered, alongwith there study with job is possible, so there reason(s) have a 'positive' contribution of 16.103% where as reason(s) like: expense in terms of coaching fees & poor school teaching alongwith study with job is not possible are responsible for NOT opting the Science stream hence they have a Negative contribution and their contribution is: 19.312%.

Table 5.6.8. :   PCA OUTPUT WITH RESPECT TO IMAPCT OF ARTS & SCIENCE STREAM (TOTAL VARIANCE EXPLAINED

Sr. No.	RESONS (ARTS & NOT SCIENCE)	% CONTRIBUTION
1.	Helps in competitive exams & diversified career opportunities (+ve)	14.174%
2.	Comparative economic return is less and study with job is not possible (-ve)	8.276%
3.	Poor assessment & result of 12th standard and amount of labour & time (-ve)	7.794%
4.	Tough syllabus & poor school teaching (-ve)	6.953%
5.	Easy course contents and study with job is possible (+ve)	5.828%
6.	Personal liking & To pursue higher studies and research (+ve)	5.501%
7.	Poor numerical ability or fear of Maths (+ve)	5.108%
8.	Study with job is not possible and No encouragement for scientists in our country (-ve)	4.966%
	TOTAL VARIANCE EXPLAINED	**58.593%**

INTERPRETATIONS: The Reason(s): Helps in competitive exams and diversified career opportunities, easy course contents and study with job is possible contribute positively 20.002% towards the total variance explained. While: comparative economic return is less and the study with job is not possible and poor assessment & result of 12th standard coupled with amount of labour & time have a negative contribution of: 16.07% towards the total variance.

5.7 STATISTICAL ANALYSIS OF DATA SET FOR AHMEDABAD AND ITS FINDINGS:

To study the changing trends I science as a career in Ahmedabad city. The sample of students was selected from the schools/colleges mentioned in the following table:

CITY	NAME OF SCHOOL	NAME OF COLLEGES
AHMEDABAD	N.R. Secondary High School	Gujarat Arts & Sci. College
	New Samarath School	H.A. College of Commerce
	New Saurabh High School	H.L. College of commerce & Arts
	St. Xavier School	M.G. Science College
	Vijaynagar High School	S.L.U. Arts and H.P. Thakor commerce

Kendall's W and the Non-parametric tests out-put are given in the table 5.7.1.

Table 5.7.1. : DISTRIBUTION OF RANK SUM FOR VARIOUS REASONS WITH RESPECT TO REASONS FOR OPTING SCIENCE

Sr. No.	REASONS	RANK SUM
1.	Better Career goals	348
2.	Natural Liking	528
3.	To pursue higher studies & research	542
4.	Honour in society	775
5.	Motivated by teacher	939

Kendall's W = .384

The minimum rank sum is for the reason Better Career goals so it implies that this is the most important reason for opting science.

Table 5.7.2: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better Career Options	581
2.	Professional degrees offered	667
3.	Job Openings available	946
4.	Natural Liking	991
5.	To pursue higher studies & research	1018
6.	Encouraging 12th exam-board results	1092
7.	Study with job is possible	1129
8.	Parental business	1147
9.	Easy course contents	1152

Kendall's W = .296

The minimum rank sum is (581) which is for Better Career Options, which is followed by Professional degrees offered with a rank-sum of (667). If therefore seems that Better Career Options is the strongest reason to opt for Commerce stream.

Table 5.7.3: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Personal liking	158
2.	Helps in competitive exams.	167
3.	Study with job is possible	184
4.	Diversified career opportunities	189
5.	To pursue higher studies & research	228
6.	Easy course contents	240
7.	Fear of maths	247

Kendall's W = .315

Personal liking has a minimum rank-sum, so it appears to be most important reason for opting ARTS, followed by Helps in competitive exams.

Table 5.7.4.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASONS	RANK SUM
1.	Poor assessment & results of 12th standard	1931
2.	Tough Syllabus	1948
3.	Amount of Labour & time	1971
4.	Expense in terms of coaching fees	2169
5.	Poor school teaching	2661
6.	Lack of information about careers in science	2733
7.	Study with job is not possible	2740
8.	NOT many respectful job openings	2974
9.	No encouragement for scientists in our country	3017
10.	Experience of family members	3046
11.	Comparative economic return i.e. less	3087
12.	Poor numerical ability	3529
13.	Size of the family	3710
14.	NOT good optional subjects for competitive exams.	3728

Most important reason for NOT opting science: Poor assessment & result of 12th standard, followed by tough syllabus.

Table 5.7.5. : PERCENTAGE WISE DISTRUBUTION OF CONTRIBUTION OF FACTORS FOR CHANGING 'TISAC'

Sr. No.	FACTORS RESPONSIBLE FOR TISAC (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour time and tough syllabus (-ve)	8.173%
2.	Social pressure, To pursue higher studies & research (+ve)	7.207%
3.	Better career goals, Honour in the society (+ve)	7.635%
4.	Not many respectful job openings, comparative economic return is less (-ve)	7.492%
5.	Motivated by teacher, Natural liking (+ve)	7.648%
6.	Poor school teaching, experience of family members (-ve)	7.342%
7.	Expense in terms of coaching fees, study with job is not possible (-ve)	7.177%
8.	Poor assessment & results of 12th standard, lack of information about careers in science (-ve).	6.760%
	TOTAL VARIANCE EXPLAINED	**59.755%**

INTERPRETATIONS: **(1)** Amount of labour & time and tough syllabus contribute. 175% towards the total variance explained for reasons NOT opting the Science stream. **(2)** Social pressure and to pursue higher studies and research have a positive contribution of 7.707% towards the total variance explained for the changing trends to opt for science stream.

Table 5.7.6.: **PCA OUTPUT WITH RESPECT TO IMAPCT OF COMMERCE STREAM ON SCIENCE STREAM (TOTAL VARIANCE EXPLAINED**

Sr. No.	FACTORS FOR OPTING COMMERCE & NOT SCIENCE	% CONTRIBUTION
1.	Better career options and professional degrees offered (+ve)	9.212%
2.	Tough syllabus and poor assessment & results of 12th standard (-ve)	8.697%
3.	Easy course contents and encouraging 12th exam board (+ve)	7.990%
4.	Study with job is possible, parental business (+ve)	7.381%
5.	Job openings available, Natural liking (+ve)	6.814%
6.	Poor school teaching and expense in terms of coaching fees etc. (-ve)	6.482%
7.	Not many respectful job openings, study with job is not possible (-ve)	6.175%
8.	Lack of information about career in science (-ve)	5.827%
9.	Comparative economic return is less (-ve)	5.228%
	TOTAL VARIANCE EXPLAINED	**63.805%**

INTERPRETATIONS: **(1)** Better career options and professional degrees offered have a 'positive' contribution of 9.212% to the total variance explained by all the factors responsible for opting commerce and NOT Science **(2)** Tough syllabus and poor assessment have a negative contribution of 8.697% for the variance of the reasons for not opting the Science stream. Thus these two factors contribute significantly for the reasons to NOT OPT for Science stream.

Table 5.7.7. : PCA OUTPUT WITH RESPECT TO IMAPCT OF ARTS & SCIENCE STREAM (TOTAL VARIANCE EXPLAINED)

Sr. No.	FACTORS RESPONSIBLE FOR OPTING ARTS & NOT SCIENCE	% CONTRIBUTION
1.	Study with job is possible, Diversified career opportunities (+ve)	9.427%
2.	Easy course contents, To pursue higher studies & research (+ve)	9.015%
3.	Amount of labor & time tough syllabus (-ve)	7.994%
4.	Poor school teaching, poor assessment & result of 12th standard (-ve)	7.753%
5.	Helps in competitive exams & personal liking (+ve)	7.146%
6.	Study with job is not possible, Not many respectful job openings. (-ve)	6.047%
7.	Comparative economic return is less, expense in terms of coaching fees etc. (-ve)	5.903%
8.	Lack of information about careers in science & experience of family members (-ve)	5.699%
	TOTAL VARIANCE EXPLAINED	**58.804%**

INTERPRETATIONS: (1) Study with job is possible and diversified career opportunities have a positive contribution of 9.427% towards the total variance explained i.e. these two factors have highest positive contribution (in the sense that they are responsible for opting Arts Stream) **(2)** 'Amount of labour & time' and tough syllabus have a negative contribution of 7.994% towards the total variance explained (for the reasons for opting Arts & Not science) thus these two factors have highest contribution for NOT opting science.

5.8 STATISTICAL ANALYSIS OF DATA SET FOR <u>BARODA</u> AND ITS FINDINGS

The following table provides a list of schools surveyed in Baroda city. As there are no colleges in Baroda the students for the college level were selected from Arts/Science/Commerce faculties of The M.S. University of Baroda for this purpose, so the table below contains the name(s) of schools only.

Table 5.8.1.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better Career goals	280
2.	Natural Liking	424
3.	To pursue higher studies & research	459
4.	Honour in society	670
5.	Motivated by teacher	747

Most important reason: Better Career goals
Kendall's W = .477

Table 5.8.2.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better Career Options	288
2.	Professional degrees offered	363
3.	Job Openings available	462
4.	Natural Liking	537
5.	To pursue higher studies & research	585
6.	Encouraging 12th exam-board results	614
7.	Easy course contents	638
8.	Study with job is possible	645
9.	Parental business	742

Most important reason: Better Career options
Kendall's W= .281

Table 5.8.3.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Personal liking	133
2.	Study with job is possible	175
3.	Diversified career opportunities	181
4.	Easy course contents	204
5.	To pursue higher studies & research	209
6.	Helps in competitive exams	211
7.	Poor numerical ability	288

Most important reason: Personal liking

Kendall's W = .292

Table 5.8.5.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASONS	RANK SUM
1.	Tough Syllabus	1117
2.	Amount of Labour & time	1244
3.	Poor assessment & results of 12th standard	1635
4.	Expense in terms of coaching fees	1789
5.	Lack of information about careers in science	2286
6.	Poor school teaching	2292
7.	Study with job is not possible	2301
8.	NOT many respectful job openings	2411
9.	No encouragement for scientists in our country	2474
10.	Comparative economic return i.e. less	2538
11.	Experience of family members	2653
12.	Poor numerical ability	2717
13.	Size of the family	3122
14.	NOT good optional subjects for competitive exams.	3451

Kendall's - W = .317

Most important reason for NOT opting science: Tough syllabus.

Table 5.8.6.: PERCENTAGE WISE DISTRUBUTION OF CONTRIBUTION OF FACTORS FOR CHANGING 'TISAC'

Sr. No.	FACTORS RESPONSIBLE FOR CHANGING TISAC	% CONTRIBUTION
1.	Better career goals and To pursue higher studies & research. (+ve)	7.889%
2.	Amount of labour time and tough syllabus (+ve)	7.676%
3.	Honour in society and motivated by teacher (+ve)	7.285%
4.	Social pressure, Natural liking (+ve)	7.240%
5.	Expense in terms of coaching fees etc. Poor assessment & result of 12th standard, poor school teaching. (-ve)	7.202%
6.	Not many respectful job openings, study with job is not possible (-ve)	7.080%
7.	Comparative economic return is less, experience of family members (-ve)	7.044%
8.	Lack of information about careers in science (-ve)	6.867%
9.	No encouragement for scientist in our country (-ve)	6.860%
10.	Not good optional subjects for competitive exams (-ve)	6.441%
	TOTAL VARIANCE EXPLAINED	**71.584%**

INTERPRETATIONS: **(1)** 'Better career goals' and to pursue higher studies & research contribute 7.889% for the total variance explained for the reasons for opting science and NOT opting Science **(2)** Amount of labour & time and tough syllabus contribute (negatively) 7.676% towards the total variance explained in the sense that these are responsible NOT opting Science.

Table 5.8.7.: IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	FACTORS RESPONSIBLE FOR OPTING COMMERCE & NOT SCIENCE	% CONTRIBUTION
1.	Better career options, professional degrees offered. (+ve)	11.126%
2.	Amount of labour time and tough syllabus (-ve)	10.132%
3.	Natural liking, job openings available. (+ve)	8.093%
4.	Easy contents, encouraging 12th exam board results (+ve)	7.262%
5.	Study with job is not possible, poor school teaching(-ve)	6.138%
6.	To pursue higher studies & research (+ve)	6.080%
7.	Expense in terms of coaching fees etc. & Not many respectful job openings (-ve)	5.419%
8.	Poor assessment & result of 12th standard, poor school teaching. (-ve)	5.336%
9.	Lack of information about careers in science (-ve)	4.893%
10.	Comparative economic return is less (-ve)	4.596%
11.	Not good optional subjects for competitive exams (-ve)	4.354
	TOTAL VARIANCE EXPLAINED	**73.429%**

INTERPRETATIONS: **(1)** 'Better career options and professional degrees offered contribute 11.126% towards the reasons for opting commerce vis-à-vis opting science. **(2)** Amount of labour & time and tough syllabus have a negative contribution of 10.132% towards the total variance explained for reasons for NOT opting Science.

Table 5.8.8.: PERCENTAGEWISE DISTRUBUTION OF CONTRIBUTION OF FACTORS REPONSIBLE FOR 'TISAC'

Sr. No.	FACTORS RESPONSIBLE FOR CHANGING 'TISAC'	% CONTRIBUTION
1.	Study with job is possible, Diversified career opportunities (+ve)	12.102%
2.	Helps in competitive exams, To pursue higher studies & research. (+ve)	11.705%
3.	Amount of labour & time, tough syllabus (-ve)	10.066%
4.	Poor school teaching, expense in terms of coaching fees etc. (-ve)	9.764%
5.	Easy course contents, personal liking (+ve)	8.169%
6.	Study with job is not possible, Not many respectful job openings (-ve)	7.564%
7.	Comparative economic return is less & experience of family members (-ve)	7.296%
8.	Lack of information about careers in science (-ve)	6.931%
9.	Not good optional subjects for competitive exams (-ve)	6.168%
	TOTAL VARIANCE EXPLAINED	**79.763%**

INTERPRETATIONS: **(1)** The contribution of 'study with job is possible & Diversified career opportunities is 12.102% towards opting Commerce stream. **(2)** Amount of labour & time and tough syllabus have a negative contribution of 10.066% for NOT opting science, among all the other reasons responsible for this, the contribution is highest because of these two factors..

5.9 STATISTICAL ANALYSIS OF DATA SET FOR RAJKOT AND ITS FINDINGS:

Enlisted below are the schools/colleges in Rajkot city for the data collection for the study.

CITY	NAME OF SCHOOL	NAME OF COLLEGE
RAJKOT	Kendriya Vidyalaya	Christ College
	Kotak Kanya Vinay Mandir	H & H B Kotak Sc College
	Lal Bahadur shastri Vidyalaya	J J Kundaliya College
	Mahatma Gandhi Vidyalaya	Kansagra College
	Nirmala Convent	M J Kundalia College
	Rajkumar College	Meenaben Kundaliya College
		P D Malaviya College

Table 5.9.1.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better Career goals	234
2.	Natural Liking	336
3.	To pursue higher studies & research	401
4.	Honour in society	594
5.	Motivated by teacher	611

Kendall's W = .533

Minimum rank sum is for the reason: Better Career goals (234).

Table 5.9.2.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK-SUM
1.	Better Career Options	522
2.	Professional degrees offered	613
3.	Job openings available	722
4.	Natural liking	844
5.	Study with job is possible	1007
6.	Encouraging 12th exam board result	1009
7.	To pursue higher studies & research	1064
8.	Parental business	1093
9.	Easy course contents	1110

Kendall's - W = .308

Most important reasons: Better career options, Professional degrees offered, job openings available etc.

Table 5.9.3.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK-SUM
1.	Personal liking	176
2.	Diversified career opportunities	207
3.	To pursue higher studies & research	233
4.	Helps in competitive exams.	236
5.	Study with job is possible	265
6.	Encouraging course contents	279
7.	Poor numerical ability (Fear of maths)	313

Kendall's -W = .306

Most important reasons: Personal liking, Diversified career opportunities, To pursue higher studies & research.

**Table 5.9.4. : DISTRIBUTION OF RANK-SUM FOR VARIOUS
REASONS FOR NOT OPTING SCIENCE STREAM**

Sr. No.	REASONS	RANK-SUM
1.	Tough syllabus	1702
2.	Amount of labour & time	1826
3.	Poor assessment & result of 12th standard	1913
4.	Expense in terms of coaching fees	2026
5.	Poor school teaching	2592
6.	Study with job is not possible	2628
7.	Not many respectful job openings	2646
8.	Experience of family members	2673
9.	Lack of information about career in science	2714
10.	No encouragement for scientists in our country	2998
11.	Comparative economic return is less	3047
12.	Poor numerical ability	3146
13.	Size of the family	3499
14.	Not good optional subjects for competitive exams	3672

Kendall's - W = .223

Most important reasons: Tough syllabus, Amount of labour & time, poor assessment & result of 12th standard, expense in terms of coaching fees, poor school teaching etc.

Table 5.9.5.: SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Tough syllabus and poor school teaching (-ve)	9.669%
2.	Better career goals, Natural liking (+ve)	9.318%
3.	Honour in society, social pressure, motivated by the teacher (+ve)	9.009%
4.	Amount of labour & time, expense in terms of coaching fees etc. (-ve)	8.306%
5.	To pursue higher studies & research (+ve)	8.236%
6.	Study with job is not possible, comparative economic return is less (-ve)	7.558%
7.	Not many respectful job openings, experience of family members (-ve)	6.645%
8.	Lack of information about careers in science, size of the family.	6.529%
	TOTAL VARIANCE EXPLAINED	**65.269%**

INTERPRETATIONS: **(1)** Tough syllabus and poor school teaching contribute 9.669% to the total variance explained for the reasons for 'TISAC' these factors are responsible for NOT opting Science stream. **(2)** The contribution of factors: Better career goals & Natural liking is positive and it is 9.318% towards the reasons for opting Science stream. These are responsible positively in the sense, that these motivate for opting science.

Table 5.9.6.: SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career options, Professional degrees offered (+ve)	9.275%
2.	Amount of labour & time, Tough syllabus (-ve)	9.307%
3.	Job openings available, Natural liking (+ve)	7.956%
4.	Poor school teaching, expense in terms of coaching fees etc. (-ve)	7.454%
5.	To pursue higher studies & research, study with job is possible (+ve)	7.068%
6.	Study with job is not possible, Not many respectful job openings (-ve)	5.925%
7.	Easy course contents, encouraging 12th exam board results (+ve)	5.015%
8.	Lack of information abut careers in science, experience of family members (-ve)	4.777%
9.	Comparative economic return is less (-ve)	4.596%
	TOTAL VARIANCE EXPLAINED	**61.822%**

INTERPRETATIONS: **(1)** 'Better career options, professional degrees offered' have a positive contribution of 9.725% to the total variance explained for the reasons responsible for opting commerce and not opting Science stream. **(2)** Amount of labour & time and Tough syllabus have a negative contribution of 9.307% in the sense that these are the factors responsible for <u>NOT</u> opting the Science stream.

Table 5.9.7.: SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Personal liking, diversified career opportunities, study with job is possible (+ve)	15.446%
2.	Poor school teaching, tough syllabus (-ve)	11.022%
3.	Easy course contents, fear of maths (+ve)	10.118%
4.	Amount of labour & time and expense in terms of coaching fees (-ve)	8.666%
5.	Helps in competitive exams, To pursue higher studies & research (+ve)	8.009%
6.	Comparative economic return is less, experience of family members (-ve)	6.174%
7.	Lack of information about careers in science, size of the family (+ve)	6.123%
8.	Not many respectful job openings, study with job is not possible (-ve)	5.777%
9.	No encouragement for scientist in our country (-ve)	5.120%
	TOTAL VARIANCE EXPLAINED	**76.995%**

INTERPRETATIONS: (1) Personal liking, Diversified career opportunities and study with job is possible have a major (positive) contribution of 15.446% to the total variance explained for the reasons for opting 'ARTS' vis-a-vis Science stream. (2) Poor school teaching and tough syllabus have a maximum (negative) contribution of 11.022% towards the reasons for not opting science compared to reasons for opting Arts Stream.

5.10 STATISTICAL ANALYSIS OF DATA SET FOR SURAT AND ITS FINDINGS:

'Surat was survey according to the sampling design and the list of schools/colleges surveyed in this city is as follows:

CITY	NAME OF SCHOOL	NAME OF COLLEGE
SURAT	H.M.B. Sardar English School	J.D. Gabani C. & J.B. Dharuka
	I.N. Tekrawala	M.T.B. Arts College
	Kendriya Vidyalaya No. 1	Navyug Science College
	M N J Patel High School	P.T. Science College
	S D A Girls High School	
	Seventh Day Adventist	

Table 5.10.1.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better Career goals	399
2.	Natural Liking	568
3.	To pursue higher studies & research	784
4.	Honour in society	952
5.	Motivated by teacher	1144

Kendall's $W = .489$

Minimum rank sum is for the reason: 'Better Career goals' with a minimum rank-sum of (399) turns out to be most important reason for opting science. While Tough syllabus with a minimum rank-sum figures out to be most important reason for NOT opting Science stream.

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Table 5.10.2. : DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK-SUM
1.	Better Career Options	602
2.	Professional degrees offered	712
3.	Natural likings	950
4.	Parental business	1063
5.	Job openings available	1126
6.	Encouraging 12th exam board result	1156
7.	Easy course contents	1285
8.	Study with job is possible	1287
9.	To pursue higher studies & research	1342

Kendall's - W = .318

Most important reason: Better career options

Table 5.10.3. : DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK-SUM
1.	Personal liking	106
2.	Study with job is possible	115
3.	To pursue higher studies & research	147
4.	Diversified career opportunities	151
5.	Easy course contents	153
6.	Helps in competitive exams.	169
7.	Poor numerical ability (Fear of maths)	208

Kendall's -W = .273

Most important reason: Personal liking

Table 5.10.4. : DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK-SUM
1.	Tough syllabus	2160
2.	Amount of labour & time	2171
3.	Expense in terms of coaching fees	2338
4.	Poor assessment & result of 12th standard	2429
5.	Poor school teaching	2997
6.	Experience of family members	3059
7.	Study with job is not possible	3068
8.	Comparative economic return is less	3159
8.*	Not many respectful job openings	3159
9.	Lack of information about career in science	3355
10.	No encouragement for scientists in our country	3428
11.	Poor numerical ability	4016
12.	Size of the family	4265
14.	Not good optional subjects for competitive exams	4391

Kendall's - W = .153

Most important reason: Tough syllabus

**Table 5.10.5:   PERCENTAGE WISE DISTRIBUTION OF
CONTRIBUTION OF FACTORS FOR 'TISAC**

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE	% CONTRIBUTION
1.	Tough syllabus & poor school teaching, Amount of labour & time (-ve)	17.720%
2.	Social pressure, Honour in society (+ve)	9.929%
3.	Better career goals, To pursue higher studies & research (+ve)	9.400%
4.	Poor assessment & result of 12th standard, lack of information about careers in science (-v)	8.970%
5.	Motivated by teacher, Natural liking (+ve)	8.829%
6.	Study with job is not possible, experience of family members (-ve)	8.764%
7.	Comparative economic return is less (-ve)	7.666%
	TOTAL VARIANCE EXPLAINED	**71.277%**

INTERPRETATIONS: **(1)** Tough syllabus, poor school teaching and amount of labour & time have a major contribution towards the total variance explained for the reasons for NOT opting science and their contribution put together is 17.720%. **(2)** There is a positive contribution of 9.929% by 'social pressure & honour in society' for the reasons, responsible for opting 'Science stream'

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Table 5.10.6. : PCA OUTPUT WITH RESPECT TO IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	FACTORS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career options, professional degrees offered & study with job is possible (+ve)	17.207%
2.	Parental business, easy course contents (+ve)	12.323%
3.	Amount of labour & time, poor school teaching (-ve)	9.444%
4.	To pursue higher studies & research, Natural liking (+ve)	8.652%
5.	Tough syllabus, expense in terms of coaching fees etc.	6.492%
6.	Poor assessment & result of 12th standard, experience of family members (-ve)	5.830%
7.	Comparative economic return is less (-ve)	5.573%
8.	Lack of information about careers in science (-ve)	4.973%
9.	No encouragement for scientists in our country (-ve)	4.532%
	TOTAL VARIANCE EXPLAINED	**75.025%**

INTERPRETATIONS: (1) Better career options, professional degrees offered and study with job is possible have a highest contribution of 17.207% for opting commerce (2) Amount of labour & time and poor school teaching have a contribution of 9.444% for NOT opting science.

Table 5.10.7.: PCA OUTPUT WITH RESPECT TO IMPACT OF ARTS STREAM & NOT SCIENCE STREAM

Sr. No.	FACTORS (ARTS & NOT SCIENCE)	% CONTRIBUTION
1.	Helps in competitive exams, Diversified career opportunities & study with job is possible (+ve)	19.285%
2.	Amount of labour & time, poor school teaching & tough syllabus (-ve)	14.268%
3.	Personal liking, to pursue higher studies & research (+ve)	11.582%
4.	Expense in terms of coaching fees etc., poor assessment & result of 12th standard (-ve)	11.505%
5.	Easy course contents (+ve)	10.567%
6.	Comparative economic return is less, experience of family members (-ve)	7.208%
7.	Study with job is not possible, lack of information about careers in science (-ve)	4.950%
	TOTAL VARIANCE EXPLAINED	**79.365%**

INTERPRETATIONS: **(1)** The three factors: Helps in competitive exams, diversified career opportunities and study with job is possible contribute 19.285% towards the total variance explained for the factors responsible for opting 'ARTS' stream, vis-à-vis science stream. These three factors contribute maximum towards opting the ARTS stream. **(2)** Amount of labour & time and poor school teaching account for 14.268% towards the reasons for responsible for not opting Science stream. This is in comparison to the reason responsible for changing trends in science vis-à-vis Arts Stream.

CONCLUSIONS: TOP-3 reasons for opting science alongwith their contributes

TOP-3^S BARODA

TOP-3 REASONS : (A) FOR OPTING SCIENCE :

1. Better career goals, To pursue higher studies & research (7.889%).

2. Honour in society, motivated by teacher (7.285%)

3. Social pressure, Natural liking (7.240%)

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (7.676%).

2. Expense in terms of coaching fees etc. poor assessment & result of 12th standard and poor school teaching (7.202%).

3. Study with job is not possible, NOT many respectful job opening (7.080%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE:

1. Better career options, professional degrees offered (11.126%).

2. Job openings available, Natural liking (8.093%).

3. Easy course contents, encouraging 12th exam board results (7.262%).

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (10.132%).

2. Study with job is not possible, poor school teaching (6.138%).

3. Expense in terms of coaching fees etc and Not many respectful job opening (5.419%).

TOP-3 REASONS : (A) FOR OPTING ARTS :

1. Study with job is possible, diversified career opportunities (12.102%).

2. Helps in competitive exams, To pursue higher studies & research (11.705%).

3. Easy course contents, personal liking (8.169%).

B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (10.066%).

2. Poor School teaching, expense in terms of coaching fees etc. (9.764%).

3. Study with job is not possible, NOT many respectful job openings (7.564%).

--------X---------

TOP-3^S - SURAT

TOP-3 REASONS : (A) FOR OPTING SCIENCE :

1. Social pressure, Honour in society (9.929%).

2. Better career goals, To pursue higher studies & research (9.400%).

3. Motivated by teacher, Natural liking (8.829%).

(B) FOR NOT OPTING SCIENCE :

1. Tough syllabus, poor school teaching and amount of labour & time (17.720%).

2. Poor assessment & result of 12th standard, lack of information about careers in science (8.970%).

3. Study with job is not possible, experience of family members (8.764%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

1. Better career options, professional degrees offered, study with job is possible (17.207%).

2. Easy course contents, parental business (12.323%).

3. To pursue higher studies & research, Natural liking (8.652%).

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(B)   FOR NOT OPTING SCIENCE :

1.   Amount of labour & time, poor school teaching (9.444%).

2.   Tough syllabus, expense in terms of coaching fees etc. (6.492%).

3.   Poor assessment & result of 12th standard, experience of family members (5.830%).

TOP-3 REASONS : (A) FOR OPTING ARTS :

1. Helps in competitive exams, diversified career opportunities, Study with job is possible (19.285%).

2. Personal liking, To pursue higher studies & research (11.582%).

3. Easy course contents (10.567%).

(B)   FOR NOT OPTING SCIENCE :

1. Amount of labour & poor school teaching (14.268%).

2. Expense in terms of coaching fees etc., poor assessment & result of 12th standard (11.505%).

2. Comparative economic return is less, experience of family members (7.208%).

--------X---------

TOP-3^S -AHMEDABAD

TOP-3 REASONS : (A) FOR OPTING SCIENCE :

1. Social pressure, To pursue higher studies & research (7.707%)

2. Better career goals, Honour in the society (7.635%).

3. Motivated by teacher, Natural liking (7.468%)

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (8.175%).

2. NOT many respectful job openings, comparative economic return is less (7.492%).

3. Poor School teaching, experience of family members (7.342%)

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

1. Better career options and professional degrees offered (9.212%).

2. Easy course contents and encouraging 12th exam. Board results (7.990%).

3. Study with job is possible, parental business (7.381%).

(B) FOR NOT OPTING SCIENCE :

1. Tough syllabus, poor assessment & results of 12th standard (8.697%),.

2. Poor School teaching, expense in terms of coaching fees etc. (6.482%).

3. Study with job is not possible, NOT many respectful job openings (6.175%).

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TOP-3 REASONS : (A) FOR OPTING ARTS :

1. Study with job is possible, diversified career opportunities (9.427%).

2. Easy course contents, To pursue higher studies & research (9.015%).

3. Helps in competitive exams, personal liking (7.146%).

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (7.994%).

2. Poor School teaching, poor assessment & result of 12th standard (7.753%).

3. Study with job is not possible, NOT many respectful job openings (6.047%).

--------X---------

TOP-3^S RAJKOT

TOP-3 REASONS : (A) FOR OPTING SCIENCE :

1. Better career goals, Natural liking (9.318%).

2. Honour in society, motivated by teacher & social pressure (9.009%).

3. To pursue higher studies & research (8.236%).

(B) FOR NOT OPTING SCIENCE :

1. Tough syllabus & poor school teaching (9.669%).

2. Amount of labour & time, expense in terms of coaching fees etc. (8.306%).

3. Study with job is not possible, comparative economic return is less (7.558%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

1. Better career options, professional degrees offered (9.725%).

2. Job openings available, Natural liking (7.956%).

3. To pursue higher studies & research, study with job is possible (7.068%).

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time, Tough syllabus (9.307%).

2. Poor school teaching and expense in terms of coaching fees etc. (7.454%).

3. Study with job is not possible, Not many respectful job openings (5.925%).

TOP-3 REASONS : (A) FOR OPTING ARTS :

1. Personal liking diversified career opportunities, study with job is possible (15.446%).

2. Easy course contents, fear of Maths (10.118%)

3. Helps in competitive exams, To pursue higher studies & research (8.009%).

B) FOR NOT OPTING SCIENCE :

1. Poor school teaching, tough syllabus (11.022%).

2. Amount of labour & time and tough syllabus (8.666%).

3. Comparative economic return is less, experience of family members (6.714%).

--------x----------

5.11.: WHAT SHOULD BE DONE ?

Section-3 of the questionnaire was devoted the responses from students to a question. What should be done in short term/long term to attract bright students to opt for Science stream? The responses from the students were classified into six various categories the following table gives the COUNT (No. of students responding for a particular category).

Table 5.11.1.:

Sr. No.	SUGGESTIONS	COUNT
1.	Improve school teaching	430
2.	Reduce the cost	369
3.	Proper guidance	278
4.	Revises syllabus	198
5.	Proper checking	142
6.	More facilities	118
	TOTAL	***1465**

Around 10.67% are the non response to this question. Maximum number of the students were of the view that: by improving school teaching (430), Reducing the cost of education (369) and providing the proper guidance (278) this declining trend may be checked'.

Table 5.11.2.: DISTRIBUTION OF 'COUNTS' WITH RESPECT TO WAYS FORWARD IN VARIOUS CITIES.

CITY	MORE FACILITIES	IMPROVE SCHOOL TEACHING	REDUCE THE COST	REVISE THE SYLLABUS	PROPER SUIDENCE	PROPER CHECKING
AHMEDABD	152	166	98	198	166	122
BARODA	274	255	154	288*	188	140
RAJKOT	68	179*	168	150*	131	78
SURAT	68	179*	168	160*	121	79

(* indicate the highest count)

From the above table it can be seen that students from different cities give importance to different suggestions mode. But improve school teaching and 'revise the syllabus' have highest counts.

5.12: CONCLUDING REMARKS :

From the over all analysis of the data-set collected from this 'state' it can be concluded that:

TOP– 3 REASONS   (A) FOR OPTING SCIENCE ARE:

1. Better career goals & Natural liking
2. Social pressure & honour in society
3. To pursue higher studies & research

(B) FOR NOT OPTING SCIENCE:

1. Amount of labour & time and tough syllabus
2. Poor school teaching, poor assessment and result of 12th standard
3. Expense in terms of coaching fees, study with job is not possible.

CHAPTER - 6

CHANGING TRENDS IN SCIENCE AS CAREER IN DELHI

6.1 BRIEF STATE PROFILE:

Delhi being the capital city of India, has its own importance it acquired the status of a 'STATE' recently. Looking at the area under coverage. The whole 'state' was divided into: North Delhi, South Delhi, East Delhi & West Delhi and every segment was considered to be city within the 'State' just like in other states we have considered different cities.

6.2 CITIES SURVEYED:

As out lined above Delhi being considered as 'state' North Delhi etc. have been considered as cities within the 'state'. The students were selected from these cities viz: North, South, East & West Delhi according to the sample design decided from different categories of schools and different types of colleges. **819** students were sampled from the schools and **467** students from the college, thus a total sample of size **1286** was taken from DELHI state.

The following table provides a complete list of schools & colleges surveyed in different parts of Delhi.

Table 6.2.1. : NAME OF THE SCHOOL / COLLEGES:

NAME OF SCHOOL	NAME OF COLLEGE
NORTH DELHI	**NORTH DELHI**
Govt. Boys Sen. Sec. School	Hindu College
Kendriya Vidyalaya Shalimar Ba	Kiroimal College
Kulachi Hansraj Model School	Shri Ram College of Commerce
Maharaja Agrasen Public School	Shri Ram College of Commerce
Rajkiya S.S.S.V. School	**SOUTH DELHI**
Sarvodaya Vidayalaya	Dyal Singh College
SOUTH DELHI	Lady Shri Ram College
B.R.M. Sr. Sec. School	P.G.D.A.V. College
D.A.V. Public School	**EAST DELHI**
Kendriya Vidyalaya	Shyamal College
Tagore International School	Vivekananada College
EAST DELHI	**WEST DELHI**
A.C.C. Govt. Boys School	Kalindi College
A.C.C.S. B. Vidyalaya	Keshav Mahavidyalaya
Bharat National Public School	Sri Guru Tegh Bahadur Khalsa
D.A.V. Public School	
Dav Public School	
Govt. Girls Sen. School	
Kendriya Vidayalata	
WEST DELHI	
Bhai Joga Singh Khalsa Girls	
Kendriya Vidyalaya	
P.G.D.A.V. Sen. Sec. School	
S.K.V. No. 1Keshav Puran	
S.K.V. No.2Keshav Puran	

Table 6.2.2: DISTRIBUTION OF STUDENTS SEXWISE/CITIWISE

CITY	MALE	FEMALE	TOTAL
NORTH DELHI	113	92	205
SOUTH DELHI	132	71	203
EAST DELHI	111	94	205
WEST DELHI	71	135	206
TOTAL	**427**	**392**	**819**

From the above table it is clear that, our sample included approximately 52% of male students whereas remaining 48% were the female students.

6.3: DISTRIBUTION OF STUDENTS WITH RESPECT TO CHANGING TRENDS AT SCHOOL/COLLEGE LEVEL

The question 1.13 attempts to answer the question about the science stream as first choice at school/college level. The following two tables provide the current trend among students.

Table 6.3.1.: DISTRIBUTION OF SCHOOL STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE

	NUMBER OF STUDENTS		
CITIES	YES	NO	TOTAL
NORTH DELHI	78	127	205
SOUTH DELHI	98	105	203
EAST DELHI	106	99	205
WEST DELHI	46	160	206
TOTAL	**328 (40%)**	**491 (60%)**	**819**

From the above table it is clear that about (only) 40% of the students expressed the inclination towards science stream as the first choice, whereas about 60% of the students expressed NO as first choice to the science stream.

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Fig 6.3.1   NORTH DELHI

11th STANDARD   F Y COLLEGE LEVEL
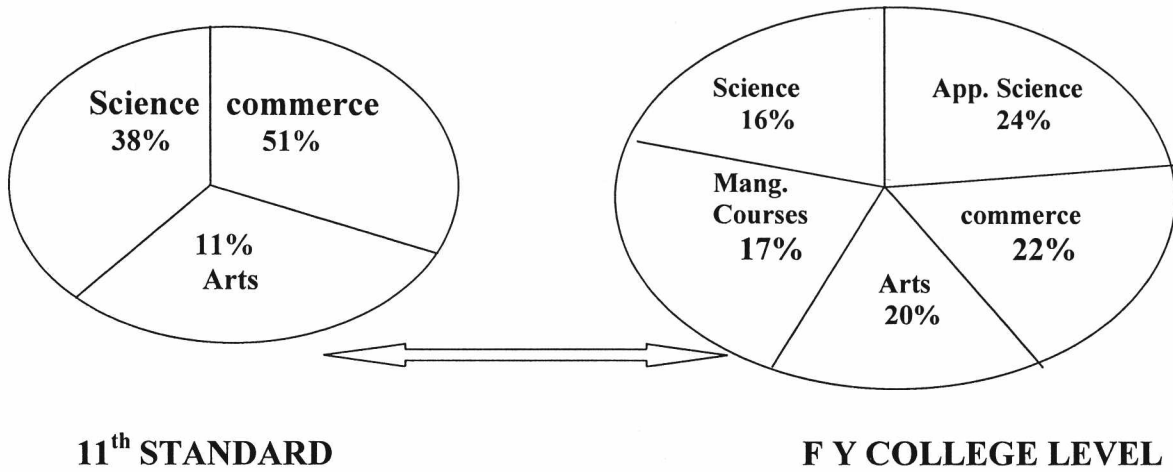
From the above figure it is evident that the students having science at 11th standard and leaving at first year college, have the maximum inclination towards the Applied Science Courses, followed by choice in commerce stream.

Fig. : 6.3.2   SOUTH DELHI

11th STANDARD   F Y COLLEGE LEVEL
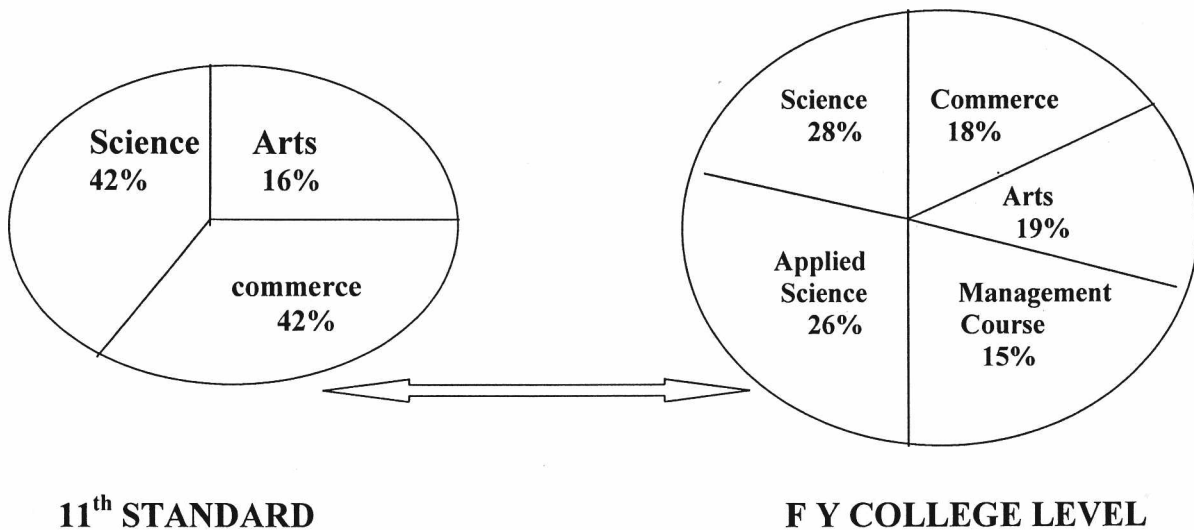
Evidently maximum numbers of students are willing to change to Applied science courses & to Arts stream.

Table 6.3.2 : DISTRIBUTION OF COLLEGE STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE 1st CHOICE

CITIES	NUMBER OF STUDENTS		
	YES	NO	TOTAL
NORTH DELHI	30	69	99
SOUTH DELHI	53	68	123
EAST DELHI	39	72	111
WEST DELHI	64	69	134
TOTAL	186 (39%)	278 (61%)	467

39% of the college students expressed in affirmation to Science stream as the first choice, where as 61% of the students had expressed their desire for same other stream as the first choice. These two tables provide as a quick measure about students first choice at school as well as college level.

Other two most important questions in the section-1 are: 1.15 & 1.16 and 1.17 & 1.18 which gives the response of the students at two different stages.(i.e. one at 11th standard and another at first year college level) . Reponses of students from these questions have been analysed and their outcomes have been presented in the following series of diagrams.

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Fig. : 6.3.3   **EAST DELHI**

'CHANGE'

11th STANDARD   F Y COLLEGE LEVEL
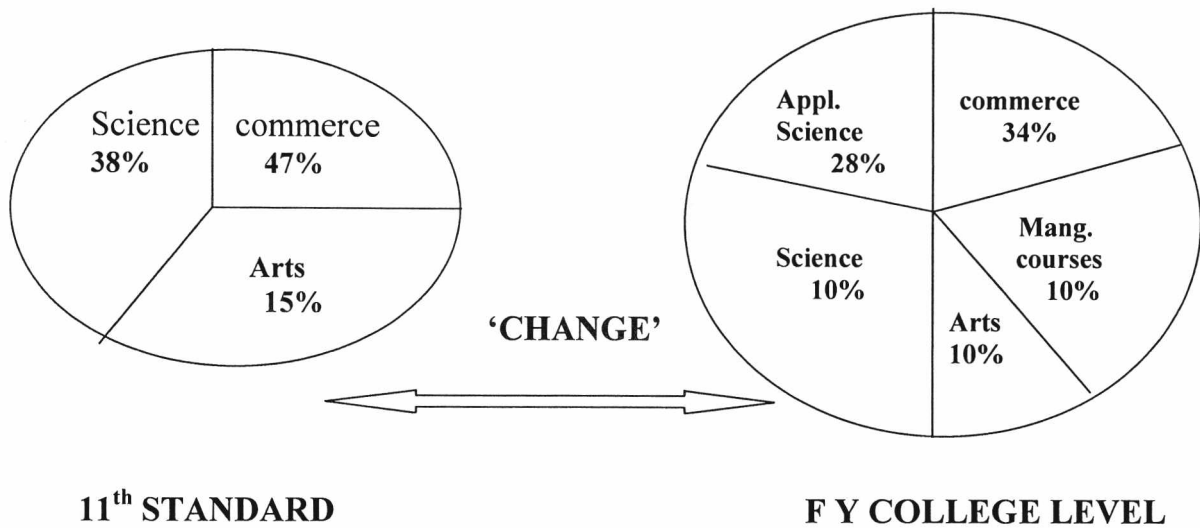
Most of the students expressed to join commerce course, Applied science courses are next attractive to the student at F Y Level.

Fig. : 6.3.4   **WEST DELHI**

'CHANGE'

11th STANDARD   F Y COLLEGE LEVEL
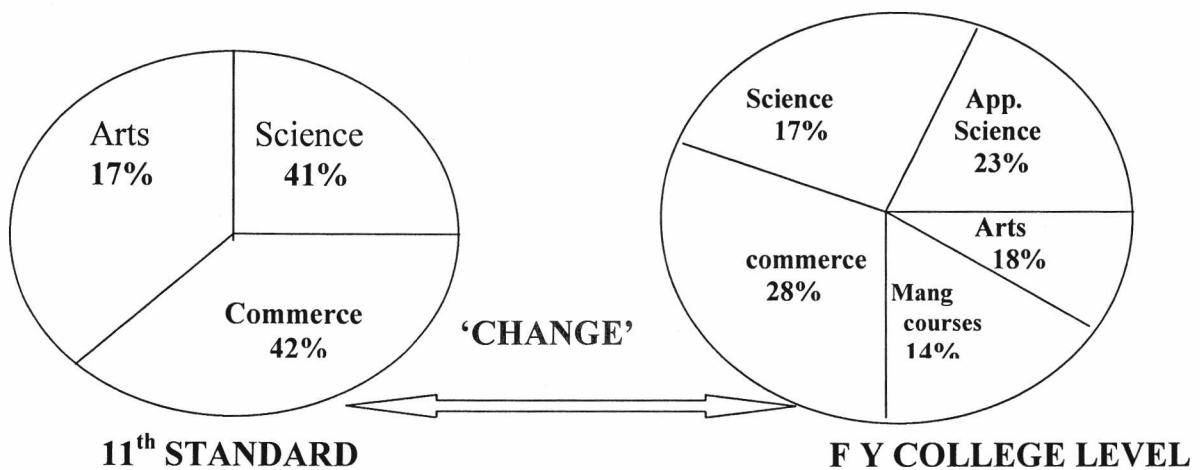
Majority of the students are willing to join the Commerce stream followed by Applied Science Courses.

Table 6.3.3: AMONG CITY COMPARISIONS

City	Stream at 11th Standard				Stream at First year college				
	Arts	Science	commerce		Arts	App. Sci	Science	commerce	Mang cour-ses
North Delhi	11%	38%	51%		20%	24%	16%	22%	17%
South Delhi	16%	42%	42%		19%	26%	22%	18%	15%
East Delhi	15%	38%	47%		18%	28%	10%	34%	10%
West Delhi	17%	41%	42%		18%	23%	17%	28%	14%

The above table provides the changing trends from different streams at 11th standard to college level (First year).

DELHI

6.4 DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT SCHOOL LEVEL

Fig. 6.4.1.
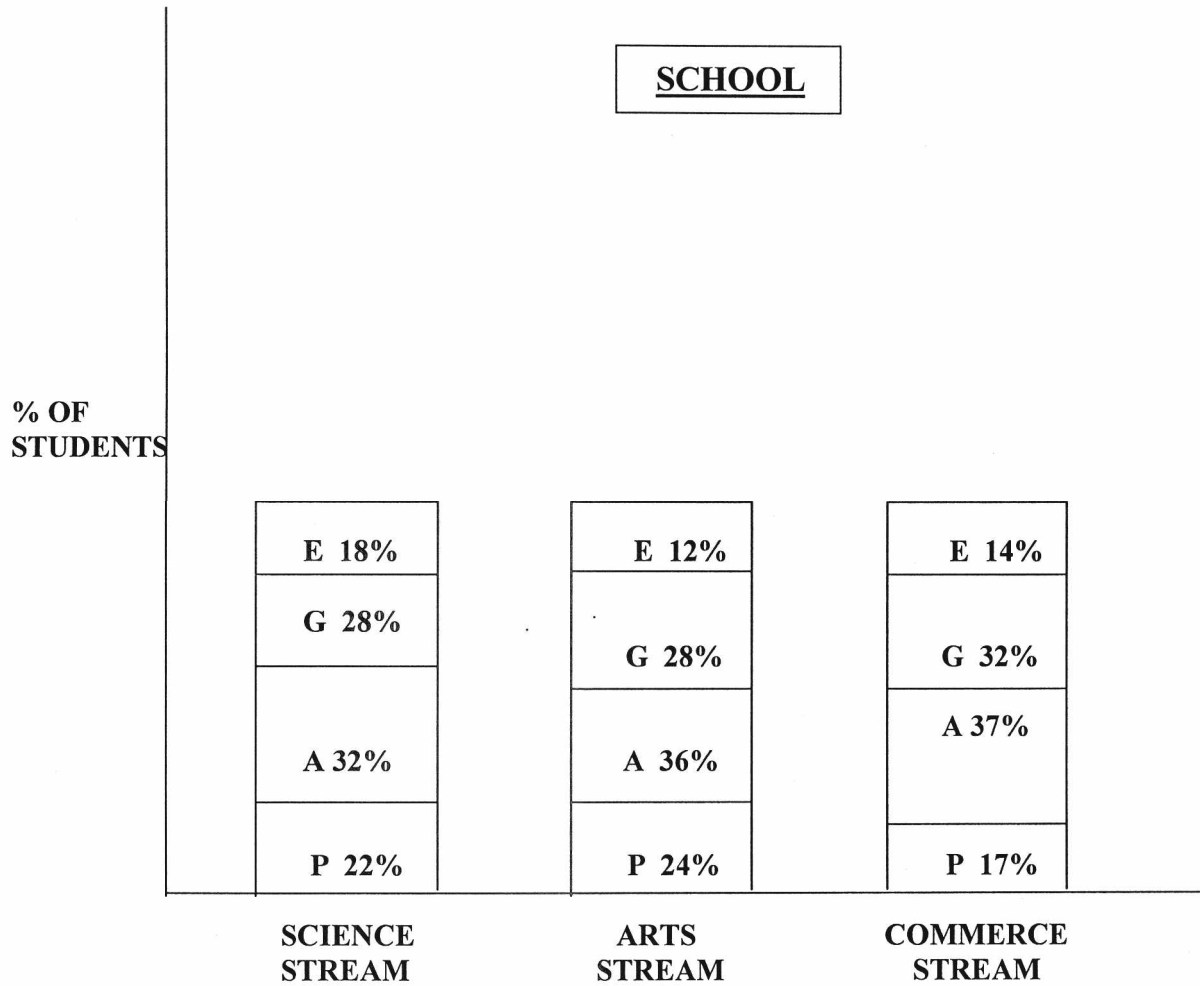
	SCHOOL	
E 18%	E 12%	E 14%
G 28%	G 28%	G 32%
A 32%	A 36%	A 37%
P 22%	P 24%	P 17%
SCIENCE STREAM	ARTS STREAM	COMMERCE STREAM

% OF STUDENTS

P : Poor
A : Average
G : Good
E : Excellent

DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT COLLEGE LEVEL

Fig. 6.4.2.
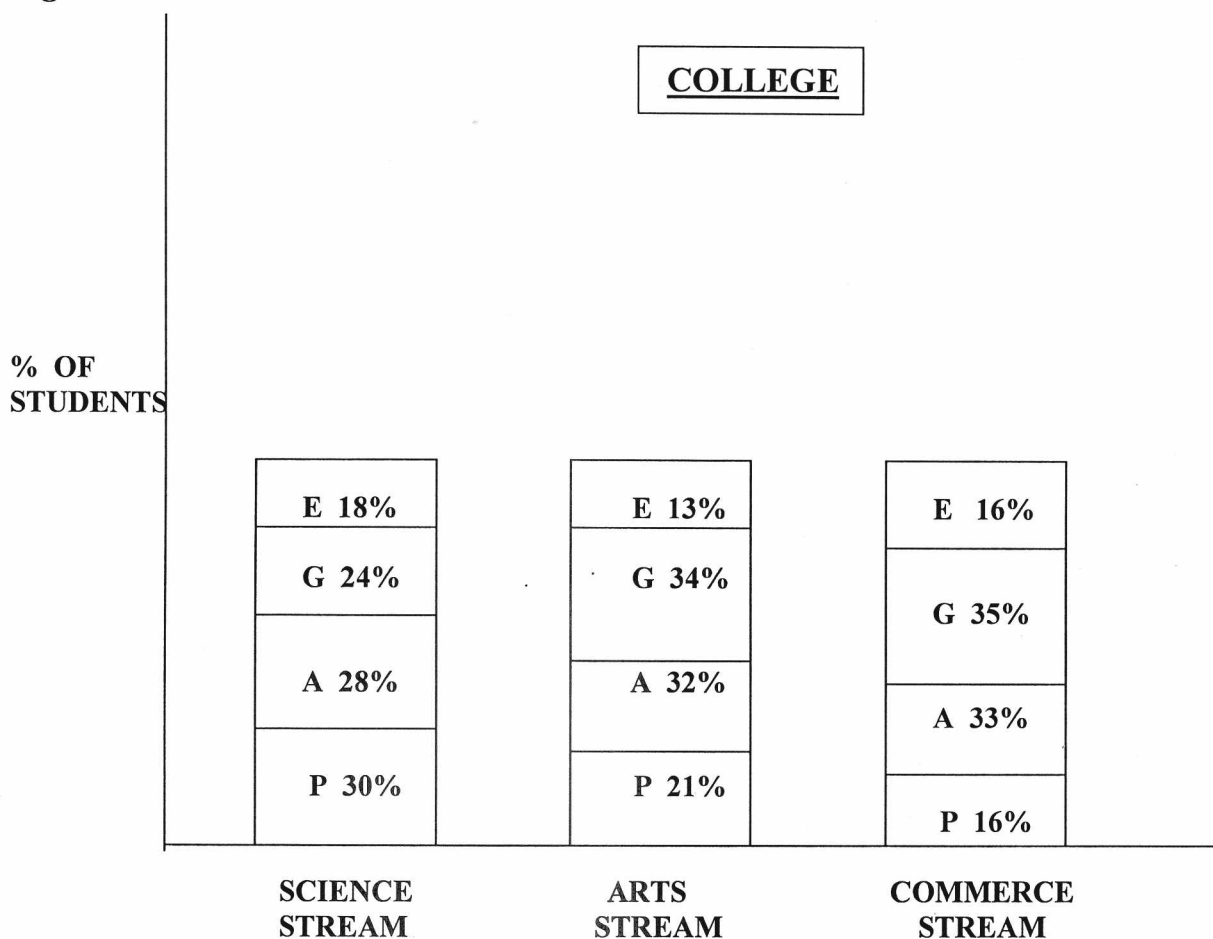
In DELHI most of the school students are of the view that with Science stream the job opportunities are good 28% almost comparable with Arts Stream, but definitely 4% below than Commerce stream (32%). With Science stream 22% of the students feel that job opportunities are poor, while only 17% of the Commerce stream feel so.

There is a lot of change in the opinion of college students where 30% of the students (almost student in every 3 students) feel that there is no job opportunity (poor job opportunity) with Science stream, while only 16% of the student at college level with Commerce stream do not see much of the job opportunity. A maximum number of 35% with Commerce stream are assured of god job, while this is only 24% with the Science stream student.

6.5 STATISTICAL ANALYSIS OF THE TOTAL DATA SET FOR DELHI STATE:

The following table gives an idea of the sample composition at school/college level with respect to sex (Male/Female) is the various regions (considered as cities) within Delhi state.

Table 6.5.1.:

STUDENTS AT							
	SCHOOL				COLLEGE		
City	Male	Female	Total		Male	Female	Total	Grand Total
North Delhi	113	92	205		49	50	99	304
South Delhi	132	71	203		60	63	123	326
East Delhi	111	94	205		32	79	111	316
West Delhi	71	135	206		45	89	134	340
TOTAL	**427**	**392**	**819**		**186**	**281**	**467**	**1286**

The responses from these **1286** students were analyzed to find out 'reasons' responsible for 'TISAC'. The statistical analysis has been done using SPSS & as described in chapter–5, In order to reach to a 'consensus' among the student regarding which of the reasons analyzed is most important amongst al the reasons responsible for the 'trend' again Kendall's W has been computed. Especially for the questions in section-2 viz : 2.4, 2.5,2.6 & 2.7 for each of them Kendall's W is computed. For example question 2.4 has six reasons to be ranked by all the students, so it will be a 6X 1286 order matrix, similarly for the section 2.5 it will be 8 X 1286 order matrix and so on.

Table 6.5.2. : DISTRIBUTION OF 'RANK-SUMS' FOR VARIOUS REASONS WITH RESPECT TO REASONS FOR NOT OPTING SCIENCE.

Sr. No.	REASONS	RANK SUM
1	Tough Syllabus	4071
2	Amount of labour & time	4928
3	Expenses in terms of coaching fees	5860
4	Study with job i.e. not possible	7513
5	Lake of information about careers in science	7548
6	Poor assessment & results of 12th Standard	7873
7	Poor School Teaching	8264
8	No encouragement for scientist of our country	8307
9	Not many respectful job openings	8466
10	Experience of family members	8779
11	Comparative economic return & less	9314
12	Poor Numerical ability	10097
13	Not good optional subjects for competitive economy	10750
14	Size of the family	

Most important reason: Tough syllabus, Kendall's -W = 2.209

The minimum rank sum i.e. 4071 is the above table which stands for the reason: Tough syllabus, Next it is followed by 4928 which stands for the reason : Amount of labour & time. So, these are the two most important reasons, over which there is a kind of 'agreement' among the students for not opting science. In other words the students of Delhi do not opt for science stream due to 'Tough Syllabus' & Amounts of labour & time.

Table 6.5.3: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE/COMMERCE/ARTS STREAMS

STREAMS		REASONS	RANK SUM
SCIENCE	1.	Better Career goals*	732
	2.	Social Pressure	1119
	3.	Natural liking	1124
	4.	To pursue higher studies & research	1543
	5.	Honour in Society Kendall's W = .401	1798
COMMERCE	1.	Better career options*	1161
	2.	Professional degrees offered	1626
	3.	Job opening available	1816
	4.	Natural liking	2416
	5.	Study with job is possible	2681
	6.	Encouraging 12th exam results	2746
	7.	To pursue higher studies & research	2780
	8.	Easy course contents	2926
	9.	Parental business Kendall's W = .350	3344
ARTS	1.	Helps in competitive exams *	1086
	2.	Personal liking	1339
	3.	Diversified career opportunity	1471
	4.	Study with job is possible	1579
	5.	To pursue higher studies & research	1721
	6.	Easy course contents	1871
	7.	Poor numerical ability (Fear of MATHS) Kendall's W = .185	1888

* Denotes the most important reason.

Applying the Principal component Analysis method to 'identify' the 'factors' for 'change' (here the following table is the output when we have analyzed the reasons for 'opting' science together with reasons for 'NOT opting the science)

Table 6.5.4: PRINCIPAL COMPONENT ANALYSIS (PCA) OUTPUT WITH RESPECT TO CHANGING TRENDS IN SCIENCE

Sr. No.	FACTORS (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour time and tough syllabus (-ve)	9.528%
2.	Poor school teaching, NO encouragement for scientists in our country and not good optional subjects for competitive exams (-ve)	8.630%
3.	Expense in terms of coaching fees AND study with job is not possible (-ve)	8.410%
4.	Not many respectful job openings (-ve)	7.711%
5.	Poor assessment & results of 12th standard (-ve)	7.553%
6.	Lack of information about careers in science AND comparative economic return is less (-ve).	6.119%
7.	Better career goals AND Natural liking (+ve)	5.954%
8.	Honour in society (+ve)	5.731%
9.	Social pressure AND motivation by teachers (+ve)	5.159%
10.	To pursue higher studies and research (+ve)	5.082%
	TOTAL VARIANCE EXPLAINED	**69.877%**

INTERPRETATIONS: **(1)** Amount of labour & time, poor school teaching, NO encouragement for scientists Account for 18.158% towards the total variance explained. The contribution of these reason(s) or pairs of reason(s) is obtained with the help of Rotated component matrix. Positive sign indicating inclination 'towards' the stream whereas negative sign indicating that for 'away' from the stream. **(2)** Better career goals, natural liking, honour in society and social pressure, along with motivation by teachers, contribute positively 16.844% towards the total variance explained.

Following table provides a list of 'factors' for the changing trends is science as a career vis-à-vis 'commerce' stream.

Table 6.5.5.: PCA OUTPUT WITH RESPECT TO IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	FACTORS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Poor school teaching (-ve)	11.998%
2.	Parental business (+ve)	10.214%
3.	Not many respectful job openings (-ve)	7.760%
4.	Expense in terms of coaching fees (-ve)	6.336%
5.	Encouraging 12th exam board results & professional degrees offered (+ve)	6.168%
6.	Lack of information about careers in science (-ve)	5.408%
7.	Comparative economic return is less (-ve)	5.243%
8.	Better career options (+ve)	4.973%
9.	Easy course contents (+ve)	4.446%
	TOTAL VARIANCE EXPLAINED	**62.546%**

This last table shows a list of 'Factors' responsible for the 'changing trends' vis-à-vis 'Arts stream.

INTERPRETATIONS: **(1)** Poor school teaching and expense in terms of 18.344% towards the total variance explained for the reasons responsible for NOT opting science in comparison to opting for Commerce stream. **(2)** Parental business, encouraging 12th exam board results and professional degrees offered contribute positively 16.382% towards the contribution of reasons responsible for opting the Commerce stream vis-à-vis Science stream.

Table 6.5.6.: PCA OUTPUT WITH RESPECT TO IMPACT OF ARTS STREAM & NOT SCIENCE STREAM

Sr. No.	FACTORS (ARTS & NOT SCIENCE)	% CONTRIBUTION
1.	Not many respectful job openings, Poor numerical ability and experience of family members (-ve).	12.293%
2.	Study with job is not possible and No encouragement for scientists in our country (-ve)	9.197%
3.	Diversified career opportunities, easy course contents and study with job is possible (+ve)	7.667%
4.	Amount of labour & time, tough syllabus (-ve)	6.455%
5.	Expense in terms of coaching fees (-ve)	5.836%
6.	Helps in competitive exams (+ve)	5.405%
7.	To pursue higher studies & research (+ve)	5.077%
	TOTAL VARIANCE EXPLAINED	**51.930%**

INTERPRETATIONS: (1) Diversified career opportunities, easy course contents, study with job is possible along with Arts stream helps in competitive exams contribute 13.072% towards the total variance explained for the reasons responsible for opting ARTS Stream, this contribution is out of total 51.930% variance explained. **(2)** NOT many respectful job openings available, poor numerical ability and experience of family members, study with job is not possible and no encouragement for scientists in our country have a negative contribution of 21.49% towards the total variance explained.

The study of changing trends as science as a career included following schools/colleges from this area.

6.6. Statistical analysis of data set for **NORTH DELHI** and its findings. The study of changing trends in science as a career included following schools/colleges from this area.

NAME OF SCHOOL	NAME OF COLLEGE
Govt. Boys Sen. Sec. School	Hindu College
Kendriya Vidyalaya Shalimar Ba	Kiroimal College
Kulachi Hansraj Model School	Shri Ram College of Commerce
Maharaja Agrasen Public School	Shri Ram College of Commerce
Rajkiya S.S.S.V. School	
Sarvodaya Vidayalaya	

Table 6.6.1.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career goals	137
2.	Natural Liking	225
3.	To pursue higher studies & research	249
4.	Honour Society	298
5.	Motivated by teacher	365
6.	Social pressure	386

From the above table the most important reasons is followed by Natural liking and so on. Similarly, it can be said that 'social pressure' is least important reasons for opting science.

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Table 6.6.2.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career Options	234
2.	Professional degree offered	350
3.	Natural Liking	411
4.	Job openings available	425
5.	Encouraging 12th exam board results	488
6.	To pursue higher studies & reasons	524
7.	Easy course contents	549
8.	Study with job is possible	568
9.	Parental Business	674

Kendall's-W = .297

Most important reason: Better career option followed by professional degrees offered, and so on. Parental business has least influence for opting commerce.

Table 6.6.3: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Helps in competitive exams	364
2.	Personal liking	381
3.	Diversified career opportunities	414
4.	Easy course contents	478
5.	Study with job is possible	501
6.	To pursue higher studies & reasons	523
7.	Poor numerical ability or fear for maths	638

Kendall's -W = .258

Most Important reason: Helps in competitive exams followed by personal liking. However, poor numerical ability (or fear for Maths) is not that important reasons for opting ARTS.

Table 6.6.4.: DISTRIBUTION OF 'RANK-SUMS' FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1	Tough Syllabus	1021
2	Amount of Labour & time	1061
3	Expenses in terms of coaching fees	1364
4	Poor School Teaching	1589
5	Poor assessment results 12th Standard	1628
6	Study with job is not possible	1663
7	Not many respectful job openings	1675
8	Lake of Information about careers in science	1693
9	No encouragement for scientist of our country	1774
10	Comparative economic returns less	1780
11	Experience of family members	1821
12	Poor numerical ability	1967
13	Not good optional subjects for competitive economy	2020
14	Size of the family	2178

Kendall's -W =.125

Most important reason: Tough syllabus is followed by Amount of labour & time. However size of the family has no influence for NOT opting science. As outlined earlier that with this approach we can list out reason(s) important for opting /Not opting particular streams, but this does not tell us about the respective contribution of these reasons, towards this end PCA (Principal Component Analysis) to applied the following tables put forward the output of PCA for changing trends along with their contributions.

Table 6.6.5.: SHOWING PERCENTAGE WISE CONTRIBUTION OF VARIOUS REASONS (OR COMBINATIONS OF REASONS) 'CHANGE'

Sr. No.	REASONS (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	To Pursue higher studies & research (+ve)	19.505%
2.	Amount of labour & time, poor school teaching and tough syllabus (-ve)	15.817%
3.	No encouragement for scientists in our country, expense in terms of coaching fees etc. (-ve)	14.005%
4.	Not good options subjects for competitive exams, comparative economics return is less (-ve)	11.483%
5.	Natural liking, social pressure, Honour in society (+ve)	11.163%
6.	NOT many respectful job openings, lack of information about careers in science (-ve)	8.253%
7.	Poor numerical ability, expensive of the family members & size of the family members (-ve)	6.256%
	TOTAL VARIANCE EXPLAINED	**86.541%**

INTERPRETATIONS: **(1)** To pursue higher studies and research and better career options account for 19.505% towards the total variance explained where as the Negative contribution of: Amount of labour & time, poor school teaching and tough syllabus is: 15.817%.

Table 6.6.6.: FACTORS RESPONSIBE FOR CHANGING TRENDS

Sr. No.	FACTORS FOR OPTING COMMERCE & NOT SCIENCE	% CONTRIBUTION
1.	Better career options and professional degrees offered (+ve)	12.593%
2.	Amount of labour & time, Tough syllabus (-ve)	9.914%
3.	Easy course contents, study with job is possible. (+ve)	9.403%
4.	Poor school teaching, poor assessment & results of 12th standard (+ve)	8.065%
5.	Job openings available, encouraging 12th exam board results (+ve)	5.970%
6.	Natural liking, To pursue higher studies & research. (+ve)	5.600%
7.	Study with job is not possible, experience of family members(-ve)	5148%
8.	Lack of information about career in science & comparative economic return is less (-ve)	4.927%
9.	Not many respectful job openings, No encouragement for scientists in our county (-ve)	4.751%
10.	Not good optional subjects for competitive exams, poor numerical ability (-ve)	4.400%
	TOTAL VARIANCE EXPLAINED	**70.772%**

INTERPRETATIONS: **(1)** (+)contribution of: Better career options and professional degrees offered is : 12.593% whereas(-ve) contribution of **(2)** 9.914%.

Table 6.6.7.: PCA OUTPUT RESPECT TO IMPACT OF 'ARTS' STREAM ON SCIENCE STREAM.

Sr. No.	FACTORS RESPONISBLE FOR OPTING ARTS & NOT SCIENCE	% CONTRIBUTION
1.	Helps in competitive exams, Diversified career opportunities (+ve)	14.044%
2.	Poor school teaching, tough syllabus, Amount of labour & time (-ve)	9.578%
3.	Personal liking, To pursue higher studies and research (+ve)	9.548%
4.	Study with job is possible, easy course contents. (+ve)	8.812%
5.	Expense in terms of coaching fees and poor assessment and results of 12th standard. (-ve)	7.520%
6.	Lack of information about careers in science & comparative economic return is less. (-ve)	6584%
7.	Study with job is not possible, experience of family members (-ve)	5.695%
8.	No encouragement for scientists in our country, poor numerical ability (-ve)	5.087%
9.	Not good optional subjects for competitive exams, size of the family. (-ve)	4.897%
	TOTAL VARIANCE EXPLAINED	**71.765%**

INTERPRETATIONS: Positive contribution of the reasons: Helps in competitive exams, Diversified career opportunities is 14.044% whereas the Negative contribution of poor school teaching, Tough syllabus and amount of labour & time: 9.578%.

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6.7. STATISTICAL ANALYSIS OF DATA SET FOR <u>SOUTH DELHI</u> AND ITS FINDINGS:

Following table provides a list of schools / college considered in his study from south Delhi.

NAME OF SCHOOLS	NAME OF COLLEGES
B.R.M. Sr. Sec. School	Dyal Singh College
D.A.V. Public School	Lady Shri Ram College
Kendriya Vidyalaya	P.G.D.A.V. College
Tagore International School	

Table 6.7.1: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career goals	220
2.	To pursue higher studies & research	339
3.	Natural Liking	367
4.	Honour Society	492
5.	Motivated by teacher	591

Kendall's W = .536

Most important reason & Better career goal is followed by To pursue higher studies & research and so on.

Table 6.7.2. : DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career Options	346
2.	Professional degree offered	533
3.	Job openings available	584
4.	Natural Liking	710
5.	Easy course contents	826
6.	Study with job is possible	834
7.	To pursue higher studies & research	839
8.	Encouraging 12th exam board results	866
9.	Parental Business	1038

Kendall's - W = .311

Most important reason: Better career option is followed by professional degrees offered, parental business is the least important reason for opting Commerce stream.

Table 6.7.3.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Helps in competitive exams	84
2.	Personal liking	144
3.	Diversified career opportunities	200
4.	To pursue higher studies & research	227
5.	Easy course contents	252
6.	Study with job is possible	261
7.	Poor numerical ability or fear for maths	268

Kendall's -W = .406

Most Important reason: Helps in competitive exams is followed by personal liking. Where as fear of maths comes at last as regards the reasons for opting Arts.

Table 6.7.4.: DISTRIBUTION OF 'RANK-SUMS' FOR VARIOUS REASONS FOR NOT OPTING SCIENCE.

Sr. No.	REASONS	RANK SUM
1	Tough Syllabus	839
2	Amount of Labour & time	1048
3	Expenses in terms of coaching fees	1669
4	Poor assessment results 12th Standard	1729
5	Lake of Information about careers in science	1774
6	Study with job is not possible	1878
7	Poor School Teaching	1974
8	Not many respectful job openings	2024
9	No encouragement for scientist of our country	2057
10	Comparative economic returns less	2114
11	Experience of family members	2153
12	Poor numerical ability	2357
13	Not good optional subjects for competitive economy	2439
14	Size of the family	2730

Kendall's W = .233

Most important reason: tough syllabus is followed by Amount of labour & time and the list for the reasons for NOT opting science ends with size of the family.

Again the PCA is done for the whole data set for South Delhi and the Following tables provide the output of this analysis.

Table 6.7.5.: PCA OUTPUT WITH RESPECT TO 'TISAC'

Sr. No.	FACTORS RESPONSIBLE FOR TISAC (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour time and tough syllabus, study with job is not possible (-ve)	11.821%
2.	Expense in terms of coaching fees, poor assessment & result of 12th standard (-ve)	9.875%
3.	Poor school teaching, lack of information abut careers in science (-ve)	9.447%
4.	Not many respectful job openings, comparative economic return is less (-ve)	8.724%
5.	No encouragement for scientists in our country, experience of family members.(-ve)	7.501%
6.	Not good optional subjects for competitive exams, size of the family	7.148%
7.	Better career goals, motivated by teacher (+ve)	6.688%
8.	Social pressure & Honour in society (+ve)	5.766%
9.	Natural liking & to pursue higher studies & research (+ve)	5.411%
	TOTAL VARIANCE EXPLAINED	**72.379%**

INTERPRETATIONS: Amount of labour & time and tough syllabus, study with job is not possible are the reasons which students put forward for NOT opting science their (-ve) contribution is: 11.821%. However Better career goals and motivation by teachers have a positive contribution of 6.688%.

Table 6.7.6. : PCA OUTPUT WITH RESPECT TO IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	FACTORS FOR OPTING COMMERCE & NOT SCIENCE	% CONTRIBUTION
1.	Better career options and professional degrees offered (+ve)	11.133%
2.	Job openings available, Easy course contents (+ve)	9.647%
3.	Encouraging 12th exam board results, study with job is possible. (+ve)	8.187%
4.	Natural liking, To pursue higher studies & research. (+ve)	7.638%
5.	Amount of labour & time, Tough syllabus (-ve)	7.471%
6.	Expense in terms of coaching fees, poor school teaching (-ve)	6.589%
7.	Poor assessment & result of 12th standard, lack of information about careers in science (-ve)	5.676%
8.	Not many respectful job openings, comparative economic return is less. (-ve)	4.945%
9.	Study with job is possible, Not good optional subjects for competitive exams. (-ve)	4.515%
	TOTAL VARIANCE EXPLAINED	**65.802%**

INTERPRETATIONS: Better career options and professional degrees offered contribute positively towards the reasons responsible for opting commerce, with a 11.133% contribution towards the total variance explained. Amount of labour & time and tough syllabus contributed in other direction and are responsible for NOT opting science with a (-ve) contribution of 7.471%.

Table 6.7.7. : PCA OUTPUT WITH RESPECT TO IMPACT OF ARTS STREAM ON SCIENCE STREAM

Sr. No.	FACTORS RESPONISBLE FOR OPTING ARTS & NOT SCIENCE	% CONTRIBUTION
1.	Helps in competitive exams, Diversified career opportunities, to pursue higher studies & research (+ve)	30.648%
2.	Study with job is possible, easy course contents. (+ve)	13.699%
3.	Personal liking, poor numerical ability (+ve)	9.608%
4.	Amount of labour & time, tough syllabus (-ve)	8.376%
5.	Poor school teaching, Expense in terms of coaching fees etc. (-ve)	6.557%
6.	Lack of information about careers in science & comparative economic return is less. (-ve)	5.599%
	TOTAL VARIANCE EXPLAINED	**74.487%**

INTERPRETATIONS: Reasons (motivating) put forward by the students to opt for Science stream are: Helps in competitive exams & diversified career opportunities alongwith to pursue higher studies & research with a (positive) contribution 30.648%. Reasons NOT opting science as compared to their choice for Science stream include: Amount of labour & time & tough syllabus with a contribution of 8.376%.

CONCLUSIONS: TOP –3 REASONS FOR 'CHANGING' TRENDS

POSITIVE (STRENGTHS)

1. Better career goals, motivated by teacher
2. Social pressure & honour in society
3. To pursue higher studies & research & natural liking

NEGATIVE (WEAKNESS)

1. Amount of labour & time.
2. Expenses in terms of coaching fees
3. Poor school teaching and lack of information about careers in science.

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6.8. STATISTICAL ANALYSIS OF DATA SET FOR <u>EAST DELHI</u> AND ITS FINDINGS:

Following table provides a list of schools / colleges considered in his study from East Delhi area.

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
EAST DELHI	A.C.C. Govt. Boys School	Shyamal College
	A.C.C.S. B. Vidyalaya	Vivekananada College
	Bharat National Public School	
	D.A.V. Public School	
	Dav Public School	
	Govt. Girls Sen. School	
	Kendriya Vidayalata	

Table 6.8.1.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career goals	187
2.	To pursue higher studies & research	289
3.	Natural Liking	312
4.	Honour Society	400
5.	Motivated by teacher	445
6.	Social pressure	558

Kendall's - W = .437

Most important reason & Better career goals list for opting Science stream, ends with social pressure.

Table 6.8.2.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERECE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career Options	317
2.	Professional degree offered	383
3.	Job openings available	482
4.	Natural Liking	508
5.	To pursue higher studies & research	635
6.	Easy course contents	704
7.	Encouraging 12th exam board results	718
8.	Study with job is possible	725
9.	Parental Business	790

Kendall's -W = .352

Most Important reason: Better career option is again followed by professional degrees offered. The list for reasons for opting Commerce stream ends with parental business.

Table 6.8.3.: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Helps in competitive exams	301
2.	Personal liking	328
3.	Easy course contents	340
4.	Study with job is possible	344
5.	Diversified career opportunities	396
6.	To pursue higher studies & research	426
7.	Poor numerical ability or fear for maths	460

Kendall's- W = .194

Most Important reasons: Helps in competitive exams Personal likings, easy course contents are some of the most important reasons for opting Arts Stream. Again fear of maths or poor numerical ability is not that much possible.

Table 6.8.4.: DISTRIBUTION OF 'RANK-SUMS' FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM.

Sr. No.	REASONS	RANK SUM
1	Tough Syllabus	1185
2	Amount of Labour time	1363
3	Expenses in terms of coaching fees	1378
4.	Poor school teaching	1599
5.	Poor assessment & results 12th Standard	1879
6.	Lake of Information about careers in science	2049
7.	Study with job is not possible	2121
8.	No encouragement for scientist of our country	2202
9.	Not many respectful job openings	2211
10.	Experience of family members	2239
11.	Comparative economic returns less	2283
12.	Poor numerical ability	2449
13.	Not good optional subjects for competitive exams	2534
14.	Size of the family	2699

Kendall's -W = .232

Most important reasons: Tough syllabus

Table 6.8.5.: PCA OUTPUT WITH RESPECT TO 'TISAC'

Sr. No.	FACTORS RESPONSIBLE FOR CHANGING TRENDS IN SCIENCE STREAM	% CONTRIBUTION
1.	To pursue higher studies research, Better career goals (+ve)	11.133%
2.	Social pressure, Honour in society (+ve)	9.647%
3.	Natural Liking, motivated by teacher (+ve)	8.187%
4.	Amount of labour & time, expense in terms of coaching fees etc.(-ve)	7.638%
5.	Poor school teaching & tough syllabus (-ve)	7.471%
6.	Not many respectful job openings, lack of information about careers in science (-ve)	6.589%
7.	Poor assessment & result of 12th standard (-ve)	5.676%
8.	Study with job is not possible, comparative economic return is less(-ve)	4.945%
9.	No encouragement for scientists in our country & Not good optional subjects for competitive exams (-ve)	4.515%
	TOTAL VARIANCE EXPLAINED	**65.802%**

+ve Represents inclination <u>towards</u> the stream

-ve Represent the inclination <u>away</u> from the stream

INTERPRETATION: 11.133% is the contribution of the factors to pursue higher studies & research, Better career goals towards opting the stream etc. the students for opting the 'science stream'.

Table 6.8.6. : IMPACT OF Commerce stream ON 'TISAC'

Sr. No.	REASONS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour & time, Tough syllabus (+ve)	19.505%
2.	Better career options and professional degrees offered (+ve)	15.877%
3.	Easy course contents, job openings available (+ve)	14.005%
4.	Poor assessment & result of 12th standard (-ve)	11.483%
5.	Encouraging 12th exam board result, job openings available (+ve)	11.163%
6.	To pursue higher studies & research, study with job is possible (+ve)	8.253%
7.	Study with job is not possible, comparative economic return is less. (-ve)	6.256%
	TOTAL VARIANCE EXPLAINED	**86.541%**

+ve : Factors responsible for <u>opting</u> Commerce stream when asked to students vis-a-vis opting for Science stream.

-ve : Factors responsible for <u>NOT</u> opting Science stream compared to Commerce stream.

INTERPRETATIONS: Amount of labour & time and tough syllabus contributes 19.505% of the TOTAL variance explained for NOT opting science. Similarly encouraging results job openings Encouraging 12th exam board result, job openings available (+ve) available contributes 11.163% for opting Commerce stream

Table 6.8.7.: SHOWING PERCENTAGE WISE CONTRIBUTION OF REASONS RESPONSIBLE FOR 'TISAC'

Sr. No.	FACTORS FOR OPTING COMMERCE & NOT SCIENCE	% CONTRIBUTION
1.	To pursue higher studies & research, Better career goals (+ve)	11.133%
2.	Social pressure, Honour in society (+ve)	9.647%
3.	Natural liking, motivated by teacher (+ve)	8.187%
4.	Amount of labour & time, expense in terms of coaching fees etc. (-ve)	7.638%
5.	Poor school teaching & tough syllabus (-ve)	7.471%
6.	Not many respectful job openings, lack of information about careers in science (-ve)	6.589%
7.	Poor assessment & result of 12th standard (-ve)	5.676%
8.	Study with job is not possible, comparative economic return is less (-ve)	4.945%
9.	No encouragement for scientist in our country & Not optional subjects for competitive exams. (-ve)	4.515%
	TOTAL VARIANCE EXPLAINED	**65.802%**

+ve : Represents inclination <u>towards</u> the stream
- ve : Represents the inclination <u>away</u> from the stream.

INTERPRETATIONS: 11.133% is the contribution of the factors To pursue higher studies & research, Better career goals (+ve) towards opting stream etc.

CONCLUSIONS: EAST DELHI

TOP –3 REASONS FOR 'COMBINATION OF FACTORS FOR OPTING SCIENCE

1. Better career goals, To pursue higher studies & research (11.133%)
2. Social pressure & Honour in society (9.647%).
3. Natural liking, motivated by teacher (8.187%)

TOP –3 REASONS FOR 'COMBINATION OF FACTORS OF IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

(A) COMBINATIONS RESPONSIBLE FOR OPTING COMMERCE

1. Professional degrees offered, Better career options (15.877%)
2. Easy course contents, job openings available (14.005%)
3. Encouraging 12th exam board results, job openings available (11.163%)

(B) (COMBINATIONS RESPONSIBLE FOR NOT OPTING SCIENCE vis-à-vis COMMERCE)

1. Amount of labour & time, Tough syllabus (19.505%)
2. Expense in terms of coaching fees and poor assessment &results of 12th standard (11.483%)
3. Study with job is not possible, comparative economic return is less (6.256%).

TOP –3 REASONS FOR 'COMBINATION OF FACTORS OF IMPACT OF ARTS STREAM ON SCIENCE STREAM

(A) COMBINATIONS RESPONSIBLE FOR OPTING ARTS

1. Diversified career opportunities and study with job is possible (11.133%).

2. Easy course contents & helps in competitive exams (9.647%).

3. Natural liking & to pursue higher studies & research (8.187%)

(B) COMBINATIONS RESPONSIBLE FOR NOT OPTING SCIENCE vis-à-vis COMMERCE

1. Amount of labour & time, Tough syllabus (7.638%)

2. Poor school teaching, expense in terms of coaching fees etc. (7.471%)

3. Not many respectful job openings & study with job is not possible (6.589%).

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6.9.   STATISTICAL ANALYSIS OF DATA SET FOR <u>WEST DELHI</u> AND ITS FINDINGS

Students were selected from each category of the schools and different types of colleges form this part of WEST DELHI. The following tables provided a list of such schools/colleges.

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
WEST DELHI	Bhai Joga Singh Khalsa Girls Kendriya Vidyalaya P.G.D.A.V. Sen. Sec. School S.K.V. No. 1Keshav Puran S.K.V. No.2Keshav Puran	Kalindi College Keshav Mahavidyalaya Sri Guru Tegh Bahadur Khalsa

Table 6.9.1.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career goals	179
2.	Natural Liking	215
3.	To pursue higher studies & research	247
4.	Honour in Society	353
5.	Motivated by teacher	397
6.	Social pressure	511

Kendall's - W = .526

Most important reason: Better career goals list ends with social pressure.

Table 6.9.2. : DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING COMMERECE STREAM

Sr. No.	REASONS	RANK SUM
1.	Better career Options	264
2.	Job openings available	325
3.	Professional degree offered	360
4.	Study with job is possible	583
5.	Encouraging 12th exam board results	674
6.	To pursue higher studies & research	782
7.	Natural Liking	787
8.	Parental Business	842
9.	Easy course contents	847

Kendall's-W = .528

Most Important reason: Better career options.

Table 6.9.3: DISTRIBUTION OF RANK-SUM FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASONS	RANK SUM
1.	Helps in competitive exams	337
2.	Easy course contents	401
3.	Diversified career opportunities	461
4.	Study with job is possible	473
5.	Personal liking	486
6.	Poor numerical ability or fear for maths	522
7.	No pursue higher studies & research	545

Kendall's- W = .152

Most Important reason: Helps in competitive exams.

Table 6.9.4. : DISTRIBUTION OF 'RANK-SUMS' FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM.

Sr. No.	REASONS	RANK SUM
1	Tough Syllabus	1026
2	Expenses in terms of coaching fees	1451
3	Amount of Labour & time	1456
4.	Study with job is not possible	1851
5.	Lake of Information about careers in science	2032
6.	No encouragement for scientist of our country	2231
7.	Experience of family members	2253
8.	Not many respectful job openings	
9.	Poor assessment & results 12th Standard	2560
10.	Poor numerical ability	2598
11.	Comparative economic returns less	2602
12.	Poor school teaching	2711
13.	Not good optional subjects for competitive exams	3104
14.	Size of the family	3143

Kendall's - W = .313

Most important reason: Tough syllabus.

In order to see exactly how much a particular reason contribute to the motivation to 'CHANGE' from Science stream to other streams, the following tables summarize the PCA output for the impact of Arts & Commerce stream on the Science stream.

Table 6.9.5. : PCA OUTPUT WITH RESPECT TO 'TISAC'

Sr. No.	FACTORS RESPONSIBLE FOR CHANGING TRENDS IN SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time, tough syllabus (-ve)	11.163%
2.	Expense in terms of coaching fees, Poor assessment & result of 12th standard & poor school teaching (-ve)	9.495%
3.	Lack of information about careers in science & Not many respectful job openings (-ve)	8.187%
4.	Better career goals, To pursue higher studies research, (+ve)	8.383%
5.	No encouragement for scientists in our country, study with job is not possible (-ve)	8.139%
6.	Natural Liking & honour in society (+ve)	7.936%
7.	Comparative economic return is less, experience of family members(-ve)	7.542%
8.	Not good optional subjects for competitive exams, poor numerical ability (-ve)	7.451%
	TOTAL VARIANCE EXPLAINED	**68.807%**

INTERPRETATIONS: The reason for NOT opting science are: Amount of labour & time, tough syllabus, expense in terms of coaching fees etc. they contribute 20.678% towards the total variance explained.

Table 6.9.6. : IMPACT OF Commerce stream ON 'TISAC'

Sr. No.	REASONS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour & time, Tough syllabus (-ve)	9.557%
2.	Professional degrees offered and Better career options and (+ve)	9.219%
3.	Study with job is possible, easy course contents (+ve)	8.935%
4.	Poor school teaching, expense in terms of coaching fees etc.(-ve)	6.943%
5.	Job openings available, Natural liking (+ve)	6.613%
6.	Encouraging 12th exam board results, parental business (+ve)	6.599%
7.	Expense in terms of coaching fees etc. (-ve)	6.384%
8.	Lack of information about careers in science (-ve)	6.123%
9.	Poor assessment & result of 12th standard	5.743%
	TOTAL VARIANCE EXPLAINED	**66.116%**

Table 6.9.7. : SHOWING PERCENTAGE WISE CONTRIBUTION OF REASONS RESPONSIBLE FOR 'TISAC'

Sr. No.	FACTORS FOR OPTING ARTS & NOT SCIENCE	% CONTRIBUTION
1.	Diversified career opportunities, Helps in competitive exams (+ve)	9.677%
2.	Study with job is possible, easy course contents (+ve)	9.658%
3.	Tough syllabus, Amount of labour & time (-ve)	9.213%
4.	Expense in terms of coaching fees etc., poor school teaching (-ve)	8.974%
5.	To pursue higher studies & research, personal liking (+ve)	8.435%
6.	No encouragement for scientist in our country (-ve)	7.842%
7.	Study with job is not possible and experience of family members. (-ve)	7.614%
8.	Comparative economic return is less & lack of information about careers in science.	6.812%
	TOTAL VARIANCE EXPLAINED	**68.225%**

6.10   WAYS FORWARD

Students were asked to: What should be done ? To response of this question the following table provides the view of the students from the WHOLE DELHI State.

Sr. No.	SUGGESTIONS	COUNT
1.	More facilities	402*
2.	Revise syllabus	350
3.	Improve school teaching	303
4.	Proper guidance	293
5.	Reduce the cost	216
6.	Proper checking	198

*Highest count

Maximum number of students feel that more facilities should be provided to attract the students towards Science stream.

6.11 CONCLUDING REMARKS :

Based on the analysis in the precedings sections of this chapter, we have tried to summarize the 'reasons' responsible for the 'changing' trends and also their respective contributions towards this phenomenon. Reasons favouring to opt for Science stream or not to opt for Science stream (taking only TOP-5 reasons) have been presented in the SWOT analysis form.

S	REASONS (+ve)	RANK SUM	W	REASONS (-ve)	RANK SUM
1	Better career goals	723	1	Tough syllabus	4071
2	Natural liking	1119	2	Amount of labour & time	4928
3	To pursue higher studies & research	1124	3	Expense in terms of coaching fees	5860
4	Honour in society	1543	4	Study with job is not possible	7513
5	Motivated by teacher	1798	5	Lack of information about career	7548
O	REASONS(ARTS)	RANK SUM	T	REASONS (Commerce)	RANK SUM
1	Helps in competitive exam.	1086	1	Better career options	1161
2	Personal liking	1339	2	Professional degrees offered	1626
3	Diversified career opportunities	1471	3	Job openings available	1816
4	Study with job is possible	1579	4	Natural liking	2416
5	To pursue higher studies & research	1721	5	Study with job is possible	2681

CHAPTER - 7

CHANGING TRENDS IN SCIENCE AS A CAREER IN RAJASTHAN

7.1. BRIEF STATE PROFILE:

RAJASTHAN is an important and Historically famous state in the north-western region of our country. Famous as the 'state' of 'FORTS' and desserts, Rajasthan has been famous for its rich tradition and is internationally famous for its tie-n-dye

7.2. CITIES SURVEYED:

We have selected some important cities from all the states under study. In Rajasthan the selected cities include: Jaipur (the capital), Udaipur (the zinc city) and Jodhpur (the heart of Rajasthan). The students from these cities were selected from schools & colleges, according to the sampling design discussed in the Chapter-2. A total of 1008 students were selected from the schools and 616 students came form colleges. The total sample size of students from all the cities surveyed is 1624.

7.3. DISTRIBUTION OF STUDENTS WITH RESPECT 'CHANGING TRENDS' AT SCHOOL LEVEL AND COLLEGE LEVEL

'TREND' in the present study has been interpreted as, it is not a 'trend' in the sense that the data has been taken over a period of time (say) last 10-15 years and then some trend is observed over a 'period' of time. It is an attempt to see that how the students perceive science as a career in the present situation, when it is observed (over all) that students are no more interested in pursuing their career with science. Most important information gathered from the students is the questionnaire comes from the questions 1.15 & 1.16 and the questions 1.17 & 1.18. Response to these questions lead to an estimate of 'ACTUAL DECLINE' and the

'CHANGE' in trends among students for opting science. The following series of figures gives the distribution at school level/college level.

Fig. : 7.3.1

JAIPUR (SAMPLE SIZE : 451)
Distribution of % for change
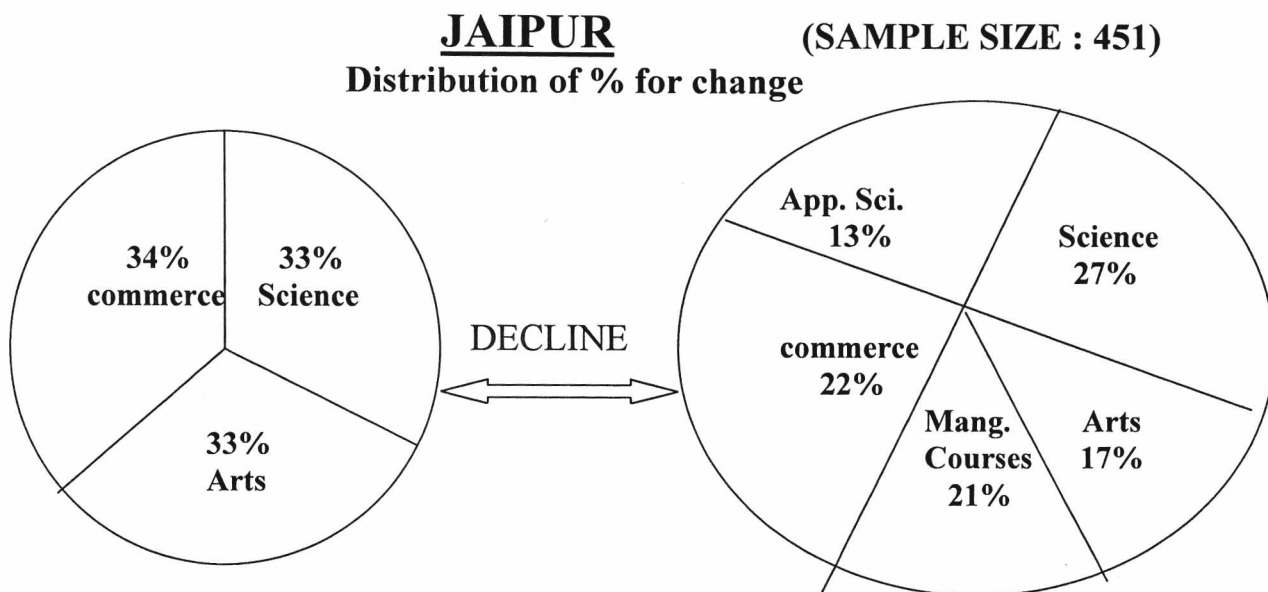
Different percentages in the above figures show a changing trend from Arts/Science/Commerce to Applied Sciences/Science/Commerce/Management Courses/ Arts.

Fig : 7.3.2 UDAIPUR (SAMPLE SIZE : 253)

11th STANDARD   F.Y. COLLEGE
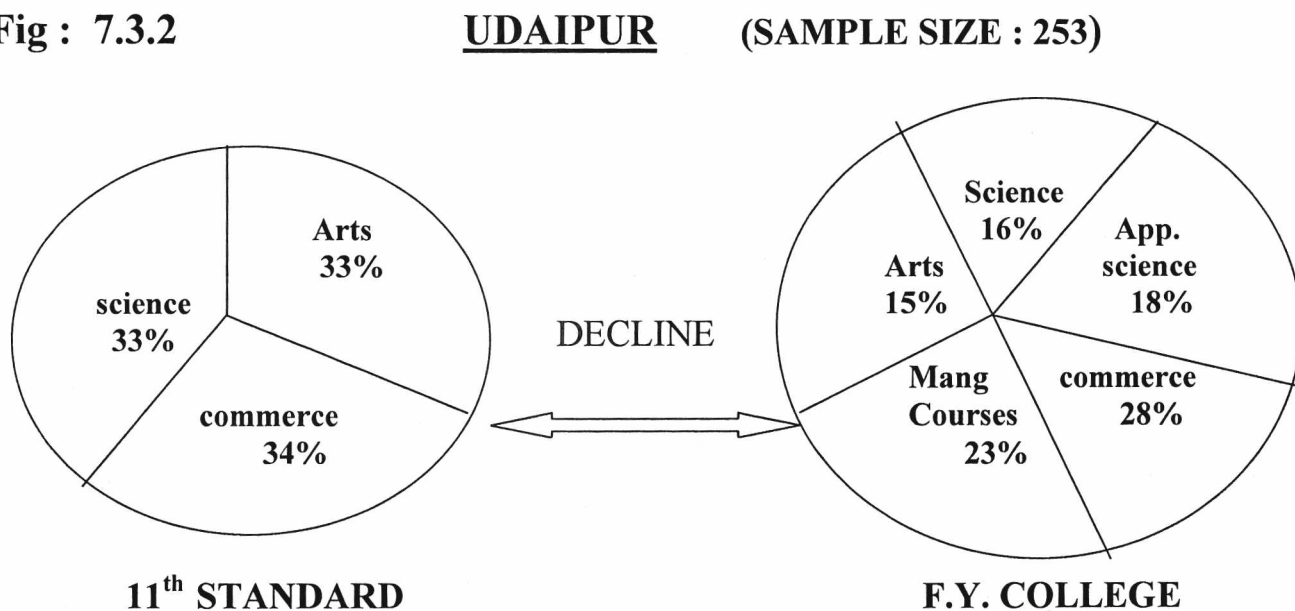
Maximum number of students, willing to change from their stream have shown their inclination for Applied Science and Management courses.

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Fig. 7.3.3.:   **JODHPUR**   (SAMPLE SIZE:304)

11th STANDARD   DECLINE   **F.Y. COLLEGE**
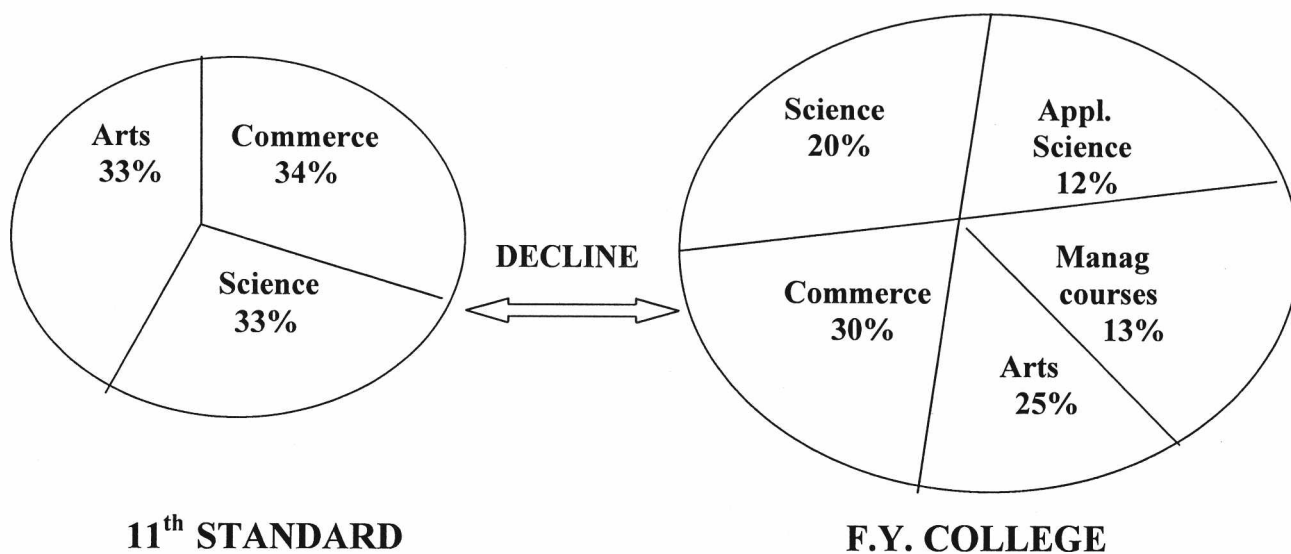
Majority of the students preferred to opt for Applied Science courses, Arts & Management courses.

Table 7.3.1. : DISTRIBUTION OF SCHOOL STUDENTS WITH RESPECT TO SCIENCE AS FIRST CHOICE

CITIES	YES	NO	TOTAL
JAIPUR	158	293	451
UDAIPUR	120	133	253
JODHPUR	145	159	304
TOTAL	**423**	**585**	**1008**

41% students expressed that their first choice was Science stream whereas 59% of the students answered 'NO' for science as 1st choice.

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Table 7.3.2. : DISTRIBUTION OF COLLEGE STUDENTS WITH RESPECT TO SCIENCE AS FIRST CHOICE

CITIES	YES	NO	TOTAL
JAIPUR	160	121	281
UDAIPUR	100	55	155
JODHPUR	72	108	180
TOTAL	**332 (53%)**	**284 (47%)**	**616**

53% of students at the college expressed to have science stream as their first choice, while 47% of the students did say 'NO' to science as their first choice.

Table 7.3.3. : WITHIN STATE AMONG CITIES (INTRASTATE) COMPARISION OF DECLINE

	11th Standard Stream			First Year College Level Stream				
CITY	Arts	Science	Commerce	Arts	Science	Appl. science	Commerce	Mang. Courses
JAIPUR	33%	33%	34%	17%	27%	13%	22%	21%
UDAIPUR	33%	33%	34%	15%	16%	18%	28%	25%
JODHPUR	33%	33%	34%	25%	20%	12%	30%	13%

Table above provides declining trends from different streams at school level to different streams at college level.

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7.4. WOULD YOU LIKE TO 'CHANGE' THE CURENT STREAM

Fig. 7.4.1. : It is only that science stream students can 'change' their stream.

JAIPUR   SAMPLE SIZE : 732

11th STANDARD   **F.Y. COLLEGE**
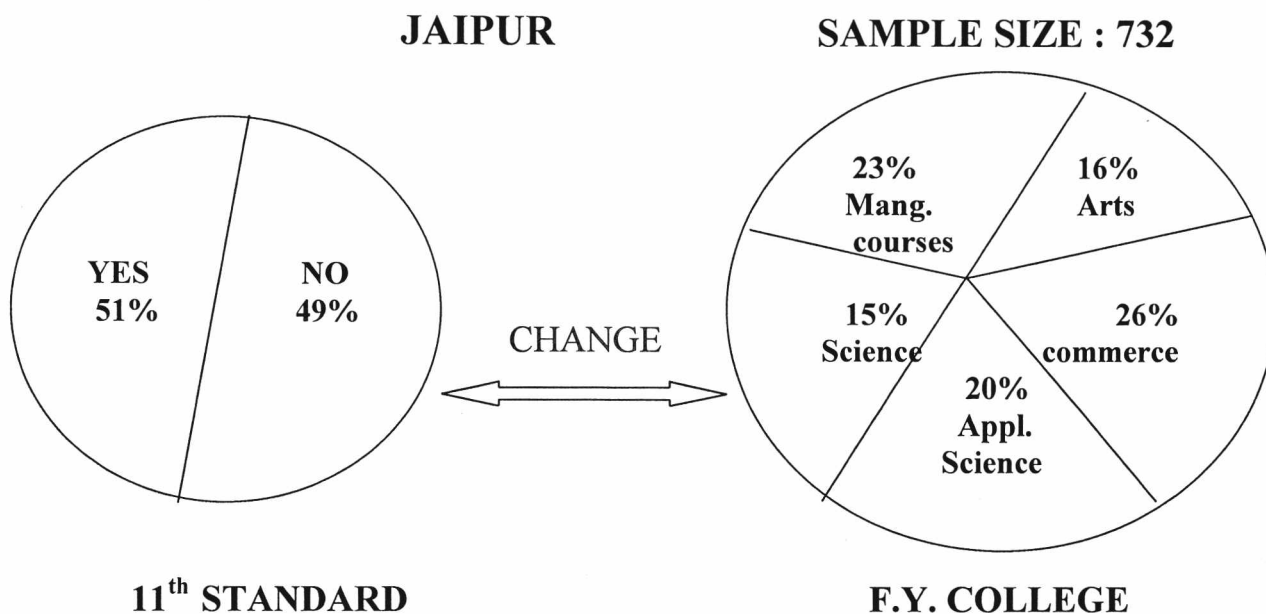
51% of the students would like to 'change' their stream from science to some other 'stream' how it is distributed is shown in the above figure.

Fig. 7.4.2 :

UDAIPUR   SAMPLE SIZE:408

11th STANDARD   **F.Y. COLLEGE**
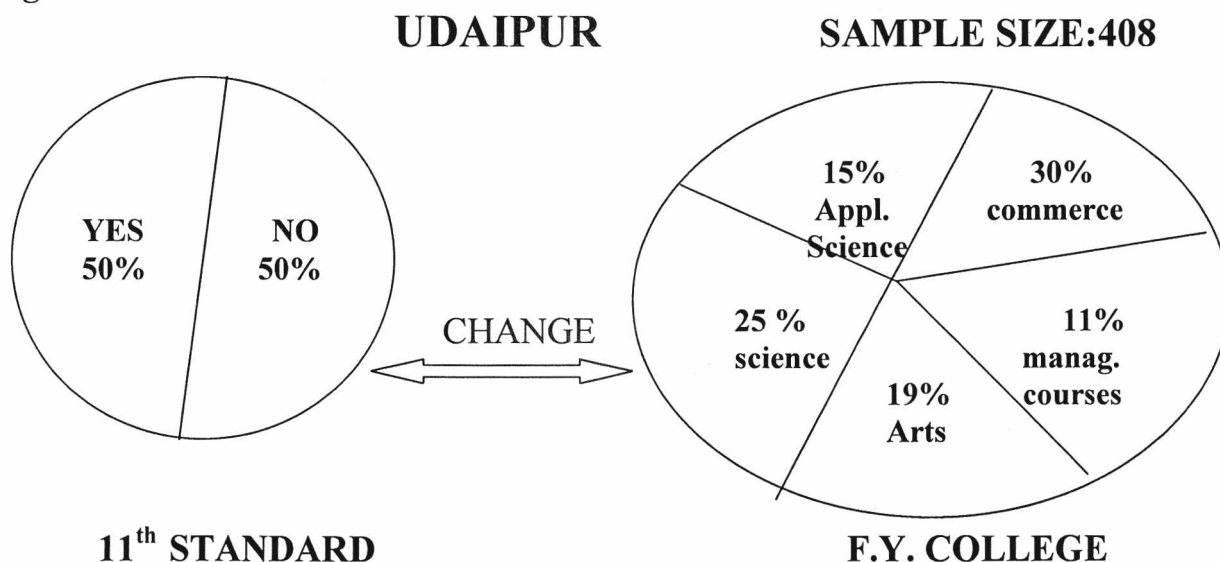
Approximately 50% students would like to change their stream from science to some other stream.

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Fig. 7.4.3 :   **JODHPUR**   **SAMPLE SIZE: 484**
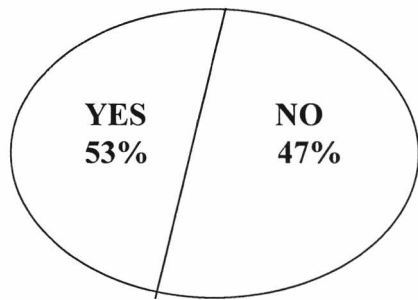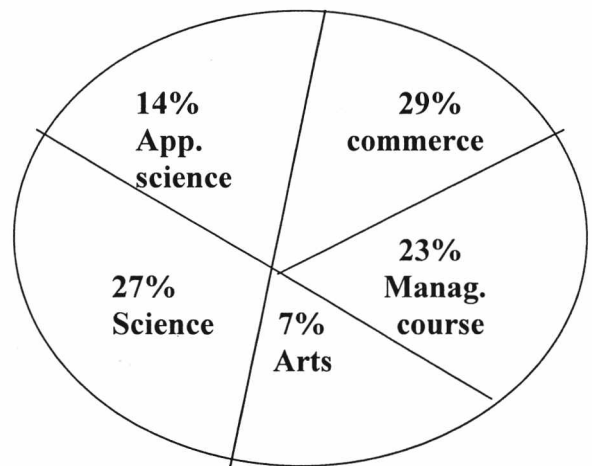
11ᵗʰ STANDARD   **F.Y. COLLEGE**

53% of the students are willing to change their stream from science stream to various other streams.

RAJASTHAN

7.5 DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT SCHOOL LEVEL

Fig. 7.5.1.

SCHOOL

% OF STUDENTS

	SCIENCE STREAM	ARTS STREAM	COMMERCE STREAM
E	24%	12%	20%
G	36%	36%	37%
A	28%	32%	32%
P	12%	20%	11%

P : Poor
A : Average
G : Good
E : Excellent

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DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT COLLEGE LEVEL

Fig. 7.5.2.

P : Poor
A : Average
G : Good
E : Excellent

In Rajasthan state most of the school students are of the view that with Science stream there are Good job opportunity(36%) almost parallel with Arts and Commerce stream with the responses of college students maximum number of students 29% (as compared to only 13% for Commerce stream) feel that with Science stream job opportunities do not exist in comparison to Commerce stream.

7.6 : STATISTICAL ANALYSIS OF THE TOTAL DATA SET FOR RAJASTHAN STATE

The following table provides a break up of students at different schools/colleges with respect to male/female in various cities covered in the state.

Table 7.6.1.: DISTRIBUTION OF STUDENTS

City	11th Standard			First Year College		
	Male	Female	Total	Male	Female	Total
JAIPUR	310	141	451	228	53	281
UDAIPUR	167	86	253	79	76	155
JODHPUR	108	196	304	135	45	180
TOTAL	585	423	1008	442	174	616
						1624

The responses from all these students were recorded on the structured (printed) questionnaire to identify and analyze reasons' for 'changing' trends in science as a career. For this purpose again the Kendall's- W and principal component analyze along with X^2 – test have been used. The whole analysis is carried out using SPSS. The various outputs and resulting tables have been presented in the following sections of this chapter.

Table 7.6.2.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOROPTING SCIENCE STREAM IN THE RAJASTHAN STATE

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better Career Goals	935
2.	Natural Liking	1461
3.	To pursue higher studies & research	1743
4.	Honour In Society	2129
5.	Motivated By Teacher	2497
6.	Social Pressure	2462

Kendall's - W = .380

Most important reason: Better Career goal

Table 7.6.3. : DISTRIBUTION OF RANK-SUMS FOR OPTING COMMERCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE	RANK SUM
1.	Better Career Options	1509
2.	Professional Degrees Offered	1911
3.	Job Openings Available	2258
4.	Natural Liking	2726
5.	Easy Course Contents	2892
6.	Study with job is possible	2936
7.	To pursue higher studies & research	3096
8.	Encouraging 12th exam board results	3150
9.	Parental Business	3210

Kendall's - W = .356

Most important reason: Better Career Options

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Table 7.6.4.: DISTRIBUTION OF RANK-SUMS FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS	RANK SUM
1.	Helps In Competitive Exam	1404
2.	Personal Liking	1793
3.	Diversified Career Opportunities	1832
4.	To Pursue Higher Studies & research	2159
5.	Study with job is possible	2236
6.	Easy Course Contents	2721
7.	Poor numerical ability (or fear of maths)	3175

Kendall's -W = .376

Most important reason : Helps in competitive exams

Table 7.6.5: DISTRIBUTION OF RANK-SUMS FOR NOT OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Amount of Labour & time	6602
2.	Tough syllabus	6736
3.	Expenses in terms of coaching fees	9257
4.	Poor School teaching	9417
5.	Poor assessment & result of 12th Standard	10652
6.	Lake of information about career in science	11047
7.	Not many respectful job openings	11151
8.	Study with job is not possible	11331
9.	Comparative economic return is less	11663
10.	No encouragement for scientists in our country	12772
11.	Not good optional subjects for competitive exams	13911
12.	Experience of family members	13977
13.	Poor numerical ability	14013
14.	Size of family	15475

Kendall's - W = .283

Most important reason: Amount of labour & time

Again as discussed in previous chapters, PCA is performed to 'extract' the 'exact' respective contribution of various reasons for the changing trends.

Table 7.6.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career goals and Natural liking (+ve)	10.973%
2.	Amount of labour & time and tough syllabus (-ve)	9.868%
3.	Honour in society and motivated by teacher (+ve)	8.879%
4.	Poor school teaching, expense in terms of coaching fees etc., poor assessment and result of 12th standard (-ve)	8.064%
5.	To pursue higher studies & research, Natural liking (+ve)	7.969%
6.	Comparative economic return is less, Not many respectful job openings (-ve)	7.082%
7.	Study with job is not possible, lack of information about careers in science (-ve)	6.649%
8.	Not good optional subjects for competitive exams (-ve)	5.532%
	TOTAL VARIANCE EXPLAINED	**65.016%**

INTERPRETATIONS: (1) Students in the state fell that: Better career goals, social pressure, honour in society and motivation by the teachers are the positive reasons due to which students opt for Science stream. The contribution of these factors is: 19.852%. **(2)** Students do not opt for Science stream due to the reasons: Amount of labour & time, tough syllabus, poor school teaching, expense in terms of coaching fees etc. and their contribution is: 17.932% towards the total variance explained.

Table 7.6.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career options, professional degrees offered (+ve)	12.269%
2.	Amount of labour & time, poor school teaching (-ve)	10.868%
3.	Job openings available, study with job is possible (+ve)	9.979%
4.	Expense in terms of coaching fees, poor assessment & result of 12th standard (-ve)	8.643%
5.	Easy course contents, encouraging 12th exam board results (+ve)	8.217%
6.	Study with job is not possible, experience of family members (-ve)	7.626%
7.	Not many respectful job openings, lack of information about careers in science (-ve)	7.048%
8.	Poor numerical ability, No encouragement for scientists in our country (-ve)	6.628%
	TOTAL VARIANCE EXPLAINED	**61.299%**

INTERPRETATIONS: **(1)** Commerce stream has an edge over Science stream due to: Better career options, professional degrees offered, job openings available, study with job is possible, these factors contribute (positively): 22.248%. **(2)** Science stream (in comparison to Commerce stream) is not preferred due to: Amount of labour & time, poor school teaching, expense in terms of coaching fees, poor assessment & result of 12th standard and their contribution is: 19.511%.

Table 7.6.8. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Helps in competitive exams and personal liking (+ve)	9.728%
2.	Amount of labour & time, tough syllabus (-ve)	8.632%
3.	Diversified career opportunities, study with job is possible (+ve)	8.413%
4.	Poor school teaching, poor assessment & result of 12th standard (-ve)	7.724%
5.	Easy course contents, poor numerical ability (+ve)	7.253%
6.	Study with job is not possible, Comparative economic return is less (-ve)	6.119%
7.	Lack of information about careers in science, experience of family members (-ve)	5.956%
8.	Not good optional subjects for competitive exams (-ve)	5.159%
	TOTAL VARIANCE EXPLAINED	**58.984%**

INTERPRETATIONS: **(1)** Arts stream is preferred by the students due to the reasons: Helps in competitive exams, personal liking, Diversified career opportunities, study with job is possible, these factors put together contribute: 18.360%. **(2)** Science stream faces a competition from the Arts Stream due to the reasons: Amount of labour & time, tough syllabus, poor school teaching, poor assessment & result of 12th standard in Science stream. The contribution of all these factors is: 16.356% to the total variance explained.

7.7 : STATISTICAL ANALYSIS OF DATA– SET FOR <u>JAIPUR</u> AND ITS FINDING

In order to study the changing trends in science as a career in Jaipur city. The sample was selected from schools/colleges listed out in the following table. In order to study the general agreement / disagreement on particular reason(s), which students feel are more/less important for opting/Not opting science and for opting Arts or Commerce stream.

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
JAIPUR	Amar Public School	Kamodiya Girls College
	Govt. Sen. Sec. School	Maharani College
	Khandelwal Higher Sec. School	Shree Swaroop Govind Parakh College
	Maharani Gayatri Devi Girl's	Shri Khandelwal Vaishya College
	Maheshavari Girls Sr.Sec. School	Subodh College
	Maheshvari Public School	Uni. Commerce College
	Shri Bhavani Niketan Sr.Sec.G	Uni. Maharaja College, Jaipur
	Subodh Public School	Uni. Rajasthan College

Table 7.7.1 :   DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE STREAM	RANK SUM
1.	Better Career Goals	408
2.	Natural Liking	693
3.	To pursue higher studies & research	756
4.	Honour in Society	932
5.	Motivated by Teacher	1031
6.	Social Pressure	1059

Most important reason: Better Career goal / Kendall's -W = .294

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Table 7.7.2 : DISTRIBUTION OF RANK-SUMS FOR OPTING COMMERCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Better Career Options	720
2.	Professional degrees Offered	923
3.	Job openings Available	1000
4.	Natural Liking	1254
5.	Easy Course Contains	1277
6.	Encouraging 12th exam board results	1286
7.	Study with job is possible	1289
8.	To pursue higher studies & research	1297
9.	Parental Business	1421

Most Important Reason: Better Career Options / Kendall's W = .242

Table 7.7.3.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR ARTS STREAM	RANK SUM
1.	Helps In Competitive Exam	609
2.	Diversified Career Opportunities	826
3.	Personal Liking	856
4.	To Pursue Higher Studies & research	1000
5.	Study with job is possible	1017
6.	Easy course contents	1254
7.	Poor numerical ability (Fear of maths)	1507

Most Important Reason: Helps in competitive exams Kendall's W = .380

Table 7.7.4. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Amount of Labour & time	3022
2.	Tough syllabus	3270
3.	Poor School Teaching	3929
4.	Expenses in terms of coaching fees	4133
5.	Poor assessment & result of 12th Standard	4845
6.	Lake of information about career in science	5103
7.	Not many respectful job openings	5196
8.	Study with job is not possible	5562
9.	Comparative economic return is less	5621
10.	No encouragement for scientists in our country	6035
11.	Not good optional subjects for competitive exams	6524
12.	Experience of family members	6540
13.	Poor numerical ability	6607
14.	Size of family	7212

Most Important Reason: Amount of labour & time Kendall's - W .331

Kendall's coefficient of concordance provides an idea about agreement/disagreement regarding the importance of a particular reasons. Again, to know about the respective contribution of various reasons to the total variance explained the following tables provide the summary of PCA output.

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Table 7.7.5.: PERCENTAGE WISE DISTRIBUTION OF CONTRIBUTION OF FACTORS FOR 'TISAC

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE	% CONTRIBUTION
1.	Better career goals & Social pressure (+ve)	8.827%
2.	Expense in terms of coaching fees & NOT many respectful job openings (-ve)	7.721%
3.	Amount of labour & time and tough syllabus	7.662%
4.	Natural liking, To pursue higher studies & research (+ve)	7.194%
5.	Poor school teaching, Poor assessment & result of 12th standard (-ve)	7.165%
6.	Honour in society, motivated by teacher (+ve)	7.148%
7.	Comparative economic return is less, experience of family members (-ve)	6.890%
8.	Study with job is not possible, size of the family (-ve)	6.605%
9.	Lack of information about careers in science (-ve)	5.952%
	TOTAL VARIANCE EXPLAINED	**65.163%**

INTERPRETATIONS: **(1)** Better career goals & social pressure contribute 8.827% towards the total variance explained, these are factors responsible for opting the science stream, and their contribution is highest. **(2)** Expense in terms of coaching fees and not many respectful job openings are the two most important factors (among the other factors) responsible for NOT opting science stream and their contribution is 7.662% which is highest among all those responsible for NOT opting science.

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Table 7.7.6: PCA OUTPUT WITH RESPECT TO IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	FACTORS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career options, professional degrees offered (+ve)	12.305%
2.	Poor school teaching, tough syllabus (-ve)	9.668%
3.	Job openings available, parental business (+ve)	7.989%
4.	Amount of labour & time and expense in terms of coaching fees etc. (-ve)	7.429%
5.	Easy course contents, encouraging 12th exam board results (+ve)	6.850%
6.	Natural liking, to pursue higher studies & research (+ve)	5.888%
7.	Not many respectful job openings, experience of family members (-ve)	5.675%
8.	Comparative economic return is less (-ve)	5.377%
9.	Lack of information about careers in science (-ve)	4.566%
10.	Not good optional subjects for competitive exams (-ve)	4.394%
	TOTAL VARIANCE EXPLAINED	**70.140%**

INTERPRETATIONS: **(1)** Better career options and professional degrees offered account for 12.305% towards the total variance explained for the reasons responsible for opting Commerce stream. **(2)** Amount of labour & time and expense in terms of coaching fees etc. contribute 7.429% towards the reasons for variance explained for not opting Science stream vis-à-vis commerce stream.

Table 7.7.7. : PCA OUTPUT WITH RESPECT TO IMPACT OF ARTS STREAM & NOT SCIENCE STREAM

Sr. No	FACTORS (ARTS & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour & time, tough syllabus (-ve)	8.427%
2.	Lack of information about career in science, expense in terms of coaching fees etc. (-ve)	8.015%
3.	Helps in competitive exams, Diversified career opportunities, (+ve)	7.994%
4.	Study with job is possible, personal liking (+ve)	7.573%
5.	Poor school teaching, poor assessment & result of 12th standard (-ve)	7.146%
6.	To pursue higher studies & research, easy course contents (+ve)	6.047%
7.	Study with job is not possible, experience of family members (-ve)	5.903%
8.	Comparative economic return is less, No encouragement for scientists in our country (-ve)	5.699%
	TOTAL VARIANCE EXPLAINED	**56.804%**

INTERPRETATIONS: **(1)** The contribution of 'Amount of labour & time and tough syllabus is 8.427% for the reasons for <u>NOT</u> opting science. This contribution is highest among all the reasons responsible for this. **(2)** Helps in competitive exams and diversified career opportunities have a positive contribution of 7.994% towards the reasons for <u>opting</u> Arts Stream. Again this is the highest positive contribution among all the factors responsible for opting Arts stream. vis-a-vis reasons for opting for Science stream.

CONCLUSIONS :

TOP-3^{S} RAJASTHAN

JAIPUR

TOP-3 REASONS : **(A)** **FOR OPTING SCIENCE :**

1. Better career goals, social pressure (8.827%)

2. Natural liking, To pursue higher studies & research (7.194%)

3. Honour in the society, motivated by teacher, Natural liking (7.148%)

(B) **FOR NOT OPTING SCIENCE :**

1. Expense in terms of coaching fees etc. and Not many respectful job openings (7.721%)

2. Amount of labour & time and tough syllabus (7.662%).

3. Poor school teaching and poor assessment & result of 12th standard (7.165%).

TOP-3 REASONS : (A) **FOR OPTING COMMERCE :**

1. Better career options and professional degrees offered (7.274%).

2. Job openings available, easy course contents (6.638%).

3. To pursue higher studies & research, Natural liking (6.555%)

(B) FOR NOT OPTING SCIENCE :

1. Poor School teaching, expense in terms of coaching fees etc. (10.529%).

2. Lack of information about careers in science, NOT many respectful job openings (8.728%).

3. Amount of labour & time, Tough syllabus (6.653%).

TOP-3 REASONS : (A) FOR OPTING ARTS :

1. Helps in competitive exams, Diversified career opportunities (7.994%).

2. Study with job is possible, personal liking (7.573%)

3. To pursue higher studies & research, easy course contents (6.047%).

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (8.427%).

2. Lack of information about careers in science and expense in terms of coaching fees etc. (8.015%)

3. Poor School teaching, poor assessment & result of 12th standard (7.146%).

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7.8.: STATISTICAL ANALYSIS FOR <u>UDAIPUR</u> DATA AND ITS FINDINGS:

UDAIPUR, 'the lake city' of Rajasthan is an internationally famous tourist place. It is the main education center in MEWAR region of the state. In the table given below, a list of schools/colleges surveyed is provided.

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
UDAIPUR	Alok Se. Sec. School	B.N.P.G. College
	Central Public School	College of Science
	G.G.S. Senior Sec. School	Govt. Meera Girls College
	G.N. Girls School	Guru Nanak Girls College
	Govt. Fateh Se. Sec. School	
	Kendriya Vidyalaya No. 1	

Table 7.8.1 : DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM.

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career goals	273
2.	Natural liking	308
3.	To pursue higher studies & research	404
4.	Honour in society	560
5.	Motivated by teacher	686
6.	Social pressure	688

Kendall's -W = .286

Most Important Reason: Better career goals

Table 7.8.2. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM.

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career options	431
2.	Professional degrees offered	458
3.	Job openings available	582
4.	Natural liking	606
5.	To pursue higher studies & research	748
6.	Easy course contents	784
7.	Parental business	797
8.	Study with job is possible	826
9.	Encouraging 12th exam board results	880

Kendall's -W = .532

Most Important Reason : Better career options

Table 7.8.3. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASON FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	340
2.	Personal liking	416
3.	Diversified career opportunities	455
4.	Study with job is possible	573
5.	To pursue higher studies & research	520
6.	Easy course contents	647
7.	Poor numerical ability (Fear of maths)	729

Kendall's - W = .429

Most Important Reason: Helps in competitive exams

Table 7.8.4.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	1728
2.	Amount of Labour & time	1921
3.	Expenses in terms of coaching fees	2454
4.	Study with job is not possible	2567
5.	Lake of information about career in science	2664
6.	Poor assessment & result of 12th Standard	2803
7.	Not many respectful job openings	2892
8.	Poor School Teaching	2894
9.	Comparative economic return is less	3096
10.	No encouragement for scientists in our country	3248
11.	Experience of family members	3619
12.	Poor numerical ability	3665
13.	Not good optional subjects for competitive exams	3685
14.	Size of family	4204

Most Important Reason: tough syllabus, Kendall's - W .368

Table 7.8.5. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career goals, social pressure (+ve)	12.282%
2.	Amount of labour & time and tough syllabus (-ve)	10.997%
3.	Honour in society, motivated by teacher (+ve)	8.081%
4.	Poor school teaching, expense in terms of coaching fees (-ve)	7.902%
5.	To pursue higher studies & research, Natural liking (+ve)	7.501%
6.	Lack of information about careers in science, experience of family members (-ve)	6.529%
7.	Not many respectful job openings, study with job is not possible (-ve)	6.399%
8.	Poor assessment & result of 12th standard (-ve)	5.885%
9.	Comparative economic return is less (-ve)	5.579%
	TOTAL VARIANCE EXPLAINED	**71.095%**

INTERPRETATIONS: (1) Better career goals and social pressure are the two most important factors contributing 12.282% towards the variance explained for the reasons responsible for <u>opting</u> Science stream. (2) Expense in terms of coaching fees etc. & poor school teaching contribute 7.902% towards the variance of reasons responsible for <u>NOT</u> opting science.

Table 7.8.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	FACTORS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career options, professional degrees offered (+ve)	12.305%
2.	Poor school teaching, tough syllabus (-ve)	9.668%
3.	Job openings available, parental business (+ve)	7.989%
4.	Amount of labour & time and expense in terms of coaching fees etc. (-ve)	7.429%
5.	Easy course contents, encouraging 12th exam board results (+ve)	6.850%
6.	Natural liking, to pursue higher studies & research (+ve)	5.888%
7.	Not many respectful job openings, experience of family members (-ve)	5.675%
8.	Comparative economic return is less (-ve)	5.377%
9.	Lack of information about careers in science (-ve)	4.566%
10.	Not good optional subjects for competitive exams (-ve)	4.394%
	TOTAL VARIANCE EXPLAINED	**70.140%**

INTERPRETATIONS: **(1)** Better career options and professional degrees offered account for 12.305% towards the total variance explained for the reasons responsible for opting Commerce stream. **(2)** Amount of labour & time and expense in terms of coaching fees etc. contribute 7.429% towards the reasons for variance explained for not opting Science stream vis-à-vis commerce stream.

Table 7.8.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Helps in competitive exams and diversified career opportunities (+ve)	15.018%
2.	Tough syllabus and poor school teaching (-ve)	8.847%
3.	Personal liking, To pursue higher studies & research (+ve)	7.855%
4.	Amount of labour & time and tough syllabus (-ve)	7.714%
5.	Easy course contents and study with job is possible (+ve)	7.138%
6.	Lack of information about careers in science, experience of family member (-ve)	6.742%
7.	Study with job is not possible, size of the family (-ve)	5.568%
8.	Comparative economic return is less (-ve)	5.178%
9.	Not many respectful job openings, expense in terms of coaching fees (-ve)	5.048%
10.	Poor assessment & result of 12th standard (-ve)	4.790%
	TOTAL VARIANCE EXPLAINED	**73.899%**

INTERPRETATIONS: 1) The contribution of the factors 'Helps in competitive exams and diversified career opportunities PLUS study with job is possible account for a huge 15.018% towards the total variance explained for the reasons responsible for opting Commerce stream, when compared with Science stream. (2) Tough syllabus & poor school teaching contribute for 8.847% towards the total variance for the reasons for NOT opting science.

CONCLUSIONS :

TOP-3^S UDAIPUR

TOP-3 REASONS : **(A) FOR OPTING SCIENCE :**

    1.   Better career goals, social pressure (12.282%).

    2.   Honour in society, motivated by teacher (8.081%)

    3.   To pursue higher studies & research and Natural liking (7.501%).

(B) FOR NOT OPTING SCIENCE :

    1.   Amount of labour & time and tough syllabus (10.997%).

    2.   Poor school teaching and expense in terms of coaching fees etc. (7.902%).

    3.   Lack of information about careers in science and experience of family members. (6.529%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

    1. Better career options, professional degrees offered (12.305%).

    2. Job openings available, parental business (7.989%).

    3. Easy course contents, encouraging 12th exam board results (6.850%).

(B) FOR NOT OPTING SCIENCE :

    1. Poor School teaching, tough syllabus (9.668%).

    2. Amount of labour & time, expense in terms of coaching fees etc. (7.429%)

    3. Not many respectful job openings, experience of family members (5.675%).

TOP-3 REASONS : (A) FOR OPTING ARTS :

1. Helps in competitive exams, diversified career opportunities and study with job is possible (15.018%).

2. Personal liking, To pursue higher studies & research (7.855%).

3. Easy course contents and study with job is possible (7.138%).

B) FOR NOT OPTING SCIENCE :

1. Tough syllabus & poor school teaching (8.847%).

2. Amount of labour & time, expense in terms of coaching fees etc. (7.714%).

3. Lack of information about careers in science and experience of family members (6.742%).

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7.9.: STATISTICAL ANALYSIS OF DATA-SET FOR <u>JODHPUR</u> AND ITS FINDINGS:

In this city, we collected the data from students studying in the schools and colleges, listed in the following table:

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
JODHPUR	B.C.S.C. Sr. Sec. School	Jai Narayan Vyas University
	Govt. Girls Secondary School	Kamla Nehru Girls college
	Govt. Girls Sr . Sec. School	Rachoo Memorial science
	New Govt. Hr. Sec. School	Somani College of commerce
	R.N.U.M.V. Jodhpur	
	Rajmahal School	
	Summer Higher Sec. School, Jodhpur	

Kendall's W is obtained, using the Rank-sum for various reasons. The ranks given by the students to various reasons may vary (and will vary) it is therefore, the minimum rank-sum corresponds to 'agreement' on a particular reason to be most 'important' while a higher value of Rank-sum leads to a disagreement the following series of tables give the distribution of Rank-sums.

Table 7.9.1.:   DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM.

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career goals	254
2.	Natural liking	460
3.	To pursue higher studies & research	583
4.	Honour in society	637
5.	Motivated by teacher	780
6.	Social pressure	795

Kendall's W = .433

Most Important Reason: Better career goals

Table 7.9.2. :   DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM.

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career options	358
2.	Professional degrees offered	530
3.	Job openings available	676
4.	Study with job is possible	821
5.	Easy course contents	831
6.	Natural liking	
7.	Encouraging 12th exam board results	
8.	Parental business	
9.	To pursue higher studies & research	

Kendall's -W =   .396

Most important reason: Better career options

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Table 7.9.3. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASON FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	455
2.	Personal liking	521
3.	Diversified career opportunities	551
4.	To pursue higher studies & research	639
5.	Study with job is possible	706
6.	Easy course contents	820
7.	Poor numerical ability (Fear of maths)	939

Kendall's - W = .392

Most Important Reason: Helps in competitive exams

Table 7.9.4.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Amount of labour & time	1926
2.	Tough syllabus	1715
3.	Poor school teaching	2476
4.	Expenses in terms of coaching fees	2578
5.	Poor assessment & result of 12th Standard	2678
6.	Comparative economic return is less	2835
7.	Not many respectful job openings	2898
8.	Study with job is not possible	3196
9.	Lake of information about career in science	3384
10.	No encouragement for scientists in our country	3795
11.	Not good optional subjects for competitive exams	3985
12.	Poor numerical ability	4403
13.	Experience of family members	4589
14.	Size of family	4607

Kendall's - W = .286

Most important Reason: Amount of labour & time and tough syllabus the list concludes with the size of the family (i.e. this reason being the least important one).

Table 7.9.5. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career goals, social pressure (+ve)	11.048%
2.	Poor school teaching and expense in terms of coaching fees etc. (-ve)	10.244%
3.	Honour in society, motivated by teacher (+ve)	9.014%
4.	Amount of labour & time and tough syllabus (-ve)	8.538%
5.	Natural liking and to pursue higher studies & research (+ve)	7.038%
6.	Poor assessment & result of 12th standard (-ve)	6.835%
7.	Not many respectful job openings, experience of family members (-ve)	6.468%
8.	Comparative economic return is less, study with job is not possible (-ve)	5.618%
9.	Lack of information about careers in science, No encouragement for scientists in our country (-ve)	5.531%
	TOTAL VARIANCE EXPLAINED	**70.380%**

INTERPRETATIONS: **(1)** 'Better career goals and social pressure' account for 11.048% towards the total variance explained for the reasons responsible for opting Science stream. Their contribution is highest among all the positive/Negative contributions for the changing trend. **(2)** Poor school teaching & expense in terms of coaching fees etc. contribute 10.244% towards the same for NOT opting science.

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Table 7.9.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	FACTORS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career options, professional degrees offered (+ve)	11.123%
2.	Study with job is possible, Natural liking (+ve)	9.473%
3.	Poor school teaching, expense in terms of coaching fees etc. (-ve)	8.460%
4.	Amount of labour & time, Tough syllabus (-ve)	8.383%
5.	Job openings available, parental business (+ve)	6.535%
6.	Encouraging 12th exam board results, easy course contents(+ve).	5.699%
7.	Not many respectful job openings, lack of information about careers in science (-ve)	5.349%
8.	Comparative economic return is less, experience of family members (-ve)	5.211%
9.	Study with job is not possible, size of the family (-ve)	4.884%
10.	Not encouragement for scientists in our country (-ve).	4.491%
	TOTAL VARIANCE EXPLAINED	**69.608%**

INTERPRETATIONS: **(1)** Better career options and professional degrees offered have a positive (highest) contribution of 11.123% towards the total variance explained for the reasons responsible for opting Commerce stream. **(2)** Poor school teaching and expense in terms of coaching fees etc. contribute (negatively) an amount of 8.460% towards the total variance explained for the reasons for <u>Not</u> opting Science stream vis-à-vis commerce stream.

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Table 7.9.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Study with job is possible, Diversified career opportunities (+ve)	19.828%
2.	Helps in competitive exams, personal liking (+ve)	12.832%
3.	Amount of labour & time and tough syllabus (-ve)	8.981%
4.	Easy course contents, encouraging 12th exam board result (+ve)	8.397%
5.	Expense in terms of coaching fees etc., poor assessment & result of 12th standard (-ve)	6.206%
6.	Study with job is not possible, experience of family members (-ve)	6.067%
7.	Comparative economic return is less, Lack of information about careers in science (-ve)	4.894%
	TOTAL VARIANCE EXPLAINED	**67.205%**

INTERPRETATIONS: (1) Out of total variance explained for the reasons for opting Arts Stream 19.828% is accounted for by the factors: study with job is possible and diversified career opportunities (2) Amount of labour & time and tough syllabus account for 8.981% for reasons for <u>NOT</u> opting science.

7.10. CONCLUSIONS:

JODHPUR

TOP-3 REASONS : (A) FOR OPTING SCIENCE :

1. Better career goals, social pressure (11.048%).

2. Honour in the society, motivated by teacher (9.014%).

3. Natural liking and to pursue higher studies & research (7.038%)

(B) FOR NOT OPTING SCIENCE :

1. Poor school teaching, expense in terms of coaching fees etc. (10.244%).

2. Amount of labour & time and tough syllabus (8.538%).

3. Poor assessment & result of 12th standard (6.835%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

1. Better career options, professional degrees offered (11.123%).

2. Study with job is possible, Natural liking (9.473%).

3. Job openings available, parental business (6.535%).

(B) FOR NOT OPTING SCIENCE:
(vis-à-vis commerce stream)

1. Poor school teaching, expense in terms of coaching fees etc. (8.460%)

2. Amount of labour & time & tough syllabus (8.383%).

3. Not many respectful job openings, lack of information about careers in science (5.349%).

TOP-3 REASONS : (A) FOR OPTING ARTS STREAM :

    1. Study with job is possible, Diversified career opportunities, Personal liking (19.828%).

    2. Helps in competitive exams, personal likings (12.832%).

    3. Easy course contents, encouraging 12th exam board results (8.397%).

    B)   FOR NOT OPTING SCIENCE STREAM:
        (vis-à-vis Arts Stream)

    1. Amount of labour & time, tough syllabus (8.981%).

    2. Expense in terms of coaching fees etc., poor assessment & result of 12th standard (6.206%)

    3. Study with job is not possible, experience of family members (6.067%).

7.11   WHAT SHOULD BE DONE ?

To bring back students to Science stream the following table provides the summary of remedial measures.

Sr. No.	SUGGESTIONS	COUNT
1.	Provide more facilities	642
2.	Improve school teaching	596
3.	Proper checking	476
4.	Revise Syllabus	382
5.	Proper guidance	316
6.	Reduce the cost	297

CHAPTER - 8

8.1 BRIEF STATE PROFILE:

Uttar Pradesh (U.P.) is the most important state of North India. It has its own educational, cultural, historical and political importance. This state has several important cities famous for various things. The state has its own websites and other demographical details are available at http://censusindia.net.in/

8.2 CITIES SURVEYED:

This state has several centers of learning and some of its cities are internationally acclaimed seats of learning. The cities taken in this study are: Lucknow (the state capital), Varanasi (internationally famous city for learning since ancient times), & Allahabad (The sangam city and famous educational centers of modern times). The other details of these cities are available on http://lucknow.nic.in, http://allahabad.nic.in and http://varansi.nic.in

The following table provides a complete list of schools and colleges surveyed in different cities.

Table 8.2.1 :

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
LUCKNOW	A.P. Sen. Girls Inter college	A.P. Sen. Girls College, Lucknow
	B.R.D. Saraswati Vidya Mandir	B.S N V P G College, Lucknow
	Kendriya Vidyalaya AMC	J N P G College, Lucknow
	Navyug Kanya Vidyalaya	Kali Charan Degree College
	Pioneer Monterssori Inter college	Lucknow Chritian College
	Seth M.R. Jaipuria School	Lucknow University, Lucknow
	Shri Jainarayan Inter college	Mahila Vidyalaya College
	St. Joseph Kethedral	Mumtaz P.G. College
VARANASI	C.M. Anglo Bengali College	B.H.U Varanasi, Faculty of Commerce
	Govt. Queen college	B H U Varanasi, Faculty of Arts
	Kendriya Vidyalaya	B H U Varanasi, Faculty of Science
	S.D.S. Inter College	Dr. Ghanshyam Singh Degree College
	Sunbeam English School	Harishchandra P G College
	Tulsi Vidya Niketan	Jagatpur College, Varanasi
	Uday Pratap Inter College	M.G. Kashi Vidyapith
		Udai Pratap College, Varanasi
		National P.G. College
		Navyug Kanya Degree College
ALLAHABAD	Allahabad Inter College	Allahabad Degree College
	Bai bharti Inter College	Allahabad University
	Govt. Inter College	C.M.P. College
	K.P. Girls Inter College	Ewing Christian College, Allahabad
	Kendriya Vidyalaya	H.N.B.G. Degree College
	Mahershi Valmiki Inter College	
	R P S Convent School	

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Table 8.2.2.: The following gives the percentagewise distribution of Male/female students in different cities of the state.

CITY	MALE	FEMALE	TOTAL
LUCKNOW	664	616	1280
VARANSI	458	142	600
ALLAHABAD	395	125	520
TOTAL	1517(63%)	**883 (37%)**	2400

In the whole state, 63% of the male students and 37% of the female students were included in the sample.

8.3   DISTRIBUTION OF STUDETS WITH RESPECT TO CHANGING TRENDS AT SCHOOL/COLLEGE LEVEL

As a quick measure of changing 'trends' question 1.13 of the questionnaire attempts to provide the current trend among students.

Table 8.3.1. : DISTRIBUTION OF SCHOOL STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE

CITIES	NUMBER OF STUDENTS		
	YES	NO	TOTAL
VARANSI	176 (46%)	199 (54%)	375
ALLHABAD	204 (62%)	121 (38%)	325
LUCKNOW	353 (44%)	447 (56%)	800
TOTAL	**733 (48%)**	**767 (52%)**	**1500**

From the above table it is clear that over all 48% of the students in all the three cities combined had science stream as their first choice, whereas 52% of the students had some other streams(s) as their first choice. It is to be noted that 62% students from Allahabad had science stream as their first choice, while 56% of the students from Lucknow did not have science stream as their first choice.

Table 8.3.2.: DISTRIBUTION OF COLLEGE STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE.

CITIES	YES	NO	TOTAL
VARANSI	133 (59%)	92 (41%)	225
ALLHABAD	99 (50%)	96 (50%)	195
LUCKNOW	264 (55%)	216 (45%)	480
TOTAL	**496 (55%)**	**404 (45%)**	**900**

Approximately 55% of the students expressed Science stream as their first choice while 45% (approx) of the students in the cities covered did not have science stream as first choice. About 59% of the students from Varanasi city has highest percentage for science stream, where as about 50% of the students from Allahabad did not favour science as 1st choice.

In order to study the changing trends among students the responses to questions in section-1 namely 1.15 and 1.16 & 1.17 and 1.18 have been analyzed and their findings have been presented in the following series of diagrams.

Fig 8.3.1 :

VARANASI

11th STANDARD   F.Y. COLLEGE LEVEL

FIG 8.3.2:

ALLAHABAD

11th STANDARD   F.Y. COLLEGE LEVEL
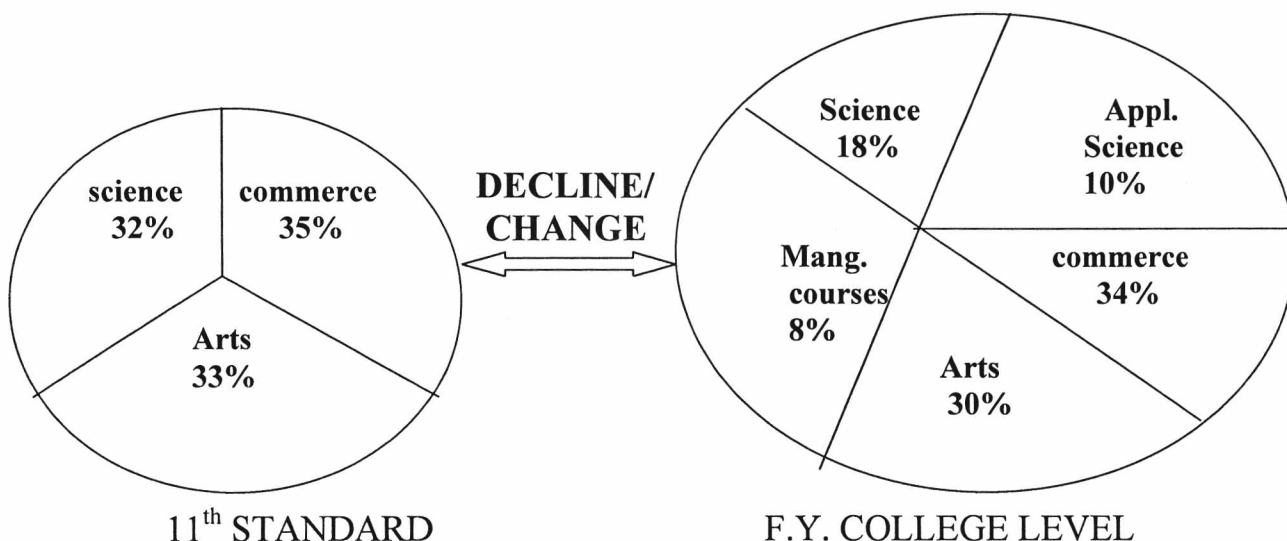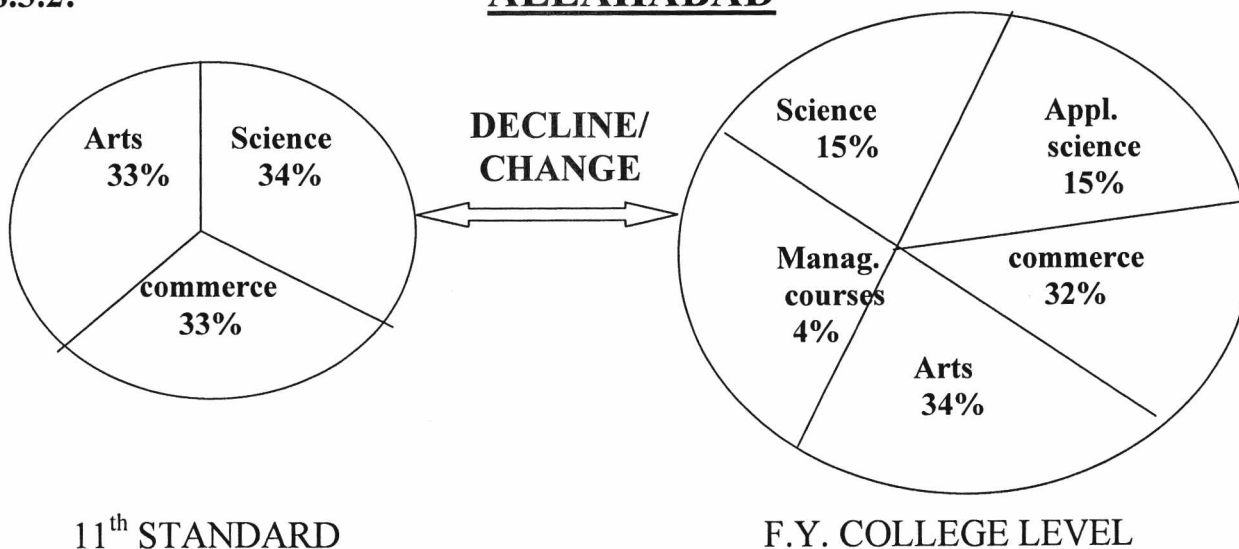
Analysis of data which is presented in the above diagram reveals that students in Arts/commerce streams almost maintain their same choice from school level to college level. But students from Science stream opt. For applied Science courses, with marginal inclination towards management courses and Arts stream.

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Fig. 8.3.3:   **LUCKNOW**

11ᵗʰ STANDARD   **F.Y. COLLEGE LEVEL**
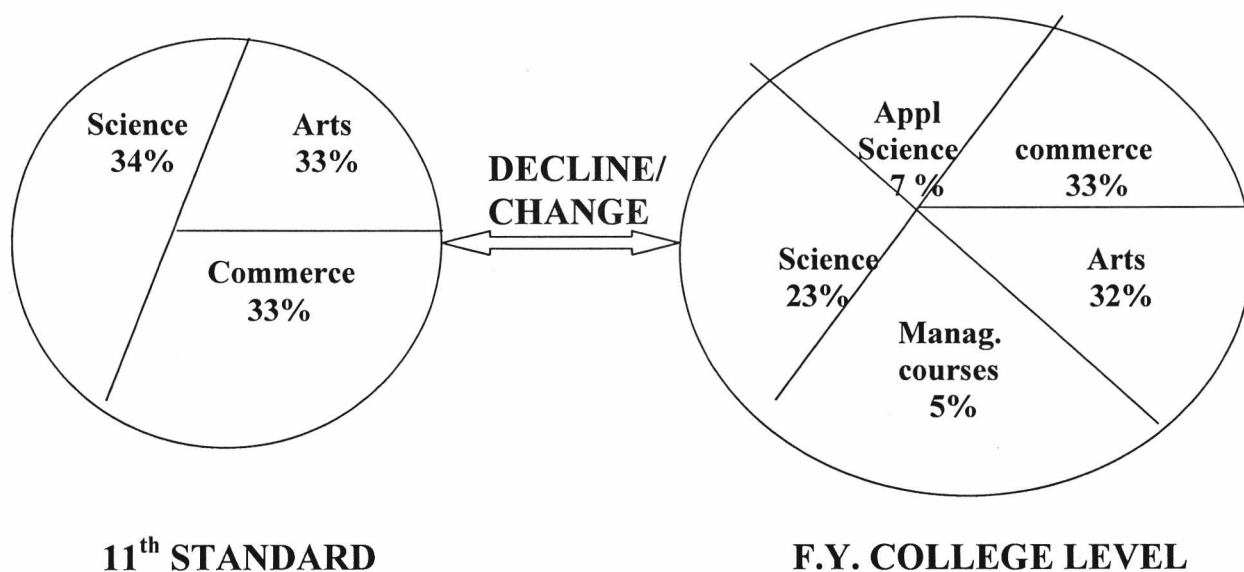
Evidently students belonging to Arts/Commerce stream at school level continue with their same stream at the college level. While students of science stream opt for applied science courses, with a little inclination towards management courses and Arts stream.

The following table provides at a glance percentagewise distribution of students studying in different streams at 11ᵗʰ standard and what would be/what is their choice of stream at the first year college level.

Table 8.3.4 : AMONG CITY COMPARISIONS

CITY	STREAM AT 11ᵗʰ Standard			STREAM AT First Year College				
	arts	science	commerce	Arts	science	Appl. science	commerce	Manag. Courses
VARANSI	33%	32%	35%	30%	10%	18%	34%	8%
ALLAHABAD	33%	34%	33%	34%	15%	15%	32%	4%
LUCKNOW	33%	34%	33%	32%	7%	23%	33%	5%

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8.4. DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPERTUNITIES IN DIFFERENT STREAMS AT SCHOOL LEVEL

<u>UTTAR PRADESH</u>

Fig. : 8.4.1.
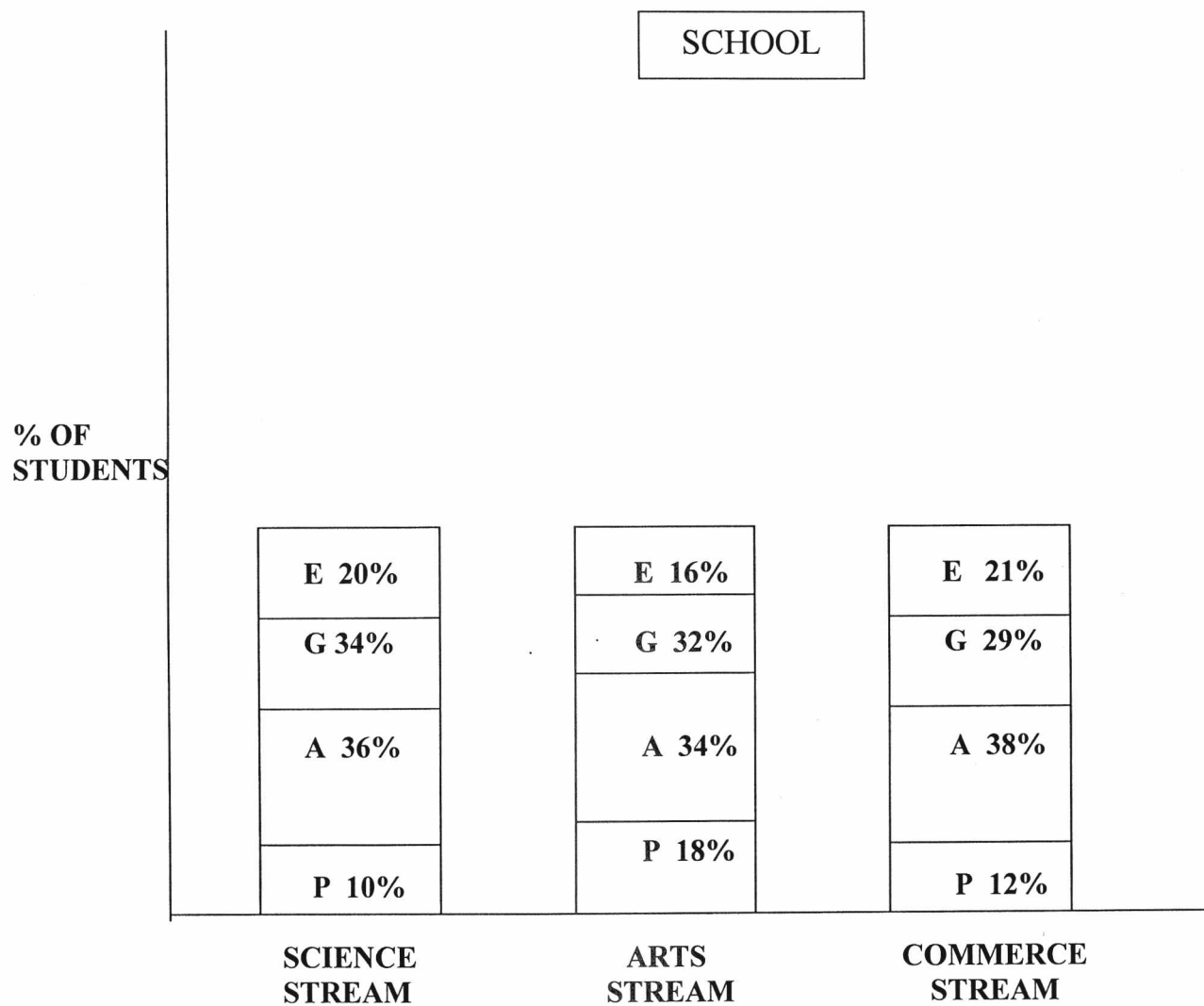
SCHOOL

% OF STUDENTS

SCIENCE STREAM	ARTS STREAM	COMMERCE STREAM
E 20%	E 16%	E 21%
G 34%	G 32%	G 29%
A 36%	A 34%	A 38%
P 10%	P 18%	P 12%

P : Poor
A : Average
G : Good
E : Excellent

DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT COLLEGE LEVEL

Fig. 8.4.2
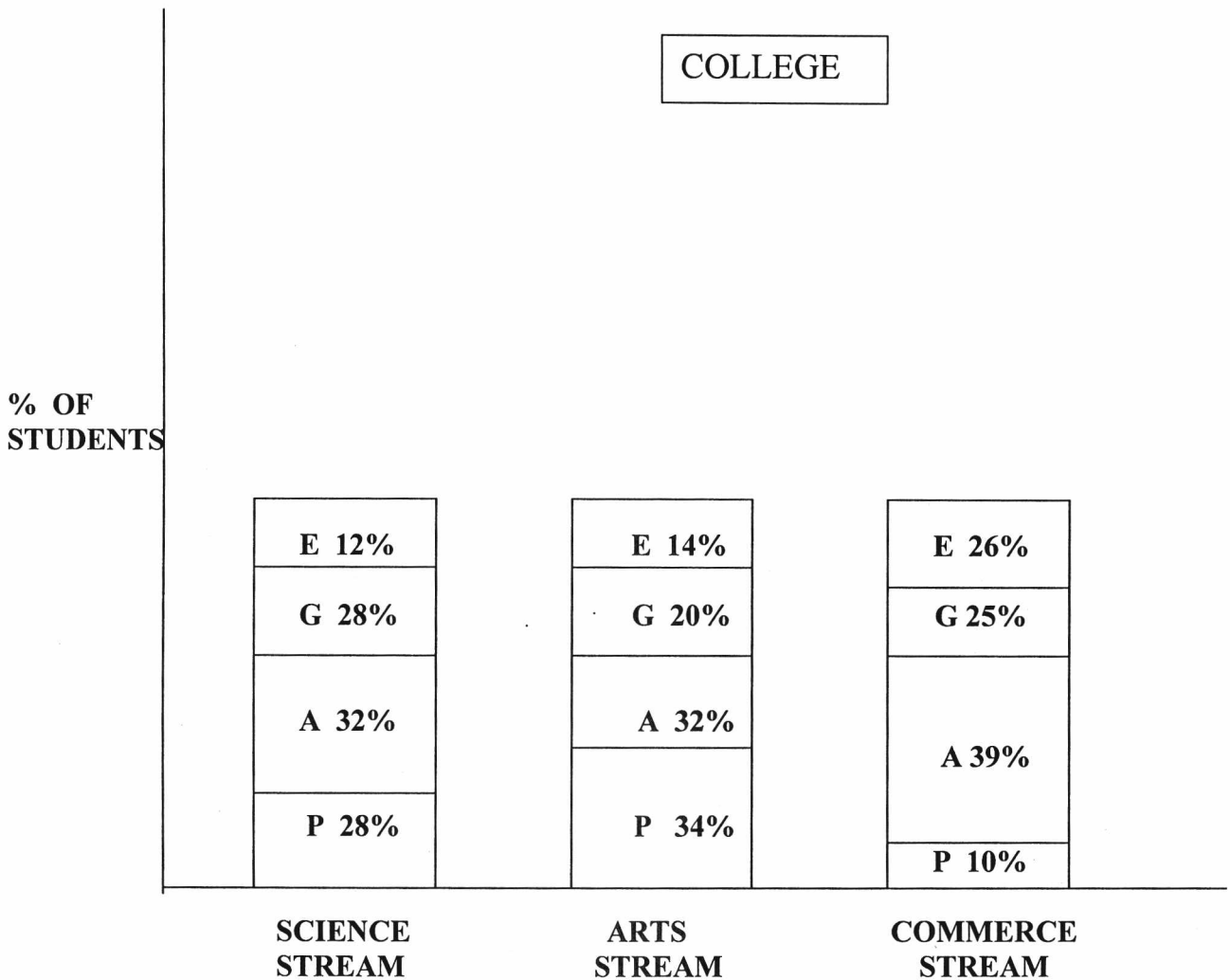
P : Poor
A : Average
G : Good
E : Excellent

It is observed that the maximum number of students perceive highest 38% of Average job opportunities with Commerce stream at school level. Strikingly 28% of the students at college level feel that the job opportunities with science are poor compared to only 10% of the students having poor job opportunities with Commerce stream

8.5. : STATISTICAL ANALYSIS OF THE TOTAL DATA SET FOR U.P. STATE

The following table provides the sample break-up in U.P. State for the sample composition at school and college level with respect to sex (male/female) in different cities of this state.

Table 8.5.1.:

CITY	SCHOOL STUDENTS			COLLEGE STUDENTS			
	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	G.T.
VARANSI	285	90	375	173	52	225	600
ALLHABAD	227	98	325	168	27	195	520
LUCKNOW	396	404	800	268	212	480	1280
TOTAL	**908**	**592**	**1500**	**609**	**291**	**900**	**2400**

The response from these **2400** students were analyzed to identify reasons responsible for changing trends in science. The statistical analysis has been done using SPSS and as described in the previous chapters, Kendall's-W and principal component analysis have been used to find out the most important reason(s) along with their respective contributions. The following series of tables presents the Kendall's W calculations and the PCA (Principal Component Analysis) outputs for the whole data set.

Table 8.5.2.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS RESONS WITH RESPECT TO REASONS FOR NOT OPTING SCIENCE (U.P. STATE)

Sr. No.	REASONS	RANK-SUM
1.	Better career goals	1354
2.	To pursue higher studies & research	2294
3.	Natural Liking	2309
4.	Honour in society	3377
5.	Motivated by teacher	3745
6.	Social pressure	4073

Most important reason for opting Science stream is : Better career goals, followed by To pursue higher studies & research. However social pressure comes at the end in this list.

Non-parametric tests:

Kendall's – W test

N	353
Kendall's W	.481
Chi-square	459.975
degree of freedom	6

Table 8.5.3.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM. (U.P.STATE)

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Better career goals	1860
2.	Professional degrees offered	2487
3.	Job openings available	2899
4.	Natural liking	4402
5.	To pursue higher studies & research	4460
6.	Study with job is possible	4886
7.	Easy course contents	5221
8.	Parental Business	5297
9.	Encouraging 12th exam board results	5444

Kendall's - W = .434

Most important reason for opting Commerce stream is: Better career options followed by professional degrees offered.

Table 8.5.4. : DISTRIBUTION OF RANK-SUMS FOR REASONS FOR OPTING ARTS STREAM. (U.P STATE)

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	2046
2.	Personal liking	2561
3.	Diversified career opportunities	3009
4.	Study with job is possible	3111
5.	To pursue higher studies & research	3450
6.	Easy course contents	3989
7.	Poor numerical ability (Fear of maths)	4572

Kendall's $W = .347$

Most Important Reason for opting Arts Stream turns out to be: Helps in competitive exams followed by personal liking. However, Fear of maths or poor numerical ability comes at the end of list of reasons responsible for opting Arts.

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Table 8.5.5.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	7847
2.	Amount of labour & time	8096
3.	Expenses in terms of coaching fees	9158
4.	Poor school teaching	9998
5.	Not many respectful job openings	10588
6.	Poor assessment & result of 12th Standard	10963
7.	Lake of information about career in science	11399
8.	Study with job is not possible	11842
9.	Comparative economic return is less	12379
10.	No encouragement for scientists in our country	13872
11.	Experience of family members	14555
12.	Poor numerical ability	15063
13.	Not good optional subjects for competitive exams	16378
14.	Size of family	16598

Kendall's - W = .217

Most important reason(s) for not opting science are: Tough syllabus, followed by Amount of labour & time, the list completes with (the weakest reason) size of the family. All the above tables list out important reasons, in order to see the respective contribution of these reasons the following series of tables present the PCA output.

The following section presents three tables: First one relates to the 'factors' for 'TISAC' with respect to science and Not science, second for the same with respect to commerce and NOT science and finally the third one presents a list of factors for changing trends with respect to Arts & NOT science.

Table 8.5.6. : FACTORS RESPONSIBE FOR OPTING COMMERCE & NOT SCIENCE

Sr. No.	FACTORS FOR OPTING COMMERCE & NOT SCIENCE	% CONTRIBUTION
1.	Not many respectful job openings and poor numerical ability (-ve)	13.262%
2.	Amount of labour & time, Tough syllabus (-ve)	9.450%
3.	Study with job is not possible and No encouragement for scientist in our country(-ve)	7.294%
4.	Professional degrees offered Job openings available Natural liking, To pursue higher studies & research. (+ve)	6.253%
5.	Expense in terms of coaching fees and not good optional subjects for competitive exams (-ve)	5.258%
6.	Easy course contents and encouraging 12th exam board results (+ve)	5.071%
7.	Study with job is possible and Natural liking (+ve)	4.786%
8.	Better career options and parental business (+ve)	4731%
9.	To pursue higher studies & research (+ve)	4.674%
	TOTAL VARIANCE EXPLAINED	**60.779%**

INTERPRETATIONS: **(1)** Students preferred commerce stream in comparison to Science stream due to: Professional degrees offered, job openings available,

easy course contents and encouraging 12th exam board results these factors contribute 11.324% to the total variance explained. **(2)** Science stream does not seem to attract the students because of: NOT many respectful job opening, Amount of labour & time & tough syllabus and the contribution of these factors is: 22.712%

Table 8.5.7. : PCA OUTPUT FOR THE IMAPCT OF ARTS STREAM

Sr. No.	FACTORS RESPONISBLE FOR OPTING ARTS & NOT SCIENCE	% CONTRIBUTION
1.	Amount of labour & time, tough syllabus (-ve)	14.858%
2.	school teaching, Expense in terms of coaching fees etc. (-ve)	9.577%
3.	Personal liking, poor numerical ability (+ve)	8.405%
4.	Diversified career opportunity and No encouragement for scientists in our country (+ve)	5.881%
5.	Lack of information about careers in science & comparative economic return is less (-ve)	5.828%
6.	Study with job is possible (+ve)	5.586%
7.	Helps in competitive exams (+ve)	5.174%
8.	To pursue higher studies & research (+ve)	4.889%
	TOTAL VARIANCE EXPLAINED	**60.198%**

INTERPRETATIONS: **(1)** Amount of labour & time, tough syllabus, poor school teaching and expense in terms of coaching fees etc. are the major factors for NOT opting the science stream in comparison to Arts Stream, these factors have a contribution of 24.435% to the total variance explained. **(2)** Students like to opt for Arts Stream mainly due to: Diversified career opportunities, study with job is possible and it helps in competitive exams, these factors put together account for 25.70% to the total variance explained.

Table 8.5.8. : DETERMINANTS FOR DECLINE TRENDS IN SCIENCE IN U.P.

Sr. No.	FACTORS RESPONISBLE FOR OPTING SCIENCE & NOT SCIENCE	% CONTRIBUTION
1.	Amount of labour & time and Tough syllabus (-ve)	12.548%
2.	Not many respectful job openings & comparative economic return is less (-ve)	11.641%
3.	Lack of information about careers in science and not good optional subjects for competitive exams (-ve)	10.155%
4.	Poor assessment & result of 12th standard and poor numerical ability (-ve)	8.466%
5.	Expense in terms of coaching fees and No encouragement for scientists in our country (-ve)	6.128%
6.	Honour in society and natural liking (+ve)	5.646%
7.	To pursue higher studies & research (+ve)	
8.	Motivated by teacher & social pressure (+ve)	5.283%
	TOTAL VARIANCE EXPLAINED	**59.867%**

INTERPRETATIONS: **(1)** The most important reasons (over all in the whole state) for NOT opting Science stream are found to be: Amount of labour & time and tough syllabus, also not many respectful job openings and comparative economic return is less, these factors (reasons) put together contribute 24.189% towards the total variance explained. **(2)** Students opt for Science stream due to the factors: Honour in society, Natural liking, motivated by teacher and social pressure, also to pursue higher studies & research play a positive role, the contribution of these factors put together is 16.218%.

8.6.: STATISTICAL ANALYSIS OF DATA SET FOR <u>LUCKNOW</u> AND ITS FINDINGS :

From this capital city of U.P. state, the students were contacted from different categories of schools and types of colleges, the following table provides a list of these from Lucknow.

Table 8.6.1. :

CITY	NAME OF SCHOOL	NAME OF COLLEGE
LUCKNOW	A.P. Sen. Girls Inter College	A.P. Sen. Girls College, Lucknow
	B.R.D. Saraswati Vidya Mandir	B.S N V P G College, Lucknow
	Govt. J.I.C.	J N P G College, Lucknow
	Kendriya Vidyalaya AMC	Kali Charan Degree College
	Pioneer Monterssori Inter College	Lucknow Chritian College
	Seth M.R. Jaipuria School	Lucknow University, Lucknow
	Shri Jainarayan Inter college	Mahila Vidyalaya College
	St. Joseph Kethedral	Mumtaz P.G. College
		National P.G. College
		Navyug Kanya Degree College

In order to study about the consensus of school & college students for various reasons responsible for opting (Arts/science/commerce streams) and not opting Science stream. A series of tables presented here gives the computation of Kendall's-W and provide the distribution of RANK-SUMS.

Table 8.6.2. : DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career goals	759
2.	Natural liking	1132
3.	To pursue higher studies & research	1262
4.	Honour in society	1822
5.	Motivated by teacher	2033
6.	Social pressure	2210

Kendall's - W = .436

Most Important Reasons for opting Science stream included: Better career goals, followed by Natural liking, the list concludes with social pressure.

Table 8.6.3. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERC STREAM	RANK SUM
1.	Better career options	956
2.	Professional degrees offered	1398
3.	Job openings available	1594
4.	To pursue higher studies & research	2330
5.	Natural liking	2349
6.	Study with job is possible	2543
7.	Easy course contents	2688
8.	Encouraging 12th exam board results	2817
9.	Parental business	2820

Kendall's -W = .423

Most Important Reasons for opting Commerce stream include Better career options, professional degrees offered, the least influential reason is: parental business.

Table 8.6.4. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	1180
2.	Personal liking	1452
3.	Study with job is possible	1589
4.	Diversified career opportunities	1703
5.	To pursue higher studies & research	1906
6.	Easy course contents	2049
7.	Poor numerical ability (Fear of maths)	2420

Kendall's - W = .348

Most important reasons for opting Arts are: Helps in competitive exams, personal liking and study with job is possible.

Table 8.6.5.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	4185
2.	Amount of labour & time	4498
3.	Expenses in terms of coaching fees	5005
4.	Not many respectful job openings	5530
5.	Poor school teaching	5685
6.	Poor assessment & result of 12th Standard	5792
7.	Lake of information about career in science	5908
8.	Study with job is not possible	6126
9.	Comparative economic return is less	6442
10.	No encouragement for scientists in our country	7337
11.	Experience of family members	7756
12.	Poor numerical ability	7963
13.	Size of family	8817
14.	Not optional subjects for competitive exams.	8860

Kendall's - W = .222

Most influential reasons for not opting science include: Tough syllabus, Amount of labour & time etc. Not good optional is not that important reason.

All the above tables provide the list of important reasons for opting various streams. However, these analyses do not shed light on the respective contribution of these reasons towards the changing trends. For this purpose PCA was carried out over the whole data set. The following tables present the PCA outputs.

Table 8.6.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	8.664%
2.	Expense in terms of coaching fees, comparative economic return is less (-ve)	8.464%
3.	Poor assessment & result of 12th standard, study with job is not possible (-ve)	8.253%
4.	Better career goals, To pursue higher studies & research (+ve)	7.958%
5.	Social pressure and motivated by the teacher (+ve)	7.421%
6.	Natural liking and Honour in society (+ve)	6.929%
7.	Lack of information about careers in science, Comparative economic return is less (-ve)	6.479%
8.	Not many respectful job openings, experience of family members (-ve)	6.369%
9.	No encouragement for scientists in our country, Not good optional subjects for competitive exams.	6.297%
	TOTAL VARIANCE EXPLAINED	**66.834%**

INTERPRETATIONS: **(1)** Amount of labour & time contribute 8.664% towards the total variance explained for the components responsible for NOT opting the Science stream. Their contribution is highest among all other components responsible for this 'change'. **(2)** The contribution of the components: 'Better career goals' & To pursue higher studies & research is the highest contribution among all the other factors responsible for opting the Science stream, and it is 7.958%.

Table 8.6.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	8.664%
2.	Professional degrees offered and easy course contents (+ve)	8.265%
3.	Poor school teaching, experience of family members (-ve)	8.253%
4.	Expense in terms of coaching fees, study with job is not possible (-ve)	7.758%
5.	Job openings available, Better career options (+ve)	7.211%
6.	Encouraging 12th exam board results, study with job is possible (+ve)	6.729%
7.	Natural liking, To pursue higher studies & research (+ve)	6.479%
8.	Lack of information about careers in science and study with job is not possible (-ve)	6.369%
9.	Comparative economic return is less, Not many respectful job openings available (-ve)	6.297%
	TOTAL VARIANCE EXPLAINED	**66.023%**

INTERPRETATIONS: **(1)** The contribution of the factors Amount & labour of time and tough syllabus is 8.664% for the components responsible for NOT opting the Science stream. This is the maximum % among all the other factors responsible in this category. **(2)** 'Professional degrees offered and easy course contents' account for 8.268% towards the reasons responsible for opting the Commerce stream.

Table 8.6.8. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Expense in terms of coaching fees etc. & poor school teaching (-ve)	9.222%
2.	Study with job is not possible, Not many respectful job openings (-ve)	10.139%
3.	Amount of labour & time and tough syllabus (-ve)	9.222%
4.	Easy course contents, Helps in competitive exams. (+ve)	7.941%
5.	Diversified career opportunities, personal liking (+ve)	7.792%
6.	Study with job is possible, To pursue higher studies & research (+ve)	7.254%
7.	Comparative economic return is less, Lack of information about careers in science (-ve)	6.539%
8.	No encouragement for scientists in our country, experience of family members. (-ve)	5.720%
	TOTAL VARIANCE EXPLAINED	**65.240%**

INTERPRETATIONS: (1) The contribution of the factors Expense in terms of coaching fees etc. and poor school teaching is 10.632% towards reasons for NOT opting Science stream as compared to reasons for opting the Science stream. (2) 'Easy course contents' and helps in the competitive exam contribute 7.941% towards the total variance explained for the reasons responsible for opting Arts stream.

8.7.: STATISTICAL ANALYSIS OF DATA SET FOR <u>ALLAHABAD</u> AND ITS FINDINGS:

The city of Allahabad is amongst the largest cities of U.P. and is situated at the confluence of three rivers, this city is also known as the SANGAM city. Students from different schools and colleges are contacted from this city. The following table provides a list of the same.

Table 8.7.1. :

CITY	NAME OF SCHOOL	NAME OF COLLEGE
ALLAHABAD	Allahabad Inter College	Allahabad Degree College
	Bal Bharti Inter College	Allahabad University
	Govt. Inter College	C.M.P. College
	K.P. Girls Inter College	Ewing Christian College, Allahabad
	Kendriya Vidyalaya	H.N.B.G. Degree College
	Mahershi Valmiki Inter College	
	R.P.S. Convent School	

Different groups of students may think differently and the main objective of the present study is to 'identify' the reasons responsible for changing trends in science. For this purpose 'concordance' among the students has been studied and the following tables provide the distribution of 'RANK-SUMS' for various reasons.

Table 8.7.2. : DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career goals	242
2.	To pursue higher studies & research	490
3.	Natural liking	542
4.	Honour in society	740
5.	Motivated by teacher	817
6.	Social pressure	888

Kendall's -W = .549

Most Important Reasons for opting Science stream included: Better career goals, to pursue higher studies & research are among the top reasons for opting Science stream, social pressure does not has that much importance for opting Science stream.

Table 8.7.3. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Professional degrees offered	422
2.	Better career options	433
3.	Job openings available	536
4.	Natural liking	936
5.	To pursue higher studies & research	995
6.	Study with job is possible	1084
7.	Easy course contents	1159
8.	Parental business	1179
9.	Encouraging 12th exam board results	1197

Kendall's -W = .487

Most Important Reasons for opting Commerce stream are: Professional degrees offered and Better career options, however according to the highest rank-sum value encouraging 12th exam results do not much influence the choice of students for Commerce stream.

Table 8.7.4. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASON FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	444
2.	Personal liking	506
3.	Diversified career opportunities	592
4.	To pursue higher studies & research	716
5.	Study with job is possible	727
6.	Easy course contents	970
7.	Poor numerical ability (Fear of maths)	989

Kendall's - W = .346

Most important reasons for opting Arts stream are: Helps in competitive exams, personal liking and diversified career opportunities.

Table 8.7.5.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	1546
2.	Amount of labour & time	1646
3.	Poor school teaching	1751
4.	Expenses in terms of coaching fees	1837
5.	Not many respectful job openings	2318
6.	Poor assessment & result of 12th Standard	2340
7.	Lake of information about career in science	2612
8.	Study with job is not possible	2723
9.	Comparative economic return is less	2766
10.	No encouragement for scientists in our country	3115
11.	Experience of family members	3161
12.	Poor numerical ability	3180
13.	Size of the family	3578
14.	Not good optional subjects for competitive exams.	3618

Kendall's - W = .254

Most influential reasons for not opting science include: Tough syllabus, Amount of labour & time poor school teaching are among the most important reasons for NOT opting science, whereas this list concludes with the reason: Not good optional subjects for competitive exams.

As mentioned earlier the tables given above provide a hierarchical list of reasons, (A reason with minimum rank being most important and as the rank-sum increases the consensus becomes less focused). The PCA helps to find out exactly what is the contribution of a particular reasons is the following three tables provide the findings of PCA.

Table 8.7.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	9.583%
2.	Expense in terms of coaching fees, poor school teaching (-ve)	9.129%
3.	Better career goals, motivated by teacher (+ve)	8.440%
4.	Social pressure, Honour in society (+ve)	6.844%
5.	To pursue higher studies & research & Natural liking (+ve)	6.658%
6.	Study with job is not possible, Not many respectful job openings (-ve)	6.228%
7.	Comparative economic return is less, Lack of information about careers in science (-ve)	5.805%
8.	No encouragement for scientists in our country (-ve)	5.725%
9.	Poor assessment & result of 12th standard and Not good optional subjects for competitive exams. (-ve)	5.530%
	TOTAL VARIANCE EXPLAINED	**63.942%**

INTERPRETATIONS: (1) Amount of labour & time and tough syllabus have a contribution 9.853% towards the trend for NOT opting science their contribution is highest among all the factors considered here. **(2)** Better career goals and motivated by teacher are the factors responsible for opting Science stream and their contribution is 8.440%.

Table 8.7.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	10.482%
2.	Lack of information about careers in science, Not many respectful job openings (-ve)	10.207%
3.	Poor school teaching, Expense in terms of coaching fees (-ve)	8.466%
4.	Poor assessment & result of 12th standard, No encouragement for scientists in our country. (+ve)	8.001%
5.	Professional degrees offered, job openings available (+ve)	7.654%
6.	Easy course contents, encouraging 12th exam board results (+ve)	6.678%
7.	Better career options, parental business (+ve)	6.641%
8.	To pursue higher studies & research, natural liking (+ve)	6.241%
	TOTAL VARIANCE EXPLAINED	**66.023%**

INTERPRETATIONS: (1) The contribution of the factors Amount of labour & time and tough syllabus account for 10.484% towards the factors responsible for NOT opting Science stream. **(2)** Professional degrees (like: C.A./C.S./CFA etc.) offered and job openings available are the factors contributing 7.654% for opting Commerce stream. However this figure highest is among all the other factors responsible for opting Commerce vis-à-vis 'Science stream', so these are the most important reasons.

Table 8.7.8. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	10.177%
2.	Diversified career opportunities, Helps in competitive exams. (+ve)	9.798%
3.	To pursue higher studies & research, at personal liking (+ve)	9.208%
4.	Study with job is possible, easy course contents (+ve)	8.817%
5.	Poor school teaching, expense in terms of coaching fees (-ve)	6.694%
6.	Poor assessment & result of 12th standard, lack of information about careers in science (-ve)	6.254%
7.	Comparative economic return is less, Study with job is not possible (-ve)	5.518%
8.	Not many respectful job openings Not good optional subjects for competitive exams (-ve)	5.505%
	TOTAL VARIANCE EXPLAINED	**61.968%**

INTERPRETATIONS: **(1)** Amount of labour & time and tough syllabus share 10.177% out of total variance explained for factors responsible for changing trends in science these are the factors responsible for not opting science, when compared to the choice of 'Arts' stream. **(2)** Diversified career opportunities and 'helps in the competitive exams account for 9.798% out of the total, these are the 'factors' responsible for opting 'ARTS' stream, their contribution is highest among all the other factors, for tilting the inclination towards ARTS.

CONCLUSIONS :

TOP-3^S ALLAHABAD

TOP-3 REASONS : (A) FOR NOT OPTING SCIENCE STREAM :

1. Amount of labour & time and tough syllabus.

2. Expense in terms of coaching fees etc. and poor school teaching

3. Study with job is not possible, Not many respectful job openings available.

(B) FOR OPTING SCIENCE :

1. Better career goals, motivated by teacher.

2. Social pressure and honour in the society

3. To pursue higher studies & research and natural liking.

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

1. Professional degrees offered, job openings available.

2. Easy course contents, encouraging 12th exam board results.

3. Better career options, parental business.

(B) FOR NOT OPTING SCIENCE (vis-à-vis COMMERCE):

1. Amount of labour & time & tough syllabus.

2. Lack of information about careers in science, Not many respectful job openings available.

3. Poor school teaching and expense in terms of coaching fees etc.

TOP-3 REASONS : (A) FOR OPTING ARTS STREAM

1. Diversified career opportunities, Helps in competitive exams.

2. To pursue higher studies & research, Personal liking.

3. Study with job is possible, easy course contents.

B) FOR NOT OPTING SCIENCE STREAM (vis-à-vis ARTS STREAM)

1. Amount of labour & time, tough syllabus.

2. Poor school teaching and expense in terms of coaching fees etc.

3. Lack of information about careers in science and poor assessment & result of 12th standard.

----------X----------

8.8. : STATISTICAL ANALYSIS OF DATA SET FOR <u>VARANASI</u> AND ITS FINDINGS :

Varanasi is an important city of U.P. internationally famous for its culture and an ancient of learning is also famous as the city lord shiva. This study covers following schools/colleges from the city.

Table 8.8.1. :

CITY	NAME OF SCHOOL	NAME OF COLLEGE
VARANASI	C.M. Anglo Bengali College	B.H.U Varanasi, Faculty of Commerce
	Govt. Queen college	B H U Varanasi, Faculty of Arts
	Kendriya Vidyalaya	B H U Varanasi, Faculty of Science
	S.D.S. Inter College	Dr. Ghanshyam Singh Degree College
	Sunbeam English School	Harishchandra P G College
	Tulsi Vidya Niketan	Jagatpur College, Varanasi
	Uday Pratap Inter College	M.G. Kashi Vidyapith
		Udai Pratap College, Varanasi
		National P.G. College
		Navyug Kanya Degree College

To have an idea about student' view for various reasons for opting a particular stream of for not opting Science stream, we have computed Rank-sums for all the reasons. In the questionnaire students have been asked to give the ranks to all the reasons. Following four tables give the distribution of RANK-SUMS.

Table 8.8.2.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career goals	353
2.	To pursue higher studies & research	542
3.	Natural liking	635
4.	Honour in society	815
5.	Motivated by teacher	895
6.	Social pressure	975

Kendall's - W = .470

Most Important Reasons for opting Science stream included: Better career goals, to pursue higher studies & research are the most important reasons for opting Science stream.

Table 8.8.3.: DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Better career options	471
2.	Professional degrees offered	667
3.	Job openings available	769
4.	Natural liking	1117
5.	To pursue higher studies & research	1135
6.	Study with job is possible	1259
7.	Parental business	1298
8.	Easy course contents	1374
9.	Encouraging 12th exam board results	1430

Kendall's - W = .422

Students are attracted towards commerce stream due to: Better career options and professional degrees offered. However, it seems that encouraging 12th exam board results do not influence that much.

Table 8.8.4. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	422
2.	Personal liking	603
3.	Diversified career opportunities	714
4.	Study with job is possible	795
5.	To pursue higher studies & research	828
6.	Easy course contents	970
7.	Poor numerical ability (Fear of maths)	1163

Kendall's - W = .354

Arts stream has been the choice of students because of: Helps in competitive exams, personal liking and diversified career opportunities. While poor numerical ability (or fear of maths) does not play that much important role.

Table 8.8.5.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Amount of labour & time	1952
2.	Tough syllabus	2136
3.	Expenses in terms of coaching fees	2316
4.	Poor school teaching	2562
5.	Not many respectful job openings	2740
6.	Poor assessment & result of 12th Standard	2831
7.	Lake of information about career in science	2879
8.	Study with job is not possible	2993
9.	Comparative economic return is less	3171
10.	No encouragement for scientists in our country	3420
11.	Experience of family members	3638
12.	Not good optional subjects for competitive exams.	3900
13.	Poor numerical ability	3920
14.	Size of the family	4203

Kendall's - W = .200

Most influential reasons for not opting science include: Amount of labour & time, Tough syllabus, expense in terms of coaching fees etc. are the most important reasons for NOT opting Science stream.

In order to study about the contribution of these various reasons for changing trends, we have analyzed the whole data again using principal component Approach (PCA), the following three tables provide the outputs for PCA.

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Table 8.8.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Poor school teaching, Not good optional subjects for competitive exams (-ve)	10.347%
2.	Better career goals, Honour in society (+ve)	10.288%
3.	Expense in terms of coaching fees, lack of information about careers in science (-ve)	9.015%
4.	Poor assessment & result of 12th standard, Not many respectful job openings (-ve)	8.921%
5.	Study with job is not possible, Not many respectful job openings and Comparative economic return is less (-ve)	8.643%
6.	Poor school teaching, poor numerical ability (-ve)	8.539%
7.	Social pressure, motivated by teacher (-ve)	7.597%
8.	To pursue higher studies & research, Natural liking (+ve)	5.725%
	TOTAL VARIANCE EXPLAINED	**70.920%**

INTEPRETATIONS: (1) The most important reasons for not opting science are: Poor school teaching, not good optionals for competitive exams, expense in terms of coaching fees and lack of information about careers in science, these factors contribute: 19.362%. (2) Students are attracted to opt for Science stream due to: Better career goals, honour in the society, To pursue higher studies & research and these factor contribute (positively) 16.013% towards the total variance explained.

Table 8.8.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career options, Professional degrees offered (+ve)	20.229%
2.	Job openings available, study with job is possible (+ve)	16.618%
3.	Easy course contents, encouraging 12th exam board results (+ve)	9.320%
4.	Amount of labour & time, tough syllabus (-ve)	7.463%
5.	Poor school teaching, poor assessment & result of 12th standard (-ve)	5.802%
6.	Not many respectful job openings, lack of information about careers in science (-ve)	5.525%
7.	Study with job is not possible, No encouragement for scientists in our country. (-ve)	4.596%
	TOTAL VARIANCE EXPLAINED	**69.554%**

INTERPRETATIONS: **(1)** Better career options, professional degrees offered account for 20.229% of the total variance explained i.e. these two factors are responsible for opting Commerce stream. However it is to be mentioned that among all the other factors responsible for opting 'commerce' these two have the HIGHEST impact. **(2)** Amount of labour & time and Tough syllabus are responsible for <u>NOT</u> opting the Science stream and among other factors responsible for this, their contribution is highest i.e. 7.463% (-ve factor)

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Table 8.8.8. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	16.126%
2.	Helps in competitive exams and diversified career opportunities (+ve)	13.158%
3.	To pursue higher studies & research, at personal liking (+ve)	10.500%
4.	Not many respectful job openings, expense in terms of coaching fees (-ve)	7.912%
5.	Poor assessment & result of 12th standard, lack of information about careers in science (-ve)	6.868%
6.	Study with job is not possible, easy course contents (+ve)	6.357%
7.	Personal liking, To pursue higher studies and research (+ve)	5.779%
8.	Comparative economic return is less (-ve)	5.191%
	TOTAL VARIANCE EXPLAINED	**71.890%**

INTERPRETATIONS: (1) The Amount of labour & time and tough syllabus account of 16.126% out of total variance explained responsible for 'changing trends' when compared with respect to 'Science stream' vis-à-vis Arts Stream, a negative contribution means factors responsible for not opting science. (2) Study with job is possible and lack of information abut careers in science are responsible for opting 'Arts stream' in preference to 'science' and their contribution put together is 10.500% among all the other factors.

CONCLUSIONS :

TOP-3^S VARANASI

TOP-3 REASONS : (A) FOR NOT OPTING SCIENCE STREAM :

1. Poor school teaching and Not good optional subjects for exams.

2. Expense in terms of coaching fees etc. and lack of information about careers in science.

3. Poor assessment & result of 12th standard, NOT many respectful job openings available.

(B) FOR OPTING SCIENCE :

1. Better career goals and honour in society.

2. Social pressure, motivated by teacher.

3. To pursue higher studies & research and Natural liking.

TOP-3 REASONS : (A) FOR OPTING COMMERCE STREAM:

1. Better career options, Professional degrees offered.

2. Job openings available, study with job is possible.

3. Easy course contents, encouraging 12th exam board results.

(B) FOR NOT OPTING SCIENCE (vis-à-vis COMMERCE):

1. Amount of labour & time & tough syllabus.

2. Poor school teaching and poor assessment & result of 12th standard.

3. Lack of information about careers in science, Not many respectful job openings.

TOP-3 REASONS : (A) FOR OPTING ARTS STREAM:

1. Helps in competitive exams & diversified career opportunities

2. Study with job is possible, easy course contents

3. Personal liking, to pursue higher studies & research

B) FOR NOT OPTING SCIENCE STREAM (vis-à-vis ARTS STREAM) :

1. Amount of labour & time, tough syllabus.

2. Study with job is not possible, Lack of information

3. Expense in terms of coaching fees, Not many respectful job openings.

-----------X-----------

8.9   WHAT SHOULD BE DONE ?

Having identified and analyzed various reasons for changing trends, it was also decided to incorporate the suggestions to 'revert' this trend. Students were invited to expressed their views so as to what should be done? to arrest this declining trend. The responses from students were analyzed and classified into six categories for the short term/long term measures. The following table provides the output of this analysis.

Table 8.9.1. :

Sr. No.	SUGESSTIONS	COUNT
1.	Provide more facilities	968
2.	Improve school teaching	577
3.	Reduce the cost	500
4.	Revise syllabus	457
5.	Proper guidance	338
6.	Proper checking	253

* Represents the highest count.

Most of the students felt that by providing more facilities and improving the school teaching it may be possible to bring back students to Science stream.

8.10   **CONCLUSIONS (STATE LEVEL)**

TOP-3 REASONS

(A)   FOR OPTING SCIENCE

1.   Better career goals

2.   To pursue higher studies & research

3.   Natural liking

(B)   FOR NOT OPTING SCIENCE

1.   Tough syllabus

2.   Amount of labour & time

3.   Expenses in terms of coaching fees etc.

TOP-3 REASONS

(A)   FOR OPTING COMMERCE STREAM

1.   Better career options

2.   Professional degrees offered

3.   Job openings available

(B)   FOR NOT OPTING SCIENCE
     (vis-à-vis Commerce stream)

1.   Tough syllabus, Amount of labour & time

2.   Study with job is not possible

3.   Poor school teaching, expense in terms of coaching fees etc.

TOP-3 REASONS

(A) FOR OPTING ARTS STREAM

1. Helps in competitive exams.

2. Diversified career opportunities.

3. Study with job is possible.

(B) FOR NOT OPTING SCIENCE
(vis-à-vis ARTS stream)

1. Amount of labour & time & tough syllabus

2. Study with job is not possible

3. Comparative economic return is less, lack of information about career in science.

CHAPTER – 9

CHANGING TRENDS IN SCIENCE AS A CAREER IN UTTARANCHAL (U.A.)

9.1. BRIEF STATE PROFILE:

U.A. is a newly created state, carved out of U.P. its capital city is Dehradoon. The state has other important cities as Nainital, Haridwar, Mussorie etc. other relevant details are available on the website http://gov.ua.nic/

9.2. CITIES SURVEYED:

This state has two important cities as learning centers. The cities of Dehradoon & Nainital are famous for their public schools. We have tried to cover almost all the famous public schools from both of these cities. Some of them are: DOON SCHOOL, Dehradoon, Sherwood college, Nainital etc. The other details of the cities surveyed are available on the websites : nai@ua.nic.in (for Nainital) and on http://dehradun.nic.in/ (for Dehradoon). The following table provides a complete list of schools and colleges surveyed in different cities.

Table 9.2.1. :

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
DEHRADUN	Cambridge School Doon School GGIC Dehradoon Kendriya Vidyalaya ONGC M K P Inter College Welham Girl's School	Dav P.G. College MKP College
NAINITAL	Amtul's Public School Bhartiya Shahid Sainik School G I C Nainital Mohanlal Sah Bal Vidya Mandir Saint Mary's College Shrewood College	D.S.B. Campus Nainital

Table 9.2.2.:

The following table provides percentagewise distribution of Male/female students in different cities of the state.

CITY	MALE	FEMALE	TOTAL
DEHRADOON	95	269	364
NAINITAL	216	175	391
TOTAL	311(41%)	444(59%)	755

The sample consists of 41% male students, while 59% females students constituted (remaining sample).

9.3. DISTRIBUTION OF STUDETS WITH RESPECT TO CHANGING TRENDS AT SCHOOL/COLLEGE LEVEL

Was science education your FIRST choice? student's response to this question (1.13) were recorded in YES/NO. The table given below provides the distribution of school students with respect to their first choice.

Table 9.3.1.: DISTRIBUTION OF SCHOOL STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE

CITIES	NUMBER OF STUDENTS		
	YES	NO	TOTAL
DEHRADOON	143 (58%)	104 (42%)	245
NAINITAL	157 (59%)	105 (41%)	264
TOTAL	300 (59%)	209 (41%)	509

From the above table it is obvious that over all from both the cities put together 58% of the students had expressed Science stream as their first choice, whereas

42% of the students had an inclination towards other streams as their first choice. It is to be noted that 58% from Dehradoon & 59% from Nainital had Science stream as their first choice while 42% from Dehradoon & 41% from Nainital did not have 'Science stream' as their first choice.

Table 9.3.2. : DISTRIBUTION OF COLLEGE STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE

CITIES	NUMBER OF STUDENTS		
	YES	**NO**	**TOTAL**
DEHRADOON	60 (50%)	56 (50%)	119
NAINITAL	82 (64%)	51 (36%)	127
TOTAL	**142 (57%)**	**107 (43%)**	**246**

Approximately 57% of the students expressed Science stream as their first choice while approximately 43% of the students from the cities covered did not have science stream as first choice. About 64% from Nainital city has highest percentage for Science stream whereas about 36% of the students from this city did not favour science as the first choice.

A series of diagrams give below provide an idea of the changing trends in science as a career among the students. To study this changing trend, the responses of the students to the questions in section-1 were analysed. In particular question numbers of 1.15 and 1.16 & 1.17 and 1.18 have been analyzed for this purposes.

Fig 9.3.1 :   **DEHRADOON**

Science 34%   Arts 33%

Commerce 33%

CHANGE/ DECLINE

Arts 30%   Science 18%

Management courses 5%   Commerce 30%

Applied Science 17%

11th STANDARD   **F.Y. COLLEGE LEVEL**

Fig. : 9.3.2:   **NAINITAL**

commerce 34%   Arts 31%

Science 35%

CHANGE/ DECLINE

Applied science 18%   Arts 29%

Science 15%   Commerce 30%

Management courses 8%

11th STANDARD   **F.Y. COLLEGE LEVEL**

269
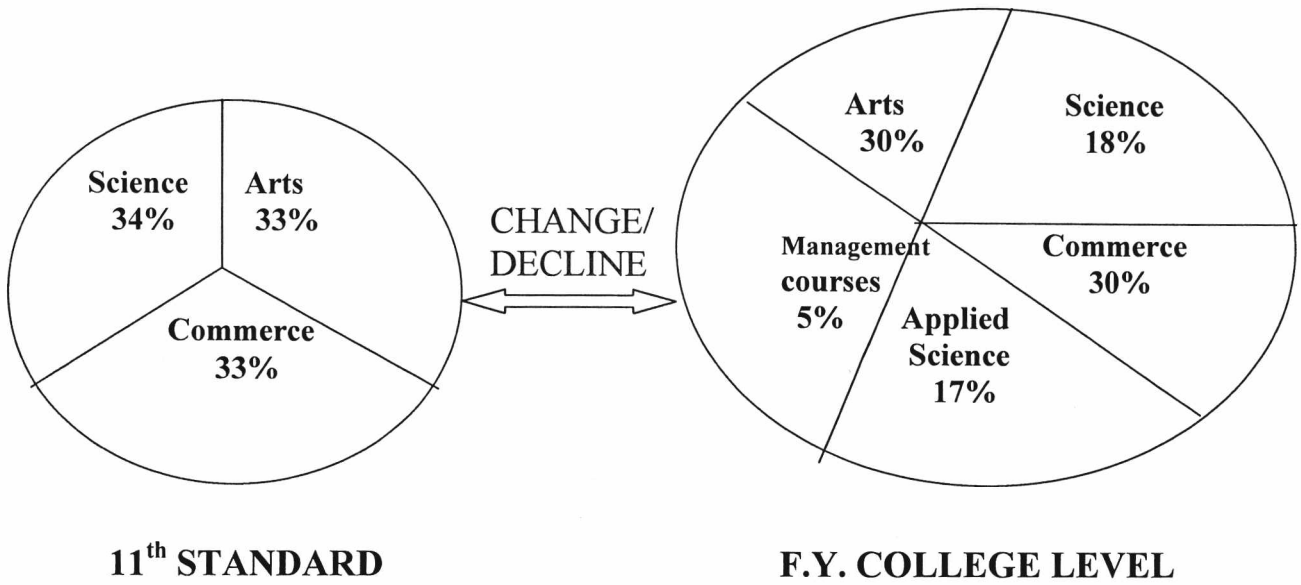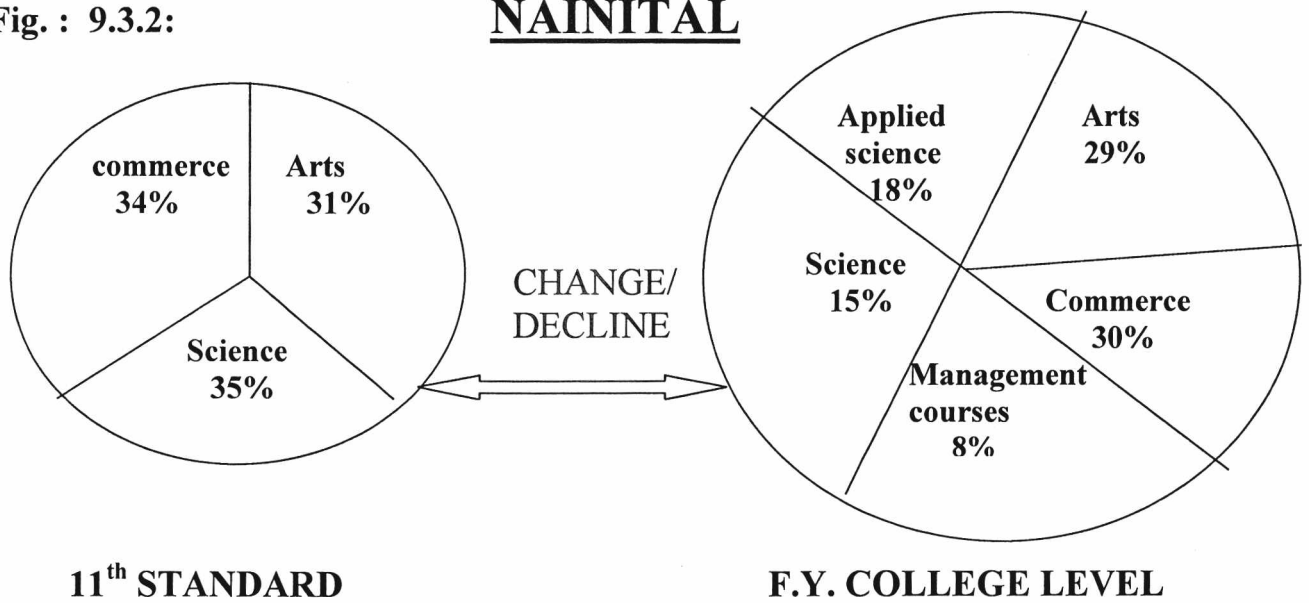
Table 9.3.4. : AMONG CITY COMPARISIONS:

The following table provides at a glance the percentagewise distribution of students studying in different streams at 11th standard and what would be/what is their choice of stream at the first year college level.

CITY	STREAM AT 11th Standard			STREAM AT First Year College				
	Arts	Science	Commerce	Arts	Science	Appl. Science	Commerce	Manag. courses
DEHRADOON	35%	34%	33%	30%	18%	17%	30%	5%
NAINITAL	31%	35%	34%	29%	15%	18%	30%	8%

9.4 DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT SCHOOL LEVEL

Fig. 9.4.1.
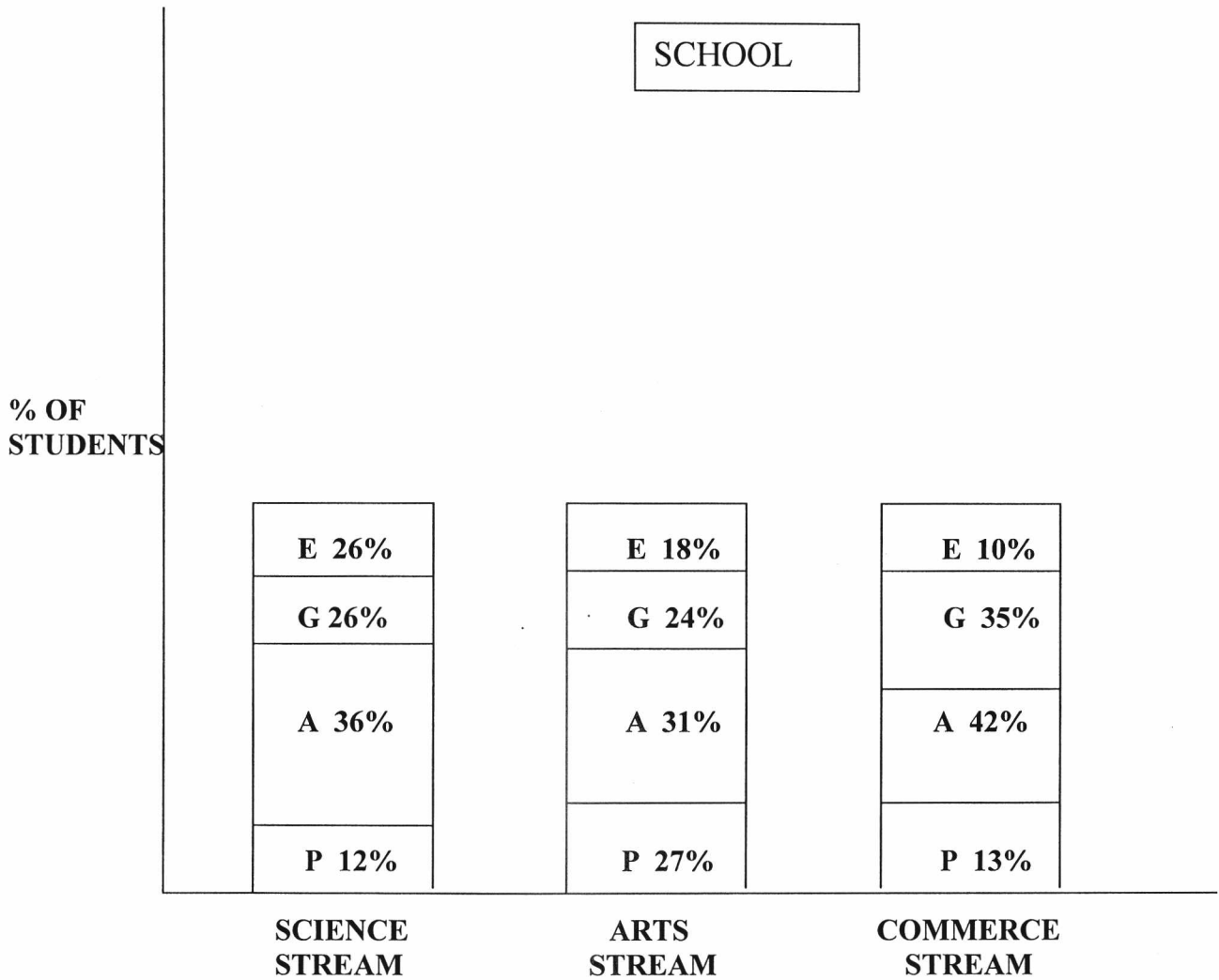

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                                              ┌──────────────┐
                                              │   SCHOOL     │
                                              └──────────────┘

% OF
STUDENTS

              ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
              │   E  26%    │   │   E  18%    │   │   E  10%    │
              ├─────────────┤   ├─────────────┤   ├─────────────┤
              │   G 26%     │   │   G  24%    │   │   G  35%    │
              ├─────────────┤   ├─────────────┤   ├─────────────┤
              │             │   │             │   │             │
              │   A  36%    │   │   A  31%    │   │   A  42%    │
              │             │   ├─────────────┤   ├─────────────┤
              ├─────────────┤   │             │   │             │
              │   P  12%    │   │   P  27%    │   │   P  13%    │
              └─────────────┘   └─────────────┘   └─────────────┘
                 SCIENCE           ARTS             COMMERCE
                 STREAM            STREAM            STREAM
```

P : Poor
A : Average
G : Good
E : Excellent

DISTRIBUTION OF STUDENTS WITH RESPECT TO JOB OPPOURTUNITIES IN DIFFERENT STRAMS AT COLLEGE LEVEL

Fig. 9.4.2.
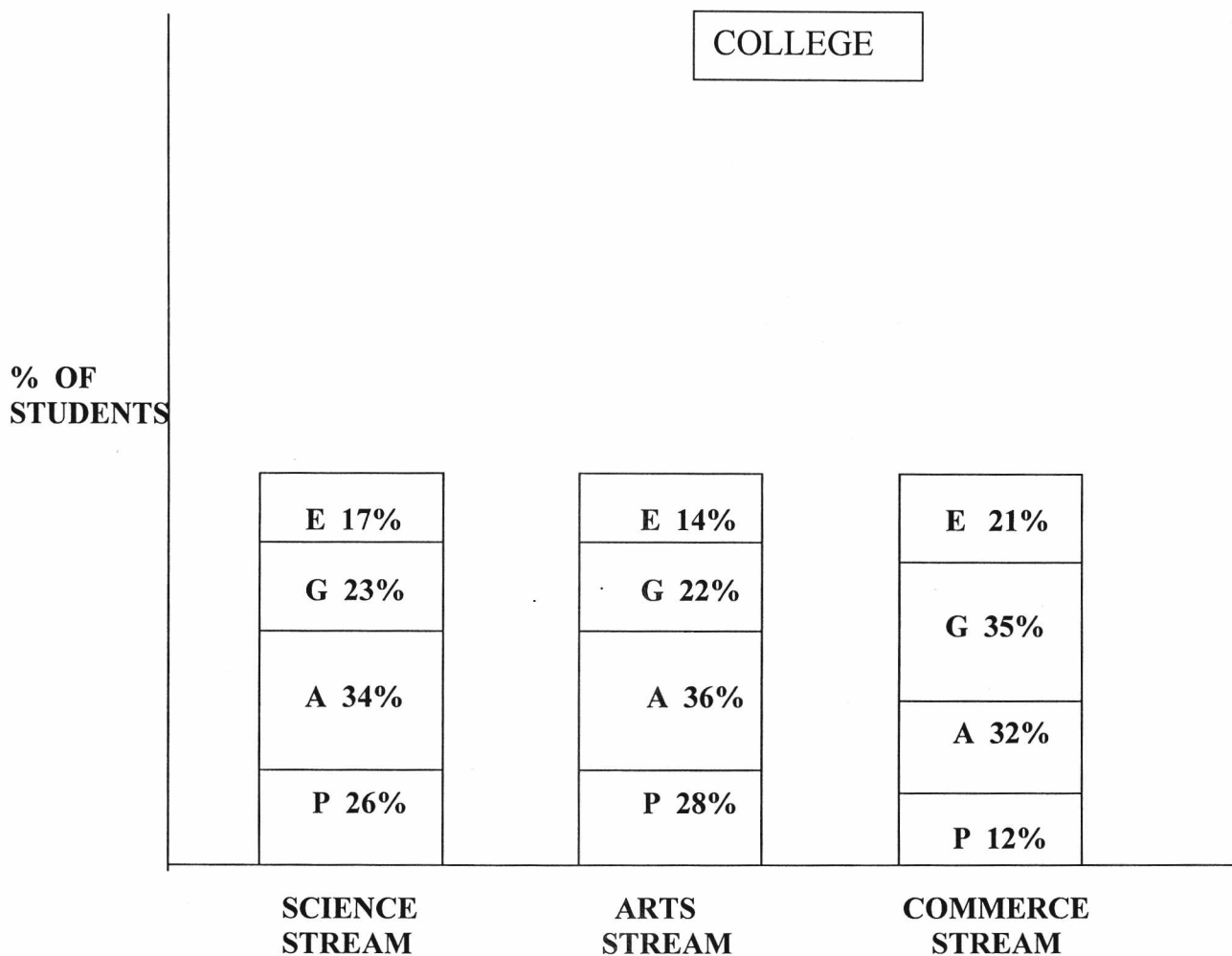
P : Poor
A : Average
G : Good
E : Excellent

27% students of the state feel that the job opportunities with Arts stream are poor while only 12% of the students have the same feelings for Science stream. Maximum number of students subscribe to the view that with Commerce stream 42% average job opportunities are available. In a small state like Uttranchal, students (at school) feel that with Science stream there are excellent job opportunities while at the college level the same feelings change.

9.5. STATISTICAL ANALYSIS OF THE TOTAL DATA SET FOR UTTARANCHAL STATE

In the table 9.2.2. the sample break-up in U.A. State has been provided according to the male/female students selected from different cities in this state. The following series of table provide the output of Kendall's-W statistic. We have provided the distribution of Rank-sums for various reasons to opt for a particular stream (i.e. Arts/Science/Commerce). Also, we have analyzed separately the reasons for NOT opting Science stream, so that an idea about the 'changing' trends can obtained by knowing about the consensus of students, in this state, having analyzed the STATE data, separate analysis has been carried out for the cities also.

Table 9.5.1. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS WITH RESPECT TO REASONS FOR NOT OPTING SCIENCE (U.A. STATE)

Sr. No.	REASONS	RANK-SUM
1.	Better career goals	634
2.	Natural Liking	881
3.	To pursue higher studies & research	930
4.	Honour in society	1311
5.	Motivated by teacher	1561
6.	Social pressure	1715

Kendall's $- W = .440$

Better career goals and natural likings are the two most important reasons for opting Science stream. An output of the Non-parametric, Kendall's $-$ W test has been reproduced below.

Test Statistics:

N	152
Kendall's W	.440
Chi-square	401.93
degree of freedom	6

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Table 9.5.2: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM. (U.A. STATE)

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Better career goals	519
2.	Professional degrees offered	769
3.	Job openings available	769
4.	Natural liking	930
5.	Encouraging 12^{th} exam board results	1182
6.	Study with job is possible	1203
7.	Easy course contents	1219
8.	Parental Business	1372
9.	To pursue higher studies & research	1384

Kendall's - W = .314

Most of the students agree that: Better career options & professional degrees offered are the two most important reasons for opting for Commerce stream. However, to pursue higher studies & research come at the end with is list.

Table 9.5.3. : DISTRIBUTION OF RANK-SUMS FOR REASONS FOR OPTING ARTS STREAM. (U.A. STATE)

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	441
2.	Personal liking	580
3.	Study with job is possible	695
4.	Diversified career opportunities	715
5.	To pursue higher studies & research	778
6.	Easy course contents	976
7.	Poor numerical ability (Fear of maths)	1049

Kendall's -W = .276

Most Important reasons for opting Arts Stream include: Helps in competitive exams and personal liking. Fear of maths or poor numerical ability has less influence on the reasons responsible for opting Arts Stream.

Table 9.5.4.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM (U.A. STATE)

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	2593
2.	Amount of labour & time	3073
3.	Poor assessment & result of 12th Standard	4300
4.	Lake of information about career in science	4363
5*	Poor school teaching	4505
6.	Expense in terms of coaching fees etc.	4670
7.	Study with job is not possible	4709
8.	Not many respectful job openings	4916
9.	Comparative economic return is less	4991
10.	No encouragement for scientists in our country	5056
11.	Poor numerical ability	5305
12.	Experience of family members	5563
13.	Not good optional subjects for competitive exams	5646
14.	Size of family	6641

Kendall's W = .217

Once again the most important reason(s) for not opting science are found to be: Tough syllabus, Amount of labour & time etc. surprisingly in a state which has so many good public schools, *poor school teaching rank within 5 top most reasons for not opting science.

All the tables presented above helps us to have an idea about the most important/important/less important/least important reasons for opting or not opting the stream. In order to know about the respective contributions of these reasons to the total variance explained and thereby to identify the major (PRINCIPAL) contributor the following three tables provide the PCA output.

Table 9.5.5. : PCA OUTPUT WITH RESPECT TO CHANGING TRENDS IN SCIENCE

Sr. No.	REASONS (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career goals & Natural liking (+ve)	10.348%
2.	Amount of labour & time and tough syllabus (-ve)	9.648%
3.	Social Pressure & Honour in society (+ve)	8.155%
4.	Poor assessment & result of 12th standard & poor school teaching (-ve)	7.265%
5.	To Pursue higher studies & research & motivated by teacher (+ve)	6.470%
6.	Study with job is not possible, lack of information about careers in science (-ve)	6.275%
7.	Expense in terms of coaching fees & NOT many respectful job openings (-ve)	5.636%
8.	Comparative economic return is less, experience of family members (-ve)	5.183%
	TOTAL VARIANCE EXPLAINED	**59.126%**

INTERPRETATIONS: **(1)** Students agreed that: Better career goals, Natural liking, social pressure and Honour in society, play a positive role for opting the Science stream and their contribution turns out to be: 18.503%. **(2)** These positive factors (mentioned above) face a competition from the Negative factors: Amount of labour and time, tough syllabus, poor assessment & result of 12th standard /along with poor school teaching, these factors have a contribution of 17.207% towards the total variance explained.

Table 9.5.6. : PCA OUTPUT WITH RESPECT TO IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	REASONS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	12.043%
2.	Poor assessment & result of 12^{th} standard (in science) and encouraging 12^{th} exam board results (in commerce) (-ve / +ve)	7.985%
3.	Easy course contents and study with job is possible (+ve)	7.689%
4.	Poor school teaching, comparative economic return is less and NO encouragement for scientists in our country (-ve)	6.768%
5.	Expense in terms of coaching fees & poor numerical ability (-ve)	6.099%
6.	NOT many respectful job openings available and parental business (-ve)	5.340%
7.	Study with job is not possible (-ve)	5.133%
8.	Job openings available and Natural liking (+ve)	4.743%
9.	Poor numerical ability and experience of family members (-ve)	4.631%
10.	NOT many respectful job openings & No encouragement for scientists in our country (-ve)	4.461%
	TOTAL VARIANCE EXPLAINED	**64.887%**

INTERPRETATIONS: (1) Commerce stream attracts more and more students due to: Encouraging 12^{th} exam board results, study with job is possible and job openings available these factors contribute (positively): 20.807% (2) Science stream bears a negative impact due to: Amount of labour & time and tough syllabus, poor assessment & result of 12thstandard, these most important factors contribute in all 26.796% towards the total variance explained.

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Table 9.5.7. : PCA OUTPUT WITH RESPECT TO IMPACT OF ARTS STREAM ON SCIENCE STREAM

Sr. No	FACTORS RESPONISBLE FOR OPTING ARTS & NOT SCIENCE	% CONTRIBUTION
1.	Helps in competitive exams, personal liking (+ve)	10.848%
2.	Amount of labour & time, tough syllabus (-ve)	9.842%
3.	Diversified career opportunities, easy course contents (+ve)	8.255%
4.	Study with job is possible, To pursue higher studies & research (+ve)	7.865%
5.	Poor school teaching, expense in terms of coaching fees etc. (-ve)	7.242%
6.	Poor assessment & result of 12th standard, experience of family members (-ve)	6.740%
7.	Study with job is not possible, comparative economic return is less (-ve)	6.128%
8.	Lack of information about careers in science, No encouragement for scientist in our country (-ve)	5.638%
	TOTAL VARIANCE EXPLAINED	**62.558%**

INTERPRETATIONS: (1) Arts stream is liked by the students (in comparison to Science stream) due to the factors: Helps in competitive exams, personal liking, diversified career opportunities and easy course contents etc. the contribution (positive) of these factors put together is: 19.103% towards the total variance explained. (2) Science stream is not preferred by the students because of: Amount of labour & time, tough syllabus, poor school teaching and expense in terms of coaching fees etc. these factors contribute (Negative) 17.707% to the total variance explained by all these positive/negative factors.

9.6. STATISTICAL ANALYSIS OF DATA SET FOR <u>DEHRADOON</u> AND ITS FINDINGS :

Dehradoon the capital city of Uttranchal has many good public/private schools. Colleges in the city are affiliated to KUMAON UNIVERSITY, Nainital. The following table provides a list of SCHOOLS and COLLEGES surveyed form this city.

Table 9.6.1. :

CITY	NAME OF SCHOOL	NAME OF COLLEGE
DEHRADOON	Cambridge School	Dav P.G. College
	Doon School	MKP College
	GGIC Dehradoon	
	Kendriya Vidyalaya ONGC	
	M K P Intercollege	
	Welham Girl's School	

In the following tables we have computed the Rank-sums for the various reasons for opting different streams. These rank-sums provide an idea of consensus among students for these reasons.

Table 9.6.2. : DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING SCIENCE	RANK SUM
1.	Better career goals	281
2.	Natural liking	398
3.	To pursue higher studies & research	436
4.	Honour in society	586
5.	Motivated by teacher	680
6.	Social pressure	795

Kendall's W = .433

Test Statistics:

N	67
Kendall's W	.433
Chi-square	174.115
degree of freedom	6

Most Important Reasons for opting Science stream turns out to be Better career goals, Natural liking and the list for reasons for opting science ends with social pressure.

Table 9.6.3. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERC STREAM	RANK SUM
1.	Better career options	243
2.	Job openings available	379
3.	Natural liking	394
4.	Professional degrees offered	396
5.	Encouraging 12th exam board results	490
6.	To pursue higher studies & research	508
7.	Study with job is possible	563
8.	Easy course contents	567
9.	Parental business	641

Kendall's W = .326

Most of the students agree that most important reasons for opting Commerce stream are: Better career options, job openings available, the list also includes parental business as the last reasons for opting Commerce stream.

Table 9.6.4. : DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	212
2.	Personal liking	306
3.	Study with job is possible	356
4.	Diversified career opportunities	379
5.	To pursue higher studies & research	400
6.	Easy course contents	489
7.	Poor numerical ability (Fear of maths)	529

Kendall's - W = .279

Inclination of students towards Arts stream is due to: Helps in competitive exams, personal liking etc. It is observed that poor numerical ability has not much influence.

Table 9.6.5.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	1028
2.	Amount of labour & time	1231
3.	Poor assessment & result of 12th Standard	1945
4.	Lake of information about career in science	2008
5.	Expense in terms of coaching fees.	2062
6.	Study with job is not possible	2072
7.	Poor school teaching	2241
8.	Poor numerical ability	2268
9.	No encouragement for scientists in our country	2287
10.	Not many respectful job openings	2297
11.	Comparative economic return is less	2305
12.	Experience of family members	2386
13.	Not optional subjects for competitive exams.	2550
14.	Size of the family	2921

Kendall's - W = .198

Most important reasons for NOT opting science are once again: Tough syllabus, Amount of labour and list includes all the above mentioned reasons in their order of importance. However, size of the family does not matter that much for NOT opting science.

REMARK: In a city like Dehradoon (state capital) lack of information about career in science ranks 4[th] in the list, which is quite surprising. It is to be noted that 'poor school teaching' slips down to 7[th] place for this city, whereas this happened to be almost within TOP-5 reasons for many other places covered in this survey. Possibly that explains, why Dehradoon is famous for schools.

All the preceding tables provide the ranking various reasons for opting Arts/Science/Commerce and for NOT opting Science stream. Once again, principal component has been applied to various reasons for opting or not opting a particular stream. The following series of tables provide the PCA output.

Table 9.6.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Better career goals, Natural liking (+ve)	9.705%
2.	Amount of labour & time and tough syllabus (-ve)	8.464%
3.	Honour in society and motivated by the teacher (+ve)	7.436%
4.	Study with job is not possible, poor school teaching (-ve)	6.351%
5.	To pursue higher studies & research and social pressure (+ve)	6.304%
6.	No encouragement for scientists in our country and experience of family members (-ve)	5.821%
7.	Expense in terms of coaching fees, poor assessment & result of 12^{th} standard (-ve)	5.737%
8.	Not many respectful job openings, poor numerical ability (-ve)	5.558%
9.	Comparative economic return is less (-ve)	5.547%
	TOTAL VARIANCE EXPLAINED	**61.975%**

INTERPRETATIONS: (1) Better career goals and Natural liking are the positive factors responsible for opting the Science stream and their contribution is 9.705% which is the maximum away all the contributions of other factors responsible for this changing trend. (2) Amount of labour & time coupled with tough syllabus has a negative contribution of 9.578% implying that these factors are responsible for Science stream. This contribution is highest among all the Negative contributions.

Table 9.6.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	9.664%
2.	Not many respectful job openings, experience of family members (-ve)	8.263%
3.	Study with job is not possible, poor assessment & result of 12th standard (-ve)	8.255%
4.	Professional degrees offered, job openings available (+ve)	7.758%
5.	Expense in terms of coaching fees, poor school teaching (-ve)	7.211%
6.	Parental business & easy course contents (-ve)	6.729%
7.	Encouraging 12th exam board result, Better career options. (+ve)	6.479%
8.	Lack of information about careers in science, Not many respectful job openings (-ve)	6.369%
9.	Comparative economic return is less, No encouragement for scientists in our country (-ve)	6.297%
	TOTAL VARIANCE EXPLAINED	**67.023%**

INTERPRETATIONS: (1) Amount of labour & time and tough syllabus have a negative contribution of 9.664% towards the factors responsible for NOT opting Science stream when compared to the reasons responsible for opting Commerce stream. (2) Professional degrees offered and job openings are available have a positive contribution of 7.758% towards the factors responsible for opting the Commerce stream, this is highest +ve contribution.

Table 9.6.8. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONENTS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Not many respectful job openings, Lack of information about careers in science (-ve)	9.222%
2.	Amount of labour & time and tough syllabus (-ve)	9.798%
3.	Poor school teaching, poor assessment & result of 12^{th} standard (-ve)	9.208%
4.	Helps in competitive exams, Diversified career opportunities (+ve)	8.817%
5.	Study with job is not possible, Comparative economic return is less, (-ve)	6.694%
6.	Study with job is possible, Easy course contents (+ve)	6.254%
7.	To pursue higher studies & research, Natural liking (+ve)	5.518%
8.	Not good optional subjects for competitive exams, size of the family (-ve)	5.505%
	TOTAL VARIANCE EXPLAINED	**61.968%**

INTERPRETATIONS: (1) Not many respectful job openings and lack of information about careers in Science have a negative contribution to the tune of 10.177% towards reasons for NOT opting Science stream. This is the highest contribution responsible among all the other factors responsible for this happening. (2) Helps in the competitive exams and diversified career opportunities have a positive contribution of 8.817% among all the other factors responsible for opting Arts stream.

CONCLUSIONS :

TOP-3^S DEHRADOON

TOP-3 REASONS : (A) **FOR OPTING SCIENCE STREAM :**

1. Better career goals, Natural liking (9.705%).

2. Honour in the society, motivated by teacher (7.436%).

3. To pursue higher studies & research and social pressure (6.304%).

(B) **FOR NOT OPTING SCIENCE :**

1. Amount of labour & time and tough syllabus (9.518%)

2. Study with job is not possible, poor school teaching (6.351%)

3. No encouragement for scientists in our country and experience of family members (5.821%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE STREAM:

1. Professional degrees offered, job openings available (7.758%)

2. Easy course contents & parental business (6.729%)

3. Better career options, encouraging 12th exam board result (6.479%)

(B) **FOR NOT OPTING SCIENCE STREAM**

1. Amount of labour & time & tough syllabus (9.644%)

2. Not many respectful job openings, experience of family members (8.263%).

3. Study with job is not possible, poor assessment & result of 12th standard (8.253%).

TOP-3 REASONS : (A) FOR OPTING ARTS STREAM:

1. Helps in competitive exams & diversified career opportunities (8.817%).

2. Study with job is possible, easy course contents (6.254%).

3. To pursue higher studies & research, Natural liking (5.518%).

B) FOR NOT OPTING SCIENCE STREAM

1. Not many respectful job openings, lack of information about careers in science (10.177%)

2. Amount of labour & time, tough syllabus (9.798%)

3. Poor school teaching, poor assessment & result of 12th standard (9.208%)

---------X-------

9.7.: STATISTICAL ANALYSIS OF THE TOTAL DATA SET FOR NAINITAL AND ITS FINDINGS:

Nainital (The jewel city of U.A.) is famous for its lakes. This city has several famous public/private schools. There is only one college affiliated to Kumaon University. So, the samples were taken from Arts/Science/Commerce faculties of the same college. The following table provides a list of schools and colleges surveyed during this study.

Table 9.7.1.:

CITY	NAME OF SCHOOLS	NAME OF COLLEGES
NAINITAL	Amtul's Public School Bhartiya Shahid Sainik School G I C Nainital Mohanlal Sah Bal Vidya Mandir Saint Mary's College Shrewood College	D.S.B. Campus Nainital

Table 9.7.2 : DISTRIBUTION OF RANK-SUMS FOR VARIOUS RESONS REASONS FOR OPTING SCIENCE

Sr. No.	REASONS	RANK-SUM
1.	Better career goals	353
2.	Natural Liking	483
3.	To pursue higher studies & research	494
4.	Honour in society	725
5.	Motivated by teacher	881
6.	Social pressure	920

Kendall's – W = .447

Most important reasons for opting science include: Better career goals, Natural likings and so on. The list also includes social pressure at the end.

Table 9.7.3.: **DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM**

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Better career goals	278
2.	Professional degrees offered	328
3.	Job openings available	390
4.	Natural liking	536
5.	Study with job is possible	640
6.	Easy course contents	652
7.	To pursue higher studies & research	664
8.	Encouraging 12th exam board results	692
9.	Parental Business	743

Kendall's - W = .348

Test Statistics:

N	152
Kendall's W	.348
Chi-square	175.148
degree of freedom	9

Students have a consensus for the reasons: Better career options, professional degrees offered etc. to opt for Commerce stream where as 'parental business' reasons does not affect much for the choice of Commerce stream.

Table 9.7.4. : DISTRIBUTION OF RANK-SUMS FOR REASONS FOR OPTING ARTS STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	229
2.	Personal liking	274
3.	Diversified career opportunities	336
4.	Study with job is possible	339
5.	To pursue higher studies & research	378
6.	Easy course contents	487
7.	Poor numerical ability (Fear of maths)	520

Kendall's - W = .291

Most Important reasons to opt for Arts Stream are: Helps in competitive exams, personal liking etc., Fear of maths or poor numerical ability does not influence much to opt for Arts Stream.

Table 9.7.5.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	1565
2.	Amount of labour & time	1842
3.	Poor school teaching	2264
4.	Poor assessment & result of 12th Standard	2355
5.	Lake of information about career in science	2355
6.	Expense in terms of coaching fees etc.	2608
7.	Study with job is not possible	2639
8.	Not many respectful job openings	2713
9.	Comparative economic return is less	2827
10.	No encouragement for scientists in our country	3084
11.	Poor numerical ability	3096
12.	Not good optional subjects for competitive exams	3145
13.	Experience of family members	3720
14.	Size of family	

Kendall's - W = .173

Students have a consensus that most important reasons for NOT opting science are: Tough syllabus, Amount of labour & time, the above table provides a complete list in the order of influence of various reasons. The list ends with the size of family.

In order to know that which of the reasons is most important above tables provide an idea of all the reasons considered in this study. Now, to know about their respective contribution, the PCA has been done. Following three tables provide PCA output for changing trends in science and the impact of Commerce and Arts stream on science stream.

Table 9.7.6. : PCA OUTPUT WITH RESPECT TO CHANGING TRENDS IN SCIENCE

Sr. No.	REASONS (SCIENCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career goals & Natural liking (+ve)	9.980%
2.	Amount of labour & time and tough syllabus (-ve)	8.752%
3.	To Pursue higher studies & research & motivated by teacher (+ve)	8.569%
4.	Social Pressure & Honour in society (+ve)	8.009%
5.	Poor school teaching, Poor assessment & result of 12^{th} standard (-ve)	7.706%
6.	Study with job is not possible, Expense in terms of coaching fees etc. (-ve)	7.159%
7.	NOT many respectful job openings, experience of family members (-ve)	6.978%
8.	Lack of information about careers in science size of the family (-ve)	6.856%
9.	Comparative economic return is less (-ve)	6.631%
	TOTAL VARIANCE EXPLAINED	**70.640%**

INTERPRETATIONS : (1) Better career goals and Natural liking have a positive contribution of 9.980% (which is the highest) towards the reasons for OPTING science. (2) Poor school teaching and poor assessment and result of 12^{th} standard have a negative contribution of 7.706% (which is the highest among negative contribution towards the reasons for NOT opting the Science stream.

Table 9.7.7. : PCA OUTPUT WITH RESPECT TO IMPACT OF COMMERCE STREAM ON SCIENCE STREAM

Sr. No.	REASONS (COMMERCE & NOT SCIENCE)	% CONTRIBUTION
1.	Better career options, professional degrees offered (+ve)	13.666%
2.	Job openings available, study with job is possible (+ve)	9.838%
3.	Easy course contents, encouraging 12th exam board results (+ve)	8.327%
4.	Amount of labour & time and tough syllabus (-ve)	7.847%
5.	Poor school teaching, Poor assessment & result of 12th standard (-ve)	6.966%
6.	NOT many respectful job openings available, lack of information about careers in science (-ve)	6.277%
7.	Study with job is not possible, No encouragement for scientists in our country (-ve)	5.924%
8.	Comparative economic return is less (-ve)	5.479%
9.	Expense in terms of coaching fees and experience of family members (-ve)	4.678%
	TOTAL VARIANCE EXPLAINED	**68.733%**

INTERPRETATIONS : (1)Contribution of 13.666% is due to Better career options & professional degrees offered to opt for Commerce stream. This is the highest positive contribution among all other factors responsible for opting the Commerce stream. (2) Amount of labour & time and though syllabus contribute highest 7.847% (for not opting the Science stream). Out of total variance explained percentage for the factors responsible for 'TISAC'.

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Table 9.7.8. : PCA OUTPUT WITH RESPECT TO IMPACT OF SCIENCE STREAM AND NOT SCIENCE STREAM

Sr. No.	FACTORS RESPONISBLE FOR OPTING ARTS STREAM vis-à-vis NOT OPTING SCIENCE STREAM	% CONTRIBUTION
1.	Diversified career opportunities, personal liking (+ve)	11.134%
2.	Expense in terms of coaching fees etc., poor assessment & result of 12th standard (-ve)	8.859%
3.	Helps in competitive exams, To pursue higher studies & research (+ve)	8.690%
4.	Study with job is possible, easy course contents (+ve)	8.640%
5.	Amount of labour & time, tough syllabus (-ve)	7.479%
6.	Poor school teaching, study with job is not possible (-ve)	7.470%
7.	Lack of information about careers in science, experience of family members (-ve)	7.284%
8.	Comparative economic return is less, size of the family (-ve)	6.583%
9.	No encouragement for scientists in our country (-ve)	6.467%
	TOTAL VARIANCE EXPLAINED	**72.606%**

INTERPRETATIONS: (1) Diversified career opportunities and personal liking are the two most important factors responsible for opting Commerce stream and their contribution to 11.134% (Highest among all the factors responsible for opting commerce) (2) Amount of labour & time and tough syllabus are the two most important factors responsible for NOT opting the Science stream with a contribution of 7.479% (Highest among all the factors responsible for not opting Science stream).

TOP-3^S NAINITAL

TOP-3 REASONS : (A) FOR OPTING SCIENCE :

1. Better career goals, social pressure (9.980%).

2. To pursue higher studies & research, motivated by teacher (8.752%).

3. Social pressure, Honour in society (8.009%)

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time and tough syllabus (8.752%).

2. Poor school teaching, poor assessment & result of 12th standard (7.706%).

3. Study with job is not possible, expense in terms of coaching fees etc. (7.159%).

TOP-3 REASONS : (A) FOR OPTING COMMERCE :

1. Better career options, professional degrees offered (13.666%).

2. Job openings available, study with job is possible (9.838%).

3. Easy course contents, encouraging 12th exam board results (8.327%).

(B) FOR NOT OPTING SCIENCE :

1. Amount of labour & time & tough syllabus (7.847%).

2. Poor school teaching, poor assessment & result of 12th standard (6.966%).

3. Not many respectful job openings, Lack of information about careers in science (6.277%).

TOP-3 REASONS : (A) **FOR OPTING ARTS :**

    1. Diversified career opportunities, Personal liking (11.134%).

    2. Helps in competitive exams, To pursue higher studies & research (8.690%).

    3. Study with job is possible, easy course contents (8.640%).

(B)   **FOR NOT OPTING SCIENCE :**

    1. Expense in terms of coaching fees etc., poor assessment & result of 12^{th} standard (8.859%)

    2. Amount of labour & time, tough syllabus (7.479%).

    3. Poor school teaching, study with job is not possible (7.470%).

9.8 : WHAT SHOULD BE DONE ?

Students were asked to give their responses in section-3 of the questionnaire, to 'revert' the declining trend. The following table summarizes the responses.

Sr. No.	SUGGESTIONS	COUNT
1.	More facilities	224
2.	Proper guidance	196
3.	Improve school teaching	174
4.	Reduce the cost	156
5.	Revise syllabus	126
6.	Proper checking	107

CHAPTER – 10
(FAST FACTS)

10.1. In this chapter we have provided the TOTAL DATA ANLAYSIS from all the five states across thirteen cities. The findings of Kendall's-W and PCA OUTPUT ANLAYSIS have been provided. A look at these tables provide a bird's eye-view of REASONS responsible for changing trends along with their respective contribution.

1.	The total sample size is	:	**7705**
	Sample size for schools is	:	**4877**
	Sample size for colleges is	:	**2828**
	Number of MALE students	:	**4256**
	Number of FEMALE students	:	**3449**
2.	Estimated decline	:	**38%**
	Estimated change	:	**27%**
	Estimated No change	:	**35%**

3. OVERALL SAMPLE BREAK-UP:

Table 10.1.1. :

CITY	MALE	FEMALE	TOTAL
NORTH DELHI	162	142	304
SOUTH DELHI	192	134	326
EAST DELHI	143	173	316
WEST DELHI	116	224	340
TOTAL	**613**	**673**	**1286**
VARANASI	458	142	600
ALLAHABAD	395	125	520
LUCKNOW	664	616	1280
TOTAL	**1517**	**883**	**2400**
DEHRADOON	95	269	364
NAINITAL	216	175	391
TOTAL	**311**	**444**	**755**
JAIPUR	538	194	732
UDAIPUR	246	162	408
JODHPUR	243	241	484
TOTAL	**1027**	**597**	**1624**
AHMEDABAD	239	207	446
BARODA	153	172	325
SURAT	248	235	483
RAJKOT	148	238	386
TOTAL	**788**	**852**	**1640**
TOTAL	**4256**	**3449**	**7705**

In order to arrive at a consensus among <u>all</u> the students to identify the most important reason(s) for opting Arts/Science/Commerce and for NOT opting Science stream, the Non-parametric test by Kendall's-W has been applied. Following series of four tables give an output of this test. With the help of these, we have tried to provide a list of reasons responsible for these changing trends.

The responses from these **7705** students were analyzed. According to Kendall's-W technique, the Rank-sums are calculated for all the ranks given to different reasons by the students. The lower the rank-sum the more strong the reason is. To obtain the major contributor out of these reasons the PCA provides, percentagewise contribution.

4. The following table provides an overview of all the reasons in terms of SWOT output for the MALE students.

Table 10.1.2. : TOTAL SAMPLE ANALYSIS: MALE (TOP-5 REASONS FOR TISAC)

S	REASONS	RANK SUM	W	REASONS	RANK SUM
1	Better career goals	2862	1	Amount of labour & time	15979
2	Natural liking	4518	2	Tough syllabus	16172
3	To pursue higher studies & research	4881	3	Expense in terms of coaching fees etc.	19568
4	Honour in society	6530	4	Poor school teaching	21871
5	Motivated by teacher	7650	5	Poor assessment & result of 12^{th} standard	22012
O	**REASONS**	**RANK SUM**	**T**	**REASONS**	**RANK SUM**
1	Helps in competitive exam.	2529	1	Better career options	4183
2	Personal liking	3341	2	Professional degrees offered	5222
3	Diversified career opportunities	3909	3	Job openings available	6297
4	Study with job is possible	4248	4	Natural liking	7976
5	To pursue higher studies & research	4414	5	To pursue higher studies & research	8935

We have summed up top-5 reasons for the changing trends in terms of SWOT output for the FEMALE students, in the following table :

Table 10.1.3. : TOTAL SAMPLE ANALYSIS: FEMALE
(TOP-5 REASONS FOR TISAC)

S	REASONS	RANK SUM	W	REASONS	RANK SUM
1	Better career goals	2045	1	Tough syllabus	12002
2	Natural liking	3106	2	Amount of labour & time	13932
3	To pursue higher studies & research	3396	3	Expense in terms of coaching fees etc.	17699
4	Honour in society	4821	4	Poor assessment & result of 12th standard	19577
5	Motivated by teacher	5392	5	Poor school teaching	20434
O	REASONS	RANK SUM	T	REASONS	RANK SUM
1	Helps in competitive exam.	3231	1	Better career options	2859
2	Personal liking	3505	2	Professional degrees offered	3926
3	Diversified career opportunities	3846	3	Job openings available	4701
4	Study with job is possible	4112	4	Natural liking	5860
5	To pursue higher studies & research	4511	5	Encouraging 12th exam result.	6555

Table 10.2. : <u>KENDALL'S - W</u> (COEFFICIANT OF CONCORDANCE):

The following four tables give the distribution of Rank-sums for various reasons. Tables presented in this section are based on the total data set.

Table 10.2.1: DISTRIBUTION OF RANK-SUMS FOR VARIOUS RESONS FOR OPTING SCIENCE STREAM

Sr. No.	REASONS	RANK-SUM
1.	Better career goals	4907
2.	Natural Liking	7624
3.	To pursue higher studies & research	8277
4.	Honour in society	11351
5.	Motivated by teacher	13042
6.	Social pressure	14268

Test Statistics :

N	1071
Kendall's W	.454
Chi-square	2915.257
Degrees of freedom	6

Most important reasons for opting Science stream are: Better career goals, Natural likings and so on and this list concludes social pressure at the end of it.

Table 10.2.2.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM.

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING COMMERCE STREAM	RANK SUM
1.	Better career goals	7042
2.	Professional degrees offered	9148
3.	Job openings available	10998
4.	Natural liking	13836
5.	Encouraging 12th exam board results	15490
6.	Study with job is possible	15774
7.	Encouraging 12th exam board results	16330
8.	Easy course contents	16443
9.	Parental Business	17280

Test Statistics :

N	949
Kendall's W	.341
Chi-square	2913.514
Degrees of freedom	9

Most of the students agree that: Better career options, professional degrees offered are the top most reasons for opting the Commerce stream. However, 'parental business' seems to affect not much towards reasons for choosing, the Commerce stream.

Table 10.2.3. : DISTRIBUTION OF RANK-SUMS FOR REASONS FOR OPTING ARTS STREAM.

Sr. No.	REASON(S) RESPONSIBLE FOR OPTING ARTS STREAM	RANK SUM
1.	Helps in competitive exams.	5760
2.	Personal liking	6846
3.	Diversified career opportunities	7755
4.	Study with job is possible	8360
5.	To pursue higher studies & research	8925
6.	Easy course contents	10033
7.	Poor numerical ability (Fear of maths)	11740

Test Statistics :

N	933
Kendall's W	.270
Chi-square	1761.740
Degrees of freedom	7

Students ranking for most important reasons for opting Arts Stream includes: Helps in competitive exams, personal liking and diversified career opportunities. However Fear of maths does not affect that much regarding the choice of Arts Stream.

Table 10.2.4.: DISTRIBUTION OF RANK SUMS FOR VARIOUS REASONS FOR NOT OPTING SCIENCE STREAM

Sr. No.	REASON(S) RESPONSIBLE FOR NOT OPTING SCIENCE	RANK SUM
1.	Tough syllabus	28174
2.	Amount of labour & time	29911
3.	Expense in terms of coaching fees etc.	37267
4.	Poor assessment & result of 12th Standard	41589
5.	Poor school teaching	42305
6.	Lake of information about career in science	45445
7.	Study with job is not possible	46122
8.	Not many respectful job openings	46152
9.	Comparative economic return is less	49643
10.	No encouragement for scientists in our country	51881
11.	Experience of family members	53992
12.	Poor numerical ability	57103
13.	Not good optional subjects for competitive exams	60945
14.	Size of family	64389

Test Statistics:

N	2023
Kendall's W	.210
Chi-square	5957.056
Degrees of freedom	14

The above table provides a list of 14 possible reasons for NOT opting science. This list includes, socio-economic, personal, societal, job prospects and other related

aspects. Most important reasons for NOT opting science are: Tough syllabus, Amount of labour & time, expense in terms of coaching fees, poor assessment & result of 12th standard and poor school teaching these are the TOP-5 reasons.

Tables provided above give a hierarchical list of various reasons responsible for changing trends in science vis-à-vis Arts and Commerce stream. The following set of tables is the PCA output providing percentagewise contribution (positive/negative) of these reasons.

Table 10.2.5. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING SCIENCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	9.131%
2.	Poor school teaching and expense in terms of coaching fees etc. (-ve)	8.968%
3.	Comparative economic return is less and not many respectful job openings available(-ve)	7.091%
4.	Poor assessment & result of 12th standard & Not good optional subjects for competitive exams (-ve)	6.653%
5.	Lack of information about careers in science and size of the family (-ve)	6.203%
6.	Better career goals & Natural liking (+ve)	5.717%
7.	Honour in the society (+ve)	5.492%
8.	Motivated by the teacher & to pursue higher studies & research (+ve)	5.379%
9.	Social pressure (+ve)	5.296%
10.	Study with job is not possible (-ve)	5.014%
	TOTAL VARIANCE EXPLAINED	**65.573%**

INTERPRETATIONS: (1) Most important reasons for NOT opting Science stream are: Amount of labour & time, Tough syllabus, poor school teaching, expense in terms of coaching fees etc. Further, comparative economic return is less and that too many respectful job openings are not available, these reasons put together contribute: 25.190% towards the total variance explained for this happening. (2) Most important reasons for opting Science stream are: Better career

goals, Natural liking, Honour in the society, motivated by teacher & to pursue higher studies & research, the combined effect of all these reasons is: 16.588% towards the total variance explained.

Table 10.2.6. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING COMMERCE STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Amount of labour & time and tough syllabus (-ve)	10.812%
2.	Not many respectful job openings & poor school teaching (-ve)	8.576%
3.	Professional degrees offered and job openings available (+ve)	6.866%
4.	Study with job is possible and poor assessment & result of 12th standard (+ve)	6.310%
5.	Poor school teaching & expense in terms of coaching fees etc. (-ve)	5.589%
6.	Easy course contents and Encouraging 12th exam board results (+ve)	4.978%
7.	Lack of information about careers in science and No encouragement for scientists in our country (-ve)	4.624%
8.	Not good optional subjects for competitive exams (-ve)	4.457%
	TOTAL VARIANCE EXPLAINED	**52.271%**

INTERPRETATIONS: (1) Professional degrees offered, job openings available, study with job is possible and poor assessment & result of 12th standard in Science stream contribute (positively) 13.178% towards the total variance explained for the

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reasons responsible for opting Commerce stream in comparison to Science stream. **(2)** The factors: Amount of labour & time and tough syllabus, Not many respectful job openings and poor school teaching contribute (negatively) 19.448% towards the total variance explained by the reasons responsible for NOT opting Science stream.

Table 10.2.7. : SHOWING PERCENTAGEWISE CONTRIBUTION OF VARIOUS COMPONETNS FOR CHANGING 'TRENDS'

Sr. No.	REASONS RESPONSIBLE FOR OPTING ARTS STREAM & NOT SCIENCE STREAM	% CONTRIBUTION
1.	Diversified career opportunities, Helps in competitive exams (+ve)	12.293%
2.	Study with job is possible, Natural liking (+ve)	9.197%
3.	Amount of labour & time and tough syllabus (-ve)	7.667%
4.	Not many respectful job openings, Comparative economic return is less (-ve)	6.455%
5.	Expense in terms of coaching fees, poor assessment & result of 12th standard (-ve)	6.282%
6.	Easy course contents and personal liking (+ve)	6.076%
7.	Lack of information about careers in science, study with job is not possible (-ve)	5.405%
8.	To pursue higher studies & research (-ve)	5.077%
	TOTAL VARIANCE EXPLAINED	**58.452%**

INTERPRETATIONS: **(1)** More students opt Arts Stream in comparison to Science stream due to: Diversified career opportunities, helps in competitive

exams, study with job is possible and natural liking, the contribution of these factors (Positive) put together is 21.490% towards the total variance explained.

(2) Students agree that they do not opt Science stream because of: Amount of labour & time, tough syllabus, comparative economic return is less and not many respectful job openings the contribution (negative) of these factors amounts to: 14.122% to the total variance explained.

The following table presents, the TOP-5 reasons for opting Arts/ Science/Commerce stream and the reasons for NOT opting Science stream in comparison to the reasons for opting Arts/Commerce Stream.

Table 10.2.8.:   **TOP-5 REASONS**

S	REASONS	RANK SUM	W	REASONS	RANK SUM
1	Better career goals	4967	1	Tough syllabus	28174
2	Natural liking	7624	2	Amount of labour & time	29911
3	To pursue higher studies & research	8277	3	Expense in terms of coaching fees etc.	37267
4	Honour in the society	11351	4	Poor assessment & result of 12th standard	41589
5	Motivated by teacher	13042	5	Poor school teaching	42305
O	REASONS	RANK SUM	T	REASONS	RANK SUM
1	Helps in competitive exam.	5760	1	Better career options	7042
2	Personal liking	6846	2	Professional degrees offered	9148
3	Diversified career opportunities	7755	3	Job openings available	10998
4	Study with job is possible	8361	4	Natural liking	13836
5	To pursue higher studies & research	8925	5	Study with job is possible	15714

Figures within parenthesis represent the RANK-SUM of the ranks given by students to different reasons for the changing trends in science as a career. The lower the rank-sum, the stronger is the consensus (or agreement) for particular reason.

10.3. WHAT SHOULD BE DONE?

Question-3 of the questionnaire tries to get the answer to the question: What should be done to bring back students to Science stream. The students were asked to give their opinion about it. The opinion expressed by the students was broadly classified into six short term/long term measures. The table given below gives the counts (frequencies) of these measures.

Sr. No.	MEASURES	COUNTS
1.	More facilities (in terms of labs etc.)	*6402
2.	Revise the syllabus	6350
3.	Improve school teacing	5303
4.	Proper guidance	5153
5.	Reduce the cost	4996
6.	Proper checking	3016
	*indicates the highest count	

To SUM UP: By providing more facilities, Revising the syllabus and improving the school teaching students (think) that students can be brought back to 'opt' for the Science stream.

INTER-STATE COMPARISONS

11.0.   In the preceding chapters an extensive analysis of the data, collected from different cities of the five(5) states has been presented. It has been observed that in different states and in different cities, different reasons for opting Arts/Science/Commerce stream have come-up. The objectives of present investigation include an inter-state comparison of these reasons i.e. in which 'state' which are the most important reasons for the 'changing' trends? Do they tally in some of the states, differ in some of the states? Even what is the ordering of these reasons in different states. In the following sections, we have to tried to provide the result at a glance at state level.

11.1. WAS SCIENCE YOUR FIRST CHOICE?
The table given below is a quick measure of students 1^{st} choice (at School/college level) for the Science stream.

Table 11.1.1.: DISTRIBUTION OF SCHOOL STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE

STATES	NUMBER OF STUDENTS		TOTAL
	YES	NO	
DELHI	328 (40%)	491 (60%)	819
UTTARPRADESH	733 (48%)	767 (52%)	1500
UTTARANCHAL	297 (58%)	209 (42%)	509
RAJASTHAN	422 (41%)	585 (59%)	1008
GUJARAT	593 (56%)	447 (44%)	1041
TOTAL	**2373 (48%)**	**2504 (52%)**	**4877**

Approximately 48% of the students (overall from <u>all</u> the states) have their first choice as Science stream at the school level. It is also observed that maximum

number of students i.e. 58% from U.A. (Uttranchal) have their first choice for Science stream, whereas a minimum number of students i.e. 40% had Science stream as their first option in Delhi. In Gujarat state 56% of the students opted for Science stream as their first choice at school level, for obvious reasons of getting their admissions to MEDICAL and ENGINEERING courses on the basis of their marks scored at 12th board examinations.

The following table provides distribution of students at college level with respect to their first choice as Science stream.

Table 11.1.2.: DISTRIBUTION OF COLLEGE STUDENTS WITH RESPECT TO SCIENCE STREAM AS THE FIRST CHOICE

STATES	NUMBER OF STUDENTS		TOTAL
	YES	NO	
DELHI	186 (39%)	281 (60%)	467
UTTARPRADESH	496 (55%)	767 (52%)	900
UTTARANCHAL	132 (53%)	404 (45%)	246
RAJASTHAN	332 (53%)	114 (47%)	616
GUJARAT	269 (44%)	330 (56%)	599
TOTAL	**1415 (48%)**	**1413 (50%)**	**2828**

From the above table, apparently it looks that almost 50% of the students at college level had their first choice science reasons could be that in the states of U.P./U.A./Rajasthan the student at B.Sc level try to appear for PMTs (Pre medical tests) and other engineering competitions.

These two tables do not give a clear picture of the changing trends.

Question 1.15 & 1.16 and 1.17 & 1.18 attempt to find out the actual decline and change in Science stream from school level to the college level. The responses to these questions when analyzed yield the following results.

CHANGING TRENDS IN SCIENCE AS A CAREER (AT STATE LEVEL)

% OF STUDENTS

	GUJARAT	RAJASHTAN	U.A.	U.P.	DELHI
No change	13%	46%	30%	34%	28%
Decline	38%	26%	44%	37%	35%
Change	49%	28%	26%	29%	37%
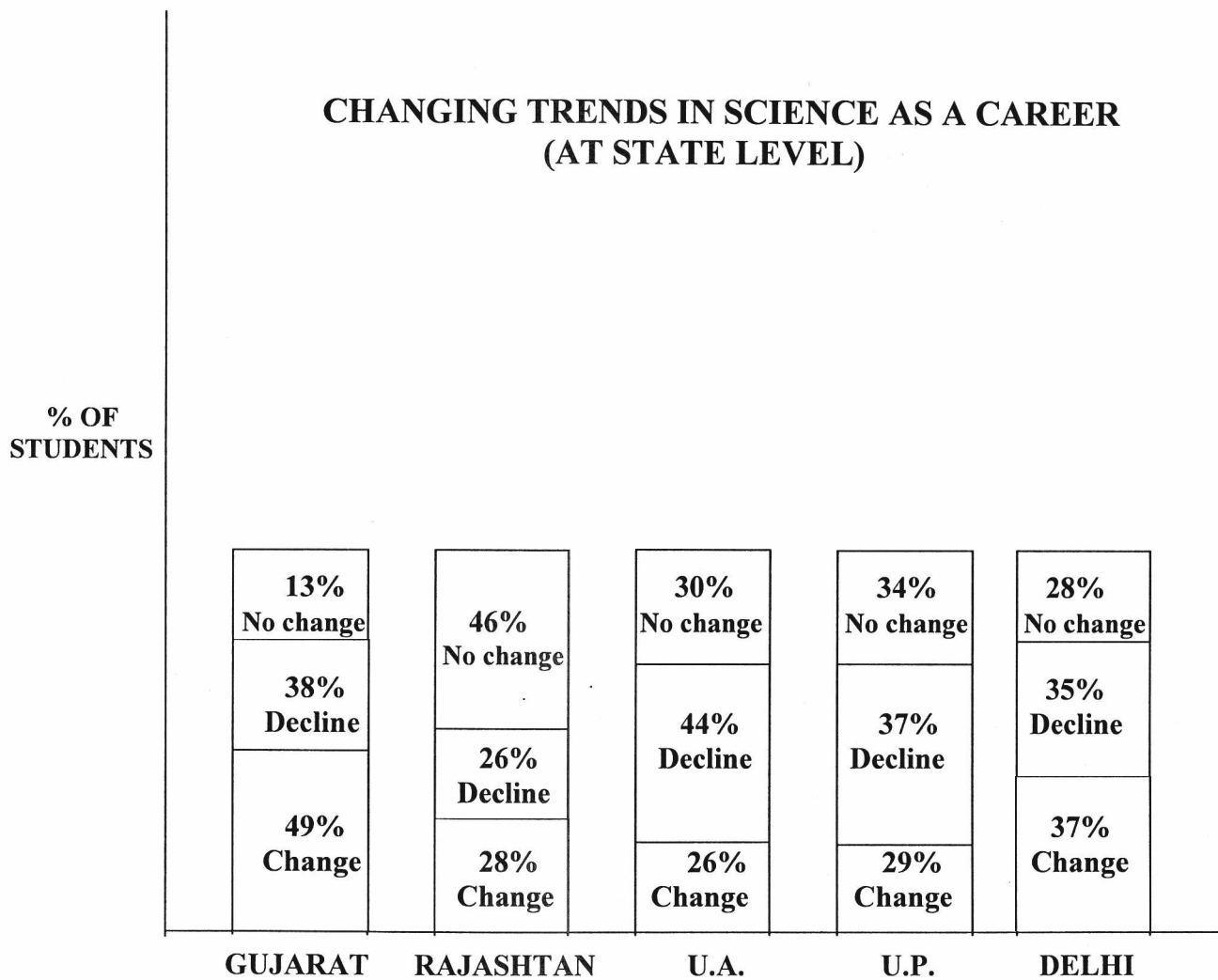
11.2. This section is devoted to the comparison of Rank-sums for various reasons for opting the Arts/Science/Commerce stream and not opting for Science stream. The following series of tables presented here sums-up the Rank-sum for various reasons for changing trends in different states.

Table 11.2.1.: INTER STATE DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING SCIENCE STREAM (TOP-3 REASONS)

STATE	REASONS (FOR OPTING SCIENCE)	RANK-SUMS
GUJARAT	1. Better Career Goals	1261
	2. Social Pressure	1854
	3. Natural Likings	2186
DELHI	1. Better Career Goals	732
	2. To Pursue Higher Studies & Research	1119
	3. Natural Likings	1124
RAJASTHAN	1. Better Career Goals	935
	2. Natural Likings	1461
	3. To Pursue Higher Studies & Research	1743
UTTAR PRADESH	1. Better Career Goals	1354
	2. Natural Likings	2309
	3. To Pursue Higher Studies & Research	2294
UTTARANCHAL	1. Better Career Goals	634
	2. To Pursue Higher Studies & Research	930
	3. Natural Likings	881

COMMENTS: In almost all the states the reasons for opting Science stream are more or less the same, with Better career goal being the most important one. As the sample includes school students also, and at school level the students perceived

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medical/engineering lines after their 12[th] standard, so this reason seems to occupy the first place. This is followed by mostly the natural liking and to pursue higher studies & research. Except in Gujarat State where social pressure occupies the 2[nd] place.

Table 11.2.2.: INTER STATE DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING COMMERCE STREAM (IMPACT OF COMMERCE STREAM)

STATE	REASONS (FOR OPTING COMMERCE)	RANK-SUMS
GUJARAT	1. Better Career Options	1993
	2. Professional degrees offered	2355
	3. Job Openings available	3256
DELHI	1. Better Career Options	1161
	2. Professional degrees offered	1626
	3. Job Openings available	1816
RAJASTHAN	1. Better Career Options	1509
	2. Professional degrees offered	1911
	3. Job Openings available	2258
UTTAR PRADESH	1. Better Career Options	1860
	2. Professional degrees offered	2487
	3. Job Openings available	2899
UTTARANCHAL	1 . Better Career Goals	519
	*2. To Pursue Higher Studies & Research	769
	*3. Natural Likings	769 tie

COMMENTS: Interestingly enough the reasons for opting Commerce stream are exactly the same in all the states. Only in U.A. there is a tie for the two reasons.

Professional degrees offered and the job openings available, while Better Career Options ranks <u>first</u> reason to opt for Commerce stream in all the five states covered in this study.

Table 11.2.3.: INTER STATE DISTRIBUTION OF RANK-SUMS FOR VARIOUS REASONS FOR OPTING ARTS STREAM (IMPACT OF ARTS STREAM)

STATE	REASONS (FOR OPTING ARTS)	RANK-SUMS
GUJARAT	1. Personal Liking	573
	2. Diversified Career Opportunities	728
	3. Job Openings available	739
DELHI	1. Helps in competitive examinations	1086
	2. Personal Liking	1339
	3. Diversified Career Opportunities	1471
RAJASTHAN	1. Helps in competitive examinations	1404
	2. Personal Liking	1793
	3. Diversified Career Opportunities	1832
UTTAR PRADESH	1. Helps in competitive examinations	2046
	2. Personal Liking	2561
	3. Diversified Career Opportunities	3009
UTTARANCHAL	1. Helps in competitive examinations	441
	2. Personal Liking	580
	3. Diversified Career Opportunities	695

COMMENTS: The reasons for opting 'Arts' stream in different states differ in their ranking. While the reason: 'Helps in competitive examinations' remained at top in the 4 states out of 5 states it was followed by personal liking and Diversified

Career Opportunities in Delhi, Rajasthan, U.P. & U.A. While in Gujarat state: Study with job is possible also figured in the Top-3 reasons for opting Arts Stream. However in this state personal liking ranked first.

11.3. This section is devoted to the PCA output comparisons across the five states. In the previous sections, a list of the important reasons have been listed. However, these tables do not provide the contribution of respective reasons. The following series of tables provide the PCA output providing percentagewise contribution (positive/negative) of these reasons.

Table 11.3.1: INTERSTATE COMPARISON OF PCA OUTPUT FOR VARIOUS REASONS FOR CHANGING TRENDS IN SCIENCE

STATE	REASONS (NOT OPTING SCIENCE)	% CONTRIBUTION
GUJARAT	1. Amount of labour & time and tough syllabus	9.641%
	2. Poor Assessment & result of 12th standard (in Science stream) & poor school teaching	7.566%
	3. Study with job is not possible and lack of information about careers in science	6.128%
DELHI	1. Amount of labour & time and tough syllabus	9.528%
	2. Poor school teaching, No encouragement for scientists in our country, NOT good optional subjects for competitive exams.	8.630%
	3. Not many respectful job openings	7.711%
RAJASTHAN	1. Amount of labour & time and tough syllabus	9.868%
	2. Poor school teaching, expense in terms of coaching fees etc.	8.064%
	3. Comparative economic return is less, NOT many respectful job openings	7.082%
UTTAR PRADESH	1. Amount of labour & time and tough syllabus	12.548%
	2. Comparative economic return is less, NOT many respectful job openings	11.641%
	3. Poor assessment & result of 12th Science stream, poor numerical ability	8.466%
UTTARANCHAL	1. Amount of labour & time and tough syllabus	9.648%
	2. Poor assessment & result of 12th standard (in science & poor school teaching)	7.265%
	3. Study with job is not possible, lack of information about careers in science.	6.275%

COMMENTS: In all the states, the reasons for NOT opting Science stream included: Amount of labour & time and tough syllabus as the most important reason. In Gujarat, Delhi, Rajasthan and U.A. it was followed to poor assessment & results of 12th board exams (in Science stream) and the poor school teaching.

While in U.P. comparative economic return is less and not many respectful job openings figured next to the most important reason. Most important reason therefore for NOT opting Science emerges to be: **"Amount of labour & time and Tough syllabus alongwith poor school teaching".**

Table 11.3.2: INTERSTATE COMPARISON OF PCA OUTPUT FOR VARIOUS REASONS REPONSIBLE FOR OPTING THE COMMERCE STREAM (vis-à-vis Science stream)

STATE	REASONS (FOR OPTING COMMERCE)	% CONTRIBUTION
GUJARAT	1. Better Career options & professional degrees offered	8.730%
	2. Study with job is possible	7.376%
	3. Job openings available & Natural liking	5.235%
DELHI	1. Encouraging 12th exam board and professional degrees offered	6.168%
	2. Better career options	4.173%
	3. Easy course contents	4.446%
RAJASTHAN	1. Better Career options & professional degrees offered	12.269%
	2. Job openings available, Study with job is possible	9.979%
	3. Easy course contents, encouraging 12th exam board results	8.217%
UTTAR PRADESH	1. Professional degrees offered, job openings available	6.253%
	2. Easy course contents and encouraging 12th exam board results	5.071%
	3. Study with job is possible and Natural liking	4.786%
UTTARANCHAL	1. Encouraging 12th exam board results in Commerce stream	7.985%
	2. Easy course contents and Study with job is possible	7.689%
	3. Job openings available & Natural liking	4.743%

COMMENTS: In Gujarat and Rajasthan: Better career options and Professional degrees offered turns out to be the most important reason for opting Commerce stream. While in Delhi: Encouraging 12th exam board result in Commerce stream and professional degrees offered ranks number one, which is the same as in the

case of U.A. While in U.P. Professional degrees offered and the job openings available has the highest importance. It seems therefore that the most important reason for opting Commerce stream across these states is: **"Better career options and the professional degrees offered".**

Table 11.3.3: INTERSTATE COMPARISON OF PCA OUTPUT FOR VARIOUS REASONS REPONSIBLE FOR OPTING ARTS STREAM
(vis-à-vis Science stream)

STATE	REASONS (FOR OPTING COMMERCE)	% CONTRIBUTION
GUJARAT	1. Helps in competitive exams & diversified career opportunities	14.174%
	2. Easy course contents & Study with job is possible	5.828%
	3. Personal liking & to pursue higher studies & research	5.501%
DELHI	1. Diversified career opportunities, easy course contents, study with job is possible	9.197%
	2. Helps in competitive examinations	5.405%
	3. To pursue higher studies & research	5.077%
RAJASTHAN	1. Helps in competitive exams and personal liking	9.728%
	2. Diversified career opportunities, Study with job is possible	8.413%
	3. Easy course contents, poor numerical ability	7.253%
UTTAR PRADESH	1. Personal liking, poor numerical ability	8.405%
	2. Diversified career opportunities	5.881%
	3. Study with job is possible	5.586%
UTTARANCHAL	1. Helps in competitive exams and personal liking	10.848%
	2. Diversified career opportunities, easy course contents	8.255%
	3. Study with job is possible, To pursue higher studies & research	7.865%

COMMENTS: In Gujarat, Rajasthan and U.A. the 'Arts' Stream is chosen by the students because of the reasons: Helps in competitive exams and the diversified career opportunities. While in Delhi students opt for this stream as: Study with job is possible, easy course contents besides the diversified career opportunities. In U.P. the reasons are altogether different than those in the other states, as the students of this state have personal liking for Arts stream besides poor numerical ability, diversified career opportunity and study with job is possible are also important reasons. It is inferred therefore that the reasons for opting Arts Stream are: **"Diversified career opportunities, Helps in competitive examinations and the study with job is possible".**

11.4.:   Having identified the reasons responsible for changing trends, and analyzing their respective contribution in the previous sections. The present section is devoted to the remedial measures, the following table provides a comparison of these measures suggested by the student of these states.

STATE	MEASURES (REMEDIAL)	COUNT
GUJARAT	1. Improve school teaching	* 430
	2. Reduce the cost of education	369
	3. Proper guidance	278
DELHI	1. Provide more facilities (in terms of labs etc.)	* 402
	2. Revise syllabus	350
	3. Improve school teaching	303
RAJASTHAN	1. Provide more facilities (in terms of labs etc.)	* 642
	2. Improve school teaching	596
	3. Proper checking	476
UTTAR PRADESH	1. Provide more facilities (in terms of labs etc.)	* 968
	2. Improve school teaching	577
	3. Reduce the cost of education	500
UTTARANCHAL	1. Provide more facilities (in terms of labs etc.)	* 224
	2. Proper guidance	196
	3. Improve school teaching	174

* indicates the highest count

COMMENTS: It is observed that the feelings of the students across 4 states is almost same as far as the remedial measures to check the decline are concerned. In Delhi, Rajasthan, U.P. & U.A. students suggested to provide more facilities in terms of good laboratories, class rooms and other essential facilities. While only in Gujarat state, students feel that by improving the 'school teaching' this trend may be reverted'. It is to be noted that, this is the feeling in all the other states (though the rankings may differ).

To sum-up: "By providing basic facilities, improving school teaching and revising the syllabus" it may be possible to attract students to 'opt' for Science stream.

APPENDICES

APPENDIX – I   :   Main questionnaire

APPENDIX – II   :   Data Structure

APPENDIX - III   :   Suggestions

APPENDIX - I

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE & TECHNOLOGY
DST SPONSORED PROJECT
ON
CHANGING TRENDS IN SCIENCE AS A CAREER
By, DEPARTMENT OF STATISTICS, SAURASHTRA UNIVERSITY, RAJKOT-360 005
PRINCIPAL INVESTIGATOR: PROF. RAKESH SRIVASTAVA
(For Educational Use Only)

Name of the Investigator: _____ **Date :** _____

Checked by: _____ **Identity Code:** ☐☐☐☐☐☐☐

1.0.   Personal Information:

1.1.   Name of the Student (Block Letters): [   ]

1.2.   Sex : Male/Female

1.3.   Age : [   ] Years :

1.4.   Income of Family Per Month Rs.: [   ]
a) Below 10,000
b) Between 10,000 to 20,000
c) Between 20,000 to 30,000
d) Above 30,000

1.5.   Occupation: (Please Mention 'a' for Govt. Service, 'b' for Private Service, 'c' for Business and 'd' for Others)
(a) Father : [   ]

(b) Mother : [   ]

1.6.   Educational Background of Parents:
1. **Please Mention 'a' for Science, 'b' for Commerce, 'c' for Arts and 'd' for others in stream box.**
                        Stream
Father : [   ]

Mother : [   ]

2. **Please Mention 'a' for Under Graduate, 'b' for Graduate, 'c' for Post Graduate and 'd' for Others in Qualification box.**

Father : ☐

Mother : ☐

1.7. Name of the School/College: ☐

1.8. Category of the School: ☐ (For students of XI[th] Standard only)
   a) Public School
   b) Central School (Kendriya Vidyalaya)
   c) Government/Semi Government School
   d) Private School (Self Financed)

1.9. Type of School/College: ☐
   a) Boys.
   b) Girl's / Women's
   c) Co-educational

1.10 Present Class/Standard : ☐
   a) 11[th]
   b) First year of College (B.Sc/B.Com/B.A./Others) Specify _____

1.11 Name of the Board/University: ☐
   a) CBSE
   b) State Board
   c) University (Specify): _____

	At School Level	At College Level

1.12 Medium of Instruction : ☐ ☐
   a) English
   b) Hindi
   c) Gujarati
   d) Others Specify _____

☐

1.13 Was Science Education your first Choice ?
   a) Yes
   b) No

1.14 If, No, mention your first choice: ☐
   a) Commerce
   b) Arts
   c) Others Specify _____

Question 1.15 and 1.16 are to be answered by students of XIth standard only.

    1.15   Specify your Stream at 11th Level : [   ]
            a) Science
            b) Commerce
            c) Arts

    1.16   What would be your choice of stream at college level : [   ]
            a) Science
            b) Applied Science. (B.Sc.(IT), Bio-tech, Bio-chem, Bio-informatics, etc)
            c) Commerce
            d) Arts
            e) Others (Specify) _____

Question 1.17 and 1.18 are to be answered by First year colleges students only.

    1.17.   Specify your stream at college level : [   ]
            f) Science
            g) Applied Science. (B.Sc.(IT), Bio-tech, Bio-chem, Bio-informatics, etc)
            h) Commerce
            i) Arts
            j) Others (Specify) _____

    1.18   What was your Stream at 11th level: [   ]

        a) Science   b) Commerce   c) Arts

2.0   Educational Information:

    2.1.   Given a chance would you like to change the present stream? [   ]
            a) Yes
            b) No

    2.2   If YES, where would you like to go? [   ]
            a)   Science
            b)   Applied Science
            c)   Commerce
            d)   Arts
            e)   Management Course (BBA/MBA etc.)

    2.3   What do you think about the job opportunities with EACH of the following stream?

        1. Science : [   ]   a. Excellent b.Good c.Average d. Poor

        2. Commerce : [   ]   a. Excellent b.Good c.Average d. Poor

        3. Arts : [   ]   a. Excellent b.Good c.Average d. Poor

Question 2.4. is to be answered by Students of Science stream only.

2.4.　Reasons for **OPTING SCIENCE: (Please read all the reasons carefully & assign a rank in order of preference. Give a rank from 1 to 7 in the boxes against each reason, 1 for the most important and 7 for the lowest importance).**

a.	Better Career Goals	
b.	Social Pressure	
c.	Natural Liking	
d.	To pursue higher studies and research	
e.	Honour in Society	
f.	Motivated by teacher	
g.	Specify other reason except above mentioned reasons, if Any _____	

Question 2.5 is to be answered by Students of Commerce Stream Only.

2.5.　Reasons for **OPTING COMMERCE: (Please read all the reasons carefully & assign a rank in order of preference. Give a rank from 1 to 10 in the boxes against each reason, 1 for the most important and 10 for the lowest importance)**

a.	Better Career options	
b.	Professional degrees offered. (C.A./CS/ICWA/CFA)	
c.	Job openings available. (Like Accountants/Clerks/Marketing jobs etc.)	
d.	Natural Liking	
e.	To pursue higher studies and research	
f.	Parental business	
g.	Easy course contents	
h.	Encouraging 12th exam board results	
i.	Study with job is possible	
j.	Specify other reason except above mentioned reasons, if any _____	

Question 2.6 is to be answered by Students of Arts Stream Only.

2.6.   Reasons for **OPTING Arts::** (Please read all the reasons carefully & assign a rank in order of preference. Give a rank from 1 to 8 in the boxes against each reason, 1 for the most important and 8 for the lowest importance)

a.	It helps in competitive exams. (Like IAS/State level administrative Services)	
b.	Personal liking	
c.	Diversified career opportunities	
d.	To pursue higher studies and research	
e.	Study with job is possible	
f.	Easy course contents	
g.	Poor numerical ability or fear of Maths	
h.	Specify other reason except above mentioned reasons, if any _____	

2.7.   Reasons for **NOT OPTING Science:** (Please read all the reasons carefully & assign a rank in order of preference. Give a rank from 1 to 15 in the boxes against each reason, 1 for the most important and 15 for the lowest importance)

a.	It helps in competitive exams. (Like IAS/State level administrative Services)	
a.	Amount of labour & time	
b.	Tough Syllabus	
c.	Poor school teaching	
d.	Expense in terms of coaching fees etc.	
e.	Poor assessment and result of 12th standard	
f.	Not many respectful job openings	
g.	Lack of information about career in science	
h.	Comparative economic return is less	
i.	Study with job is possible	
j.	No encouragement for scientists in our country	
k..	Experience of family members	
l.	Poor numerical ability.	
m..	Size of the family	
n.	Science subjects are not good optional subjects for the central/state govt. competitive exams for administrative services.	
o.	Specify other reason except above mentioned reasons, if any _____	

3.0. What should be done in the SHORT TERM / LONG TERM to attract bright students to opt for Science Stream? (Suggestions: Not more than 15 words).

_____

_____

_____

_____

_____

Thank you

APPENDIX - II

APPENDIX – II

DATA STRUCTURE

SYSFILE INFO:

File Type	: SPSS Data File
Creation Date	: 12 May 04
Creation Time	: 11:21:43
Label	: Not Available

N of Cases   : 0

Total # of Defined Variable Elements: 91
# of Named Variables   : 79

Data Are Not Weighted

Data Are Uncompressed

File Contains Case Data

Variable Information:

Name
Position

STATCD   State Code
1   Measurement level: Scale
                      Format: F8 Column Width: 8 Alignment: Right
                      Value   Label
                          1   Delhi
                          2   Uttar Pradesh
                          3   Uttranchal
                          4   Rajasthan
                          5   Gujarat

CITYCD
2

City Code
Measurement level: Scale
Format: F8 Column Width: 8 Alignment: Right

Value	Label
1	North Delhi
2	South Delhi
3	East Delhi
4	West Delhi
5	Banaras
6	Allahabad
7	Lucknow
8	Dehradoon
9	Nainital
10	Jaipur
11	Udaipur
12	Jodhpur
13	Ahmedabad
14	Baroda
15	Surat
16	Rajkot

STDCD
3

Class Code
Measurement level : Scale
Format: F8   Column Width: 8   Alignment: Right

Value	Label
1	School
2	College

IDCODE
1

Identity Code
Measurement level: Nominal
Format: A8   Column Width: 8   Alignment: Left

NAME
5

Name of Student
Measurement level: Nominal
Format: A30   Column Width: 7   Alignment: Left

SEX
9

Sex
Measurement level: Nominal
Format: A1   Column Width: 9   Alignment: Left

Value	Label
a	Male
b	Female

AGE	Age
10	Measurement level : Scale
	Format : F3 Column Width: 8 Alignment: Right

INCOME	Income
11	Measurement level: Nominal
	Format: A1 Column Width: 8 Alignment: Left

Value   Label
a)   Below 10,000
b)   Between 10,000 to 20,000
c)   Between 20,000 to 30,000
d)   Above 30,000

OCCUPF	Occupation of Father
12	Measurement level: Nominal
	Format: A1 Column Width: 8 Alignment: Left

Value   Label
a)   Govt. Service
b)   Private Service
c)   Business
d)   Others

OCCUPM	Occupation of Mother
13	Measurement level: Nominal
	Format: A1 Column Width: 8 Alignment: Left

Value   Label
a)   Govt. Service
b)   Private Service
c)   Business
d)   Others

EDUSTRF	Educational Stream of Father
14	Measurement level: Nominal
	Format: A1 Column Width: 8 Alignment: Left

Value   Label
a)   Science
b)   Commerce
c)   Arts
d)   Others

EDUSTRM	Educational Stream of Mother		
15	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Science	
	b)	Commerce	
	c)	Arts	
	d)	Others	

EDUQUAF	Educational Qualification of Father		
16	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Under Graduate	
	b)	Graduate	
	c)	Post Graduate	
	d)	Others	

EDUQUAM	Educational Qualification of Mother		
17	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Under Graduate	
	b)	Graduate	
	c)	Post Graduate	
	d)	Others	

SCLCOLNM	School/College Name		
18	Measurement level: Nominal		
	Format: A30	Column Width: 26	Alignment: Left

SCLCATE	School Category		
22	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Public School	
	b)	Central (Kendriya) School	
	c)	Govt./Semi Govt. School	
	d)	Private (Self Fin.)	

SCLCOLTP	School/College Type		
23	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Boys	
	b)	Girls	
	c)	Co-educational	

CLASTD	Present Class/Standard		
24	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Eleventh	
	b)	First Year College	

BRDUNNM	Board/University Name		
25	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	CBSE/ICSE	
	b)	State Board	
	c)	University	

SCLMED	School Medium		
26	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	English	
	b)	Hindi	
	c)	Gujarati	
	d)	Others	

COLLMED	College Medium		
26	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	English	
	b)	Hindi	
	c)	Gujarati	
	d)	Others	

SCIEDUCH 28	Was Science your 1ST Choice ? Measurement level: Nominal Format: A1 Column Width: 8 Alignment: Left

Was Science your 1ST Choice ?
Measurement level: Nominal
Format: A1 Column   Width: 8   Alignment: Left

SCIEDUCH
28

Was Science your 1ST Choice ?
Measurement level: Nominal
Format: A1 Column   Width: 8   Alignment: Left

Value	Label
a)	Yes
b)	No

FRSTCH
29

If No, First Choice ?
Measurement level: Nominal
Format: A1   Column Width: 8   Alignment: Left

Value	Label
a)	Commerce
b)	Arts
c)	Others

STRSCL
30

Stream at School Level
Measurement level: Nominal
Format: A1   Column Width: 8   Alignment: Left

Value	Label
a)	Science
b)	Commerce
c)	Arts

STRCOLWD
31

Would be Stream at College Level
Measurement level: Nominal
Format: A1   Column Width: 8   Alignment: Left

Value	Label
a)	Science
b)	App. Science
c)	Commerce
d)	Arts
e)	Others

STRCOL
32

Stream at College Level
Measurement level: Nominal
Format: A1   Column Width: 8   Alignment: Left

Value	Label
a)	Science
b)	App. Science
c)	Commerce
d)	Arts
e)	Others

STRCOL 33	Was Stream at School Level		
	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Science	
	b)	Commerce	
	c)	Arts	

CHNGSTR 34	Would you like to change current stream		
	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Yes	
	b)	No	

CHNGSTRW 35	If yes, where would you like to go ?		
	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Science	
	b)	App. Science	
	c)	Commerce	
	d)	Arts	
	e)	Management Courses	

JOBOPSCI 36	Job opportunities with science		
	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Excellent	
	b)	Good	
	c)	Average	
	d)	Poor	

JOBOPCOM 37	Job opportunities with Commerce		
	Measurement level: Nominal		
	Format: A1	Column Width: 8	Alignment: Left
	Value	Label	
	a)	Excellent	
	b)	Good	
	c)	Average	
	d)	Poor	

JOBOPART 38	Job opportunities with Arts
	Measurement level: Nominal

Format: A1	Column Width: 8	Alignment: Left
Value	Label	
a)	Excellent	
b)	Good	
c)	Average	
d)	Poor	

RKOPSC1
39

Better Career Goals
Measurement level: Nominal

Format: F2	Column Width: 8	Alignment: Right

RKOPSC2
40

Social Pressure
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPSC3
41

Natural Liking
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPSC4
42

To pursue higher studies & research
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPSC5
43

Honour in Society
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPSC6
44

Motivated by Teacher
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPSC7
45

Others
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPCM1
46

Better Career Options
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPCM2
47

Professional Degrees Offered
Measurement level: Scale

Format: F2	Column Width: 8	Alignment: Right

RKOPCM3 48	Job Openings Available		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM4 49	Natural Liking		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM5 50	To Pursue Higher Studies & Research		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM6 51	Parental Business		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM7 52	Easy Course Contents		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM8 53	Encouraging 12th Exam Board Exams		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM9 54	Study with Job is Possible		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPCM10 55	Others		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT1 56	Helps in Competitive Exams		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT2 57	Personal liking		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT3 58	Diversed Career Opportunities		
	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT4	To Pursue Higher Studies & Research		
59	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT5	Study with job is possible		
60	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT6	Easy Course Contents		
61	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT7	Poor Numerical Ability or Fear of Maths		
62	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKOPAT8	Others		
63	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS1	Amount of Labour & Time		
64	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS2	Tough Syllabus		
65	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS3	Poor School Teaching		
66	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS4	Expense in Terms of Coaching Fees		
67	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS5	Poor Assessment & result of 12[th] Standard		
68	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS6	Not Many Respectful Job Openings		
69	Measurement level: Scale		
	Format: F2	Column Width: 8	Alignment: Right

RKNOPS7 70	Lack of information about career in science Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS8 71	Comparitive Economic Return is Less Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS9 72	Study with job is not possible Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS10 73	No Encouragement for Scientists in our country Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS11 74	Experience of Family Members Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS12 75	Poor Numerical Ability Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS13 76	Size of Family Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS14 77	Not Good Optional Subjects for Comm. Exam Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
RKNOPS15 78	Others Measurement level: Scale Format: F2 Column Width: 8 Alignment: Right
MEMO1 79	Short/Long Term -1 Measurement level: Nominal Format: A12 Column Width: 8 Alignment: Left
MEMO2 81	Short/Long Term -2 Measurement level: Nominal Format: A12 Column Width: 8 Alignment: Left

MEMO3 83	Short/Long Term -3 Measurement level: Nominal Format: A12	Column Width: 8	Alignment: Left
MEMO4 85	Short/Long Term -4 Measurement level: Nominal Format: A12	Column Width: 8	Alignment: Left
MEMO5 87	Short/Long Term -5 Measurement level: Nominal Format: A12	Column Width: 8	Alignment: Left
MEMO6 89	Short/Long Term -6 Measurement level: Nominal Format: A12	Column Width: 8	Alignment: Left
FILTER-$ 91	statcd = 5 (FILTER) Measurement level: Scale Format: F1	Column Width: 8	Alignment: Right

Value	Label
0	Not Selected
1	Selected

APPENDIX - III

SUGGESTIONS

E-mail : rakeshsrivastava30@yahoo.co.in
Fax : 0281-2577633

Phone : 2561138 (R)
2578389 (O)

SAURASHTRA UNIVERSITY
DEPARTMENT OF STATISTICS

Prof. Rakesh Srivastava
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ

Date :

Respected Sir/Madam,
Kindly give your valuable suggestions regarding to attract the students to opt for science stream.

1. By providing Scholarships at various levels of Education.

2. By making Science study more practical oriented rather than theoritical information.

3. By having no. of Seminars, workshops discussions, debates & Symposiums.

4. By organising trips to various Engineering Colleges, Medical Colleges etc.

5. By creating awareness about the latest trends in the field of science & technology.

6. By corelating theoritical information with more of practical knowledge. (The practicals in the Syllabus should be based on the topics taught in the theory Class)

SIGNATURE

Manju Kapoor

11.11.03

PHASE III

KULACHI HANSRAJ.
MODEL SCHOOL A VIHF

E-mail : rakeshs.ivastava30@yahoo.co.in
Fax : 0281 2577633

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2578389 (O)

SAURASHTRA UNIVERSITY
DEPARTMENT OF STATISTICS

Prof. Rakesh Srivastava
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ   Date :22/9/03

KINDLY GIVE YOUR SUGGESTIONS TO ATTRACT BRIGHT STUDENTS TO OPT FOR SCIENCE STREAM.

— school laboratories should be modernise, should be made more equippe

— same should be done for class rooms.

— science Teachers of non-granted section should be as well given salaries according to government role.

(chemistry Teacher)
h. m B. Sardar school

SIGNATURE

(SURAT)

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SAURASHTRA UNIVERSITY
DEPARTMENT OF STATISTICS

Prof. Rakesh Srivastava
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ

Date :

Respected Sir/Madam,

Kindly give your valuable suggestions regarding to attract the students to opt for science stream.

1. Syllabus of Science for classes $\overline{IX}$ & $\overline{X}$ is so tough that students fear taking Science in class $\overline{XI}$

2. In Science Stream, amount of labour and time is too consuming.

3. Study with job is not possible with science stream.

4. In developing country like India after class $\overline{X}$ children want to support their parents which is not possible with Science Stream.

PRINCIPAL
Shri Jaga Singh K. G. Sr. Sec School
Text Patel Nagar. New Delhi-8
West - Delhi

SIGNATURE

E-mail : rakeshsrivastava30@yahoo.co.in
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SAURASHTRA UNIVERSITY
DEPARTMENT OF STATISTICS

Prof. **Rakesh Srivastava**
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ

Date : 3. 11 2003

Respected Sir/Madam,

Kindly give your valuable suggestions regarding to attract the students to opt for science stream.

— Upto Xth standard, the science syllabus is quite simple.

— Class XI & XII syllabus is too lengthy and vast, that the students get a shock seeing the prescribed syllabus and drop the idea of taking up science.

— Many schools/colleges do not have "well qualified science teacher" who can motivate the students for the choice of science subjects.

— Many qualified science graduates are without a job in our own country — that is discourag for the students to take up science.

— The "better Brains" find their security abroad leaving our country with the "lesser quality".

— If these negative aspects are taken care of by the Government — the students have a better prospect for the future.

We need people like Dr. A. Kalam to ignite our youth.

SIGNATURE

Principal
St. Mary's College
Nainital - 263 002
Uttaranchal

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SAURASHTRA UNIVERSITY
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Prof. Rakesh Srivastava
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ

Date :

Respected Sir/Madam,
Kindly give your valuable suggestions regarding to attract the students to opt for science stream.

3/xi/03

Dear Dr Srivastava,

Ref to our meeting this morning and the survey conducted among class XI students, I would like to inform you that the trend to join any other stream but Science stream may be there in metropolitan cities, but in places like Nainital and other small towns of Uttaranchal, the topmost academic performers in class X are still attracted towards Science stream. In my school for instance, for the last ten years I have seen the top ten students have opted for science **SIGNATURE** stream in class XI. I personally feel that it may be a false notion that good students are no longer opting for sciences. Regard

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SAURASHTRA UNIVERSITY
DEPARTMENT OF STATISTICS

Prof. Rakesh Srivastava
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ

Date : 4-11-2003

Respected Sir/Madam,

Kindly give your valuable suggestions regarding to attract the students to opt for science stream.

The following are my suggestions for science stream

1. Recruitment of teachers having good academic qualifications and teachers should be devoted and dedicated to the teaching and for the improvement of teaching.

2. Establishment of modern laboratories, which lack most of the colleges including university.

3. Creation of a good library with sufficient students books, Journals & bulletins etc.

4. Creation of a general teaching and academic atmosphere for the study and other activities.

5. Regular classes should run and the teaching should be upto the mark.

SIGNATURE

(Prof. Y.P.S. Pangtey)
DSB college
Nainital.

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SAURASHTRA UNIVERSITY
DEPARTMENT OF STATISTICS

Prof. Rakesh Srivastava
Principal Investigator - DST Project
Ministry of Science & Technology

University Campus,
University Road,
Rajkot-360 005.

Ref. No./ DST/PRJ   Date :

Respected Sir/Madam,

Kindly give your valuable suggestions regarding to attract the students to opt for science stream.

1) M Stundi
(20 from Commerce Occasia)
20 from

In the era of excessive information, rapid technological changes, globalisation and cut throat competition As we all know that science is a backbone of a country. It is very necessary now a days to attract the students more and more for science. This can be achieved only by the awareness of the parents and students Due to poverty and ignorance students are not able to opt science stream. To develop awareness and interest in science stream science fiction films, discovery channels should be shown from childhood. Tours, excursion should be organized at reasonable rates.

The curriculum should be more practical and job oriented. It should be easy, related to their surroundings and daily life. More weightage should be given to practical work but strictly checked by the External Examiner. Also in the X Class Exam Students should pass separately in the practical and theory.

The objective of attraction for science stream can be achieved more easily by organizing seminars involving Parents, Teachers, Students and experts from the various fields of science so that the parents and students should know the value of science and resources for their satisfaction.

Ashi Khulara.

_____ SIGNATURE

3/11/03

CONCLUDING REMARKS

Findings are based on a sample survey of students by direct filling of a structured questionnaire.

1. Overall there is a decline of 38% among the students for opting Science stream at school level (11th standard) and at (First year) college level.

2. 'CHANGE' in trend for opting Science stream is to the tune of 27%. This indicates that the students in Science stream are opting for 'Arts', 'Commerce' streams. This also includes the students choice for management courses.

3. 'NO CHANGE' indicates that the students studying in Science stream will continue to study in Science stream and this percentage is 35%, which also includes those students who are opting the courses in Applied sciences (e.g. Biotechnology, Bio-chemistry, Microbiology etc.)

4. In the whole project we have tried to make clear that, the challenges facing contemporary science are multi-faced. In addition, those challenges and the strategies to overcome them are perceived differently by different groups, with a legitimate interest in science education. It has also been observed that the problems related to interest in, and altitude towards science education cannot be solely educational but need to be understood and addressed in a wider social and political context. As a consequence, the range of possible solutions is as large and diverse as the ways in which the problem is faced. Ranging from 'more facilities to be

provided' to 'proper guidance' are the suggestions made by most of the students to check the declining trends. How far it should be permitted or even stimulate early selection and specialization in order to identify and recruit 'talented' students for advanced scientific and other related studies? Based on the responses of 'students' when asked abut what should be done to attract the 'bright' student towards Science stream, the present study finds the following points to be important:

(i)   More facilities and infrastructure for instruction and learning environment many of the schools (except same of the KV^s) did not have well equipped laboratories and that repealed the students to opt for Science stream.

(ii) 'Improve school teaching' was the demand of majority of the students. This is evident in view of that the 'tough syllabus' ranking among TOP-5 reasons for not opting science, that this dimension becomes important and there we feel lack of enthusiasm, zeal in students because of 'Teaching' (poor school teaching in also important) that makes 'gap' still wider that on the one hand syllabus is tough and on the other hand there is shortage of good teachers (who needs science and why?). Many schools/colleges do not have well qualified science teachers who can motivate students for choice of science subjects.

5.   Reduce the cost of education: It was remarked by many students that financial support must be extended wherever possible and reasonable.

6.   'Revise the syllabus' it was remarked by many teachers and students as well, that the 'GAP' between the syllabus of 10th standard & 11th

standard is very 'big' and for students it becomes a 'steep' rise, hence difficult to follow, Moreover many teachers were also of the view that in the New (changed) syllabus there were many things included, which 'they' had never studied 'even' at their masters level. So, it was suggested that the syllabus should be revised in such a way that the gradients of syllabus are manageable by 'both' students as well as teachers, imparting education to them. In fact class XI[th] & XII[th] syllabus is too, lengthy and vast, that students get shocked and drop the idea of taking up science.

7. **<u>Proper guidance</u>**:

'Lack of information about careers in science' is one of the most important reason(s) for NOT opting the science. It was felt by the students community as a whole that they must be given proper guidance for what to do? If they don't make up with medical/ engineering after their 12[th] standard. So, there must be same WAYS to disseminate the required information to the students, about careers in science.

WHAT THEY SAY ?

(The following are suggestions given by Principals/HOD's/Teacher's/Professor's of the schools & colleges, which were included in this study).

"If it is accepted that the problems of attracting to, and the attitude towards, science education are deeply embedded in a wider social context, then those problems can not be solved simply by reforming schools, teachers colleges or their curricula. Precisely because they are so deeply embedded, they are not amenable to

easy one-off solutions. The need is of reforms that context specific, embrace multiple approaches and are implemented over long periods of time. Initiatives will have to be monitored, and their development and outcomes subjected to on-going evaluation that is formed evidence and careful analysis". We need person like Dr. A.P.J Abdulkalam to ignite the young minds.

Following list provides some of the remedial measures (to attract the students to opt for Science stream). these points are based on the suggestions made by Teachers/Prinicpals/HOD^s/Professors of schools & colleges served in this study.

* Provide scholarships at various level of education.

* Science study should be made more practical oriented rather than theoretical information.

* Curriculum should be more practical and job oriented.

* We do not have very good institutions for under graduate and post-graduate studies in science and students feel that there are no career opportunities in science comparable to those in management and IT.

* Our system allows: upto 10+2 level, many students study science, but later they branch out in engineering, medicine and other steams. These are some of the brightest students, but we are not able to retain them in science. (This point is the outcome of deliberations/discussion that took place during the draft completion report presentation).

* A system is needed that is vibrant and productive to attract good people, but there is very little to attract talent today other than just providing employment.

* To quote Professor sveinsj ϕ berg: "if science subjects are to have any appeal, they must dare to appear as what they are, namely as products of human culture. The science must find their places as cultural subjects providing general education. Such a turn of direction will no doubt move these subjects more controversial and value–laden, but it will also turn students on and fill them with enthusiasm".

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PRESENT STUDY – THE CRITIQUE

The study has its own geographical limitations as it is confined to the part of North-Western region of our country, covering five Culturally, Socially and Economically different states covering thirteen important cities across these states. It includes Delhi as a state (which is the only METRO city) whatever is happening in METROS need not be the case in small towns like Rajkot or for that matter in Nainital.

The samples are taken in such a way that it represents the target population in the best possible way. But when approached with our sample design of 40 students from each class (along the lines of ROSE study) it was some times felt that the sample size should have been taken more to accommodate more students particularly at school level. As such in each class wherever our team approached the number of students was much more higher than to be sampled. So, some of the students though interested, could not be accommodated.

Questionnaire had to be designed in a 'specific' way so that the respondents (who are school/college students) can give their clear-cut responses. This restricted the use of many standard statistical tools, which can be applied only under certain assumptions.

The result in this study cannot be generalized, as this is an empirical study covering some specific areas.