GIRLS' ACCESS TO SCIENCE EDUCATION AT SENIOR SECONDARY LEVEL: AN EXPLORATORY STUDY IN KANGRA DISTRICT OF HIMACHAL PRADESH

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ABSTRACT

The study was conducted on 4 Senior Secondary School of Jawalaji of District Kangra in H.P. Tool used for the study was self standardised tool. After analysis of result it was found that Lack of awareness about infrastructure and future prospects with regard to science education among majority of parents can prove to be a hindrance in girls’ access to science education at senior secondary level. Parents are playing a supportive role in making decision regarding the career girls’ access to science at senior secondary level seems to be a not so difficult process. There is awareness regarding the financial aspects involved in being a science student amongst parents. So, we can say that from the study that there is a need for the upgrading high schools to senior secondary schools that students can be opt science streams. There is needed to start science courses in already existing schools and colleges. Provide guidance to the students and also for their parents that there is no discrimination among boys and girls to opt science course and encourages the girls for opting science courses and send them outside the town for taking higher education.

INTRODUCTION

There are many problems prevalent in the Indian Society associated with gender bias. As education is the fundamental requirement of the hour, its availability is also one of them. Education is a basic human right. It also is a key driver of economic growth and social change. It is a basis of women’s empowerment. Investing in women and girls has positive multiplier effects on the wellbeing of their families, their communities and nations. Girls’ access to education can be particularly limited if they live in poverty, in rural areas or in urban slums; belong to a minority group; are affected by armed conflict; or live with disabilities. Science Education has been considered for the research purpose as it involves financial aspect, be it in the schools where infrastructural requirements play a crucial role or at home where tuitions and costly reference books are needed in order to pursue science education at secondary level.
ABOUT HIMACHAL PRADESH

According to 2001 census Himachal Pradesh has a literacy rate of 76.5 per cent. Male/female literacy rate differs considerably in the state as against 85.3 per cent literacy rate for males it is 67.4 per cent for females. Kangra is the largest district of the state in terms of population and Jwalaji town of this district has been selected by the researcher as the place of conducting the present study.

(a) High/ Senior Secondary Education

Highest Priority is being given towards education in the State with the share of education of the total Plan Outlay of the state is increasing every year along with the educational institutions. At present 849 High schools, 1,251 Sr. Sec. School are notified out of which 797 High Schools and 1,203 Sr. Secondary Schools are functional and 67 colleges including SCERT Solan and 5 Sanskrit colleges are also being run.

(b) Swami Vivekanand Uttkrishta Chhatarvriti Yojna

Under this scheme 4,000 meritorious students of general categories who got 77% marks or more in 10th and +1 class are being given scholarship @ Rs.10,000/- per student per annum. During the year 2008-09, 2,700 students have been benefited under this scheme.

(c) Indira Gandhi Utkrishta Chhatarvriti Yojana

Under this scheme, 150 meritorious students for post plus two courses shall be awarded @ Rs.10,000 per year per student purely on basis of merit and without any income ceiling. 116 students are benefited under this scheme during the year 2008-09. In addition to above the following Scholarship schemes are also running in the state:

(d) IRDP Scholarship Scheme

A sum of Rs. 300/- per month for 9th & 10th class, Rs. 800/- per month for +1 & +2 Class, Rs.1200/- Per month for College/Day scholar students and 2400/- Per Month for hostellers is being given to those students who belong to IRDP families and studying in Govt./Govt. Aided Institutions. In the year 2008-09, 73,184 students have been benefited under this scheme.
(e) Free Education to Girls

Free education is being provided to girl students in the State up to University level including vocational and professional courses i.e. only tuition fee is exempted.

(f) Girls Hostels in Educationally Backward Blocks

The Centrally sponsored Scheme for the construction and running of Girls hostel for students of Secondary and Sr. Secondary Schools; in Educationally Backward block is to strengthen the Boarding and Hostel facilities for Girls Students studying in classes IX to XII. The girls belonging to SC, ST, OBC, minority communities and BPL families shall be benefitted under this scheme. This scheme will pay a significant role for the promotion of Girls Education and to eliminate gender disparity in secondary and Higher Secondary Schools in Educational blocks in the state.

(g) Technical Education

One National Institute of Technology (NIT), Hamirpur, National Institute of Fashion Technology (NIFT) Kangra, 1 Jiwaharlal Nehru, Govt. Engineering College Sundernagar, 1 Indian Institute of Technology (IIT) Mandi at Kamand, 12 Privately managed engineering colleges, 9 Govt. Polytechnics and 16 Polytechnic in Private Sector, 60 Coeducation Industrial Training Institutes including one Institute for physically handicapped and 16 Industrial Training Institutes for women and one Motor Driving Training School, 63 ITCs (Pvt.) and 1 Govt. B-Pharmacy college Rohroo, 12 B-Pharmacy colleges in private sector and 1 D-Pharmacy college in private sector are functioning in the Pradesh. The ITIs/ITCs are providing 1-2 and 3 years certificate courses in 24 engineering and 22 non-engineering trades. The vocational Training under the aegis of SCVT is also being imparted, enabling the trainees to earn their livelihood through self employment and on wages in industrial units. This is helping the state to reduce unemployment problem. The present intake in the exciting institutions us as under:
1. Degree Level = 3,560
2. B. Pharmacy = 760
3. Diploma Level = 5,400
4. ITIs/ITCs = 18,758

In addition one technical university shall be established at Hamirpur in Govt. Sector from the next academic session 2010-11. The department is aware that not quantity but also the quality
is the need of the present day world. The department has taken some steps in the direction of improving the quality of education in three polytechnics namely Sundernagar, Hamirpur and Kandaghat(W) have been brought under Technical education quality improvement Programme and Rs. 7.99 crore have been spent on the project which has been closed finally on 31.3.2009. I.T.Is. i.e Solan, Una, Rampur, Shamshi, Mandi, Chamba, Shahpur, Nadaun, Nahan Shimla & Rekong Peo I.T.I. (W) Mandi, I.T.I. (W) Shimla and I.T.I. Rong Tong Kaza have been upgraded as centres of excellences and Rs. 2086.19 lakh have been received as Central Assistance for Modern Machinery & equipments etc. 27, I.T.I.s have been upgraded under Public Partnership mode for which Rs. 69.50 Crore has been received in the respective it is from the Govt. of India.

RATIONALE

As per PROBE report, sons are the preferred choice for education rather than daughters. The overwhelming reason is economic: Parents are hoping that their sons, if educated will have better employment opportunities. Parents are usually more apprehensive about education of a daughter, for fear of not being able to find a suitably educated groom for her at a reasonable price. The view of marriage is the ultimate goal of a daughter’s upbringing.

According to an article in Science Education: Major themes in education – Volume I (2005), “The conceptual structure of Science is built on the basis of sex distinctions. Historically, Science has taken for granted such masculine epistemologies and the practices of science predominantly, have been a male domain (Harding, 1991).”

Gender differences also played out in school education. In many countries, other than India, less number of girls chose science and is less likely to choose physical sciences (Rennie et al. 1991). In their science text books, women and girls continue to be in passive roles (Potter & Rosser, 1992). In class, teachers of both sexes interact more frequently with boys (Crossman, 1987); Jones, 1990) and girls have less access to lab equipment (Tobin, 1988).

Also, mentioned in another article in Science Education: Major themes in education- Volume I (2005) “over the last few years or so, girls’ participation in science subjects at senior secondary and early tertiary levels in some countries has increased considerably and their level of achievement are now on average, either equal to or higher than those of boys. However these increases have not been accompanied by corresponding increases in the levels of participation and achievement by women in scientific and technological sectors of the
workforce. While there have been small shifts in the culture of the school science education, the culture of most scientific workplaces remain strongly masculine.”

**REVIEW OF THE RELATED LITERATURE**

There is a large body of research addressing various issues associated with gender disparity in education and looking for the reasons behind it. Review of this literature suggests that these reasons include the early childhood experience, science related interests, gender stereotypes and family expectations. Various researches have acknowledged the gender bias present in the society which is affecting the choices made about the education of girls. Gender stereotyping and family expectations are also prominently contributing to it. Variation in gender bias with respect to education in the rural-urban scenario has also been the focus of few researches. Some of the crucial findings of the researches are listed below:

- Society undervalues the role of women, placing higher value on the traditional male role. Girls and women receive conflicting messages about their worth and place in our culture from schools, home, and the community.
- Independence and initiative tend to be encouraged in boys, while dependence and passive behavior tend to be encouraged in girls.
- A majority of the mothers whose girls were still studying wished their daughters’ education to continue till class X, whereas for boys it was till graduation.
- In total achievement and all subjects (Mathematics, Science and Punjabi), except English, urban boys scored the highest, followed by urban girls, rural boys and rural girls, in that order respectively.
- Female youth perceive their own future as restricted solely to marriage and motherhood, however, express modern ideas concerning husband’s qualifications and desired family size.

The present study is taking into consideration how social and economic factors and infrastructure present in the educational institutes affect the girls’ access to science education. It can be seen whether the key findings obtained from the data collected during the study are in coherence with the key findings of the researches done in the same area or not.

**OBJECTIVES**

The objectives and research questions of the research are:
To determine the major factors which are affecting girls’ access to Science education at senior secondary level in Jwalaji. Some of the issues that would be probed into relate to the following:
(a) Socio-economic factors
(b) Availability of sufficient infrastructure in the school

To understand peoples’ perspectives about girl child education in general and Science education in particular.

To find girls’ perspectives about their own education and science education.

DESIGN OF STUDY

Local families having girls as family members to be interviewed about their views on education for girls and science education for girls.

Collection of data regarding how many girls and boys have enrolled in class XI in all three streams

Identifying factors that led to the decision of opting for science as a subject at senior secondary level in both Class XI & XII.

Understanding the choices of Class X students related to the stream they are going to choose after class X and the reasons for doing so.

LIMITATIONS OF THE STUDY

SAMPLE

This study has the limitation of being both time and area bounded. There were more than 10 public and government schools located in Jwalaji but due to time constraint, only 4 schools were selected. Instead the researcher asked the girls to express themselves in written rather than verbally. The study is limited to just Jwalaji town of Kangra district, so it is area bounded.

PREPATION OF TOOLS

1. A semi-structured interview questionnaire which also included socio-demographic profile: for parents’ perspectives about their daughters’ education; to know about the economic and educational background of girls’ families.
2. Focused Group Discussion: to know about girls’ perspectives about their education and science education.
3. A Checklist: in order to know whether sufficient infrastructure needed for science stream is present in the senior secondary school or not.

METHODOLOGY
During data collection, researcher visited 4 schools. 2 schools, Saraswati Bal Bharti Public High School and Ravinder Nath Tagore Public High School, were co-educational schools up to class X, while Government Girls High School was a girls’ school up to class X. The only senior secondary school in the town was Government Boys Senior Secondary School which was co-educational at senior secondary level.

ANALYSIS OF DATA COLLECTED
1. Interviews were conducted with the parents of the girls to know about the social and economic factors that may affect their access to Science at senior secondary level.
   (a) Item wise analysis of the responses based on interviews revealing the perception of parents

   Question 1: 1. Your views on Science education (at senior secondary level) in Jwalaji in terms of (i) infrastructure (ii) future prospects
   Response: Just two families were aware of these aspects regarding science education, and thus only they were able to respond that though the infrastructure available in the only (government) senior secondary school of Jwalaji for science students of senior secondary level is of satisfactory level, but presence of just one senior secondary school definitely narrows down the scope for students looking for science stream. Further, for higher studies again, only one college is there and science classes are about to start from the coming session in July 20011^4. Rest of the families was not having any information about the query.
   Analysis: From the replies obtained from the two families, it can be inferred that because of the presence of only one senior secondary school and just one degree college, the scope of science education gets limited in Jwalaji.
   Conclusion: Lack of awareness about infrastructure and future prospects with regard to science education amongst majority of parents can prove to be a hindrance in girls’ access to science education at senior secondary level. And as indicated by the two replies obtained in this regard, there is still a lot to be done in this respect.

   Question 2: Do you want your girl child to pursue the career of her own choice or you want to take decision regarding her career?
Response: In response to this particular question, every parent was of the view that their girl child should pursue the career of her own choice.

Analysis: Parents’ opinion about the choice to be made regarding the career of their girl child is indicative of their supportive nature both in education at present and for higher studies as well.

Conclusion: As parents are playing a supportive role in making decision regarding the career, girls’ access to science at senior secondary level seems to be a not so difficult process.

Question 3: Which stream, according to you, is the best option for your girl child at senior secondary level and why?

Response: Though response to the first question indicates lack of awareness amongst parents about science education at senior secondary level and as the educational level of parents is not very high (some of the girls had parents working as labourers, making them first generation learners), it is interesting to see that 8 out of 19 set of parents responded in favour of science stream while 3 families again would like to go for the choice made by their daughters. Rest of the families was divided in favour of commerce and humanities streams. Reasons given for choosing science stream mainly focus around becoming doctors and engineers.

Analysis: Responses by majority of parents indicate that science stream is the most sought after stream for their daughters by them.

Conclusion: Once again family support to girls in order to opt for science stream at senior secondary level is indicated but it is accompanied with future dreams regarding the profession to be chosen by the girls of the family.

Question 4: Do you think career opportunities available to science students in Jwalaji are equally suited for both boys and girls?

Response: Eleven families agreed that career opportunities available to science students in Jwalaji are equally suited for both boys and girls, while two families disagreed with this. Rest of the families was not able to respond to this particular question.

Analysis: Majority parents think that career opportunities available to science students in Jwalaji are equally suited for both boys and girls.

Conclusion: Girls’ access to science stream at senior secondary level in Jwalaji is facilitated by the fact that (in parents’ view) career opportunities available to science students at Jwalaji are suited equally to both boys and girls.

Question 5: How do you see your girl child’s future after 10-15 years from now?
Response: Response by parents to this question ranged from seeing their daughter as doctor, engineer, teacher, police officer to being good housewife (just one such response). Four families were unable to respond to this question.

Analysis: Most of the parents wish to see their daughter as working professionals in the future with five families desiring for science related careers for their daughters.

Conclusion: Parents’ dreams about the professional future of their daughters form a positive picture for girls’ access to education at higher level and inherent in it is their access to science stream at senior secondary level.

Question 6: Do you think that tuitions and help books/reference books are crucial aspects of being a science student?

Response: Fourteen families were in agreement with the statement that tuitions and help books/reference books are crucial aspects of being a science student.

Analysis: Majority of parents are of the view that tuitions and help books are inevitable when it comes to being a science student.

Conclusion: There is awareness regarding the financial aspects involved in being a science student amongst parents.

Question 7: What is the daily routine of your girl child?

Response: Most of the responses to this question were quite brief. Some of the responses were

“She wakes up at 5 in the morning, assists in household chores, after getting ready goes to school”

“Her daily routine includes studying, going to school, watching television etc.”

Analysis: The aim of this question was to gaze into the daily life of the girls studying in X class so as to know if they are facing any difficulties in continuing with their studies. But the brief replies given do not reveal much.

Conclusion: Through this question nothing much can be inferred about the daily routine of girls studying in class X as parents were unable to give description about the daily routine of their daughters.

Question 8: Who amongst your children do you find potent enough to take up science stream at senior secondary level and why?

Response: In response to this question, parents were of the view that the hard work and dedication towards studies (and not the gender of the child) will be the determining factor for
children in order to choose Science stream at senior secondary level. Interestingly one family replied

“Both our daughters are capable of taking up science stream at senior secondary level because of their good command over English.”

**Analysis:** Parents are going to make decision regarding the streams to be chosen by their children at senior secondary level based on their academic performance.

**Conclusion:** No gender bias is shown on the part of the parents when it comes to make decision of the stream to be chosen at senior secondary level. This mindset of parents makes science more accessible to girls at senior secondary level.

**Question 9:** Which particular career option do you feel is the best suited one for you girl child? Why?

**Response:** In parents’ view best suited professions for their daughters are doctors (three responses); chartered accountants (three responses), those of their daughters’ choice (three responses), a good officer (single response) and teacher (single response). Rest of the families was unable to respond to this question.

**Analysis:** Whatever professional choice parents are making, it is evident that parents are interested in the higher education of their daughters that is why they have such aspirations for their girls.

**Conclusion:** Girls’ access to education and thus to science education is getting full support from parents as can be inferred from the responses received for this question.

Socio demographic profile of class X girls’ families (included in the interview) suggests that most of the girls belong to nuclear families with number of siblings ranging from 1 to 4. Leaving apart one, every girl’s mother is a homemaker. The number of family members earning in their families is either one or two (for few, where elder siblings have started working). The annual income of the families lies in the range of Rs. 2,500 (minimum for those girls whose fathers work as labourers) to Rs. 4, 80, 000 (maximum in case of that one girl whose mother is also working). Most of the families have their annual income around Rs. 30,000 to Rs. 50,000. Also, only one girl is having graduates as family members (elder siblings, sister doing post graduation in science and brother doing graduation in commerce) showing that educational level of the family members of these girls is not very high.

2. Girls of senior secondary level expressed themselves in writing about (a) what motivated them to take up science stream at senior secondary level (b) their daily routine and (c) difficulties faced by them (if any) by taking up science stream at senior secondary level.
(b) Analysis of the data regarding perception of girls

Response: (a) Motivation behind taking up science stream: While girls of XII class wrote that they have opted for Science because of their interest in the subject and the larger scope that this stream offers, girls of class XI have the dreams of becoming Doctors and Engineers which have motivated them to take up science.

(b) Daily routine: Girls of class XI and XII both have almost same daily routine that includes waking up early in the morning to study, spending 4-5 hours for self study in a day etc. Also, leaving apart 2 girls of class XI, every girl’s daily routine includes attending tuitions of one or more subjects depending on the difficulties faced by them.

(c) Difficulties in being a science student: Majority of the girls wrote that it is not the subject of science that seems to difficult to them but the problem of understanding it in English is. As almost every school in Jwalaji is Hindi medium and girls are not exposed to this language even at home it is a great challenge for them to acquaint themselves with English as only then it becomes possible to move ahead. Also tuition timings of some are problematic as it becomes difficult for them to stay out till late in the evening.

Apart from these, girls of Jwalaji do not find taking up science stream as something filled with troubles and problems. Few girls went on to say that since there are no coaching facilities in Jwalaji to prepare them for engineering and medical entrance tests, their parents are ready to send them to places where such facilities are available without any hesitation.

Analysis and Conclusion:

(a) Motivation behind taking up science stream: It appears that environment, both at school and home, is supportive enough to encourage girls for taking up science at senior secondary level and that is why girls not only felt motivated but managed to opt for science stream.

(b) Daily routine: The daily routine of the girls also show that they are fully supported and encouraged, provided with desirable time for studying by their family members. Thus science stream is not only accessible to them but there are good chances of them showing excellent results in it.

(c) Difficulties in being a science student: English as a medium of instruction and tuition timings are the problems which the girls of Jwalaji find to be a hindrance in their learning of Science.

3. Perceptions of the students of class X regarding the stream they would like to opt for in class XI and reasons for opting for it.
(c) Analysis of data regarding perceptions of the students of class X

Response:

(i) Saraswati Bal Bharti Public High School: Of the 15 boys and 15 girls interviewed, 10 boys and 8 girls wished to choose science stream at senior secondary level as they aspired to become doctors and engineers.

(ii) Ravinder Nath Tagore Public High School: Of the 19 boys and 5 girls interviewed, 9 boys and 4 girls wished to choose science stream at senior secondary level and apart from aspiring to become doctors and engineers and few students gave their interest as the reason of choosing science.

(iii) Government Girls’ High School: Just 8 of the 63 girls wished to opt for science stream at senior secondary level and of them most of the girls have their interest in Science and Mathematics motivating them to do so.

Analysis: Maximum girls of public school wish to opt for science stream while an abysmally low number of government school girls wish to do study science.

Conclusion: A good proportion of girls from public school wish to go for science stream at senior secondary level but the proportion is quite poor in the government girls’ school.

4. The Checklist contained the infrastructural parameters prescribed by the Himachal Pradesh Board of School Education for a school offering science stream at senior secondary level.

(d) Analysis of data collected through Checklist

Response: All desired infrastructural facilities as prescribed by the Himachal Pradesh Board Of School Education were available in the school.

Analysis: School was well equipped to provide quality science education at senior Secondary level to its students.

Conclusion: Adequate infrastructure in the school for senior secondary level makes science accessible to all students aspiring for science stream in Jwalaji and thus to girls also.

5. Data showing number of girls and boys enrolled in the class XI in different streams for the past ten years in Government Senior Secondary School of Jwalaji.

3 (e) Analysis of the data showing numbers of students enrolled in different streams in class XI for last 10 years in Jwalaji

Data shown in the table 1 indicates that only in science stream the number of boys enrolled is approximately equal to number of girls enrolled as the ratio between them is always around one (except in year 2006 and 2007).
Analysis of the interviews conducted with the parents of girls of class X led to the following key findings:

- There is a lack of awareness among most of the parents of the girls regarding availability of the infrastructural facilities and future prospects associated with science stream at present in Jwalaji.

- Majority of the parents feel that the facilities which are available at professional level for science students in Jwalaji are equally suited to both boys and girls.

- Parents are ready to show faith in their daughters’ decision regarding their career.

- Most of the parents have given preference to the science stream when it comes to choosing the most suitable stream for their girl child in order to fulfil their daughters’ professional dreams.

- Parents have shown a positive attitude, optimism towards the future of their daughters as they have an educationally sound vision for them.

- Parents are aware of the economic aspects associated with being a science student as they do consider reference books and tuitions quite important for pursuing science stream.

- For the parents, the academic achievement of their children will be deciding factor in determining about the stream to be chosen at senior secondary level. So it seems that no gender bias is to be shown by them in this regard.

- It appears that parents are willing to support their daughters in order to pursue higher studies.
CONCLUSION

1. It can be concluded that there are many factors which are facilitating girls’ access to science education. These include support from the family (socially), from the government (economically) and from the school (availability of infrastructure at the senior secondary level).

2. All the schools visited by the researcher is that no school was observed to have a counsellor. In the light of what has been discussed above that there is a lack of awareness among most of the parents of the girls regarding the infrastructural facilities and future prospects associated with science stream at senior secondary level present in Jwalaji, the role a counsellor can play in helping the girls to make the right choice regarding their career can prove to be quite vital.

3. There are few other challenges like the abrupt change in medium of instruction from Hindi to English, long and unsuitable duration of tuitions, lack of infrastructural facilities in their (public) schools till class X, but despite these, girls are working hard towards achieving excellence in the stream chosen by them. And in this manner Jwalaji can be used as an example for many places when there is a concern for education of girls especially in the field of science.

4. The present study do not seem to corroborate with the earlier researches done in the same field and show that science as a stream is quite accessible to the girls as it appears that not much of gender bias will be shown by the parents but yes upgrading and opening educational institutes can take this accessibility to a much higher level.

SCOPE FOR FURTHER RESEARCH

1. The present study has been conducted in a limited period of time on a very small area of the district with a small sample of girls.

2. The focus of the study didn’t include the perspective of the parents who have actually been able to send their daughters out of town for higher studies, the problems and challenges (if any) faced by such girls and their families can be taken into account.

3. The role played by classroom processes which may include pedagogy, attitude of teachers towards both sexes and many other things can be probed at a larger scale in many more schools and at many more places that is on a larger sample in order to reveal much more on the same topic at a wider scale.
4. One can explore about whether the participation level of the girls of Jwalaji in higher studies associated with science stream continues to be same as it was at the senior secondary level i.e. as suggested by the present study.

5. The present study can be extended to explore the achievement of girls in science stream and the factors affecting their achievement.

REFERENCES