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RESEARCH PAPER

Evaluation of Enrollment Trends in Science Subjects at Secondary Level in Punjab

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ABSTRACT

The aim of this study is to evaluate the enrollment trends in science subjects at secondary level. The study was descriptive in nature and quantitative approach was applied for conducting this study. Population of the study was comprised of all the teachers, students and parents of Gujranwala Division in Punjab. Stratified random sampling technique was applied for the selection of sample. The researcher developed three questionnaires for the collection of data. Percentage, mean and independent sample t-test was used for analysis of data. It was found that majority of students were enrolled in session 2015-16 on the demand of their parents and science subjects have fame among the students and boys enrollment in science subjects are better than girls in all the sessions 2015-16 to 2019-20. It is recommended that the government may arrange public awareness seminars at local level. The speakers may introduce different innovative aspects of science

Introduction

Education plays an essential character in all the aspect of individual. It provides a platform for all kind of persons who wants to do some work for the humanity. There are different broad fields in education like science, arts and humanities and technical education. There are a lot of opportunities for all the students who can adopt any field of his/her interest (Ling & Ibrahim, 2013).

In Pakistan secondary education has broadly 2 years of schooling from grade 9 to 10. The students are supposed to give standardized set of tests under regional boards at the end of tenure of 1 year and same process goes for the grade 10 and after completion of both they are awarded with degree of matriculation

labelled as secondary school education certificate (Gottfried & Plasman, 2018). Basically this education is considered as crucial phase for students, their parents and consequently in favour of society because this level provide them a chance to decide on their future career thus the importance of secondary level cannot be denied. This level is nearby a short term named 'metric' or 'matriculation certificate'. Secondary level students know how to concentrate in science, art, humanities, or practical stream. For all the students Urdu, Islamiyat, Pakistan studies, English, and Mathematics are mandatory subjects (Chisman, 2004).

There are three main streams of education in Pakistan at government level. These are Science, Humanities and Technical Education. Though core curriculum is same in all these three streams but optional subjects are different. Half curriculum (four subjects) consists on core curriculum while half is different in all these three streams (Reinhol et al, 2018).

Science in considered as most preferred field in most countries as it provide supply of doctors engineers and other core persons for the development of society. This major field of practice is maintained and explored throughout the academic study of science education (Fensham, 2004).

Science and Technology play important roles in the earth. Therefore, the demand for education in science education has become an urgent task for developing countries vie satisfactorily with developed countries. The grand nations of the globe take keep in establishment they have enclosed in equally technological and science progression. The socio-economic comforts of self-governing nation are well deep-rooted in the way they have developed methodically and technically. Countries of the earth often referred to as the developed; distribute related quality in technological improvement. Whereas, under-developed or developing countries distribute precincts in technical and scientific know-how Science Education is an essential part which shape and melds the quality of new society (Badmus & Omosewo, 2018).

Science education is an imperative element of training or instruction, mainly to get better understanding of the atmosphere and the development of organized inquisition. It is a pre-requisite to advancement (Pember & Humbe, 2009).Regardless of shifting educational inducement; it is necessity to enlarge the portion of adults by at least several college-level instructions. Because it enables students to get certificate to have access to premium wages just like experts (Xu& Trimble, 2016).

People of Pakistan have no awareness about the benefits of education or they are poor enough to bear educational expenses. It is alarming that almost one third of the students leave school after completing their primary education. When they reach in secondary level, half of them were unable to continue their education due to economic, social or family problems. When they reached in secondary education, they have to select different streams like science, humanities and

technological subjects. Parents want that their child may become a doctor or engineer. That was a reason, the researcher decided to evaluate the enrollment trend at secondary level in science subjects.

Literature Review

Science Education

Science has become a dominant strength of socio-economic change of a nation as well as has a special character in the progress of the nations. Science has its impact on all walks of life. Science identifies problems, seeks explanations and seeks solution for the wellbeing and improvement of the community. Due to spirit and value of science mankind has achieved development in various fields. Nonetheless, it has become vital to directly the youth towards science learning. However, such courses ought to be planned which are according to needs and potential of students and which may play positive part in overall economic development of country as well (GoP, 1992).

Importance of Science Education at Secondary Level

At the level of secondary school, science education plays a very significant function in overall educational system. It is important for student for two main reasons. At the one end it is incurable stage for students who cannot continue their education after matriculation. On the other hand, it becomes base for students who go for higher and professional education. It is also expected that a student at this stage age has attend higher level of cognitive development. At this stage that students should be equipped with knowledge and skills so that they may play an active part in the progress and improvement of the country (Fensham, 2004).In most of the country's science curriculum has been developed according to real life situation so that students may explain particular Idea or concept. At this stage students are equipped with scientific knowledge, skills and concepts, they will have Social awareness, sense of responsibility to protect the environment and respect for the needs of other human beings (Nawaz, 2003).

Science Education and Social Development

Science education at secondary level has an imperative task in the progress and social development of a person as well as country. It helps in eradicating social problems and environmental problems. At the same time science education accelerates industrial development and helps in raising the standard of living. In formal School system Science is considered compulsory subject light from nursery class. At present there is much pressure on science education and educational institutions to assemble the demand of different industry and discipline (Mohantay, 2004).

Kayani, (2002) highlighted the importance of science education as follows:

1. It has influenced every aspect of life and it has brought revolution in the world. It is fact that scientific knowledge is increasing rapidly. It is true that modern civilization is indebted to science education to a great extent. Today Science and technology is playing important role in social economic development of a society. It can be said without hesitation that survival of a nation in 21st century will depend upon scientific development and scientifically literate society. The cornerstone on which splendid building of the development program me of a country should be built is its expertise in Science and Technology and its application in agriculture and industry.

2. Hussain, (2002) describe that during Secondary Education most of the learner enter adolescence and the most crucial stage of life. At this stage change occur in basic perception modes of behavior. 4 years of secondary and higher secondary education therefore seems an exceptional chance for educationists to think and begin program that keep the learner in proper form of behavior and attitude that help the learner to attain useful and passive life in future.

Role of Science Education in the World

Science education plays significant roles in the world. Therefore, the demand for science education has become an urgent task for developing countries to compete favorably with developed countries. The great powers of the world are proud of their fields in scientific and technological progress, and the socio-economic well-being of sovereign states is rooted in their scientific and technological development (Mohanty, 2004).Countries generally called developed countries in the world have similar characteristics in terms of technological progress. On the other hand, underdeveloped or developing countries have limitations in scientific and technical knowledge. Science education is a chief part in shaping and integrating the characteristics of modern society (Badmus & Omosewo, 2018).

Science Education as a Pre-Requisite to Advancement

Science education can be thought of as a process of schooling or training, particularly in the school system, which can improve the development of environmental knowledge and systematic inquiry as well as natural attitude characteristics. Science education can be considered a prerequisite for progress; it involves deeply scientific research as well as educational knowledge and concepts (Pember & Humbe, 2009). Although changes in educational motivation, the proportion of adults needs to be expanded through at least some college-level training. This stems from world experience and rising wage premiums paid to college graduates or graduates with professional credentials (Xu & Trimble, 2016)

Science and Self-Regulated Learning

There has been drawn some examples of self-regulated learning. It has been focused on the essential function that met cognition plays in self-regulation. The

first part focuses on the three elements of self-regulated learning, including knowledge, satisfaction awareness and need. It links these aspects of self-regulation to current practice in science education. The second part based on six general teaching strategies to improve self-regulation in science classrooms. These focus on the use of query-based learning, the role of collaborative support, the guidance of strategies and problem solving, the development of intellectual models, and personal beliefs such as self-efficacy and the philosophical world. These teaching methods were chosen because they reflect the expanded research agenda in the science education literature over the past period of time and are vital for metacognition and self-regulation (Schraw *et al*., 2006).

Status of Science Education in Pakistan

On the independence of Pakistan innate a weak infrastructure of science, there was lack of mechanism for evaluation, implementation and monitoring of science. There was only one university and very few industries in Pakistan. Almost all the scientist who played a major role in building the scientific infrastructure came from India. Their contributions towards programs of science were incredible, but their efforts were blocked due to shortage a strong pool of local educated talents. Due to political instability a coherent science policy could not be formulated to commit adequate resources to the development of fine. In this regard the first systematic efforts were initiated in early sixties (Nawaz, 2003).

In 1965 just before the war a meeting was held for comprehensive science policy. But during and after the war priorities of the countries changed and developing local arms industries were given more importance (Khitab, Zaman, Ghaffar, &Jan, 2019).Thus dreams of formulation of balanced science policy could not be fulfilled. Again in 1974, a nuclear test from India compelled Pakistan to accelerate its weapon related nuclear programs. And again in 1998 after testing nuclear weapon successfully, performance of agriculture, medicines and human resource development got acceleration, but performance of low priority development-oriented science remained poor. Science education at school and college level imparts knowledge through Rote learning of facts and theories. At school level the students hardly provided any opportunity to do experiments and test facts and theories. At Higher Secondary and college level the practice continues to prevail even (Inayatullah, 2003).

Development in our education sector is slow due to lack of long-term planning in Pakistan. In recent past higher education has been promoted but the primary and secondary education along with technical and vocational training has been ignored. Without knowledge and education, it is difficult to maintain quality of life. At present Pakistan is spending 1.5 percent of GDP on education, while Jews are spending 60% of their income on education. We have not defined ultimate objective to make Pakistan are developed country in the comity of nations. An independent body is needed to concentrate on the point that how our education system can be transformed through the innovative use of Technologies. Pakistan

should define clear cut objective to identify the role of Technology in addressing issues of our education. We should struggle hard to achieve, two or three major objectives. One of the major objectives is to create awareness among the men and develop their faces abilities for getting education. Another major aspect is to persuade the bureaucrats to provide maximum funding for education sector. It is very pertinent to note that advancement in education can only be achieved with innovative Technologies (GoP, 2010).

Framework of Science Education 2012

According to a report from the National Academy of Sciences, the field of science, technology, and education occupy the most important positions in the modern world, but in the United States, there are understaffed workers (STEM) in science, technology, engineering, and mathematics. In 2012, the National Academy of Sciences Board developed a new conceptual framework for K-12 science education standards. The guideline developed a guidance framework to standardize K-12 science education, with the goal of systematically organizing science education within K-12 years. The publication, entitled "The Framework of K-12 Science Education: Practice, Crosscutting Concepts, and Core Ideas," aims to promote standardization of K-12 science education in the United States. It emphasizes that science educators should focus on "limited subject core ideas and cross-cutting concepts, design them so that students continuously accumulate and modify their knowledge and abilities over the years, and support the integration of such knowledge and abilities with required practices combining scientific query and engineering design."

In the 21st century the report says, Americans need science education in sort to participate and "systematical investigate issue connected to their individual and society priority," and make scientific reasoning and know how to apply scientific knowledge. The committee devising this new framework believes that the priority is to provide educational equity to a diverse range of children. The committee believes that involving more students in STEM education is an issue of social justice.

Material and Methods

Following were the methodology of the study

Research Design

The study was descriptive in nature and quantitative approach was applied for the conducting of this research. In quantitative approach the researcher applied questionnaire as a research tool for the collection of data.

Sample

All the secondary school teachers, 9th and 10th class students and their parents of Division Gujranwala were the population of the study. Stratified random sampling technique was applied for the selection of sample.

Instrument

The researcher constructed three questionnaires for teachers, students and parents. Five-point Linkert scale was used for teacher's questionnaire while Yes and No format was applied for students and parents' questionnaires. The validity of the instruments were checked through experts of the field whereas the reliability of the instrument was measured by using Cronbach's alpha statistical technique.

Data Analysis Techniques

Statistical Package for Social Sciences (SPSS) was used for the analysis of data. The researcher applied percentage, mean, standard deviation and independent sample t-test for analyzing the data in this study.

Results and Discussion

Table 1
Enrolment trends in science subjects

Session	Enrollment	%
2015-2016	138312	19.91
2016-2017	133214	19.18
2017-2018	133146	19.17
2018-2019	142233	20.48
2019- 2020	147538	21.24
Total	694443	100

Table 1 indicates the enrollment trend in science subjects. The table indicated that the year wise enrollment trends in science subjects. The highest enrollment was seen in session 2019-20 which was 21.24%. Graphical presentation of year wise enrollment trends was shown in figure 1.

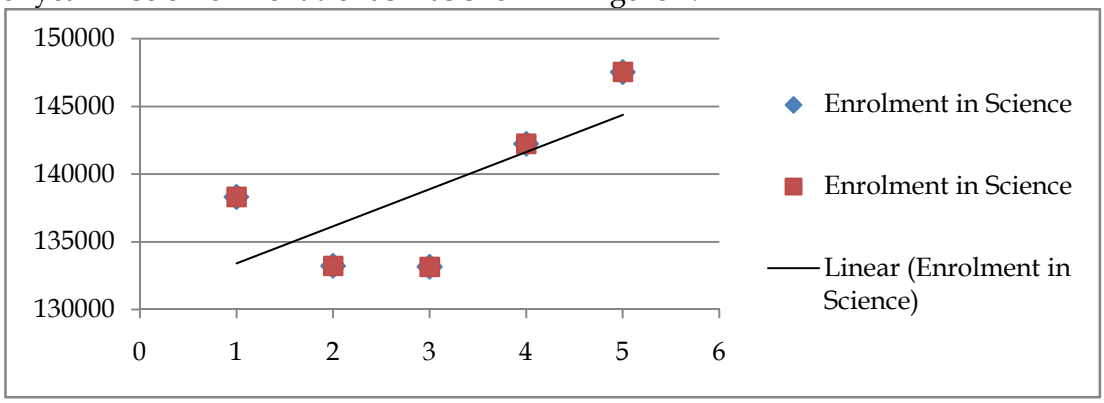

Table 2
Enrolment trends of boys in science subjects

Session	Enrollment	%
2015-2016	79184	20.75
2016-2017	73382	19.23
2017-2018	72354	18.96
2018-2019	77268	20.24
2019- 2020	79389	20.8o
Total	381577	100

Table 2 indicates the enrollment trends of boys in science subjects. The table indicated the year wise enrollment trends in science subjects. the highest enrollment were seen in session 2019-20 which was 22.80%. Graphical presentation of year wise enrollment trends were shown in figure 2.

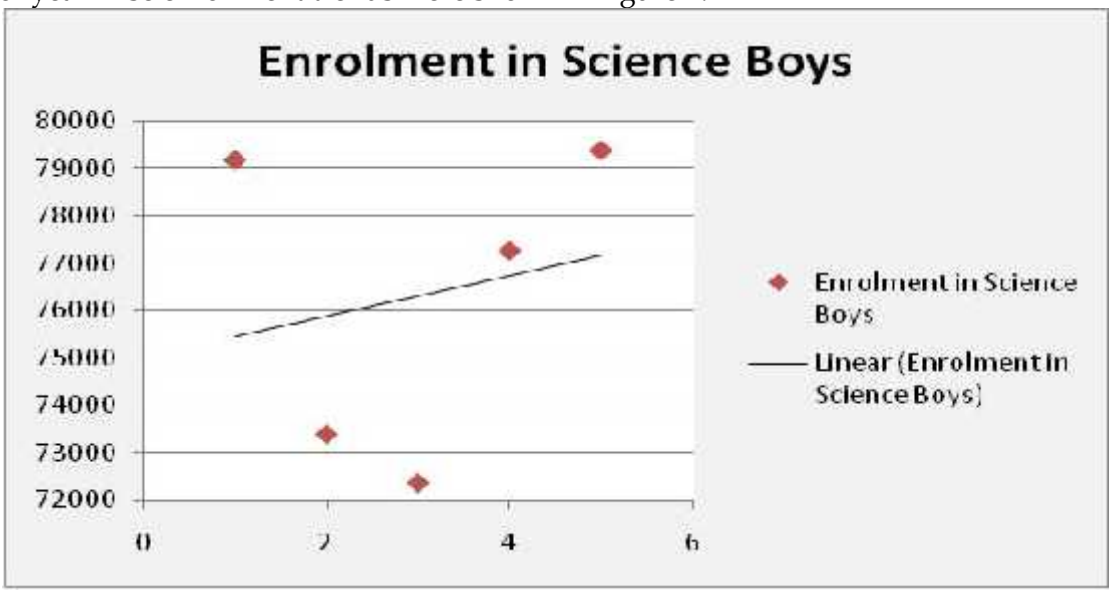

Figure 2 Enrolment trends of boys in science subject

Table 3
Enrolment trends of girls in science subjects

Session	Enrollment	%
2015-2016	59128	18.89
2016-2017	59832	19.12
2017-2018	60792	19.43
2018-2019	64965	20.76
2019- 2020	68149	21.78
Total	312866	100

Table 3 describes the enrollment trends of in science subjects. The table that indicated the year wise enrollment trends in science subjects. The highest enrollment was seen in session 2019-20 which was 21.78%. Graphical presentation of year wise enrollment trends was shown in figure 3.

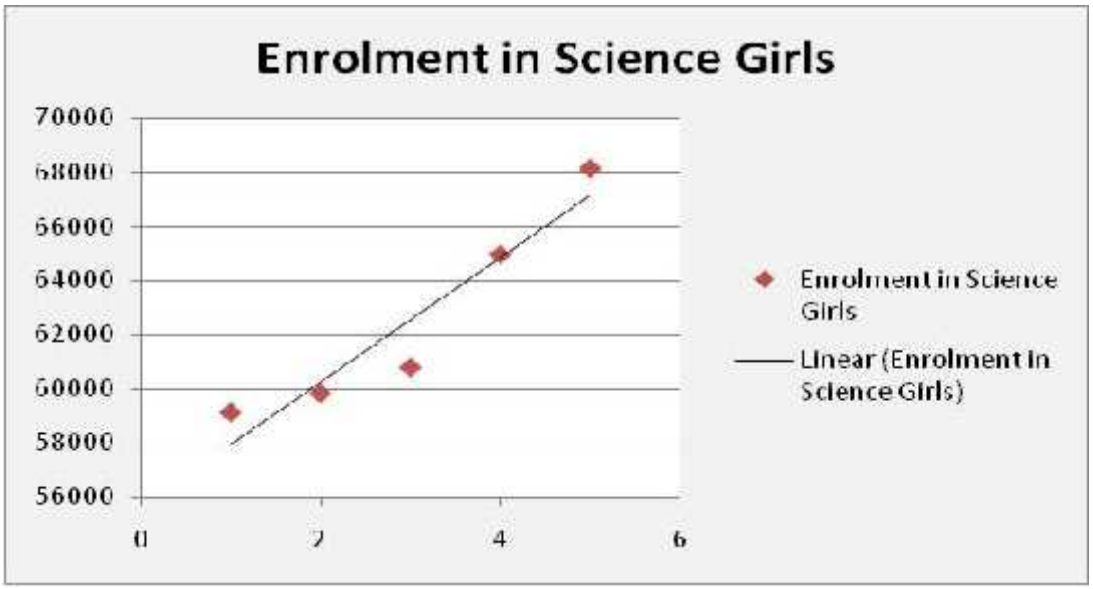

Figure 3 Enrolment trends of girls in science

Table 4
Causes of enrollment trends in science subjects by teachers

Statements	SA (%)	A (%)	N (%)	D (%)	SD (%)
There are more opportunities of jobs.	43.3	39.0	0	0	17.7
Science subjects offer better standard of living.	46.4	44.9	0	8.7	0
Boys are forced to study science subjects than girls.	51.9	39.0	0	0	9.1
Parents persuade their children to choose science subjects.	54.9	44.9	.1	0	0
Society give importance to science subjects holders	43.4	47.5	0	0	9.1
There is good name if science subjects are selected girls	54.9	45.1	0	0	0
Science subjects are chosen to impress others	43.4	47.5	0	0	9.1
Peer impact causes to get enrolled in science subjects	43.4	44.9	8.7	0	0
Science schools are mostly located in city area which offers more attraction to students	51.7	39.3	0	0	9.0
Due to availability of public transport, conveyance cost in minimized	46.6	53.2	0	0	.1

Parents' profession has impact upon the choice of subjects for their children at secondary level.	51.7	39.3	0	0	9.0
They want to become doctors.	46.4	53.3	.1	0	.1
They want to join armed forces.	46.4	53.3	.1	0	.1
They want to study abroad.	51.9	39.0	0	0	9.1

Table 4 indicates the percentages of causes of enrollment trends in science subjects by teachers. The table reveals that mostly teachers were strongly agreed and agreed regarding causes of enrollment trends in science subjects. The highest percentage 54.9 % and 44.9% showed that mostly teachers were strongly agreed and agreed with the statements "Parents persuade their children to choose science subjects". Similarly, the highest percentage 54.9 % and 45.1% showed that teachers were strongly agreed and agreed with the statement "*There is good name if science subjects are selected girls".*

Table 5
Causes of enrollment trends in science subjects by students

Statements	Yes (%)	No (%)
To become a doctor.	60.5	39.5
To become a civil engineer.	55.8	44.2
To become a scientist.	57.2	42.8
For cater their interest	60.6	39.4
To impress their fellows	67.6	32.4
To fulfill the dreams of their parents	64.2	35.7
To follow their teachers,	69.5	30.5
To increase the quality of their lives	59.2	40.8
To get more jobs opportunities	67.2	31.0
To get higher grades.	58.6	39.6
To go abroad.	52.5	46.1
To become a civil servant	76.6	23.4
To get expertise in Scientific.	53.5	46.5
Science is interested for students.	61.8	38.2
Science makes the students creative.	62.4	37.6

Table 5 indicates the percentages of causes of enrollment trends in science subjects by students. The table showed that mostly students had given the response in "Yes" regarding the causes of enrollment trends in science subject. The highest percentage 76.6% revealed that majority of students had given the response in "Yes" with the statement "To become a civil servant".

Table 6
Causes of enrollment trends in science subjects by parents

Statements	Yes (%)	No (%)

To become a doctor.	67.2	32.8
To become a civil engineer.	65.6	34.4
To become a scientist.	72.2	23.8
For cater their interest	58.6	41.4
To impress their fellows	57.1	42.9
To fulfill the dreams of their parents	74.2	25.2
To follow their teachers,	58.6	41.4
To increase the quality of their lives	65.6	34.4
To get more jobs opportunities	62.3	37.7
To get higher grades.	75.8	24.2
To go abroad.	62.3	37.7
To become a civil servant	57.1	23.4
To get expertise in Scientific.	68.2	46.5
Science is interested in students.	69.2	30.8
Science makes the students creative.	58.6	57.0

Table 6 indicates the percentages of causes of enrollment trends in science subjects by parents. The table shows that majority of parents had given the response in "Yes" regarding the causes of enrollment trends in science subject. The highest percentage 75.8% revealed that mostly parents had given the response in "Yes" with the statement "To get higher grades".

Table 7
Comparison of boys and girls enrolment in science subjects

Session	Enrollment of boys	Girls
2015-2016	79184	59128
2016-2017	73382	59832
2017-2018	72354	60792
2018-2019	77268	64965
2019- 2020	79389	68149
Total	381577	312866

Table 7 indicates the year wise comparison of boys and girls enrollment in science subjects. Table further indicated that the boys enrolment in all session were greater than girls enrolment in subjects of science.

Table 8
Enrollment compression of science students' boys and girls

Gender	N	Mean	SD	t value
Boys	5	76315.4	2928	384.94
Girls	5	62573.2	3445	

Table 8 shows the analysis of independent sample t-test. The table depicted the enrollment trends comparison of boys and girls in science subjects. Moreover, the result showed that boys (M=76315.4, SD=2928) and girls (M=62573, SD=3445)

with t=384.94 which was > tabulated value 192. This showed that there was a significant difference between the enrollment trend of boys and girls in science subjects. Furthermore, the mean scores also indicated that boys enrollment was better than girls in science subjects.

Discussion

The major objective of the current study was to evaluate the enrollment trends of students in science subjects at secondary level. The first objective of the study was to assess the enrolment trends in science subjects at secondary level. It was found that majority of students were enrolled in session 2015-16.

The second objective of the study was to explore the causes of enrolment trends in science subjects at secondary level. It was found that majority of students were enrolled in science subject on the demand of their parents and majority of students are agreed to enroll in science subjects because they want to become a civil servant. Moreover, majority of parents are agreed that their children got higher grades that are why they force their children to enroll in science subjects. A study conducted by Ngema (2016), he found that parental involvement is one of the major cause for the selection of science subjects.

The third objective was to compare the enrolment trends of boys and girls in science subjects at secondary level. It was found that boys enrollment in science subjects were better than girls in all the sessions 2015-16 to 2019-20. Contrary to this Ngema (2016) found that majority of learners in science classes were girls.

Conclusions

1. It is concluded that majority of students are enrolled in session 2015-16. Moreover, majority of boys are enrolled in session 2-19-20 while, majority of girls are also enrolled in session 2019-20.

2. It is concluded that predominance of students are enrolled in science subject on the demand of their parents and science subjects have fame among the students, majority of students are agreed to enroll in science subjects because they want to become a civil servant and majority of parents are agreed that their children got higher grades that's why they force their children to enroll in science subjects.

3. It is concluded that boys enrollment in science subjects are better than girls in all the sessions 2015-16 to 2019-20.

Recommendations

1. It is recommended that the government may arrange some kind of public awareness seminars at local level. The speakers may introduce different

innovative aspects of science. Furthermore, career counselor may motivate students to choose science subjects at school level.

2. It is recommended that there may arrange awareness seminar at the end of every session for students at school level. the students himself/herself decide to choose the subjects.

3. It is recommended that there may be awareness programs for girls also. Institutions may introduce different parents awareness programs so that parents know the importance of science.

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