ANALYSIS OF DELHI EDUCATION MODEL: CASE STUDY OF TWO DELHI GOVERNMENT SCHOOLS (2015-2020)

A dissertation submitted to the University of Hyderabad in partial fulfilment of the requirements for the award of

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by

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DECLARATION

I, Pooja Goel, hereby declare that the dissertation titled, **"Analysis of Delhi Education Model: Case study of two Delhi Government schools (2015-2020)"** submitted under the supervision and guidance of **Prof. K Laxminarayana**, School of Economics, University of Hyderabad, is my own work and effort. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due acknowledgement and reference to the literature. I declare to the best of my knowledge that no part of this dissertation was earlier submitted for the award of the research degree to any University or Institution.

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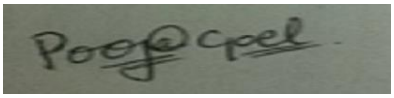

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This is to certify that the dissertation entitled "**Analysis of Delhi Education Model: Case study of two Delhi Government schools (2015-2020)**" is a bonafide record of independent research work carried out by Pooja Goel (Reg. No.: 19SEHL16) under my supervision and submitted to the University of Hyderabad in partial fulfilment for the award of the Degree of Master of Philosophy in Economics. The dissertation or a part thereof has not been submitted for any other degree to this university or elsewhere.

Prof. K Laxminarayana

(Research Supervisor) Dean of the School

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POOJA GOEL

Dedicated to my Parents

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Chapter-1: Introduction and Methodology

Education is important in yielding social development gains, making an individual self-reliant and also in empowering the nation. Quality education, must ensure that basic educational needs are accessible, adaptable, available and also acceptable to every student with equity. Bowman (1980), discusses Schultz's theory of capital which says that that, knowledge and skill of humans are like capital and this capital is a result of "deliberate investment." Skill and knowledge contribute to a person's ability to do productive work and therefore, investment in human capital is necessary to make an individual acquire education. Investment in enhancing human capabilities will increase human productivity which will give positive return. Investment in human capital may incur a cost in the short run but in longer term the returns from the investment will be more than the cost. The cost can be the cost of providing facilities, loss of income for the workers when he/she in school and returns can be higher earnings in the future and contributing to country's development. Highlighting western countries, he explains there is an increase in national income because of the investment in human capital. There is a positive link between investing in human capital and the earnings. The workers can independently increase their productivity and earnings and need not be dependent on others for their living, if they have the skills (Bowman, 1980). Thus, we can see the role of education in one's own development and for country's development also. The study by Ozturk (2001) also emphasises education as the fundamental factor of a country's development, and says no economic development is possible without good education. A balanced and good education system promotes productivity and generates income per capita in addition to economic development of the country. The effect can be noticed at the micro level of the respective individual family.

The study by Bhardwaj (2016) discusses the importance of value-based education and says it is important to have good citizens. Value-based education is the system in which people give respect and values to others. It inculcates integrity, morality, character, honesty, humility and many more good qualities in an individual. It helps in the holistic development of students. There is a high time need for value-based education system in India. Education without values[1] without any doubt can produce degree holders, doctors, and so on but the question is that can it really produce good and empowered human beings which is considered as the

[1] Bhardwaj (2016) mentions values of a good citizen as integrity, morality, character, honesty and humility

main aim of education (Bhardwaj, 2016). Hence, it should be ensured that value-based education should be included in the chapters in an interesting way to make children and students learn it at every step of their schooling.

"Education is the most powerful weapon which you can you use to change the world."

- *Nelson Mandela*

Education in India falls under Union and States. The study by Afzhal and Mazhar (2017) says that India has progressed as attendance rate in primary education has increased and has also expanded literacy to about 67 percent of the population. They both acted as the important contributors in the economic rise for India. On 1st April, 2010, the Right to Education (RTE), ensuring the right of free and compulsory education to all children, came into effect. The Right to Education Act (RTE) got implemented in 2009 to give free and compulsory education to all children till the age of 14 years within the period of ten years of the formulation of the Constitution. The provision of quality of education can be attained, which could be sensed through the enactment of RTE Act. Several other programmes and policies have been introduced in respect to education such as Kothari Commission, 1964; The National Policy on Education, (1968); The National Policy for Children, 1974; National Policy on Education, 1986; Right to Education Under Article 21-A, Sarva Siksha Abhiyan (SSA) and Rashtriya Madhyamik Shiksha Abhiyan (Afzhal and Mazhar, 2017).

Afzhal and Mazhar (2017) further discusses the importance of providing good environment, and infrastructure facilities, skilful and trained teachers etc. for ensuring quality education. The provision of all these facilities will give better learning outcomes and also helps in attaining the educational objectives of the country. The schools should be fully equipped for students so that they can have access to basic facilities such as safe and clean drinking water, proper functional toilets with handwash, good sanitary hygiene in order to help them remain healthy which in turn contribute in the learning process. The quality of the environment in which a student learns is positively related to the better educational outcomes. Government should take adequate measures where the schools are not following basic infrastructure facilities such as safe drinking water, proper hygiene, functional toilets, library and other required facilities. The budget on education should be regularly monitored and should be increased with proper allocation of funds by the government. Also, the progress should be monitored by the government in order to avoid any kind of corruption by administrative

authority of the respective school (Afzhal and Mazhar, 2017). In the same context, Nadar (2018) says that the reasons for failed government schools are non-availability and teacher's absenteeism, lack of activities by teachers, lack of proper counselling and guidance to students, lack of basic infrastructure facilities, increased participation of politicians and bureaucratic control. All these factors give rise to private schooling and therefore private schooling is desired by the people.

According to Ministry of Human Resource and Development (2016), around 19 percent of Indian children were privately educated in 2006, which got increased to 38% in 2014. The government should work on it seriously, so that schooling in government schools is not ignored (Nadar, 2018).

Delhi's Aam Aadmi Party (AAP) government, after coming to power in 2015, has introduced Delhi Education Model where in several interventions to improve the performance of Delhi government schools were launched. The interventions which are related to improve the learning outcomes of students are Chunauti program, Reading Campaign, Summer Camps and Mission Buniyad. To improve the student's mental well-being, interventions such as Happiness Curriculum, Entrepreneurship Mindset curriculum were launched by Delhi government as a step towards Delhi education Model. Spoken English classes were introduced to improve English-speaking skills of students. Interventions related to provide appropriate learning material, general counselling and stress management classes were also introduced. The interventions also aim to improve the quality of infrastructure provided in the Delhi government schools. The other interventions are related to Principals and teachers like mentor-teacher program, teacher development coordinator program to improve their teaching and pedagogic skills. (Directorate of Education, Govt of NCT of Delhi, "2015 AND BEYOND DELHI EDUCATION REVOLUTION"). All these interventions are discussed in greater detail in the next chapter.

According to Sisodia, M. (2019), *Shiksha- My Experiments as an education minister*, after the Aam Aadmi Party government came into power, in its very first budget and for the first time, education budget had been doubled and also one fourth of the annual budget was allocated to education. The focus was given on development in addition to basic education. In the last four years also, the education budget has continued to be allocated one-fourth of the budget. Because of the sizable budget, lack of funds in development of education was not a problem. Despite education being mentioned in the constitution as a fundamental right, it is

perceived to be something that should be availed in private schools, because of factors attributing to the condition of government schools, such as lack of proper funds and proper teacher training. So, according to AAP government, their first step towards reforming education sector is the allocation of sufficient funds and it's their responsibility of providing a good education on its own (Sisodia, M. (2019). *Shiksha- My Experiments as an education minister*).

According to Economic Survey of Delhi, 2020-21, it can be observed that Government of Delhi share of budget in the education sector is highest as compared to other states after 2016. In 2014-15, Assam was at the top in investing its share of budget in education. During 2019-20, Delhi was in the top state with ~23% of its budget allocated for the education sector followed by Assam (19.4%). Delhi's share in education budget is also high compared to the National Average (15.2%) in 2019-20. In 2013-14, share of education budget of Delhi was 18.1% which got increased to 23.1% in 2019-20, as seen from the following table 1.1 and figure 1.1.

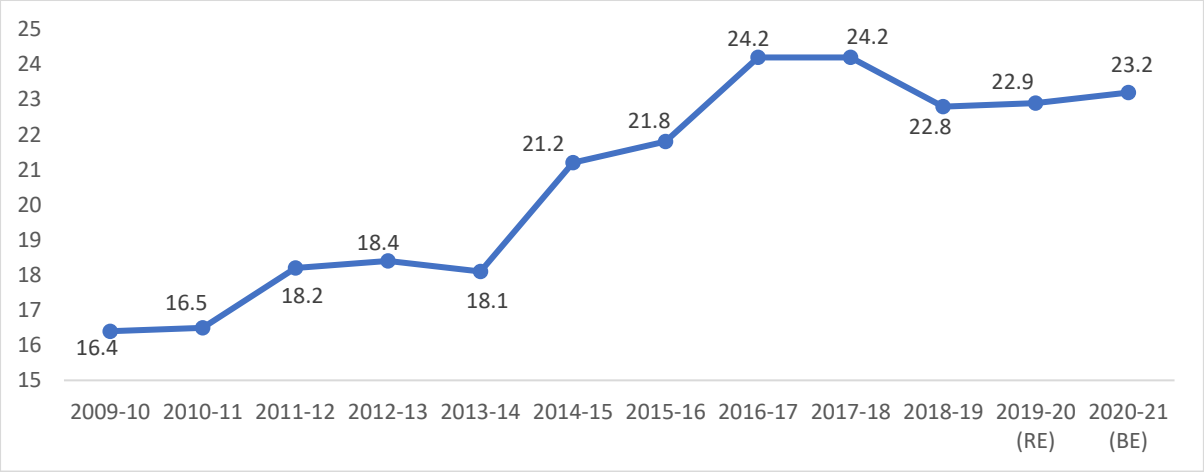
Table 1. 1: Share of education budget in aggregate expenditure for states of India (in percentage)

State/UT	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21 (RE)
Andhra Pradesh	10.0	12.5	13.0	12.9	13.7	12.6	14.6	12.6	13.6	11.9	15.3	13.1
Arunachal Pradesh	12.2	10.8	11.4	12.2	11.5	13.2	11.6	12.3	12.3	10.8	11.9	8.3
Assam	16.4	**22.0**	**20.3**	**20.6**	**22.6**	**24.7**	25.5	22.0	21.6	21.8	19.4	17.2
Bihar	18.1	16.3	17.0	20.9	18.7	17.5	17.1	16.0	18.2	18.2	18.4	17.1
Chhattisgarh	15.6	18.6	17.7	16.3	18.0	20.2	18.6	19.6	18.5	17.4	18.0	18.5
Goa	14.1	15.4	14.8	15.4	15.7	15.1	14.3	14.3	14.2	16.2	15.1	14.3
Gujarat	13.8	15.9	15.8	14.3	15.0	15.2	15.2	14.5	14.1	14.0	13.7	14.3
Haryana	16.3	17.3	16.0	15.4	15.4	16.9	12.3	13.7	13.4	13.2	13.5	13.2
Himachal Pradesh	16.3	17.9	17.8	17.3	17.8	17.7	16.3	15.2	17.6	16.5	16.2	16.4
Jharkhand	15.4	15.8	15.9	14.8	13.5	14.6	12.2	13.9	12.3	12.5	14.1	14.6
Karnataka	14.0	15.6	14.7	15.5	15.0	14.3	13.6	12.5	12.0	11.4	12.4	12.0
Kerala	16.8	17.0	17.7	17.2	17.2	16.4	16.0	16.2	16.3	15.1	15.2	12.0
Madhya Pradesh	13.0	14.2	12.4	13.2	15.4	14.8	14.3	14.0	14.4	14.9	15.8	15.9
Maharashtra	19.1	20.8	20.2	20.7	20.5	19.2	19.2	17.7	17.0	15.6	17.2	15.0
Manipur	11.9	10.7	10.6	11.7	12.8	14.0	12.5	12.2	12.3	12.4	12.7	11.5
Meghalaya	14.8	16.1	17.3	15.8	16.6	17.1	16.2	16.1	17.8	17.3	18.4	16.9
Mizoram	14.9	14.9	15.7	15.7	17.1	17.4	17.6	15.8	14.3	15.2	14.7	16.9
Nagaland	11.3	13.4	12.1	13.2	15.3	13.7	14.0	12.9	12.6	14.0	12.2	12.7
Odisha	18.2	18.3	16.4	15.5	15.0	15.5	14.6	14.0	14.9	14.9	14.4	13.7
Punjab	12.2	11.7	14.8	15.3	14.2	14.3	14.0	8.6	13.0	11.8	10.4	11.3
Rajasthan	19.0	19.1	17.8	16.1	16.3	16.7	12.5	15.2	15.1	17.3	16.2	16.9

Sikkim	12.4	17.3	14.0	15.0	15.6	15.8	17.6	17.1	15.6	15.3	18.7	16.6
Tamil Nadu	15.2	15.2	14.3	14.7	16.0	15.8	15.5	13.0	14.4	13.9	15.0	13.3
Telangana	NA	NA	NA	NA	NA	11.2	10.9	10.0	10.4	8.7	8.8	7.1
Tripura	16.2	17.2	17.0	15.9	16.4	15.5	15.5	15.8	18.5	17.7	17.4	14.4
Uttar Pradesh	13.8	16.1	17.1	17.3	16.0	15.0	15.5	16.7	14.8	12.4	14.6	12.8
Uttarakhand	22.6	23.5	22.1	20.7	20.3	19.0	17.6	18.4	18.1	18.3	19.4	18.0
West Bengal	17.7	19.7	19.1	18.1	17.2	17.2	15.2	15.1	13.9	14.6	15.8	17.0
Jammu and Kashmir	11.3	12.7	12.6	12.1	13.0	12.6	14.5	12.6	14.4	16.2	14.8	13.8
NCT Delhi	16.3	16.3	18.0	18.3	18.1	21.2	21.8	**24.2**	**24.2**	**22.8**	**23.1**	**20.5**
Puducherry	13.2	13.2	13.0	14.5	11.9	11.8	11.7	12.6	11.2	11.6	10.5	11.1
All States and UTs	15.3	16.6	16.3	16.4	16.5	16.0	15.3	14.7	15.0	14.4	15.2	14.3

Source: Reserve Bank of India and Economic Survey of Delhi, 2020-21

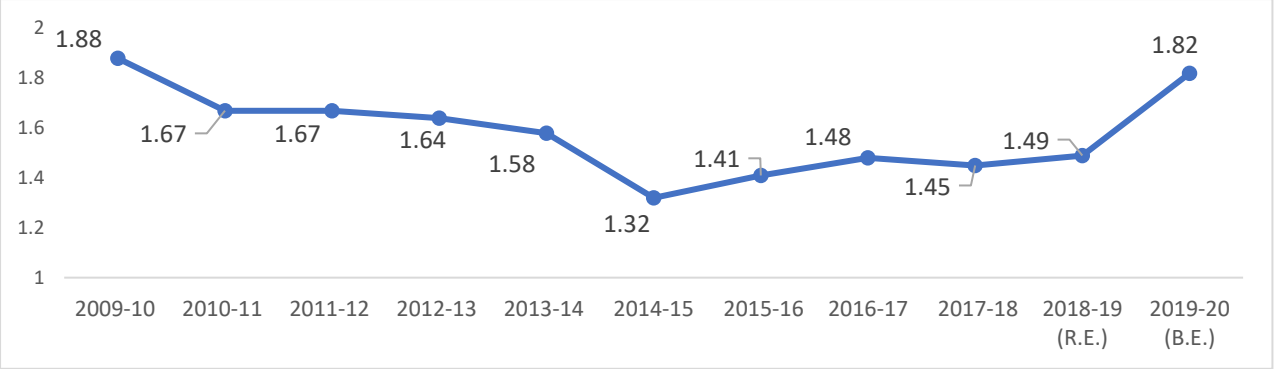
Figure 1. 1: Percentage share of Education Expenditure In total budget



Source: Economic survey of Delhi, 2019-2020

Also, the expenditure on education as a percentage to the Gross State Domestic Product of Delhi has increased to 1.82% in 2019-20 as compared to 1.32% in 2014-15, which can be seen from the Figure 1.2 (Economic Survey of Delhi, 2019-20).

Figure 1. 2: Percentage of Expenditure on education to GSDP of Delhi



Source: Economic survey of Delhi, 2019-2020

The below table 1.2 shows that percentage share of expenditure on school education carries more weightage (>90%) in expenditure on education as a whole and also percentage share of expenditure on school education in total budget has increased from 17.06 % in 2013-2014 to 23.41% in 2019-2020 (Economic Survey of Delhi, 2019-20).

Table 1. 2: Percentage share of Expenditure on school education in total budget for Delhi

Sl. No.	Years	Expenditure on School Education (in crores)	Expenditure on education as a whole (in crores)	Percentage	Delhi-Total Budget	percentage Share of expenditure on school education in total budget	GDP of Delhi (Current Prices)	percentage expenditure on education to GDP (Delhi)
1	2013-14	5810.29	6169.11	94.18%	34051.6	**17.06**	443960	1.3
2	2014-15	6145.03	6554.82	93.75%	30940.1	**19.86**	494803	1.24
3	2015-16	7178.57	7755.89	92.56%	35195.52	**20.4**	550804	1.3
4	2016-17	8561.85	9119.24	93.89%	37263.36	**22.98**	616085	1.39
5	2017-18	9208.77	9947.54	92.57%	40926.85	**22.5**	686824	1.34
6	2018-19 (R.E.)	10404.52	11558.79	90.01%	50200	**20.73**	774870	1.34
7	2019-20 (B.E.)	14047.15	15600.67	90.04%	60000	**23.41**	856112	1.64

Source: Economic survey of Delhi, 2019-2020

As per Economic Survey of Delhi, 2019-20, regarding basic facilities related to infrastructure in Delhi schools, the State Government has focused on improving cleanliness, security, Electricity, toilets and drinking facilities in Government schools. All schools are having drinking water facilities, toilets, boundary wall and electricity connection. The table given

below shows that there is a scope for improving in some facilities like playgrounds and computer facilities in the schools.

Table 1. 3: Status of basic facilities related to infrastructure in Delhi schools

% Of Schools having Access to	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Playgrounds	73.9	81.7	85.8	87.4	87.37	88.06	85.89	88.28
Boundary wall	97.8	98.7	99.4	99.5	99.90	99.88	100	100
Girls' Toilets	100	100	100	100	100	100	100	100
Boys' Toilets	100	100	100	100	100	100	100	100
Drinking Water Facility	100	100	100	100	100	100	100	100
Electricity connectivity	99.6	100	99.9	99.9	99.90	100	100	100
Facilities of computers	77.8	81.7	81	83.8	87.1	88.8	89.2	97.5

Source: Economic survey of Delhi, 2019-2020

National Achievement Survey (NAS) is conducted to assess the learning outcomes at different stages of school education accurately for improving the elementary school education system. As per the NAS Report 2017, the performance of students of Class-8, in Delhi, was below the national average in mathematics, science, social science as well as in language. Girls performed better than boys in language and social science in Delhi Government schools as shown in Table 1.4. The table also shows that students are performing better in language where Delhi's average is 55 and national average is 57, compared to other subjects. The lowest average is for subject Mathematics i.e., 32 for Delhi and 42 for national average, as shown in Table 1.4.

Table 1. 4: Subject wise percentage of correct responses of students in government and government aided schools in Delhi for class VIII

Subjects	Delhi			National Average		
	Boys'	Girls'	Total	Boys'	Girls'	Total
Language	53	56	55	56	57	57
Maths	32	32	32	42	42	42
Science	34	34	34	44	44	44
Social Science	34	36	36	44	44	44

Source: Economic Survey of Delhi, 2020-21(National Achievement Survey, 2017)

In the context of above-mentioned statistics based on the reports by Economic Survey of Delhi, Directorate of Education, Govt of NCT of Delhi, the study attempts to analyse the infrastructure facilities of two government schools of Delhi as Delhi's share of budget in school education have been seen increasing after the year 2013-14 and contributing more than 20% of share in total budget (Table 1.2). The study also tries to assess the learning outcomes of students in five subjects (English, Hindi, Maths, Science and Social Science) based on students marks over five years from 2015-16 (class VI) to 2019-20 (class X), to check the effectiveness of the program- Chunauti, by Delhi government, which aimed to increase the learning outcomes of the students as proposed in Delhi Education Model. The study can be used to compare the learning outcomes of students in the two government schools with the national average based on National Achievement Survey statistics, 2017 (Table 1.4).

1.1 The objectives of the study

- To study the status of infrastructure facilities in Delhi government schools as proposed by Delhi government in Delhi education model.
- To analyse the trend of average score of class for same batch of students from 2015-16 (class VI) to 2019-20 (class X).
- To study the effectiveness of Chunauti program by Delhi Government which aimed at improving learning outcomes of the students.
- To find out the differences in average scores-
  - *to study the difference in average scores in different subjects in the same school*
  - *to study the difference in average scores in different classes of the same school*
  - *to study the difference in average scores between two different Government schools*
- To study the difference in average scores between Delhi Government schools alongside infrastructure facilities of the same schools.

1.2 The hypothesis of the study

Null Hypothesis (H_0): There is no significant difference in the average marks of the class in different years.

Alternate Hypothesis (H_1): There exists significant differences in the average marks of the class between different years and marks in one class is comparatively higher/lower than marks in another class.

1.3 The Methodology of the study

The study uses primary and secondary sources of data. A field survey was conducted in Feb-March 2021 in two government schools of Delhi- *Govt. Girls Sr Secondary School No.1, Shakti Nagar;* and *Govt. Sarvodaya Boys Secondary School No.3, Shakti Nagar* which are near one of the biggest slums (Kabir Basti) in district North Delhi, to collect the primary data. Before conducting the final survey, pilot survey was conducted to frame the questionnaire. From these two schools, 80 students were surveyed and interviewed from secondary and senior secondary classes. The information was collected using the prepared structured questionnaire from the students. The students were asked to give their ratings based on their experiences of infrastructure in their school.

The information was analyzed through Excel and SPSS software. Likert scale analysis is done to analyze the students rating of infrastructure and UDISE (Unified District Information System for Education)[2] report cards are used as secondary data to look into the infrastructure facilities of those two schools. The Likert scale is a 5- or 7-point scale which allows the individual to show their agreement to a particular statement. Each of the 5 (or 7) responses would have a numerical value which can be used to measure the attitude under investigation (McLeod, S.A., 2019).

For the analysis of students' scores over the years, data on marks was collected from the Controller of Examination (CoE) of the school for five years. The data was in the raw format given by the CoE, which was further processed and entered into excel manually. A random sample of 40 students from each school were taken who have continued their education and then longitudinal analysis was done to analyze the learning outcomes in the schools. Longitudinal data analysis in education is the study of student growth over time in which repeated observations of the same variable(s) are recorded for the same individuals over a period of time Further, paired t-test and non-parametric Mann-Whitney U test was used in SPSS to check the significant differences in average scores. A Paired t-test (also called a correlated pairs t-test or dependent sample t-test) is used to compare means from the same group at different times. The Mann-Whitney U test is basically used for comparison to check the difference between two independent groups, where the variable is either ordinal or continuous, and not normally distributed.

[2] UDISE implemented in 2012-13 is a Management Information system on School education, which covers information on schools, teachers and children. UDISE+ is an improved version of UDISE.

1.4 The Relevance of the study

Delhi Education model which came in 2015 after AAP government came into power has proposed several interventions to improve the status of school infrastructure and learning outcomes in Delhi Government schools. Delhi model of education has drawn the attention of people in Delhi and beyond in the last five years. The AAP government of Delhi want to bridge the gap between education for the classes and education for the masses. They believe in the approach that quality education is a necessity and not a luxury. Therefore, they bought in Delhi education model with reforms in school infrastructure facilities, improving learning outcomes of students, training of teachers and principals and improving mental well-being of students, all of these which are supported by 25 per cent of the state budget. Other states like Maharashtra said they would also adopt the Delhi Education Model to improve their government schools, which makes it important to analyse the interventions of Delhi education model. There is no significant work conducted regarding this, which make this study relevant. Also, the thesis deals with micro level study i.e., primary data analysis of infrastructure facilities, alongside learning outcomes of students of two Delhi government schools, which makes the study more important and relevant while looking at the situation of specific Delhi government school.

1.5 Chapter Scheme

The first chapter deals with the introduction, secondary data from Economic Survey of Delhi, the objectives, the hypothesis, the methodology and the relevance of the study. The second chapter includes the literature review while the third chapter deals with data analysis and findings plus the discussion on the findings. The fourth chapter contains the summary of findings and concludes the study with final remarks.

Chapter-2: Literature Review

This particular chapter focuses on the review of literature on *(i)* importance of school infrastructure in education, *(ii)* factors affecting learning outcomes of students and *(iii)* Delhi education model in a broader detail, as the thesis focuses on analysing infrastructure facilities of government school after AAP party came into power in 2015 and assessing learning outcomes of students after 2015 to see the effectiveness of Chunauti program by Delhi government.

2.1 Importance of school infrastructure in education

This theme of literature discusses the importance of school infrastructure in the education system. Engels et al. (2004) talk about well-being of students as a prime factor in determining quality of education. The instrument used to determine students' well-being was developed in the study and interviews were conducted, which were used to construct Likert type questions for a questionnaire. Questions were related to their feelings, their satisfaction levels and their behaviour like sticking to school regulations or not. There was significant difference found between the schools. In line with this literature, Cuyvers et al (2011) further analyses the empirical evidence to show the significance of school infrastructure on the well-being of students. This research was done among Flemish students in secondary schools by a Flemish agency in secondary schools. The quality indicators such as clear spatial structure, open classrooms, well- integrated ICT, ventilation, lighting and condition of school buildings were taken into account. The scales varying from "very bad" to "very good" are used in the study. The descriptive statistics exhibit higher mean scores for students experiencing good quality school infrastructure compared with students having poor quality infrastructure.

The study reveals that there exists a deep contrast in the levels of satisfaction among students going to schools with good quality infrastructure as compared with the students going to schools with poor infrastructure. Also, greater levels of well-being were seen among students who attend schools, where classrooms are open to a (green) outside area and where school provides well-integrated ICT and different sources of research. On the other hand, the students attributed low scores to schools which signified badly on the above-mentioned aspects (Cuyvers et al, 2011).

The study concluded that school infrastructure is extremely important and contributes to the well-being of students. The low scores on well- being were attributed to those students who attend schools with poor quality infrastructure and schools where the score is low on the above-mentioned quality indicators. The study also shows that whether the school is urban, or rural, well -being is affected in the same way in the school with poor quality infrastructure. Another finding shows that female students are more inclined towards school infrastructure compared to male students (Cuyvers et al, 2011). Physical infrastructure is very important to improve well- being and average scores of the student.

Gouda et al, (2013), on the same lines analyzed the role of physical infrastructure and also the schooling costs as a factor impacting the performance of students, both in private and public schools. (Meyer, et al.,1977) says development of egalitarian society is majorly because of greatly expanding education sector mostly provided by the government. (Tilak, 2004) says India's GDP contribution of education has increased from 0.67 % in 1951 to 3.54 % in 2004. Also, according to the Office of the Registrar General of India, 2011, the country has seen a tremendous increase in the literacy rate from mere 18.33 % in 1951 to 74.04 % in 2011.

Gouda et al. (2013), in addition to previous literature says there is a huge variation in the quality of education which is given to the citizens in India. The roots of many such problems lie in primary education and more specifically in the government education system. According to Narayan and Mooji (2010), poor infrastructure like lack of Information and Communication Technology and teacher learning material, overcrowded classrooms, unfilled vacancies, pressure of non-academic tasks degrade the quality of education in government primary schools. (Singh, 1999; Muralidharan, 2006) says the country is experiencing a transitional phase where private schools are taking interest in delivering education at various levels and a popular trend is on the rise of growing discontent over the government funded

education. Biggest reason for rapid increase in private schooling is poor quality of education in government schools.

The study has taken India Human Development Survey (IHDS[3], 2005) data for the analyzing physical infrastructure, schooling costs and performance of students in government and private schools in India. Principal Component Analysis (PCA) was used to construct "Infrastructure index", where two divisions namely "below standards" and "fulfills the standards" were made in defining the index. The study found that there was remarkable difference in performance of students in terms of schooling cost and infrastructure facilities. The students who are enrolled in schools which fulfils infrastructure facilities shows better performance compared to the students who are enrolled in the schools which are not having proper infrastructure facilities. The results of the study show the importance and responsibility of government in giving education to Indian children. The infrastructure facilities differ significantly in different type of schools. Also, private schools have better infrastructure compared to government schools. This study corresponds to the findings of many other studies. According to Duran-Narucki (2008), the school attendance plus the test scores were found to be higher for schools with adequate infrastructure facilities. Additionally, studies show the impact of school infrastructure on the attitude of teachers and their enthusiasm to teach in the classrooms (Gouda et al, 2013). The results of the study show a positive correlation between school infrastructure, schooling costs and students' performance. The overall study concludes that the students who study in schools which fulfill the infrastructure standards are having better performance compared to the students from schools which do not have the standard infrastructure (Gouda et al, 2013).

Similarly, Sinha and Mukherjee (2020) say the learning environment of students depends on proper infrastructure, and in addition focuses government spending and social infrastructure as an important factor in education. Government investment is very necessary for learning as well as making human capital. For this purpose, a good amount of government spending is needed to boost up the infrastructure of schools and in turn the human capital formation. School infrastructure, like the buildings, furniture, equipment and the site contribute to a learning environment. In most of the schools, classrooms have problems related to proper ventilation, space, and insulation from heat. Inadequacy of benches, blackboards, lights, fans etc. are other problems related to physical infrastructure. And these

[3] The IHDS is a project of researchers from the University of Maryland and National Council of Applied Economic Research (NCAER), New Delhi

types of problems contribute to a physical infrastructural problem. Schools are another home to a child, and there exists social relationships between students and teachers within schools which are social institutions. Sense of teamwork and socialization among students are built in the schools. Children spend their maximum time in schools, away from home (Sinha and Mukherjee, 2020).

Sarva Shiksha Abhiyan (SSA) in 2001-02, was launched by the Government of India in 2001-02, which meant for promoting an increase in the infrastructural facilities up to the level of elementary education for development and for causing an increase in the literacy rate. The determinant of literacy rate is infrastructure facilities. According to Kapoor. R, (2019) good infrastructure is regarded as the base for good- quality education and also to improve the overall learning environment. Also, the problem of dropout rates, low enrolment rates, low attendance in class, and low quality of education can be solved by good quality infrastructure. The schools should have proper benches, blackboards, lights, fans, inside the classroom, lots of open spaces, plants, flowers, toys, playgrounds. The present condition of primary education in India is not up to the mark. Only 66 percent of the Indian people are literate, in which 76 percent are men and 54 percent are women. Many schools are pedagogically weak and unattractive, which is the reason for poor performance of basic schooling. In most of the schools in India, especially which are located in rural areas, the toilet facility is very poor. The drinking water facilities and electricity facilities are not at the desired level and close to 90% have functioning toilets (Ramachandran, Mehrotra and Jandhyalay, 2007). There is a lack of a playground for the students. Computer education is considered to be a very important part of learning but there are some schools which have no computers or some schools that have very few computers. The students are facing some problems due to insufficient computers. Every school should provide a well-organized lab, good electricity facility, adequate water supply, hygienic toilet facilities for both girls' and boy's students, and a sanitized school building (Varshney, G., 2017, and Teixeira, J., Amoroso, J., Gresham. J, 2017). Education is considered as the tool for human capital formation. Proper investment in primary education will help us to make human capital as primary education is the first stage of education. Therefore, investment in school infrastructure is very important for learning as well as making human capital also. The infrastructure is a broad term and there are many aspects that are included in it, which includes playground, library facility, drinking water facility, electricity facility, toilet facility, school building, classrooms, laboratories, computer centers etc. The study tries to judge the performance of Indian states as a provider

of primary school infrastructure based on the TOPSIS[4] method which states that state performance function can be written as the function of below mentioned indicators. The study collected the data from District Information system for Education (DISE 2016). The indicators such as drinking water facility, girl's toilet, playground facility, electricity facility, computer facility and boy's toilet are considered to get the states' performance on primary school infrastructure. The method of TOPSIS is that, for each criterion, it calculates the distance from the positive ideal solution (PIS) and from the negative ideal solution (NIS), and then the most favourable solution is determined by the relative closeness to the PIS. The most favourable solution is the nearest to the PIS and farthest from NIS. The results of the study shows that every state is lacking in providing the full-fledged infrastructural facilities for all the primary schools. The state of Punjab has the maximum number of schools with playground facilities and Jammu & Kashmir has the minimum. Odisha, Jammu & Kashmir, Bihar, Arunachal Pradesh, Meghalaya, Nagaland and West Bengal have 40% and fewer schools without a playground. Delhi has maximum primary schools with electricity facilities preceded by Punjab, Goa, Gujarat etc. TOPSIS score shows that maximum states are far away from the positive ideal solution and the North Eastern states are performing poorly. There should be separate policies for the development of primary school infrastructure for the North Eastern states. The study concludes that all the Indian states are not doing well as providers of primary school infrastructure, and only Delhi and Kerala have scored near to a positive ideal solution according to the TOPSIS method. All other states are far away from the positive ideal solution. For the appropriate build-up of human capital for the future, Indian states should initiate right and proper policy to develop the infrastructure of the schools (Sinha and Mukherjee, 2020).

2.2 Factors affecting Learning outcomes of students

The literature in the previous theme does not talk about other factors which affect the learning outcomes of the students and ways to improve the learning outcomes of students. Taking other factors into consideration in addition to infrastructure, is important to improve the learning outcomes of students. Tella (2007), in this context studied the effect of motivation on students' learning outcomes in the subject Maths in the schools. The study uses motivation variable as an instrument for measurement and achievement test in the subject Maths. The study also uses t-test and analysis of variance approach to test the hypothesis and

[4] TOPSIS is Technique for order of Preference by similarity to ideal situation, which is a method of compensatory aggregation that compares a set of alternatives by identifying weights for each criterion.

the results revealed that there is significant difference in impact of motivation on academic learning outcomes between male and female students. On the same lines, Gesinde (2000) is of the opinion that the achievement motivation should be learnt during the student's time of socializing and learning experiences, as the urge to do well and achieve something is high for some students and for some students, it can be low. Bank and Finlapson (1980) showed that the students who gained success were having significantly more motivation for learning than the unsuccessful students. Student's interest in the subject, positive attitude and quality delivery of the subject (Maths) knowledge by the teacher are important motivation factors. The factors when clubbed together assumed to result in better learning outcomes in Mathematics learning. It was suggested to make Maths teaching enthusiastic and interesting. Also, student's capability and ability, their background and perceptions should be considered, and student's feeling of esteem should be enhanced by including varieties of learning experiences (Biehler and Snowman, 1986).

Other study by N. Marks (2015) examines school sector differences in student performance in numeracy, reading, writing, grammar and spelling using Longitudinal Data Study of Australian Children. The results showed that there are significant school sector differences where the students are from independent schools and signifying higher average scores than Catholic and government school students, and these differences increase over the school career and are maximum when the student is in the final years of schooling. Similarly, Miller and Voon (2012) also found that school sector differences are higher in secondary schools as compared primary schools. The study suggested further research to be conducted to ensure that school sector differences in students' performance is increased over the school career. Therefore, the literature shows studying in a particular school also affects student performance. The study by Alakhtani and Sbeil (2018) tries to find out the reasons of low success rate of students and their study showed the longitudinal performance analysis of the subject Maths of government and private schools for secondary classes and also for the bachelor degree students. The study uses longitudinal, correlative research methods and independent sample t-test which showed that there is a significant positive and weak relationship between high school grades averages and university grades. The students who scored well in school are the ones who scored well in university too. The students from government schools performed better in mathematics, than students of private schools. The study suggested there is a need to revise the study plans and practical skills of students should be taken into consideration. The aptitude test should be the basis of selection of students in

universities to have the uniform enrolment of students. Development strategies should be ensured to prepare students for further examinations.

Another study by Dev (2016) analyzed other important factors which determine student's academic achievement such as intelligence, student's interest in studies, gender and home environment. This study is an improvement to the previous literature as home environment and parent's contribution is an important factor determining student's academic achievement. Liaw and Brooks-Gunn (1994) and Smith, Brooks-Gunn, and Klebanov (1997) focuses on student's mental ability i.e., IQ as positively associated with student's academic achievement, and Brooks-Gunn, Guo, and Furstenberg (1993) says achievement test scores as strongly associated with student's learning outcomes. The study emphasizes on the need for improving parenting skills and their contribution towards their child's academics. The study was conducted on 110 randomly selected students of Kendrya Vidayalas of Delhi, and correlation coefficient and t-test were used to analyze the data. The study found that General Mental Ability, home environment, interest and academic achievement are significantly and positively correlated. And, also girls score higher as compared to boys.

With reference to methodology, F. T. Nese et al. (2013) aimed to provide an overview and relevance of longitudinal data analysis in education for administrators, practitioners and other stakeholders of educational research. The study explained that longitudinal analysis in education is basically the study of student growth over time. The longitudinal analysis helps to obtain the correct functional form of growth. It also addresses the relation between trajectory and independent variables of interest for example, instructional program, private verses public schooling. Kaushik and Mathur (2014) uses the descriptive statistics and showed the analyses of 100 students scores through different measures of central tendency, variance and dispersion. The measures of central tendency include the mean, median and mode, and the measures of variability include the standard deviation/variance, the minimum and maximum values of the variables, kurtosis and skewness. The study explains the advantages of using descriptive statistics. It summarizes large amount of data in an organized manner, easily translate the data in frequency, percentages and overall averages. It is a good guide to explore and learn about statistical procedures and also presents further ideas of research in the domain.

2.3 Delhi Education Model

Manish Sisodia, 2019, through his book Shiksha recounts his experiences and experiments as Delhi's deputy chief minister and education minister.

The author in this book discusses on reforming the education system and how their government in the last five years after coming to power, planned to achieve a better education system. He discusses Delhi education model- what it wants to achieve and how it wants to achieve by mentioning the improvement in infrastructure, training principals and teachers, involving parents, introducing mentor teacher programs. Other programs like Chunauti which help students to read their own textbook properly and solve basic Maths are also proven helpful. The author also mentions about the Education Model of Coexistence in detail and discusses the Happiness class and Entrepreneurship Mindset Curriculum which were introduced for students to make them more self- confident, focused and a better person. He says that our understanding of education is limited to ending poverty or providing employment but education is capable of doing much more and good education is just not about getting good results and building great structures, rather it is about making students more confident, honest and better people over time.

2.3.1 Education budget in Delhi during Aam Aadmi Party government

Sisodia (2019), first mentioned about the education budget. According to the author, after the Aam Aadmi Party government came into power, in its very first budget and for the first time, the education budget had been doubled and also one fourth of the annual budget was allocated to education. The focus was on development also and not only on education. In the last four years also, the education budget has continued to be allocated one-fourth of the budget. Because of the sizable budget, there was no need to stop any project citing lack of funds. Despite education being mentioned in the constitution as a fundamental right, it is perceived to be something that should be available in private schools, because of factors attributing to the condition of government schools, such as lack of proper funds and proper teacher training. So, according to the AAP government, their first step towards reforming the education sector is the allocation of sufficient funds. As seen in the previous chapter, in table 1.1, Delhi was in the top state with ~23% of its budget allocated for the education sector followed by Assam (18.1%) in 2019-20 as per Economic Survey 2020-21. Also, percentage share of expenditure on school education in total budget has increased from 17.06 % in 2013-2014 to 23.41% in 2019-2020 (Economic Survey of Delhi, 2019-20).

2.3.2 Infrastructure- Delhi Government Schools

Moving on to infrastructure, Sisodia (2019) says, the education budget getting increased will not suffice, so they should have and had a clearly drawn-out map for the optimum utilization of budget. In 2015, when the education minister visited schools, he noticed classrooms were in a very bad shape in terms of infrastructure. Teaching in such conditions was impossible (ceilings crashing, blackboards broken, labs and libraries looked like storerooms, dust everywhere, no proper classrooms etc.) Then he got the information collated on classrooms, playgrounds, labs and libraries, administrative work of schools and headcount of students in each section in a school. The information was not in a proper place. After discussing the information with the analysts, the number of students in each class was matched with the infrastructure available and some surprising facts were seen - many schools were away from villages and in many schools, there were more students than required in a class. According to the analysis, 30,000 additional rooms were needed to accommodate the then present number of students. Both approaches of building new schools and adding new rooms to the existing ones were adopted. Washrooms mended and green boards were put into place. Rooms, labs, libraries, lighting, ceilings, tiling were also considered. Orders were given to the directorate to get all the classrooms whitewashed every year during the summer vacations. According to the author, there isn't a single classroom in Delhi that doesn't have a proper board, or where fans are broken, or where the washrooms are damaged. They wanted to provide the best possible education and not let it dip beyond a certain point i.e., they talked about at least basic infrastructure should be there. They also managed to replace low quality desks with high quality desks. Modern look of classrooms was given importance as they are linked to the self-respect of students and also to root out the inferiority complex from the children of government schools and parents. As per Economic Survey of Delhi, 2019-20, regarding basic facilities related to infrastructure in Delhi schools, the State Government has focused on improving cleanliness, security, Electricity, toilets and drinking facilities in Government schools. All schools are having drinking water facilities, toilets, boundary wall and electricity connection. Also, there is a scope for improvement in some facilities like playgrounds and computer facilities in the schools.

2.3.3 Improving learning outcomes in Delhi Government schools

After infrastructure, Sisodia (2019) talked about the Chunauti program, which helps students read their own textbooks properly and solve basic Maths. Here the focus was on making

children read their own textbooks and solve basic Maths. According to ASER (Annual Status of Education report), nearly 50 percent of the children in class 5 in our country cannot read textbooks of class 2 properly. The situation was discussed with principals, teachers and officials and they said only 15-20 per cent children in their school struggle to read and write, as they are usually absent from their classes, and they can't do anything because of no detention policy under RTE. To analyze the condition, baseline assessment of all children in class 6 of govt schools in Delhi was conducted at the beginning of academic year 2016-17. This was done to understand the issue empirically in three domains- reading in first language (Hindi or Urdu), reading in English and basic Maths. It was an eye-opener for them. Many could not read and solve. It was felt that building the foundation of learning is essential in addition to building classrooms and schools. Chunauti 2018 was planned and launched and they ensured that by 2018, all children should be able to read their textbook and solve basic Maths problems. Process and content were planned during the summer camp of 2016. Nearly 45,000 children attended the camp regularly, SMS were sent to parents and were appealed to send their children to the camp. Children of class 6,7 and 8 were grouped in 3 of the groups- Pratibha, Nishtha and Neo Nishtha- on the basics of reading and basic Maths levels, according to which special focus could be given on learning needs of the children. Ground reality was that except for a few children in the front row, nearly two-third of the class didn't know what was being taught. To help children to be successful in reading their own textbooks, regular workshops were conducted, creative material was provided to teachers, parents were involved and reading Melas were organized. After National assessment results declared by NCERT, it was decided that mission Buniyad would be launched in schools run by the local bodies, covering students of class 3 to 8 to help them learn how to read, write and do basic Maths, as 40-50 percent of children were well behind their grade level. As a result of both the missions, by the end of 2018-19, 20 percent more children could now read a paragraph from their own textbook or do basic Maths problems. It was felt to improve the quality of textbooks also, by keeping the learning level and needs of children in mind.

As per the National Achievement Survey (NAS) Report 2017, the learning outcomes of students of Class VIII in Delhi, was below the national average in mathematics, science, social science as well as in language. Girls performed better than boys in language and social science in Delhi Government schools as shown in Table 1.4 in the previous chapter. Students perform better in language as compared to other subjects, where Delhi's average is 55 and

national average is 57. The lowest average is for subject Mathematics i.e., 32 for Delhi and 42 for national average.

2.3.4 Reforms in teaching in Delhi Government Schools

Covering the reading and solving needs of children, Sisodia (2019) in his book talked about Principals. Crucial steps were taken to strengthen the position of principals and to make them responsible leaders. They were given rights and ample resources to prepare a vision for future students. Principals were given freedom and did not need to seek permission from the government to take care of the basic infrastructure of the school like desks, blackboards, toilets, fans and windows etc. Now, every school building has an annual budget of Rs 5 lakh to Rs 14 lakh, which can be used without any official intervention and the decision can be taken by the School management committee. Principals were given freedom to hire guest teachers and call specialists and experts to train students in different fields. Principals were asked to make the detailed vision plan so strong so that the parents would choose government schools over private schools. But only 200 out of 1000 principals submitted. In which 150 demanded minor repair works and 50 prepared detailed documents about their vision and demands from the government to improve the education system. It was decided that the financial power of the principals would be increased from Rs 5000 to Rs 50000, to get anything done in the school. Estate managers were allowed to be hired by principals who can look after the infrastructure and cleanliness so that the principals can better focus on the educational needs of children. At present, every school in Delhi has an estate manager. Special authority was given to principals to transfer two teachers annually whom they thought were disturbing the academic environment of the school. To make the principals understand the importance of leadership, they were familiarized with international education systems. IIM Ahmedabad and IIM Lucknow were asked to organize school leadership workshops and special programmes. Special programme was organized in the University of Cambridge and in a few other universities in US and Finland to develop a professional approach and understand international education systems which helped principals to build leadership qualities. Jeevan Vidya Shivir played the most important role in understanding education which was based on the philosophy of peaceful coexistence. After attending the workshop, principals felt that education played a bigger role than just eradicating poverty or providing jobs and that their work as principals was more than giving children an education and helping them clear exams. It built self confidence in principals and their role as leaders in society and country was understood.

According to Sisodia (2019) it was noticed that teachers are not free to teach and just have become clerks in government service. They don't have the freedom to select the syllabus or choose the activities they wish the children to engage in. Issues such as the problem faced by teachers in teaching their subjects, topics they struggled with, were never discussed. It was decided to make the idea of capable and enthusiastic teachers an integral part of their vision for the education system. Teachers were freed from the responsibility of filling family registers or conducting surveys. Only on election duty, they were supposed to go. Teachers were freed from the stifling schedule made by the education department in which they made the weekly schedule for teachers detailing which chapters from NCERT had to be taught within what kind of stipulated time. Teachers were directed to draw up their own monthly schedule. Teachers were allowed to create their own guidebook and support material to teach students and not only stick to NCERTs. The support materials, titled Pragati, were published by the Directorate Of Education and made available to students, which was highly successful as it was prepared by teachers based on students' needs and the content was based on NCERT textbooks. Currently, hiring guest teachers is given more importance than hiring teachers on a permanent basis as a permanent teacher's salary is more. Sisodia (2019) says, this could be the reason for the increasing number of private schools and decreasing number of govt schools. There have been a limited number of appointments of teachers in Delhi since 2007. Of the 50,000 teachers, almost 18,000 were on a guest or contract basis. Their salaries were between Rs 10,000 and Rs 18,000. No guest teacher could focus entirely on teaching because all guest teachers were removed from their position every year and hired again. Uncertainty and financial instability of these teachers were put to an end. Delhi is now the only state in India where guest teachers are treated much the same way as permanent teachers. Tablets were given both to permanent and guest teachers to avoid unnecessary paperwork. Staff Rooms were renovated with coffee machines and fridges being installed. They stressed on the fact that the education department should start giving respect to teachers. These all were baby steps in improving the state of education in Delhi. Two biggest steps to empower teachers were- Mentor - teacher program in which mentors were selected from among the teachers of govt schools and given the responsibilities of five schools each. Another big step was to reduce the curriculum. It was decided to cut the syllabus by 25% till class 8, which was decided by teachers as no one could be better experts than them. It was felt important to make teachers financially and mentally free, so they can teach freely.

Sisodia (2019) focused on the mentor teacher program as the important step in reforming the education system. Author realized that the government school teachers didn't have anyone like experienced persons to guide them, to enhance their domain knowledge and hone their skills. In the education model of different countries, a lot of emphasis is placed on mentoring and training teachers and encouraging them to adopt new ways of teaching. While studying education models in other countries, it was found that other than subject teachers, mentor-teachers played a big role in developing an academic environment in the school. It was decided to have one mentor for every school. Around 12000 teachers from different schools expressed their interest to become mentor teachers. Amazing batch of 200 mentor teachers for 1000 schools were found in the very first year. It was decided to retain 100 mentor teachers from the previous year and take new 100 every year. Excerpts from feedback received from principals and few mentor teachers are included in this book. From those feedbacks, it can be inferred that, new methodologies, new innovative ways of teaching were explored in addition to improving the skills of teachers, absenteeism and irregularity of students was decreasing, students were observed closely and psychologically, gaps between teaching and learning were reduced. Challenges like lack of self-confidence, lack of family support, irregular school attendance, parents not attending PTMS, overcrowded classrooms, lack of communication skills and lack of time management in teachers were seen, but students who were earlier disinterested started taking interest in studies, it has given students and teachers in government schools self- confidence and pride. Some teachers faced technical glitches. Announcements were made in mornings and evenings for children to attend school, as a result of which attendance increased. Discussion happened on ways of assessing practical knowledge rather than theoretical knowledge. Improving the learning levels of students was the common topic of discussion. This programme helped in bridging the gap in the number of teachers. Sharing classroom practices provided important insights into classroom pedagogy. Confidence has been instilled into those students who never ask questions earlier. Not just the academic results have been improved, but also the atmosphere of healthy discussions was created around students' behaviour. It was recommended to increase the frequency of mentor teacher's visits to be increased. But according to the author, it was becoming difficult for every mentor teacher to visit five or six schools every day as they had to attend many other meetings and conferences to understand the government's schemes and expectations. In order to take this programme forward, aTeacher Development Coordinator (TDC) programme was started by the government in every school wherein one teacher has been identified in every school and given the same work as that of mentor teacher.

2.3.5 Reforms in Parent's involvement in Delhi Government Schools

Moving ahead, Sisodia (2019) talked about parents who also play a primary role in the education of a student. Author says, earlier it was never thought or felt of building a bridge between schools and parents, no policies or plans were there to include parents actively in the education of their children. There was limited social interaction between the teachers and the parents of the students after school which could be the reason for lack of communication between them. The reason for this can be because of the teachers being appointed to schools 5-20 km away from where they live but the population from which the students come usually lives at a distance of 3-4km from the schools. It was felt important to break this wall by entrusting the school management committee (SMC) with this responsibility. These committees were formed under Right to Education Act, 2009 but till then, they had existed only on paper. So, it was decided to hold the elections democratically for SMC by involving parents and guardians in addition to principals and teachers. There are 16 members in SMC of whom 12 are guardians of students from that school. The other members are principal, teacher, an MLA representative and a social worker. Since 2015, these committees have been formed twice (in 2015 and 2017). In 2015, 100-200 parents per school cast their vote and in 2017, these voters increased. It was believed that SMC will prove to be an important milestone in the Delhi education model. While principals and teachers created a scholastic environment in schools, SMC members contributed towards improving this environment as they tried to rectify if there had been any negligence on the part of the education Directorate or school. SMC has acted like a bridge between Delhi govt's vision and the situation in schools. Earlier SMC was not allowed to hire teachers on a temporary basis and had to wait to get things done by the directorate, but they came forward with a solution. Good sounding infrastructure for schools was also the demand of members of SMC. District coordinator was appointed for smooth coordination between SMCs. Work for SMCs was shared in WhatsApp groups. In 2018, the education department ordered the historic order to allocate funding to the SMCs for hiring teachers in their schools, and maintaining buildings for education related experiments or activities. According to author, this was the biggest experiment till date in decentralizing govt school administration and management not just in Delhi, but for government school authorities all over the country. It was an important step towards making principals stronger as their decision-making abilities included everything required to run a school barring a few things like paying salaries and getting new school buildings constructed. Now with SMCs, temporary appointments can be made with the allocated funds. Under the

rule, SMC was given the authority to hire someone for 200 hours for a year if there was no permanent teacher. And it was believed that it was the first time in history that all the schools have had as many teachers as they needed. SMC also played important role in providing infrastructure like trolley for mid-day meals, garbage carts, windows, and through corporate social responsibility initiatives of company they managed to get water coolers, fans, computers, sports equipment etc. Talking about Mega PTM, the author says that it was decided that at an interval of three months, one day would be fixed for guardians to meet the teachers. Other than this, schools could fix a date to meet parents on the last few days of every month but the date of mega PTM would be the same in all govt schools of Delhi. The aim of mega PTM was not just to discuss report cards of students but to make parents familiarize with other aspects of child's personality as well- his/her interest other than studies, their health challenges, and what was the environment like at home etc. Plans were made to call the guardians as they might not turn up like announcements were made, advertisements done, text messages were sent, appeals on FM radio were made. Well off people also convinced their staff members to take their children to Mega PTMs. It was a successful experiment as many guardians turned up and active participation of principals and teachers were seen. Mega PTM broke the wall separating parents and teachers. There has been an increase in the trust between schools and parents. Students also admitted that there has been a change in their parents since the mega PTM started. Author says, this is a big change in building cooperation between parents and govt schools to help improve the future of the child.

Sisodia (2019), talked about Education as a foundation by discussing the 'Education Model of Coexistence': Jeevan Vidya Shivir. Mission of the AAP govt was to make all officers concerned with the education department understand the importance of all the structures and systems around education, to explain to them what was lacking in the education offered, and how to progress and proceed further in the next 5 years. It was felt that getting the doors and windows fixed was one task, but reorienting the approach of education was more important. The solution for this was 'Jeevan Vidya Shivir' (Life Education Workshop), which is based on the 'Madhyastha Darshan' (Coexistence) model inspired by education philosopher, A. Nagraj, on which work is going on in Chhattisgarh and many other States. This long day workshop was to present the aspirations in a meaningful way and examine the shortcomings of the current system. It was realized that all the attendees had noticed the shortcomings in the traditional way of imparting education. After that, another 8- day residential workshop

outside Delhi was conducted, in which the discussion was on the model of education that would inculcate the concept of coexistence among students. Current education system of Human Resource Development is more about rat race and making students competitive so that they can be a resource- a tool which can be of use to someone. They don't have an understanding of good or bad. Author says "Being a tool or being skilled is just a part of their personality but being a human who can live with reason and sensitivity is greater virtue". But in the Coexistence model of education, it is about competition and improvement with one self. After 20 years of that experience of education, coexistence model of education expects that he/she should have self- confidence, he/she stays healthy, he/she lives with family with prosperity, he/she has amiability in relationships and he/she contributes to society, so that there is no error, violence, fear and instability on earth. If we look deep inside, we can see that we are moving in the opposite direction. Others' success or failure decides the parameters of our success and failure. It shows the sign of low self-confidence. " Confidence born out of competition with others can never give you confidence". Similarly, these twenty years don't equip one to live a healthy life, only equipping us to barely keep the body functioning through medical treatment. Market is deciding the questions such as what we eat, how much we drink, how we use our body. As the person is becoming more educated, he/she is becoming more dependent on the market. But according to the author, every educated person, unless having met with an accident, should be healthy.

Author says prosperity needs to be understood in the context of three words- 1. poverty, which means being without facilities, a deprived and a poor person; 2. Wealth, which means having facilities, luxuries, money etc., but still he/ she can lack peace and can be fearful; 3. Prosperity means one who has all the means and is living happily too, and living with the feeling that he/she isn't lacking anything.

According to the author, living amiability with relatives teaches how to appreciate relationships and not to evaluate them. In the current model of education, the aim of an educated person is to get ahead in life. They don't have the ability to participate in society in a meaningful way. A healthy body, a self-confident mind settles the self and enables one to contribute to the larger order in terms of family, society, nation, world and nature. It would be wrong to say that the current education system has no benefits rather lots of benefits have been reaped from it (modern technological work, cyberspace studies, altered lots of beliefs and systems, women empowerment, rules about caste-based access, and much more.) But the

need of the hour is to understand the aims and shortcomings of the current education system. In economics, Adam Smith's words - limited resources and unlimited wants- have proven lethal because of incorrect interpretation of unlimited wants. Are these wants really unlimited? Can man's want of food, clothing, house, car etc., not be counted? These are not unlimited but continuous wants. To fulfil these unlimited wants, a person gets into the rat race to collect unlimited wealth, cheat and exploit people. The other person who is exploited and cheated will not stay quiet and as a result there will be discord, tension, war and natural disasters. It is important to understand this concept and fix the economic structure to end atrocities and war through education. Similarly, the father of psychology, Freud said that desire was the motive behind all actions. This also creates illusion and makes people slaves of their desires. The father of evolutionary studies, Darwin proposed the idea of ' survival of the fittest.' This gives rise to a never-ending competition. These principles of economics, psychology and evolutionary thought get embedded in the minds of those pursuing education even if they don't pursue them. It is the responsibility of education to scientifically uproot these theories from the minds of people, which can be done through education only. The coexistence model of education helps one understand the difference between having a life and living and becoming part of education and life. Educated people should learn to coexist with nature- not to dominate it but to utilize it. Education is imparted with the aim that after twenty years; every person can earn enough to feed themselves and have limited the aim of education to removing poverty and providing jobs. More importance is given to laws and protocols to end terrorism and global warming. But according to the author, this should be done through imparting education to coming generations and to teach them how-to live-in harmony with each other and nature. Author says, they made officials realize that the aim of education could be much bigger than removing poverty and providing employment. But four years is too short to achieve everything and that too given the current situation of education. He stressed that the ground realities such as student absenteeism, basic infrastructure, cleanliness, teachers availability in school, needs to be taken as the baseline and further path was discussed in those eight days about budget, building modern facilities in schools, making buildings clean, training teachers, reducing the syllabus, modifying the examination pattern, promoting music and sports, labs and libraries, starting the happiness class and entrepreneurship mindset curriculum (EMC). The eight-day camp was a beginning in itself and it was believed that it played a very big role in shaping the present model of education of Delhi.

2.3.6 Other initiatives in Delhi Education Model

To make students more focused and self-confident, Sisodia (2019) discussed the new initiative of the Happiness class for students, started by them. This is basically for students to make them better human beings, for which the inspiration came from coexistence-based Jeevan Vidya workshop, looking at all aspects of education and life very critically. The happiness class is not about giving any moral lessons, chanting or praying. Its content was prepared by a joint team of 20 Delhi govt teachers, District institute of education and training lecturers and principals, people working in the field of child psychology and also by the help of researchers and scholars. The content is based on the principle of coexistence. The three main aspects of happiness class are: (i) Mindful meditation- It is done once a week for 45-minutes in which the first five minutes and last two minutes will be devoted to meditation. This is mainly about teaching students to do everything with full attention and hone their focus, so that they can realize their thoughts and which can help becoming child more centered and can focus on their work and behaviour and improve their interpersonal relationships in the classroom and at home. It will help students to live in the present as not living in the present is the biggest reason for our worries and failures. This is being adopted all over the world, especially in the West schools. Happiness class was introduced in Delhi schools in July 2018 and in 3-4 months, positive results were seen. Children said that they feel calmer and can focus better on their studies. Their anger and irritation have dissipated. (ii) Inspirational stories- These are very short stories which are narrated in four to six minutes with discussion going on for days. Children identify situations in their lives similar to those in the stories and discuss them. These stories show the mindset of a person in a special situation and through them children are taught how to reflect on their own thoughts in similar situations. Through these, it helps them to identify what is right and what is wrong. These stories are made with these objectives in mind so that it can help to develop the emotional quotient of children through examples. (iii) Activities- Here also the aim is to help children analyze and evaluate their thought process. These activities will help them build opinion and make decisions when they are in situations similar to that in activities. It's not about moral giving lessons. Age groups are kept in mind while making these activities like for class 8 children, activity is to understand one's needs, to help them assess the idea of unlimited wants and limited resources. These needs can be classified into emotional and material. They understand that these needs are limited and can be fulfilled as they realize which things are needed and which things, they are just buying for show off. Another important activity was

about trust in which they understand how one's trust in the self is continuous. Many activities are also performed to inculcate the sense of gratitude in students towards cleaners, parents, vendors and gatekeepers. These three aspects were included in the curriculum with the same objective to make children introspective. But there are many roadblocks to bring these efforts into reality. The biggest challenge is to make teachers understand the meaning of this curriculum so that they could properly teach students.

In the author's opinion, there are two aims of education- to make people learn the ability to live happily and to help others live happily. He laid the focus on solving problems through education rather than strict laws and force. He said education is not about making buildings or modern classrooms or adopting technology in classrooms. These are only it's needs and not achievements. The biggest achievement of education is that it can foresee future problems, find solutions and prepare future generations for them. For this, happiness class is a big step. But again, challenges are there to make it a ground reality. Organizing a happiness class from nursery to class 8 for every day across 1000 schools, for 8 lakh students by 20000 teachers is a large-scale project.

Finally, the author talked about the Entrepreneurship Mindset Curriculum. He says that in the current system, children are equipped with knowledge and qualifications but lack the ability to apply these skills independently. This is why they lack confidence. More children are after looking for jobs and not after entrepreneurship or think to provide employment in future. The reason for not having enough jobs is because our schools and colleges are only creating job seekers and not job creators. Entrepreneurial mindset needs to be inculcated in students. Due to the lack of entrepreneurial attitude, the talent of students which is nurtured by the country's power, infrastructure and money, contributes to the country's economy only by spending the money they earn or by paying taxes. The reason for many economies' success lies in their ability to provide jobs and not in seeking jobs. So entrepreneurship mindset curriculum (EMC) was introduced in Delhi govt schools for class 9 to 12 for four years, as a stepping stone to lead them to the world outside the walls of the schools. Its aim is to infuse confidence in students, to do new things, to do bigger things, to make decisions, to work with courage and take the fear of failure and to make them pioneers in their field.

An informal team was made for this purpose but had many challenges as team members didn't have any prior experience in the field, no examples or case studies were there for such a curriculum for four- year long coursework. The pilot study was conducted for this purpose

which was started as one that helped children develop an attitude for starting their own business. But it has its own challenges as many students hardly have academic support at home and most parents want their children to complete their education and get a job. So after that it was decided, this curriculum will focus not only to hone skills but also on creating entrepreneurial attitude, irrespective of whether the student wants to become IAS, become scientist or do a job. So, by creating an entrepreneurial viewpoint, students may decide to be entrepreneurs or professionals in the process. The next challenge was of execution, which was to make sure that students will not face any problem in performing with this curriculum. One month pilot study of the curriculum under the guidance of SCERT was conducted in 2019 in 24 schools. Feedbacks were taken. The course was started for students from class 9 to 12 in all the 1000 schools with the number of students totaling to 6 lakh and 20,000 were given training. Stress on mindfulness was also given in these classes. It was felt that happiness class and EMC complement each other. It was believed that if this mindset is developed properly for four years, then 2.5 lakh students of Delhi won't chase jobs, rather jobs will run after them. And of them, 25,000 -30,000 children become job providers instead of job seekers and hence the paucity of jobs will be solved.

Author says we have worked on making the foundation strong, but still the tower of education has to be built. In his opinion, the most important programmes that will help achieve the improvement in education are: 1. halving the current curriculum which means analyzing and removing those topics which are not needed and not to waste time by teaching them in a traditional way. 2. Improving the structure of the Delhi education department- to make zones a hub and make the schools specialize in particular fields. 3. Change in the examination system in which the question papers will be based on testing the different aspects of a child's understanding of the subject and not testing their mugging skills. 4. Instituting a new education board in Delhi but first focus should be on improving the infrastructure. The board will decide the new ways of teaching and learning and innovative curriculum. 5. Establishing a teacher training university where new teachers will be created and current teachers will be trained at an international level. 6. Establishing an applied science university for giving importance to vocational studies so that graduation and post-graduation could be done in these studies. 7. Establishing sports universities which help sports orientated students to get graduation and post- graduation degrees in sports related subjects and those degrees will not be based on classroom teaching but on the basis of their performance at state, national and international levels.

The Delhi government needs to aim at equipping all government schools so that more children will opt for them. And, all Delhi schools should have the facilities to give quality education to all the children in Delhi. The hope of good society, country and people keep the author going in reforming and improving the education model of Delhi.

2.4 Summing Up

We have included three different sections for literature in this study, which are considered to be important to improve education status in government schools. The first section deals mainly with importance of importance of good infrastructure facilities in school. The second section deals with other factors which are important in improving students learning outcomes such as social infrastructure, teacher's role in motivating the students, student's interest in the subject etc. The third section delas with discussing Delhi education model which was implemented by AAP government in Delhi after they came into power in 2015. The objective of this dissertation is to look into the infrastructure facilities of two government schools in Delhi alongside analyzing the learning outcomes of students from those two schools from 2015 to 2020.

Chapter 3: Primary Data Analysis

This chapter of the thesis deals with primary data analysis of school infrastructure and learning outcomes of students of two government schools of Delhi. Section 3.1 discusses the infrastructure facilities in the schools based on students rating and perspectives and Section 3.2 analyses the marks of students in five different subjects for the same schools from the year 2015 to 2020, based on the data collected by Controller of Examination of the school.

3.1 Infrastructure facilities

In this, section 1 and 2 tried to see the quality of infrastructure facilities in the Delhi government schools provided by Delhi government based on student's perspectives and the researcher's observation at the school premises.

3.1.1 Government Girls Senior Secondary School No.1, Shakti Nagar, Delhi

Govt. Sarvodaya Kanya Vidyalaya No.1 got established in 1958 and managed by Department of Education. It is located in the Urban area of district North Delhi in Shakti Nagar. The school consists of Grades from 6 to 12, which is only for girls. This school is approachable by all-weather road.

The primary data on student's rating on infrastructure facilities was collected randomly from 40 students outside the school premises. Students were asked to rate the infrastructure facilities from 1 to 5 with 1 being strongly dissatisfied and 5 being strongly satisfied. And then, Likert scale analysis is used to measure the responses of students. The Likert scale is a five (or seven) point scale which is basically used to allow the person to express how much they agree or disagree with a particular statement.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
(1)	(2)	(3)	(4)	(5)

Students from secondary and senior secondary classes rated the physical infrastructure like blackboards, working condition of fans, washrooms, playground facilities, labs, sports facilities, computer facilities, electricity, menstruation facilities etc. from "very dissatisfied" to "very satisfied". The following table represents the percentage of students who are very dissatisfied, dissatisfied, neutral, satisfied and very satisfied on the above-mentioned parameters of physical infrastructure.

Table 3. 1: Percentage of students rating of physical infrastructure of Shakti Nagar No.1 School

Physical infrastructure	**Very Dissatisfied**	**Dissatisfied**	**Neutral**	**Satisfied***	**Very Satisfied***
Proper blackboards	2.5	10	10	**77.5***	0
Working condition of fans	0	7.5	30	**60***	2.5
Quality of desks	7.5	5	0	**67.5***	20
Quality of washrooms	12.5	2.5	20	**62.5***	2.5
Classroom cleanliness	0	7.5	7.5	**82.5***	2.5
Use of technology	17.5	7.5	7.5	**65***	2.5
Modern look of classrooms	7.5	15	10	**65***	2.5
Facility of library	7.5	5	7.5	25	**55***

Sports facilities	5	12.5	7.5	30	**45***
Playground	0	2.5	17.5	**50***	30
Labs	7.5	0	15	32.5	**45***
Safe drinking water	7.5	5	17.5	**40***	30
Proper electricity	7.5	2.5	17.5	**45***	27.5
Computer facilities	5	7.5	17.5	**42.5***	27.5
Menstruation hygiene facilities for girls	0	0	22.5	**67.5***	10

**Indicates a greater number of students give rating as satisfied and very satisfied as compared to the number of students who give rating as very dissatisfied, dissatisfied and neutral*

Source: Field survey, 2021

The above table shows that in almost all the parameters of physical infrastructure, students respond positively. Cumulatively, more than 60 per cent students rated in the category "satisfied" and "very satisfied" in all the parameters of infrastructure. The students were also asked to rate the improvement in the overall infrastructure of the school over the years which is presented in the following table.

Table 3. 2: Percentage of students rating improvement in the physical infrastructure over the years for Shakti Nagar No.1 School

Improvement in the physical infrastructure	**Not Improved**	**Don't know**	**Slightly improved**	**Improved**	**Improved to a great extent**
Whether infrastructure has improved or not over the years?	0	0	27.5	**52.5**	20

Source: Field survey, 2021

The above table shows that 52.5% students said that there is improvement in the physical infrastructure over the years and 20% students said the physical infrastructure has improved to a great extent. During the years, students noticed installation of smart boards as a part of digital learning in the class which helped them to learn well. Also, the girls (77.5% cumulatively) are very satisfied with menstruation facilities provided to them.

To look into the change in physical infrastructure of the school, UDISE (Unified District Information System for Education) school report cards for year 2014-15 and 2019-2020 were compared for the respective school and personal observation was done at the school premises

to check the quality of infrastructure. According to UDISE report card 2014-15 and 2019-2020 of this school, there were 19 and 21 functional toilets for boys and girls respectively in 2014-15, which got increased to 25 and 35 for boys and girls respectively. There are 4 toilets for Child with Special Needs (CWSN) in 2019-2020. All the toilets are maintained in good hygiene condition with handwashes available. Menstruation facilities are also available for the girls. With respect to classrooms, in 2014-15 there were 28 classrooms in good condition and 1 classroom needed to be repaired. But in 2019-20, all 45 classrooms are in good condition. There were ramps for disabled in 2014-15 but no handrails and in 2019-2020, there are availability of ramps and handrails for disabled in the school. In 2014-15, there were no computers available in the school and in 2019-20, the school is currently equipped with good digital and internet facilities. There is an ICT (Information and Communication Technology) lab in the school with 7 laptops, 2 projectors, 14 tablets, 3 desktops, 2 printers and 6 digital boards. The school has Physics, Chemistry, Biology, Mathematics, Language, Geography and Home Science lab to help students learn the subjects with more interest. Overall, the school is well equipped in terms of overall infrastructure as observed.

To check the effectiveness of Happiness curriculum class[5] in Delhi government schools, the students were asked to rate about the improvement in their mental well-being. To analyse the social infrastructure[6] in the school, the students were also asked to rate their learning levels over the years, teacher's engagement in the class, teacher's learning aids used in the class, parent's involvement and overall rating of the school as a whole. The ratings range from 1 to 5 with 1 being "very bad" and 5 being "very good". The following table presents the percentage of students rating the above parameters.

Table 3. 3: Percentage of students rating on social infrastructure and school as a whole for Shakti Nagar No.1 School

Rating	**very bad**	**Bad**	**Neutral**	**Good***	**very good**
overall school infrastructure	0	5	22.5	**55***	17.5
learning levels	0	5	15	**60***	20
mental well being	2.5	7.5	12.5	**57.5***	20
teacher's engagement in the class	0	10	10	**57.5***	22.5
teacher's learning aids	2.5	2.5	27.5	**52.5***	15
parent's involvement	2.5	0	25	**55***	17.5

[5] On the basis of an idea developed by Delhi deputy chief minister Manish Sisodia, the happiness curriculum was introduced by the Aam Aadmi Party (AAP) government in Delhi in 2018, which is aimed at improving the mental well-being of students between classes 1 to 8 in Delhi government schools.

[6] https://mcconnellfoundation.ca/report/building-social-infrastructure-the-role-of-students/

school as a whole	2.5	0	30	**47.5***	20

**Indicates a greater number of students give rating as good as compared to the number of students who give rating as very bad, bad and neutral*

Source: Field survey, 2021

The above table shows that cumulatively more than 60 percent of students rated in the category "good" and "very good" for the overall school infrastructure, their learning levels and mental well-being, teacher's engagement in the class and learning aids used by their teachers, parent's involvement and overall school as a whole.

Table 3. 4: Percentage of students who want and does not want to change their school in Shakti Nagar No.1 School

Statement	**Yes**	**No**
Do you want to change the school or not?	17.5	82.5

Source: Field survey, 2021

Table 3.4 shows that 82.5 per cent of students said that they do not want to change their school and want to continue their education and learning from the same school as they are satisfied with the school infrastructure and teacher's contribution in their learning levels. Most of the students responded positively about the improvement in the school infrastructure over the years. Overall picture shows that, Govt. Sarvodaya Kanya Vidyalaya Shakti Nagar No.1 is very well-equipped with infrastructural facilities and shows a good performance in the overall improvement of the school infrastructure according to students.

The next section analyses the infrastructure facilities of another Delhi Government school.

3.1.2 Government Sarvodaya Boys Secondary School No.3, Shakti Nagar, Delhi

Govt. Sarvodaya Boys Secondary School No.3, Shakti Nagar, Delhi was established in 1968 and is managed by the Dept. of Education (DOE). The school is located in DOE block of North Delhi district of Delhi. The school consists of Grades from 6 to 12, which is only for boys.

The school has a government building.

The data on student's rating on infrastructure facilities was collected randomly from 40 students outside the school premises as done for the first school. Students were asked to rate the infrastructure facilities from 1 to 5 with 1 being strongly dissatisfied and 5 being strongly satisfied. And then, Likert scale analysis as done for the first school, to measure the responses

of students for the school infrastructure is used for the second school also to measure the responses of students for their school infrastructure.

Students from secondary and senior secondary classes gave rating to the school physical infrastructure like blackboards, working condition of fans, washrooms, playground facilities, labs, sports facilities, computer facilities, electricity, etc. from "very dissatisfied" to "very satisfied". The following table represents the percentage of students who are very dissatisfied, dissatisfied, neutral, satisfied and very satisfied on the above-mentioned parameters of physical infrastructure.

Table 3. 5: Percentage of students rating of physical infrastructure of Shakti Nagar No.3 School

Physical Infrastructure	**Very Dissatisfied***	**Dissatisfied***	**Neutral***	**Satisfied**	**Very Satisfied**
Proper blackboards	15	12.5	55	17.5	0
Working condition of fans	10	15	35	37.5	2.5
Quality of desks	22.5	40	25	12.5	0
Quality of washrooms	27.5	35	5	30	2.5
Classroom cleanliness	15	30	42.5	12.5	0
Use of technology	27.5	45	20	7.5	0
Modern look of classrooms	17.5	35	15	32.5	0
Facility of library	20	22.5	27.5	15	15
Sports facilities	17.5	30	35	10	7.5
Playground	15	35	30	17.5	2.5
Labs	17.5	25	30	22.5	5
Safe drinking water	15	32.5	30	20	2.5
Proper electricity	22.5	30	10	20	17.5
Computer facilities	17.5	35	25	20	2.5

**Indicates a greater number of students give rating as neutral or below neutral category*

Source: Field survey, 2021

The above table shows that in almost all the parameters of physical infrastructure, most of the students responded neutral or below neutral category i.e., dissatisfied. Cumulatively, more than 50 per cent students rated in the category "very dissatisfied" to "neutral" in all the parameters of infrastructure. This shows that students are not satisfied with the school physical infrastructure. The students were also asked to rate the improvement in the overall infrastructure of the school over the years which is presented in the following table.

Table 3. 6: Percentage of students rating improvement in the physical infrastructure over the years for Shakti Nagar No.3 School

Improvement in the physical infrastructure	**Not Improved**	**Neutral**	**Slightly improved**	**Improved**	**Improved to a great extent**
Improvement over the years	2.5	**30**	**45**	22.5	0

Source: Field survey, 2021

The above table shows that 30% students were neutral and 45% students said that there is a slight improvement in the physical infrastructure of the school over the years. Cumulatively, 75% students rated the improvement of the school infrastructure in category "neutral" and "slightly improved". Students said that there is improvement in the school infrastructure over the years like installation of water coolers, proper electricity but it is not enough and there is a further need of improvement in the school of infrastructure like the quality of desks should be improved the years, computers should be available in the school as there are no computers in the school currently to help them learn well in the times of digital learning.

To look into the change in physical infrastructure of the school, UDISE school report cards for year 2014-15 and 2019-2020 were compared for the respective school and personal observation was done at the school premises to check the quality of infrastructure. According to UDISE report card 2014-15 and 2019-2020 of this school, there were 12 and 4 functional toilets for boys and girls respectively in 2014-15, and currently in 2019-20, the numbers remain same. There is 1 toilet for Child with Special Needs (CWSN) in 2019-2020. All the toilets are maintained in good hygiene condition with handwashes available. With respect to classrooms, in 2014-15 there were 18 classrooms in good condition and 2 classrooms needed to be repaired. But in 2019-20, all 20 classrooms are in good condition. There is availability of ramps and handrails for disabled in the school. In 2014-15, there were no computers and

no internet facility available in the school and in 2019-20, the school is currently having an ICT lab in the school with 0 laptop, 1 projector, 0 tablet, 2 desktops, 1 printer and 1 digital board with internet facility. The school is having only a Geography lab and no other labs. The school is not having a playground. Overall, the school has improved in terms of condition of classrooms, electricity but still there is much improvement needed like the quality of desks should be improved, facilities of computers and playground should be there.

To check the effectiveness of Happiness curriculum and social infrastructure in the school, the students were also asked to rate their learning levels over the years, their mental well-being, teacher's engagement in the class, teacher's learning aids used in the class, parent's involvement and overall rating of the school as a whole. The ratings range from 1 to 5 with 1 being "very bad" and 5 being "very good". The following table presents the percentage of students rating the above parameters.

Table 3. 7: Percentage of students rating on social infrastructure and school as a whole for Shakti Nagar No.3 School

Rating	**very bad**	**Bad***	**Neutral***	**good**	**very good**
overall school infrastructure	15	**37.5**	**35**	12.5	0
learning levels	12.5	**22.5**	**57.5**	7.5	0
mental well being	20	**40**	**32.5**	7.5	0
teacher's engagement in the class	25	**30**	**35**	10	0
teacher's learning aids	27.5	**30**	**37.5**	5	0
parent's involvement	22.5	**20**	**20**	17.5	20
school as a whole	10	**35**	**35**	20	0

**Indicates a greater number of students give rating as bad and neutral as compared to the number of students who give rating as good and very good*

Source: Field survey, 2021

The above table shows that cumulatively more than 50 percent of students rated "bad" and "neutral" for the overall school infrastructure, their learning levels and mental well-being, teacher's engagement in the class and learning aids used by their teachers, parent's involvement and overall school as a whole. This shows that there is a need of further improvement in the school as a whole.

Table 3. 8: Percentage of students who want and does not want to change their school in Shakti Nagar No.3 School

Statement	**Yes**	**No**

Do you want to change the school or not?	57.5	42.5

Source: Field survey, 2021

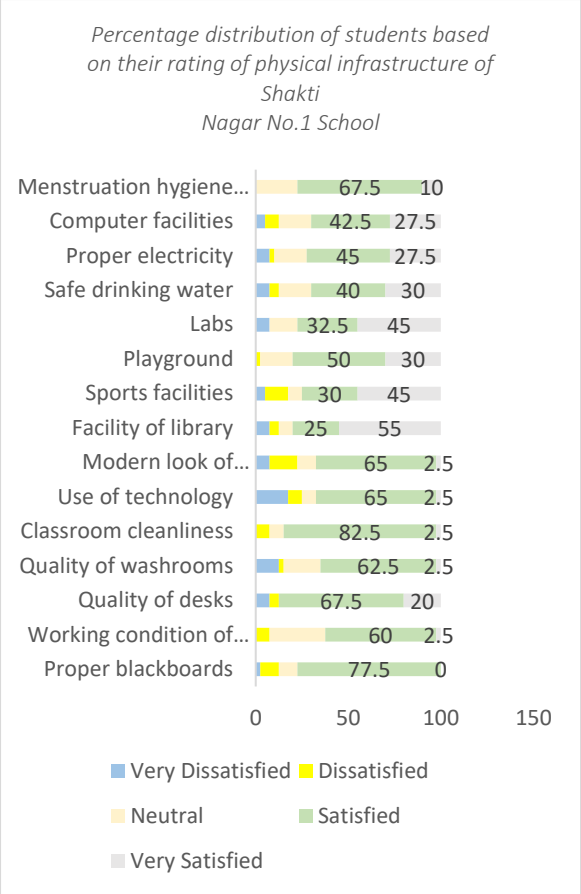
Table 3.8 shows that 57.5 per cent of students said that they want to change their school and want to learn in the environment of good physical infrastructure as they are not that much satisfied with the school infrastructure and teacher's contribution in their learning levels. Overall picture shows that, Govt. Sarvodaya Boys Secondary School No.3, Shakti Nagar, Delhi needs further improvement in school infrastructural facilities to make the students more interested in the learning.

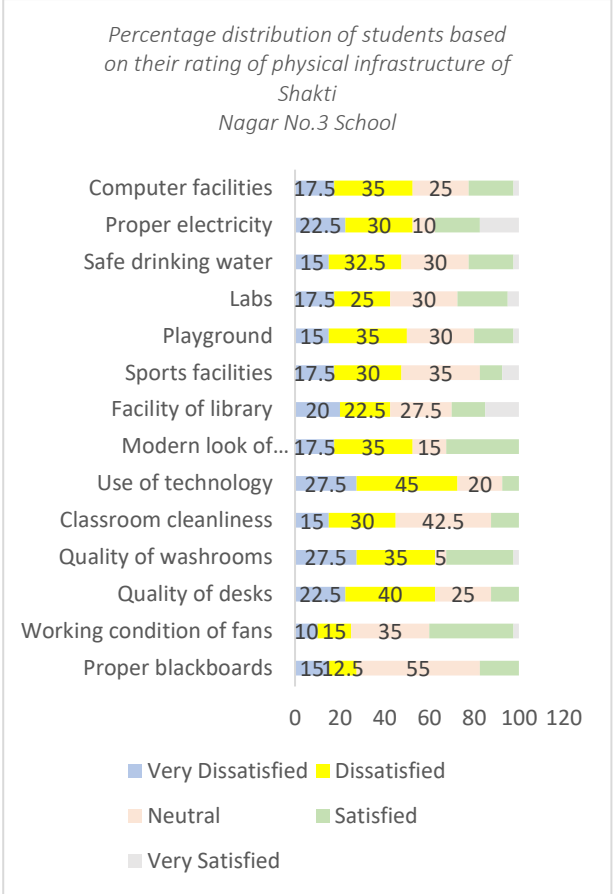
The next section compares physical infrastructural facilities and social infrastructure for both the schools.

3.1.3 Comparison between Shakti Nagar No.1 School and Shakti Nagar No.3 School in terms of physical infrastructure and social infrastructure

The below chart shows the comparison between the physical infrastructure of the school based on students rating.

Figure 3. 1: Comparison of physical infrastructure of two schools based on students rating

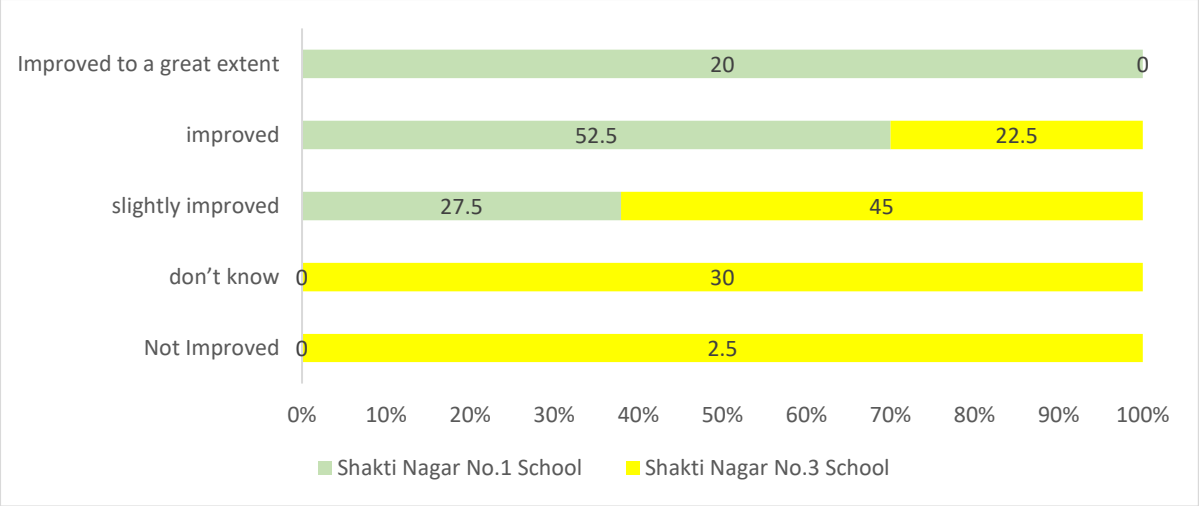




Source: Field survey, 2021

For Shakti Nagar No.1 school, most of the students rating falls under "satisfied" and "very satisfied" for all the parameters of physical infrastructure of the school, but for Shakti Nagar No.3 School, many students rated under the category "dissatisfied" and "neutral". Therefore, it can be said that students of Shakti Nagar No.1 school are satisfied with physical infrastructure of school and students of Shakti Nagar No.3 school are not satisfied.

Figure 3. 2: Percentage distribution of students based on their rating of improvement in school infrastructure over the years in both the schools

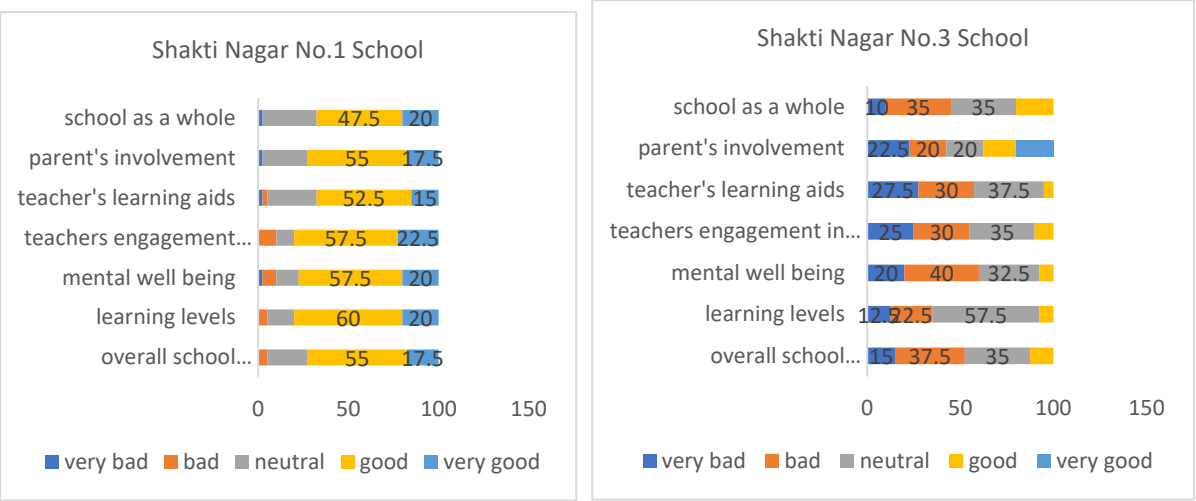


Source: Field survey, 2021

The above figure shows that in Shakti Nagar No.1 School, most of the students (52.5%) responded that school infrastructure has improved over the years, and in Shakti Nagar No.3 School, 45% students said school infrastructure has slightly improved.

The next figure shows the comparison between the social infrastructure of the school based on students rating.

Figure 3. 3: Comparison of social infrastructure of two schools based on students rating



Source: Field survey, 2021

For Shakti Nagar No.1 school, most of the students rating falls under "good" and "very good" for all the parameters of social infrastructure of the school, but for Shakti Nagar No.3 School, many students rated under the category "bad" and "neutral". Therefore, it can be said that students of Shakti Nagar No.1 school are satisfied with social infrastructure of school and students of Shakti Nagar No.3 school are not that satisfied.

The below figure 3.4 shows that in Shakti Nagar No.1 School, 82.5% of students said that they do not want to change their school as they are satisfied with continuing their studies in the same school, but in Shakti Nagar No.3 school, 57.5% students said that they want to change their school and want to go to a school in which there are comparatively better infrastructure facilities as compared to their school. Figure 3.5 shows that mean rating of the school as a whole for Shakti Nagar No. School is 3.83 (between "neutral" and "good") and for Shakti Nagar No.3 School is 2.65 (between "bad" and "neutral").

Figure 3. 4: Percentage of students who responded whole yes or no to change their school

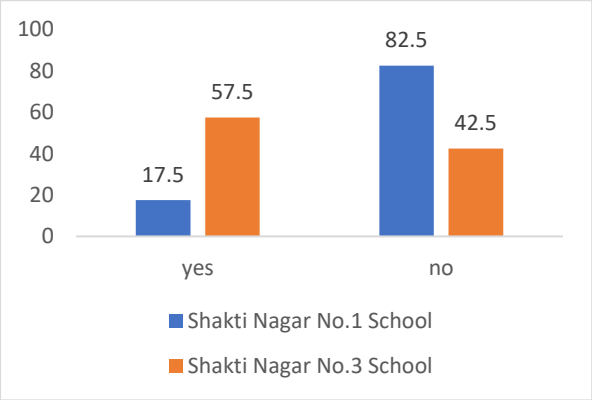
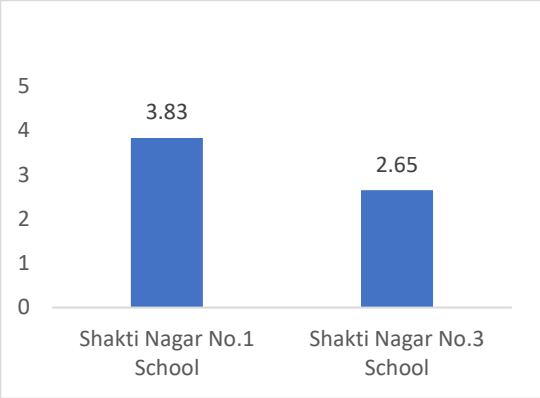


Figure 3. 5: Average of school rating as a for both the schools



Source: Field survey, 2020

The next table shows the checklist of physical infrastructure of two schools based on students rating, UDISE report cards and overall observation of the school during the field survey.

Table 3. 9: Checklist showing comparison of physical infrastructure of two Delhi Government schools

Facilities	**Shakti Nagar No.1**	**Shakti Nagar No.3**

	School	School
Classrooms	✓	✓
Toilets	✓	✓
Electricity	✓	✓
Drinking water	✓	✓
Quality of desks	✓	×
Playground	✓	×
Labs	✓	×
Computer facilities	✓	×
Modern technology (smart boards)	✓	×
Separate room for Vice Principal	×	×
Arts/Crafts room	✓	×
Integrated Science Lab	✓	✓
Library	✓	✓

Source: Field Survey, 2021

For classrooms, toilets, electricity and drinking water, both the schools are in good condition. But in Shakti Nagar No.3 School, quality of desks needs to be improved. Also, there is no proper playground for the students in this school. And, there is only one lab (Geography) in this school. But Shakti Nagar No.1 School has more labs for specific subjects (Physics, Chemistry, Biology, Mathematics, Language, Geography and Home Science). In terms of computer facilities and use of smart-boards, Shakti Nagar No.3 school needs improvement, as there are a smaller number of computers and digital boards in the respective school. Also, Shakti Nagar No.3 school does not have an arts/craft room but Shakti Nagar No.1 school has it. Both the schools have well equipped Integrated Science Lab and Library.

Overall, it can be inferred that Physical infrastructure of Shakti Nagar No.1 School is better than Shakti Nagar No.3 School and No.3 School needs improvement in some of the parameters of physical infrastructure mentioned above.

The next section analyses the students' scores in five subjects for the same schools from year 2015-16 (class VI) to 2019-20 (class X).

3.2 Student's score analysis in different subjects

This section analyses the students' scores in five different subjects for Shakti Nagar No.1 School and Shakti Nagar No. 3 school for the period 2015-16 (class VI) to 2019-20 (class X).

3.2.1 Government Girls Senior Secondary School No.1, Shakti Nagar, Delhi

Marks of students of the same batch from the class VI (2015-16) to class X (2019-2020) for five different subjects i.e., English, Maths, Hindi, Science and Social Science are collected from the Controller of the Examination of the school. The longitudinal analysis has been done to see the improvement in the student's scores in five different subjects over the years and to see the effectiveness of interventions like Chunauti program proposed by Delhi Education Model.

The class VI had around 150 students (all girls) in the year 2015-16. A random sample of 40 students has been taken for all those who have continued their education from class VI till class X i.e., the same student marks have been taken for each of the five standards-VI, VII, VIII, IX and X for five different subjects. For an example, marks of five students in one subject (English) over the five years have been showed in the following table.

Table 3. 10: Sample showing scores of 5 students in the subject English from class VI to class X

	2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Student	**VI**	**VII**	**VIII**	**IX**	**X**
1	45	51	43	48	53
2	72	71	72	61	72
3	83	86	81	78	75
4	47	62	58	48	67
5	73	78	87	81	79

Source: Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Average marks for all the years from 2015-16 to 2019-2020 (VI to X) have been calculated for all the five subjects- English, Hindi, Maths, Science and Social Science and performance of student's scores are analysed over the years in the following sections.

3.2.1.1 Performance in English

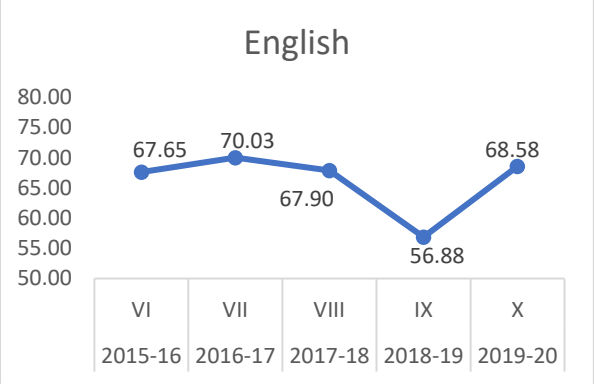
The below table shows the performance of marks (class average) in English over the years from 2015-16 to 2019-2020 of the same batch of students (from VI to X).

Table 3. 11: Average score of the class in the subject English from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Classes/Year	**Mean**	**S.D.**
VI (2015-16)	67.65	14.91
VII (2016-17)	**70.03**	11.30
VIII (2017-18)	67.90	15.14
IX (2018-19)	**56.88**	14.89
X (2019-20)	68.58	15.58

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 6: Trend of Average score of the class in the subject English from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi



Source: Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table and figure show that the mean marks of students in 2016-17 (VII class) is highest (70.03) with standard deviation 11.30, which is the lowest variation among the years which implies that in 2016-17 the marks of students are clustered around its mean value, and the mean marks of students is lowest (56.88) in 2018-19 (IX class). The standard deviation is around 15 for all the years except in 2016-17.

A Paired t-test (also called a correlated pairs t-test or dependent sample t-test) is performed in SPSS to test the significance in the difference of marks in English between different years. This test is used to compare means from the same group at different times. Marks in the year 2015-16 (class VI) are compared with marks in the year 2019-20 (class X) to test whether there is significant improvement in the marks of English between these two time periods.

In the year, 2016-17 (VII class), average marks are highest and in the year 2018-19 (IX class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks in these two classes.

Also, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16 (VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in English in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 12: Paired t-test to study differences in performance of class in different years for subject English (Shakti Nagar No.1 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	-0.92	11.41	1.80	-0.51	39.00	**0.61**
Pair 2	VII – IX	13.15	10.44	1.65	7.97*	39.00	**0.00**
Pair 3	VI – VII	-2.38	8.00	1.27	-1.88	39.00	**0.07**

**Statistically significant differences at the level of significance (0.05) or less*

The above table shows that t-value ($p<0.05$) is significant only for pair 2 i.e., for VII and IX class, which shows that there is significant difference in the marks of the student in the subject English in the year 2016-17 (class VII) and 2018-19 (class IX) at 5% level of significance, which means that students performed better in VII class as compared to IX class. In IX class, average marks are reduced by ~13 marks, which is quite a large fall.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~2 marks which is significant at 10% level of significance.

But if we compare the marks of the students between the longer time period (2015-16 and 2019-2020), which is pair 1, we see that the difference in average marks is not statistically significant as the p-value is quite high and we cannot reject the null hypothesis. We can infer that the average marks for class VI and class X in the subject English are almost same.

Prior to conducting the analysis, the assumption of normally distributed difference scores was examined. The assumption was considered satisfied.

Descriptive statistics are calculated for all the five years to see the range of the marks over the years and to get the overall picture of student marks in English.

Table 3. 13: Descriptive statistics of student's scores in the subject English (2015-16 to 2019-20) - Shakti Nagar No.1 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	45	94	67.65	14.90749	0.013	-1.201
VII	47	95	70.025	11.29894	0.229	-0.22
VIII	39	95	67.9	15.14172	-0.15	-0.813
IX	38	91	56.875	14.88621	0.68	-0.632
X	43	97	68.575	15.57922	-0.126	-0.75

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject English. The minimum marks over the years are in the range of 38-47 and highest marks are in the range of 91-97. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

3.2.1.2 Performance in Hindi

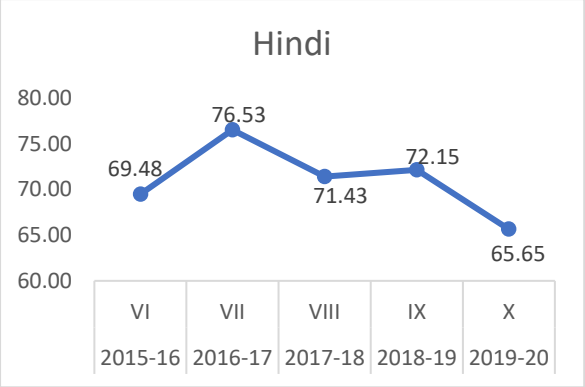
The below table shows the average marks of class in Hindi over the years from 2015-16 to 2019-2020 of the same batch of students (from class VI to class X).

Table 3. 14: Average score of the class in the subject Hindi from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Classes/Year	Mean	S.D.
VI (2015-16)	69.48	13.76
VII (2016-17)	**76.53**	11.44
VIII (2017-18)	71.43	16.08
IX (2018-19)	72.15	16.80
X (2019-20)	**65.65**	14.43

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 7: Trend of Average score of the class in the subject Hindi from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi



Source: Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The table and chart show that the mean marks of students in 2016-17 (VII class) is highest (76.53) with standard deviation 11.44, which is the lowest variation among the years which implies that in 2016-17 the marks of students are clustered around its mean value, and the mean marks of students is lowest (65.66) in 2019-20 (X class). The standard deviation is ~ 14-15 for all the years except in 2016-17.

A Paired t-test is performed in SPSS to test the significance in the difference of marks in Hindi between different years. Marks in the year 2015-16 (class VI) are compared with marks in the year 2019-2020 (class X) to test whether there is significant decrease in the marks of students in Hindi between these two time periods, as it can be seen that the average marks in VI class is 69.48 which got reduced to 65.55 in class X.

In the year, 2016-17 (VII class), average marks are highest and in the year 2019-20 (X class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in Hindi in these two classes.

Also, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16(VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in Hindi in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 15: Paired t-test to study differences in performance of class in different years for subject Hindi (Shakti Nagar No.1 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	3.83	12.18	1.93	1.99*	39.00	**0.05**
Pair 2	VII – X	10.88	10.65	1.68	6.46*	39.00	**0.00**
Pair 3	VI – VII	-7.05	8.84	1.40	-5.04*	39.00	**0.00**

**Statistically significant differences at the level of significance (0.05) or less*

The above table shows that t-value (p<=0.05) is significant for all the pairs. For pair 1, we can see that when we compare the marks of students in Hindi from 2015-16 (VI class) to 2019-2020 (X class), the average marks have decreased of ~4 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance has decreased in Hindi from VI class to X class.

For pair 2 i.e., for VII and X class, which shows that there is significant difference in the marks of the student in the subject Hindi in the year 2016-17 and 2019-2020 at 5% level of significance, which means that students performed better in VII class as compared to X class. In X class, average marks are reduced by ~11 marks, which is quite a large fall.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~7 marks which is significant at 5% level of significance. The students performed better in VII class as compared to VI class.

The assumption of normally distributed difference scores was examined before conducting the analysis. The assumption was considered satisfied.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in Hindi over the years and to get the overall picture of student marks.

Table 3. 16: Descriptive statistics of student's scores in the subject Hindi (2015-16 to 2019-20)- Shakti Nagar No.1 School

Class	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**	**Skewness**	**Kurtosis**
VI	43	94	69.48	13.76	-0.141	-0.872
VII	49	97	76.53	11.44	-0.106	-0.411
VIII	39	97	71.43	16.08	-0.427	-0.584
IX	39	99	72.15	16.80	0.061	-1.255
X	41	92	65.65	14.43	0.228	-1.025

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Hindi. The minimum marks over the years are in the range of 39-49 and highest marks are in the range of 92-99. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

3.2.1.3 Performance in Maths

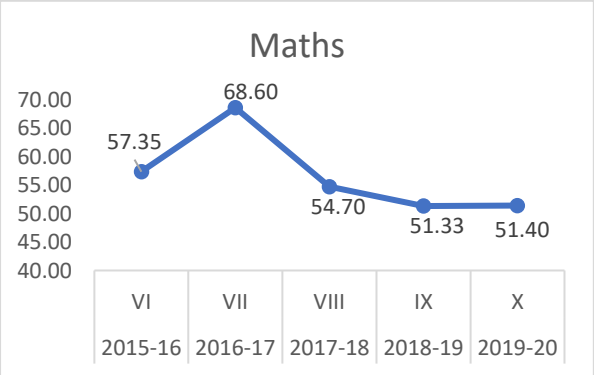
The below table shows the performance of marks (class average) in the subject Maths over the years from 2015-16 to 2019-2020 for the same batch of students (from VI to X).

Table 3. 17: Average score of the class in the subject Maths from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Classes/Year	**Mean**	**S.D.**
VI (2015-16)	57.35	16.08
VII (2016-17)	**68.60**	14.83
VIII (2017-18)	54.70	22.04
IX (2018-19)	**51.33**	19.42
X (2019-20)	51.40	19.06

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 8: Trend of Average score of the class in the subject Maths from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table and chart show that the mean marks of students in 2016-17 (VII class) is highest (68.60) with standard deviation 14.83, which is the lowest variation among the years which implies that in 2016-17 the marks of students are clustered around its mean value, and the mean marks of students is lowest (51.33) in 2018-19 (IX class). The standard deviation is greater than 15 for all the years except in 2016-17.

A Paired t-test is performed to test the significance in the difference of marks in Maths between different years. Marks in the year 2015-16 (class VI) are compared with marks in the year 2019-2020 (class X) to test whether there is significant decrease in the marks of students in Maths between these two time periods, as it can be seen that the average marks in VI class is 57.35 which got reduced to 51.40 in class X.

In the year, 2016-17 (VII class), average marks are highest and in the year 2018-19 (IX class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in Maths in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16(VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in Maths in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 18: Paired t-test to study differences in performance of class in different years for subject Maths (Shakti Nagar No.1 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	5.95	11.73	1.85	3.21*	39.00	0.003
Pair 2	VII – IX	17.28	11.01	1.74	9.93*	39.00	0.000
Pair 3	VI – VII	-11.25	11.81	1.87	-6.03*	39.00	0.000

**Statistically significant differences at the level of significance (0.05) or less*

The above table clearly shows that t-value ($p<0.05$) is significant for all the pairs. For pair 1, we can see that when we compare the marks of students in Maths from 2015-16 (VI class) to 2019-2020 (X class), the average marks have decreased by ~6 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average

marks are equal between these two time periods. This shows that student's performance has decreased in Maths from VI class to X class.

For pair 2 i.e., for VII and IX class, which shows that there is significant difference in the marks of the student in the subject Maths in the year 2016-17 and 2018-19 at 5% level of significance, which means that students performed better in VII class as compared to IX class. In IX class, average marks are reduced by ~17 marks, which shows a large fall in the average marks of students in Maths.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~11 marks which is significant at 5% level of significance. The students performed better in VII class as compared to VI class.

Before conducting the analysis, the assumption of normally distributed difference scores was examined. The assumption was considered satisfied.

In all the three cases, we can reject the null hypothesis as the p-value is very low and infer that there is significant difference in the marks of the students in Maths.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in Maths over the years and to get the overall picture of student's marks in the respective subject.

Table 3. 19: Descriptive statistics of student's scores in the subject Maths (2015-16 to 2019-20)- Shakti Nagar No.1 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	33.00	92.00	57.35	16.08	0.37	-0.55
VII	34.00	95.00	68.60	14.83	0.03	-0.82
VIII	24.00	100.00	54.70	22.04	0.77	-0.43
IX	17.00	98.00	51.33	19.42	0.99	0.19
X	25.00	97.00	51.40	19.06	0.87	0.04

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Maths. The minimum marks over the years are in the range of 17-34 and highest marks are in the range of 92-100. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

3.2.1.4 Performance in Science

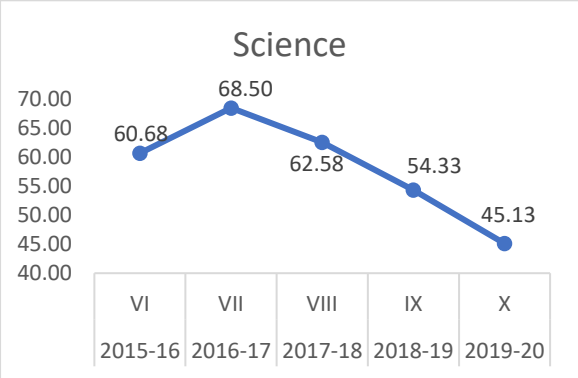
The below table shows the average performance of marks in the subject Science over the years from 2015-16 to 2019-2020 of the same batch of students (from VI to X).

Table 3. 20: Average score of the class in the subject Science from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Classes/Year	**Mean**	**S.D.**
VI (2015-16)	60.68	15.64
VII (2016-17)	**68.50**	15.19
VIII (2017-18)	62.58	19.33
IX (2018-19)	54.33	18.91
X (2019-20)	**45.13**	17.39

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 9: Trend of Average score of the class in the subject Science from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table and chart show that the mean marks of students in 2016-17 (VII class) for the subject Science is highest (68.50) with standard deviation ~15, which is the lowest variation among the years which implies that in 2016-17 the marks of students are clustered around its mean value, and the average marks of students is lowest (45.13) in 2019-20 (X class). The standard deviation is greater than 15 for all the years except in 2016-17.

A Paired t-test is done to test the significance in the difference of marks in the subject Science between different years. Marks in the year 2015-16 (class VI) are compared with

marks in the year 2019-2020 (class X) to test whether there is significant decrease in the marks of students in the subject Science between these two time periods, as it can be seen that the average marks in VI class is 60.68 which got reduced to 45.13 in class X.

In the year, 2016-17 (VII class), average marks are highest and in the year 2019-20 (X class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in the subject Science in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16 (VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in the subject Science in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 21: Paired t-test to study differences in performance of class in different years for subject Science (Shakti Nagar No.1 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	15.55	12.46	1.97	7.894*	39	0.000
Pair 2	VII – X	23.38	11.33	1.79	13.05*	39	0.000
Pair 3	VI – VII	-7.83	7.70	1.22	-6.431*	39	0.000

**Statistically significant differences at the level of significance (0.05) or less*

The above table clearly shows that t-value ($p<0.05$) is significant for all the pairs. For pair 1, we can see that when we compare the marks of students in the subject Science from 2015-16 (VI class) to 2019-2020 (X class), the average marks have decreased by ~16 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance has decreased in Science from VI class to X class.

For pair 2 i.e., for VII and X class, which shows that there is significant difference in the marks of the student in the subject Science in the year 2016-17 and 2019-20 at 5% level of significance, which means that students performed better in VII class as compared to X class in the respective subject. In X class, average marks are reduced by ~23 marks, which shows a large fall in the average marks of students in Science subject.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~8 marks which is significant at 5% level of significance. The students performed better in VII class as compared to VI class.

The assumption of normally distributed difference scores was examined before conducting the analysis. The assumption was considered satisfied.

In all the three cases, we can reject the null hypothesis because the p-value is very low and infer that there is significant difference in the marks of the students in science subject.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in science over the years and to get the overall picture of student's marks in the respective subject.

Table 3. 22: Descriptive statistics of student's scores in the subject Science (2015-16 to 2019-20) - Shakti Nagar No.1 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	37.00	94.00	60.68	15.64	0.25	-1.08
VII	44.00	96.00	68.50	15.19	0.10	-1.22
VIII	25.00	94.00	62.58	19.33	-0.02	-1.11
IX	22.00	95.00	54.33	18.91	0.70	-0.61
X	23.00	88.00	45.13	17.39	1.10	0.30

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Science. The minimum marks over the years are in the range of 22-44 and highest marks are in the range of 88-96. The value of skewness is ~0 for all the years which is nearly symmetrical except for class X and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

3.2.1.5 Performance in Social Science

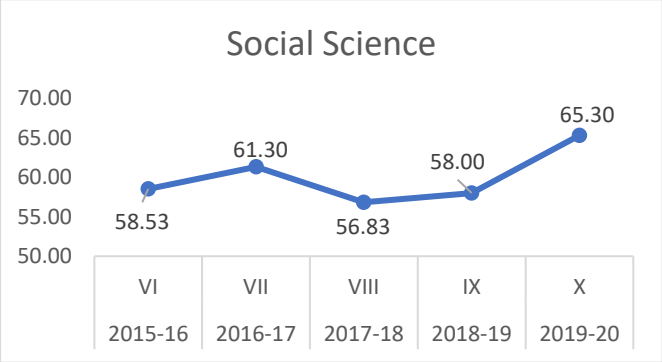
The below table shows the performance of marks (class average) in the subject Social Science over the years from 2015-16 to 2019-2020 of the same batch of students (from VI to X).

Table 3. 23: Average score of the class in the subject Social Science from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Classes/Year	Mean	S.D.
VI (2015-16)	58.53	14.77
VII (2016-17)	61.30	10.04
VIII (2017-18)	**56.83**	16.47
IX (2018-19)	58.00	19.49
X (2019-20)	**65.30**	17.14

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 10: Trend of Average score of the class in the subject Social Science from class VI (2015-16) to class X (2019-20): Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table and chart show that the mean marks of students in 2019-20 (X class) for the subject Social Science is highest (65.30) with standard deviation ~17, which is not the lowest variation among the years. The lowest variation of ~10 marks is observed in VII class which means that in this class marks are clustered around its mean value. The average marks of students are lowest (56.83) in 2017-18 (VIII class). The standard deviation is greater than 14 for all the years except in 2016-17.

A Paired t-test is done to test the significance in the difference of marks in Social Science between different years. Marks in the year 2015-16(VI) are compared with marks in the year 2019-2020 to test whether there is significant increase in the marks of students in the subject Social Science between these two time periods, as it can be seen that the average marks in VI class is 58.53 which got increased to 65.30 in class X.

In the year, 2019-20 (X class), average marks are highest and in the year 2017-18 (VIII class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in the subject Social Science in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16(VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in Social Science in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 24: Paired t-test to study differences in performance of class in different years for subject Social Science (Shakti Nagar No.1 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	-6.78	12.12	1.92	-3.535*	39	0.001
Pair 2	X – VIII	8.48	11.29	1.78	4.748*	39	0.000
Pair 3	VI – VII	-2.78	11.50	1.82	-1.526	39	0.135

**Statistically significant differences at the level of significance (0.05) or less*

The above table shows that P- value is significant for all the pairs except for pair 3. For pair 1, we can see that when we compare the marks of students in Social Science from 2015-16 (VI class) to 2019-2020 (X class), the average marks have increased by ~6 marks, which is significant at 5% level of confidence and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance has increased in Social Science from VI class to X class.

For pair 2 i.e., for X and VIII class, which shows that there is significant difference in the marks of the student in the subject Social Science in the year 2019-20 and 2017-18 at 5% level of confidence, which means that students performed better in X class as compared to VIII class in the respective subject. In X class, average marks are increased by ~8 marks, which shows an increase in the average marks of students in Social Science subject.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~3 marks but it is not significant at 5% level of confidence. Therefore, we cannot reject the null hypothesis and infer that the average marks in these two classes are almost equal and there is not much improvement in the marks of the students in the subject Social Science in class VII as compared to class VI.

Prior to conducting the analysis, the assumption of normally distributed difference scores was examined. The assumption was considered satisfied.

For pair 1 and pair 2, we can reject the null hypothesis because the p-value is very low and infer that there is significant difference in the marks of the students in Social Science subject.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in the subject Social Science over the years and to get the overall picture of student's marks in the respective subject.

Table 3. 25: Descriptive statistics of student's scores in the subject Social Science (2015-16 to 2019-20)- Shakti Nagar No.1 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	33	86	58.53	14.77	0.075	-0.931
VII	39	88	61.30	10.04	0.267	0.553
VIII	26	92	56.83	16.47	0.24	-0.661
IX	33	97	58.00	19.49	0.503	-1.031
X	39	96	65.30	17.14	0.336	-1.256

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Social Science. The minimum marks over the years are in the range of 26-39 and highest marks are in the range of 86-97. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

The next section summarizes the above results for all the five subjects for the respective school.

3.2.1.6 Findings and Comparison of student's scores in all the five subjects for the school- Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

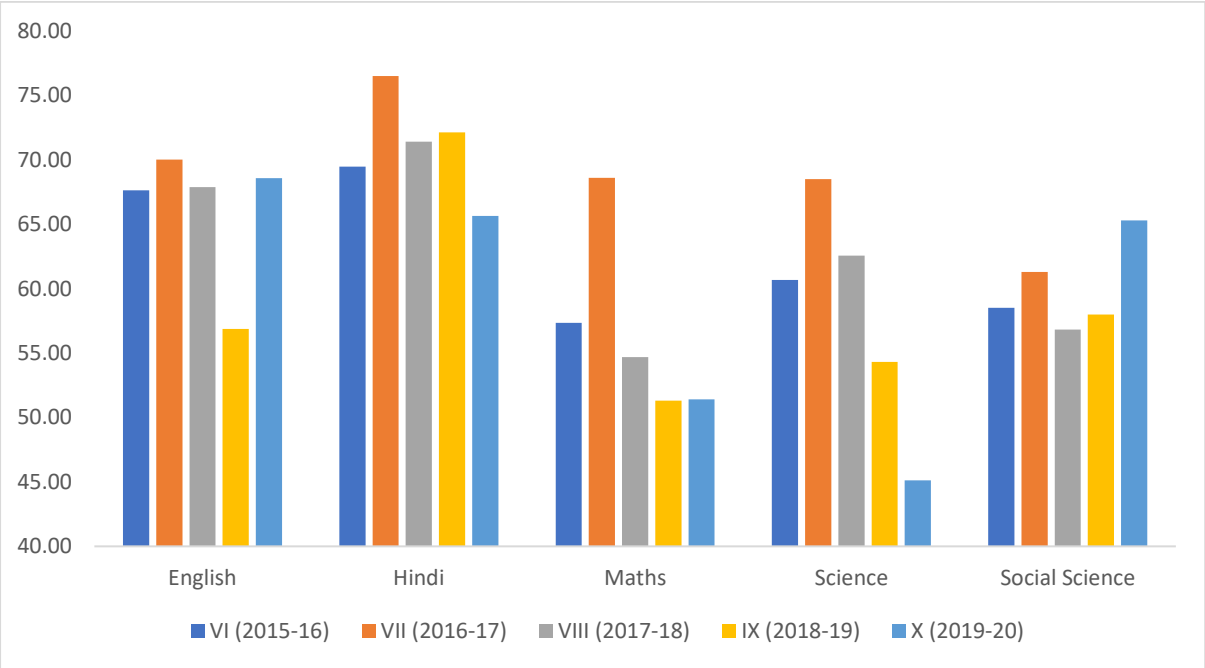
The mean score of the students of the class is compared for all the five subjects (English, Hindi, Maths, Science and Social Science over the five years from 2015-16 (class VI) to 2019-20, to get the overall picture of average marks in five different subjects for the respective school. The below table and chart show the comparison of mean score of students in five subjects over the five years.

Table 3. 26: Comparison of mean score of students in five subjects over the five years- Shakti Nagar No.1 School

Subject / Year/Class	English	Hindi	Maths	Science	Social Science
VI (2015-16)	67.65	69.48	57.35	60.68	58.53
VII (2016-17)	70.03	76.53	68.60	68.50	61.30
VIII (2017-18)	67.90	71.43	54.70	62.58	56.83
IX (2018-19)	56.88	72.15	51.33	54.33	58.00
X (2019-20)	68.58	65.65	51.40	45.13	65.30

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 11: Mean score of students in five subjects over the five years- Shakti Nagar No.1 School



Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

From the above table and chart, we can see that the mean score of students is highest for all the five subjects in the year 2016-17 (Class VII) i.e., soon after the implementation of Chunauti program by Delhi government in Delhi government schools. And, the mean scores are lowest in the year 2018-19 (class IX) for the subjects English and Maths and in the year 2019-20 (class X) for the subjects Hindi and Science.

The table and chart also show that the average marks of students over the years are lowest for subject Maths and Science when compared to other three subjects. Also, the performance has worsened over the years for the subjects Maths and Science.

The second column in the below table shows whether the mean scores of the students have changed between the year 2015-16 (Class VI) and 2019-2020 (class X). Year 2015-16 is taken because it is the time period before the implementation of scheme Chunauti and year 2019-2020 is taken to see the effectiveness of Chunauti program (introduced in 2016-17) in the longer period.

The third column in the table shows that whether the mean scores of the students have changed between the year 2015-16 (Class VI) and 2016-2017 (class VII). Year 2015-16 is taken because it is the time period before the introduction of Chunauti scheme and year 2016-17 is chosen because it is the time period soon after the implementation of Chunauti scheme.

The fourth column shows whether there are significant differences in the highest mean marks and lowest mean marks of the students over the years. The results are based on paired t-test which was done in the previous sections for five different subjects. Here, the table summarizes the results of the paired t-tests.

Table 3. 27: Summary of paired t test results for the performance in five subjects over five years from 2015-16 to 2019-20 (Class VI to class X)- Shakti Nagar No.1 School

Subjects	**Performance between year 2015-16 and 2019-20 (VI-X)**	**Performance before Chunauti program and soon after its implementation (VI-VII)**	**Difference in performance in terms of highest and lowest mean marks over the years**
English	Not improved (same)	Improved*	VII> IX (Decreased by ~13 marks)
Hindi	Not improved (decreased)	Improved	VII >X (Decreased by ~11 marks)
Maths	Not improved (decreased)	Improved	VII> IX (Decreased by ~17 marks)
Science	Not improved (decreased)	Improved	VII >X (Decreased by ~11 marks)
Social Science	Improved	Same	X> VIII (Increased by ~8 marks)

**Statistically significant differences at the level of significance (0.10) or less*

So, in the above table it can be seen that for all the subjects except Social Science, the average scores have not improved between the year 2015-16 (class VI) and 2019-20 (class X). But, if we compare the average scores between the year 2015-16 and 2016-17, for all the subjects the average score has improved and for the subject Social Science, it remained same. Also, we can see that for all subjects except Social Science highest mean marks are observed in the year 2016-17 (class VII), that is soon after the implementation of Chunauti scheme. And, then the average marks have decreased in IX and X standards.

The next table shows the percentage of students who score less than or equal to 33 marks in the subjects English, Hindi, Maths, Science and Social Science over five years from 2015-16 to 2019-20 i.e., from class VI to class X.

Table 3. 28: Percentage of students scoring less than or equal to 33 marks in the five subjects for the years 2015-16 to 2019-20 ((Class VI to class X)

Year/Class Subject	**2015-16 (VI)**	**2016-17 (VII)**	**2017-18 (VIII)**	**2018-19 (IX)**	**2019-20 (X)**
English	0.00%	0.00%	0.00%	0.00%	0.00%
Hindi	0.00%	0.00%	0.00%	0.00%	0.00%
Maths	2.50%	0.00%	20.00%	15.00%	17.50%
Science	0.00%	0.00%	5.00%	5.00%	32.50%
Social Science	2.50%	0.00%	7.50%	7.50%	0.00%

Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

The above table shows that percentage of students who scored less than 33 marks are mostly in VIII, IX and X standards mainly in the subject Maths and Science. In class VI and class VII, the performance of class is good.

The next section analyses the scores for the other school in the same way.

3.2.2 Government Sarvodaya Boys Secondary School No.3, Shakti Nagar, Delhi

Marks of students for the same batch from the class VI (2015-16) to class X (2019-2020) have been collected from the Controller of the Examination of the school for five different subjects (English, Maths, Hindi, Science and Social Science). To see the effectiveness of Chunauti program proposed by Delhi Education Model, the longitudinal analysis has been done to see the improvement in the student's scores in five different subjects over the years.

The class VI had around 80 students (all boys) in the year 2015-16. A random sample of 40 students has been taken, who have continued their education from class VI till class X i.e., the same student marks have been taken for each of the five standards-VI, VII, VIII, IX and X for five different subjects.

Average marks from the year 2015-16 to year 2019-2020 (class VI to class X) have been calculated for all the five subjects- English, Hindi, Maths, Science and Social Science and performance of student's scores are analysed based on paired t-test over the years in the following sections, as was done for previous school.

3.2.2.1 Performance in English

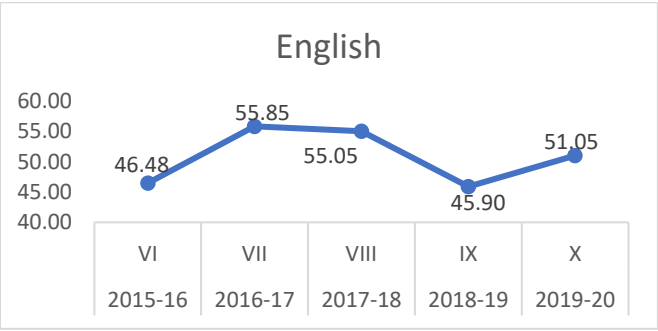
The following table shows the performance of marks (average marks) in the subject English over the years from the year 2015-16 to 2019-20 for the same batch of students (from VI to X), for Shakti Nagar No.3 School.

Table 3. 29: Average score of the class in the subject English from class VI (2015-16) to class X (2019-20)- Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Classes/Year	**Mean**	**S.D.**
VI (2015-16)	46.48	13.16
VII (2016-17)	**55.85**	13.78
VIII (2017-18)	55.05	13.94
IX (2018-19)	**45.90**	10.54
X (2019-20)	51.05	13.23

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Figure 3. 12: Trend of Average score of the class in the subject English from class VI (2015-16) to class X (2019-20)- Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table and chart show that the mean marks of students in 2016-17 (VII class) is highest (55.85) with standard deviation 13.78, which means that marks of the students deviate

around 14 marks from the mean value, and the mean marks of students is lowest (45.90) in 2018-19 (IX class). The standard deviation is around 14 for all the years except in 2018-19.

A Paired t-test as performed earlier for the previous school is performed to test the significance in the difference of marks in the subject English between different years. The test is used to compare means from the same group at different times. Marks in the year 2015-16 (class VI) are compared with marks in the year 2019-2020 (class X) to test whether there is significant improvement in the marks of English between these two time periods.

In the year, 2016-17 (VII class), average marks are highest and in the year 2018-19 (IX class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16 (class VI) and 2016-17 (class VII) in the respective subject. The null hypothesis of the test is that there is no significant difference between the average marks of class in English in the two time periods. The results of paired t-test are shown in the following table.

Table 3. 30: Paired t-test to study differences in performance of class in different years for subject English (Shakti Nagar No.3 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	-4.58	13.4	2.13	-2.15*	39	0.038
Pair 2	VII – IX	9.95	11.6	1.83	5.43*	39	0.000
Pair 3	VI – VII	-9.38	7.54	1.19	-7.87*	39	0.000

**Statistically significant differences at the level of significance (0.05) or less*

The above table shows that t-value ($p<0.05$) is significant for all the pairs. For pair 1, we can see that when we compare the marks of students for the subject English from 2015-16 (VI class) to 2019-2020 (X class), the average marks have increased by ~5 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that average marks of the class have increased in the subject English from class VI to class X.

For pair 2 i.e., for VII and IX class, which shows that there is significant difference in the marks of the student for the subject English in the year 2016-17 and 2018-19 at 5% level of

significance, which means that students performed better in VII class as compared to IX class. In IX class, average marks are reduced by ~10 marks, which is quite a large fall.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~10 marks which is significant at 5% level of significance. The students performed better in VII class as compared to VI class in the subject English

The assumption of normally distributed difference scores was examined before conducting the t-test analysis, and was found to be satisfied.

In all the three cases, we can reject the null hypothesis as the p-value is very low and infer that there is significant difference in the marks of the students in the subject English for the respective school.

Descriptive statistics, as was calculated for subjects in previous school are also calculated for this school for all the five years to see the range of the marks of students in the subject English over the years and to get the overall picture of student marks in the respective subject.

Table 3. 31: Descriptive statistics of student's scores in the subject English (2015-16 to 2019-20)- Shakti Nagar No.3 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	22	70	46.48	13.16	-0.25	-0.795
VII	23	83	55.85	13.78	-0.374	0.225
VIII	31	81	55.05	13.94	0.136	-0.922
IX	28	75	45.90	10.54	0.591	0.163
X	33	78	51.05	13.23	0.514	-0.601

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject English. The minimum marks over the years are in the range of 22-33 and highest marks are in the range of 70-83. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

3.2.2.2 Performance in Hindi

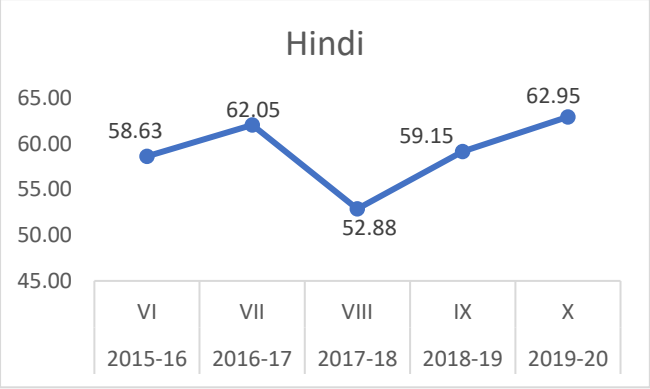
The below table shows the performance of marks in the subject Hindi over the years from 2015-16 to 2019-20 for the same batch of students (from class VI to class X).

Table 3. 32: Average score of the class in the subject Hindi from class VI (2015-16) to class X (2019-20): Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Classes/Year	**Mean**	**S.D.**
VI (2015-16)	58.63	15.04
VII (2016-17)	**62.05**	13.45
VIII (2017-18)	**52.88**	14.25
IX (2018-19)	59.15	18.05
X (2019-20)	**62.95**	11.52

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Figure 3. 13: Trend of Average score of the class in the subject Hindi from class VI (2015-16) to class X (2019-20)- Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The table and chart show that the mean marks of students in 2019-20 (X class) is highest (62.95) with standard deviation 11.52, which is the lowest variation among the years which implies that in 2019-20 the marks of students are clustered around its mean value. Also, the mean marks of students (62.05) in 2016-17(VII class) is near to the highest mean marks of students of class X. And the average marks of class are lowest (52.88) in 2017-18 (VIII class). The standard deviation is greater than 13 for all the years except in 2019-20.

A Paired t-test is performed in SPSS to test the significance in the difference of marks in Hindi between different years. Marks in the year 2015-16 (class VI) are compared with marks in the year 2019-20 (class X) to test whether there is significant increase in the marks of students in Hindi between these two time periods, as it can be seen that the average marks in VI class is 58.63 which got reduced to 62.05 in class X.

In the year, 2019-20 (X class), average marks are highest and in the year 2018-19 (VIII class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in Hindi in class X and VIII and also for classes VII and VIII, as students marks in VII class is near to the highest mean marks of students of class X.

Also, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16(VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in Hindi in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 33: Paired t-test to study differences in performance of class in different years for subject English (Shakti Nagar No.3 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	-4.33	15.6	2.47	-1.75#	39	**0.087**
Pair 2	X – VIII	10.1	15	2.37	4.26*	39	**0.000**
Pair 3	VII – VIII	9.18	8.35	1.32	6.95*	39	**0.000**
Pair 4	VI – VII	-3.43	12.1	1.91	-1.8#	39	**0.080**

**Statistically significant differences at the level of significance (0.05) or less*
 # Statistically significant differences at the level of significance (0.10) or less

The above table shows that t-value ($p<0.05$) is significant for all pair 2 and pair 3. For pair 1, we can see that when we compare the marks of students in Hindi from 2015-16 (VI class) to 2019-2020 (X class), the average marks have increased by ~4 marks, which is not significant at 5% level of significance and therefore we cannot reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance is almost similar in Hindi from VI class to X class for 95% level of confidence. But we can reject the null hypothesis at 10% level of significance.

For pair 2 i.e., for class X and class VIII, and for pair 3 i.e., for class VII and class VIII, it shows that there is significant difference in the marks of the student in the subject Hindi in the classes X and VIII and in the classes VII and VIII at 5% level of significance, which means that students performed better in class X and VII as compared to VIII class. In VIII class, average marks are reduced by ~10 marks as compared to class VII and X, which is quite a large fall.

For pair 3 i.e., for class VI and VII, there is an increase in the average marks of the students of ~3 marks which is not significant at 5% level of significance. But we can reject the null hypothesis at 10% level of significance.

Therefore, we can reject the null hypothesis and conclude that class average in class VII is greater than class average in class VI.

The assumption of normally distributed difference scores was examined and found to be satisfied before conducting the paired t-test analysis.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in the subject Hindi over the years and to get the overall status of student's marks.

Table 3. 34: Descriptive statistics of student's scores in the subject Hindi (2015-16 to 2019-20)- Shakti Nagar No.3 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	27	85	58.63	15.04	-0.268	-0.638
VII	25	89	62.05	13.45	-0.553	0.487
VIII	23	79	52.88	14.25	-0.286	-0.78
IX	29	91	59.15	18.05	0.079	-1.277
X	38	82	62.95	11.52	-0.229	-0.753

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Hindi. The minimum marks over the years are in the range of 23-38 and the highest marks are in the range of 79-91. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

3.2.2.3 Performance in Maths

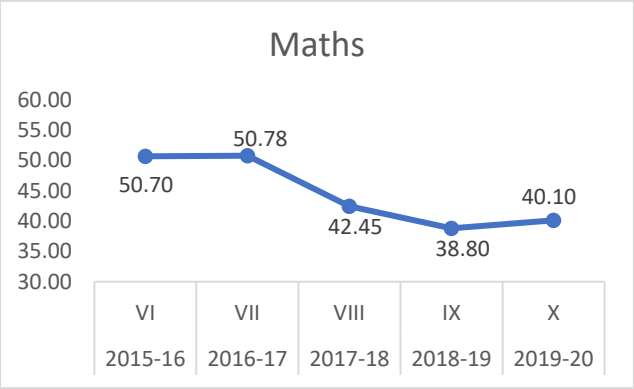
The below table shows the performance of marks in the subject Maths over the years from 2015-16 to 2019-20 of the same batch of students (from VI to X), for Shakti Nagar No.3 School.

Table 3. 35: Average score of the class in the subject Maths from class VI (2015-16) to class X (2019-20): Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Classes/Year	**Mean**	**S.D.**
VI (2015-16)	50.70	15.38
VII (2016-17)	**50.78**	15.92
VIII (2017-18)	42.45	14.88
IX (2018-19)	**38.80**	14.01
X (2019-20)	40.10	12.42

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Figure 3. 14: Trend of Average score of the class in the subject Maths from class VI (2015-16) to class X (2019-20)- Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table and chart show that the mean marks of students in 2016-17 (VII class) is highest (50.78) with standard deviation 15.92, which means that students marks are less than or greater than ~16 marks from class average. And the mean marks of students are lowest (38.80) in 2018-19 (IX class). The standard deviation is around 13-15 for all the years.

A Paired t-test is performed to test the significance in the difference of marks in the subject Maths between different years. Marks in the year 2015-16 (VI class) are compared with marks in the year 2019-20 (X class) to test whether there is significant decrease in the marks of students in Maths between these two time periods.

In the year, 2016-17 (VII class), average marks are highest and in the year 2018-19 (IX class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in Maths in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16 (VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in Maths in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 36: Paired t-test to study differences in performance of class in different years for subject Maths (Shakti Nagar No.3 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	10.6	13.4	2.12	5.00*	39	0.000
Pair 2	VII – IX	12	16.8	2.65	4.52*	39	0.000
Pair 3	VI – VII	-0.08	11.4	1.81	-0.04	39	0.967

**Statistically significant differences at the level of significance (0.05) or less*

The above table clearly shows that t-value ($p<0.05$) is significant for pair 1 and pair 2. For pair 1, we can see that when we compare the marks of students in Maths from 2015-16 (VI class) to 2019-20 (X class), the average marks have decreased by ~11 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance has decreased in Maths from VI class to X class.

For pair 2 i.e., for VII and IX class, which shows that there is significant difference in the marks of the student in the subject Maths in the year 2016-17 and 2018-19 at 5% level of significance, which means that students performed better in VII class as compared to IX class. In IX class, average marks are reduced by ~12 marks, which shows a large fall in the average marks of students in Maths.

For pair 3 i.e., for class VI and VII, the average marks are almost equal. We cannot reject the null hypothesis (p-value= 0.967) and conclude that students perform almost similar in class VI and VII.

For pair 1 and pair 2, we can reject the null hypothesis as the p-value is very low and infer that there is significant difference in the marks of the students in Maths.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in Maths over the years and to get the overall picture of student's marks in the respective subject.

Table 3. 37: Descriptive statistics of student's scores in the subject Maths (2015-16 to 2019-20)- Shakti Nagar No.3 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	30	80	50.70	15.38	0.347	-0.906
VII	19	85	50.78	15.92	-0.009	-0.699
VIII	17	83	42.45	14.88	1.115	0.955
IX	11	77	38.80	14.01	0.316	0.431
X	22	77	40.10	12.42	1.347	2.166

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Maths. The minimum marks over the years are in the range of 11-30 and highest marks are in the range of 77-85. The value of skewness is ~0 for all the classes except for the class X and VIII, which means for all classes except for class X and VIII, marks are near symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution, except for class X.

3.2.2.4 Performance in Science

The below table shows the performance of marks over the years from 2015-16 to 2019-20 of the same batch of students (from class VI to class X), for the subject Science.

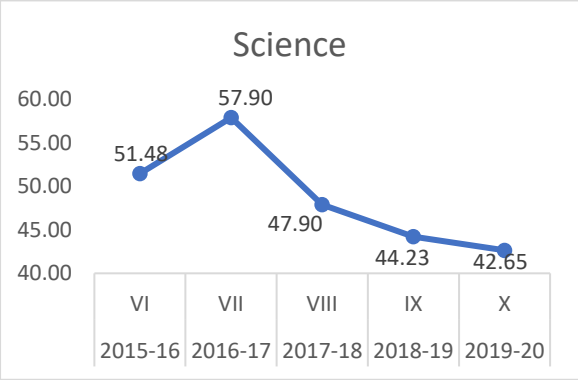
Table 3. 38: Average score of the class in the subject Science from class VI (2015-16) to class X (2019-20): Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Classes/Year	Mean	S.D.
VI (2015-16)	51.48	13.20
VII (2016-17)	**57.90**	12.34

VIII (2017-18)	47.90	12.63
IX (2018-19)	44.23	12.06
X (2019-20)	**42.65**	12.66

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Figure 3. 15: Trend of Average score of the class in the subject Science from class VI (2015-16) to class X (2019-20)- Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table and chart show that the mean marks of students in 2016-17 (VII class) for the subject Science is highest (57.90) with standard deviation 12.34, which means that students marks are less than or greater than ~12 marks from class average. And the average marks of students are lowest (42.65) in 2019-20 (X class). The standard deviation is ~13 for all the years.

A Paired t-test is performed to test the significance in the difference of marks in the subject Science between different years. Marks in the year 2015-16 (VI class) are compared with marks in the year 2019-20 (X class) to test whether there is significant decrease in the marks of students in the subject Science between these two time periods.

Average marks (highest) in the year 2016-17 (VII class) are compared with the average marks (lowest) in the year 2019-20 (X class) to test whether there is significant decrease in the marks of students in the subject Science between these two time periods. In the year, 2016-17 (VII class), average marks are highest and in the year 2019-20 (X class), average marks are lowest. Paired-t test is done between class VII and X to see whether there is

significant difference between the marks of students in the subject Science in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16(VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in the subject Science in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 39: Paired t-test to study differences in performance of class in different years for subject Science (Shakti Nagar No.3 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	8.83	10.8	1.71	5.18*	39	0.000
Pair 2	VII – X	15.25	10.66	1.69	9.05*	39	0.000
Pair 3	VI – VII	-6.43	8.19	1.29	-4.96*	39	0.000

**Statistically significant differences at the level of significance (0.05) or less*

The above table clearly shows that t-value ($p < 0.05$) is significant for all the pairs. For pair 1, we can see that when we compare the marks of students in the subject Science from 2015-16 (VI class) to 2019-2020 (X class), the average marks have decreased by ~9 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance has decreased in Science from VI class to X class.

For pair 2 i.e., for VII and X class, it shows that there is significant difference in the marks of the student in the subject Science in the year 2016-17 and 2019-20 at 5% level of significance, which means that students performed better in VII class as compared to X class in the respective subject. In X class, average marks are reduced by ~15 marks, which shows a large fall in the average marks of students in Science subject.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~6 marks which is significant at 5% level of significance. The students performed better in VII class as compared to VI class.

In all the three cases, we can reject the null hypothesis because the p-value is very low and infer that there is significant difference in the marks of the students in Science subject.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in the subject Science over the years and to get the overall picture of student's marks in the respective subject, for Shakti Nagar No.3 School.

Table 3. 40: Descriptive statistics of student's scores in the subject Science (2015-16 to 2019-20)- Shakti Nagar No.3 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	30	79	51.48	13.20	0.297	-0.586
VII	33	85	57.90	12.34	0.359	-0.652
VIII	24	75	47.90	12.63	0.159	-0.115
IX	18	76	44.23	12.06	0.722	1.248
X	24	82	42.65	12.66	1.537	2.741

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Science. The minimum marks over the years are in the range of 18-33 and highest marks are in the range of 75-85. The value of skewness is ~0 for all the classes except for the class X, which means for all classes except for class X, marks are near symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution, except for class X.

3.2.2.5 Performance in Social Science

The below table shows the performance of marks in the subject Social Science over the years from 2015-16 to 2019-2020 of the same batch of students (from VI to X).

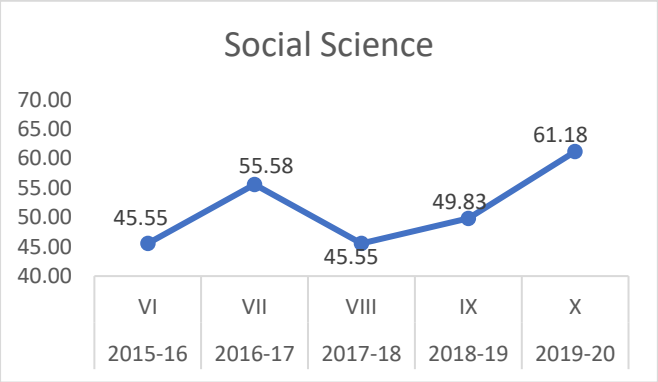
Table 3. 41: Average score of the class in the subject Social Science from class VI (2015-16) to class X (2019-20): Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Classes/Year	Mean	S.D.
VI (2015-16)	45.55	11.90
VII (2016-17)	55.58	9.11
VIII (2017-18)	**45.55**	10.84
IX (2018-19)	49.83	13.69

X (2019-20)	**61.18**	13.43

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Figure 3. 16: Trend of Average score of the class in the subject Social Science from class VI (2015-16) to class X (2019-20)- Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table and chart show that the mean marks of students in 2019-20 (X class) for the subject Social Science is highest (61.38) with standard deviation ~13, which means that students marks are less than or greater than ~13 marks from class average. The lowest variation of ~9 marks is observed in VII class which means that in this class marks are clustered around its mean value. The average marks of students are lowest (45.55) in 2015-16 (class VI) and 2017-18 (VIII class).

A Paired t-test is done to test the significance in the difference of marks in Social Science between different years. Marks in the year 2015-16 (class VI) are compared with marks in the year 2019-2020 (class X) to test whether there is significant increase in the marks of students in Social Science between these two time periods, as it can be seen that the average marks in VI class is 45.55 which got increased to 61.18 in class X.

In the year, 2019-20 (X class), average marks are highest and in the year 2017-18 (VIII class), average marks are lowest. Paired-t test is done to see whether there is significant difference between the marks of students in the subject Social Science in these two classes.

And, to check the difference in marks before the introduction of Chunauti scheme and soon after its implementation by Delhi Government in 2016-17, paired t-test is performed for the year 2015-16 (VI class) and 2016-17 (VII class). The null hypothesis of the test is that there is no significant difference between the marks of students in Social Science in the two time periods. The results of paired t-test are shown in the below table.

Table 3. 42: Paired t-test to study differences in performance of class in different years for subject Social Science (Shakti Nagar No.3 School)

Paired Samples Test		Mean	Std. Deviation	Std. Error Mean	T value	Df	**p- value** Sig. (2-tailed)
Pair 1	VI – X	-15.6	14	2.22	-7.04*	39	0.000
Pair 2	X – VIII	15.6	12.5	1.97	7.92*	39	0.000
Pair 3	VI – VII	-10	10.7	1.69	-5.93*	39	0.000

**Statistically significant differences at the level of significance (0.05) or less*

The above table shows that t-value ($p<0.05$) is significant for all the pairs. For pair 1, we can see that when we compare the marks of students in Social Science from 2015-16 (VI class) to 2019-20 (X class), the average marks have increased by ~16 marks, which is significant at 5% level of significance and therefore we can reject the null hypothesis that the average marks are equal between these two time periods. This shows that student's performance has increased in Social Science from VI class to X class.

For pair 2 i.e., for X and VIII class, it shows that there is significant difference in the marks of the student in the subject Social Science in the year 2019-20 and 2017-18 at 5% level of significance, which means that students performed better in class X as compared to VIII class in the respective subject. In X class, average marks are increased by ~16 marks, which shows an increase in the average marks of students in Social Science subject.

For pair 3 i.e., for class VI and VII, there is an improvement in the average marks of the students of ~10 marks and it is significant at 5% level of significance. Therefore, we can reject the null hypothesis and infer that the average marks in class VII got increased by ~10 marks as compared to class VI in the subject Social Science.

For all the pairs, we can reject the null hypothesis because the p-value is very low and infer that there is significant difference in the marks of the students in Social Science subject.

Descriptive statistics are calculated for all the five years to see the range of the marks of students in the subject Social Science over the years and to get the overall picture of student's marks in the respective subject.

Table 3. 43: Descriptive statistics of student's scores in the subject Social Science (2015-16 to 2019-20)- Shakti Nagar No.3 School

Class	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
VI	24	71	45.55	11.90	0.213	-0.231
VII	34	73	55.58	9.11	0.164	-0.232
VIII	21	66	45.55	10.84	-0.065	-0.272
IX	19	90	49.83	13.69	0.643	1.192
X	39	94	61.18	13.43	0.847	0.23

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table shows the descriptive statistics for the years 2015-16 (VI class) to 2019-2020 (X class) for the subject Social Science. The minimum marks over the years are in the range of 19-39 and highest marks are in the range of 66-94. The value of skewness is ~0 for all the years which is nearly symmetrical and kurtosis value is between -2 and +2, which is acceptable for normal distribution.

The next section summarizes the results of this section and shows comparison for all the five subjects from the year 2015-16 (class VI) to 2019-20 (class X).

3.2.2.6 Findings and Comparison of student's scores in all the five subjects for the school- Govt. Sarvodaya Boys Secondary School No.3, Shakti Nagar, Delhi

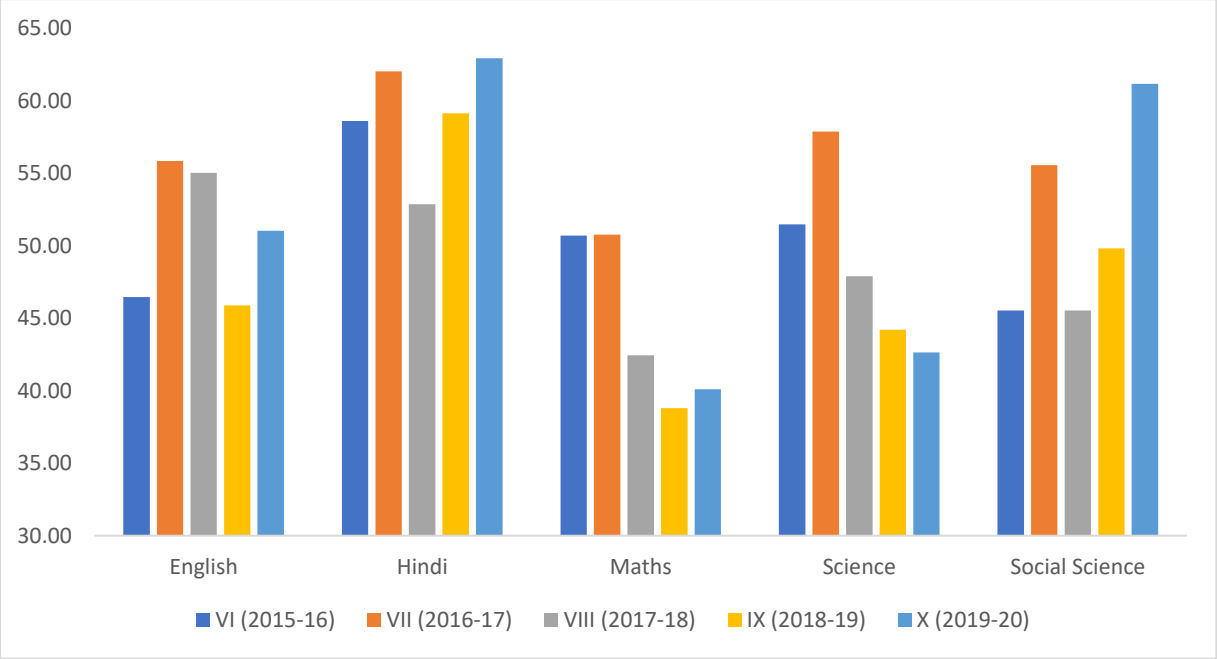
To get the overall picture of average marks of the class in five different subjects, the mean score of the students of the class is compared for all the five subjects (English, Hindi, Maths, Science and Social Science over the five years from 2015-16 (class VI) to 2019-20 (class X). The below table and chart show the comparison of mean score of students in five subjects over the five years.

Table 3. 44: Comparison of mean score of students in five subjects over the five years- Shakti Nagar No.3 School

Subject / Year/Class	English	Hindi	Maths	Science	Social Science
VI (2015-16)	46.48	58.63	50.70	51.48	45.55
VII (2016-17)	55.85	62.05	50.78	57.90	55.58
VIII (2017-18)	55.05	52.88	42.45	47.90	45.55
IX (2018-19)	45.90	59.15	38.80	44.23	49.83
X (2019-20)	51.05	62.95	40.10	42.65	61.18

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Figure 3. 17: Mean score of students in five subjects over the five years- Shakti Nagar No.3 School



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

From the above table and chart, we can see that the average score of students is highest for all the five subjects in the year 2016-17 (Class VII) i.e., soon after the implementation of

Chunauti program by Delhi government in Delhi government schools, except for subject Hindi and Social Science (highest average of the class is in class X). But still in class VII (2016-17), class average of marks is second highest in these two subjects. And, the mean scores are lowest in the year 2018-19 i.e., for the class IX for the subject English and Maths and for the subjects Hindi and Social Science, lowest average is in class VIII (2017-18). For the subject Science, lowest average marks for the class are in the class X (2019-20).

The table and chart also show that the average marks of students in class X (2019-20) are lowest for subject Maths and Science when compared to other three subjects. Also, the performance has worsened over the years for the subjects Maths and Science, which can be shown through the following table.

The second column in the below table shows whether the average scores of the class have changed between the year 2015-16 (Class VI) and 2019-20 (class X). Year 2015-16 is taken because it is the time period before the implementation of scheme Chunauti and year 2019-2020 is taken to see the effectiveness of Chunauti program (introduced in 2016-17) by Delhi government in these five years.

The third column in the table shows that whether the average scores of the class have changed between the year 2015-16 (Class VI) and 2016-17 (class VII). Year 2015-16 is taken because it is the time period before the introduction of Chunauti scheme and the year 2016-17 is taken because it is the time period soon after the implementation of Chunauti scheme.

The fourth column shows whether there are significant differences in the highest average marks and lowest average marks of the class over the years. The results are based on paired t-test which was done in the previous sections for five different subjects. The following table summarizes the results of the paired t-tests.

Table 3. 45: Summary of paired t test results for the performance in five subjects over five years from 2015-16 to 2019-20 (Class VI to class X)- Shakti Nagar No.3 School

Subjects	**Performance between year 2015-16 and 2019-20 (VI-X)**	**Performance before Chunauti program and soon after its implementation (VI-VII)**	**Difference in performance in terms of highest and lowest mean marks over the years**
English	Improved (by ~5 marks)	Improved	VII> IX (Decreased by ~10 marks)
Hindi	Same	Improved*	X, VII>VIII (Dec. by ~10 marks)
Maths	Not improved (decreased)	Same	VII> IX (Decreased by ~12 marks)

Science	Not improved (decreased)	Improved	VII > X (Dec. by ~13 marks)
Social Science	Improved	Improved	X> VIII (Increased by ~16 marks)

**Statistically significant differences at the level of significance (0.10) or less*

So, in the above table it can be seen that for the subjects English and Social Science, the average scores have improved between the year 2015-16 (class VI) and 2019-20 (class X). And for the subjects Maths and Science, average scores have decreased between the year 2015-16 (class VI) and 2019-20 (class X). But, if we compare the average scores between the year 2015-16 (class VI) and 2016-17 (class VII), for all the subjects the average score has improved and for the subject Maths, it remained same. Also, we can see that for all subjects except Social Science highest mean marks are observed in the year 2016-17 (class VII), that is soon after the implementation of Chunauti scheme. And, then the average marks have decreased in class IX as compared to class VII for subjects English and Maths and for the subject Science, average marks have decreased in class X as compared to class VII.

Table 3. 46: Percentage of students scoring less than or equal to 33 marks in the five subjects from the year 2015-16 to 2019-20 ((Class VI to class X)- Shakti Nagar no.3 School

Year/Class / Subject	**2015-16 (VI)**	**2016-17 (VII)**	**2017-18 (VIII)**	**2018-19 (IX)**	**2019-20 (X)**
English	20.00%	7.50%	5.00%	10.00%	2.50%
Hindi	5.00%	2.50%	12.50%	2.50%	0.00%
Maths	17.50%	20.00%	27.50%	37.50%	37.50%
Science	7.50%	2.50%	12.50%	10.00%	22.50%
Social Science	17.50%	0.00%	10.00%	7.50%	0.00%

Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

The above table shows in class VI, 20% students scored less than 33 marks in subject English and in class IX and X, the percentage got reduced to 10 and 2.5 respectively for the students who got less than 33 marks.

For the subject Hindi, less students (5%) scored less than 33 marks in class VI and in class X no one scored less than 33 marks.

In the subject Maths, 17.5% students scored less than 33 marks in class VI and after that in subsequent classes, the percentage of students scoring less than 33 marks got increased. In class IX and X, 37.5% students scored less than 33 marks.

For the subject Science, 7.5% students scored less than 33 marks in class VI and after that in subsequent classes from class VIII onwards, the percentage of students scoring less than 33 marks got increased. In class X, 22.5% students scored less than 33 marks.

In the subject Social Science, 17.5% students scored less than 33 marks in class VI and in class X no one scored less than 33 marks.

Hence, we can see that over the five years, students' performance has worsened for the subjects Maths and Science, and improved for the subjects English and Social Science.

3.2.3 Findings and Comparison of student's scores for the two schools in the five subjects

This section compares the score of students in the five subjects for both the schools for the period 2015-16 to 2019-20.

3.2.3.1 Performance of class average before Chunauti program and soon after its implementation (Comparison of class VI (2015-16) and class VII (2016-17) average marks)

Delhi government had introduced the Chunauti scheme in 2016 which aimed to check dropout of the students and improve education quality with special focus on the weakest students, and to increase the learning outcomes of students in English, Hindi and basic Maths, for classes VI, VII and VIII. The scheme is still in progress to improve the learning outcomes of students.

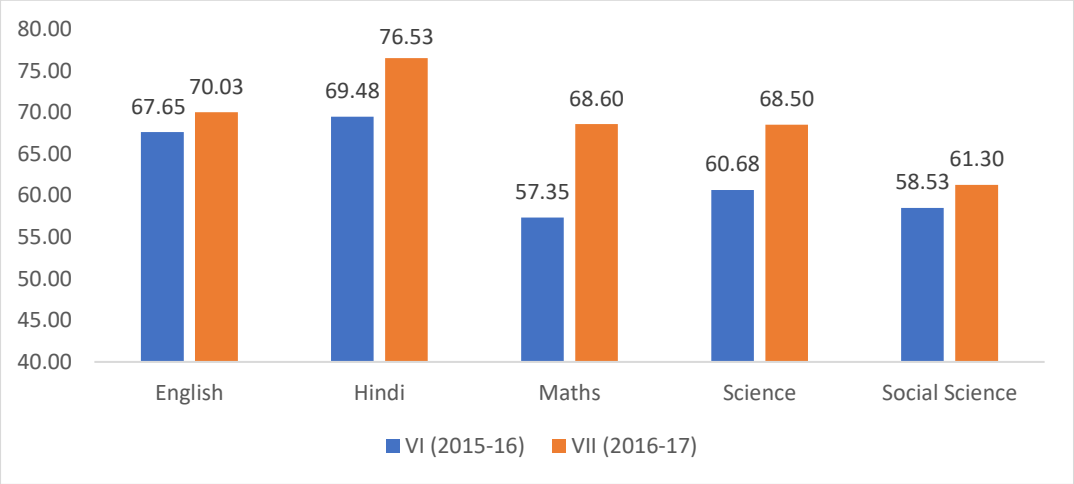
From the below charts, we can see that the average marks in all the five subjects for both the schools in class VII (2016-17) have increased as compared to class VI (2015-16). But from the below table, we can see that paired t test results show that for School 2, the average marks of the class VI and class VII remains same in the subject Maths, which means that Chunauti scheme did not give effective results as soon after its implementation for School 2 in subject Maths. This can be due to two reasons which can be either there was not a proper implementation of this scheme in this school or because students learning foundations are too weak for this subject. But for school 1, there is improvement in the class average score for the subject Maths in class VII as compared to class VI.

For the subject English, Hindi and Science, class average has increased in class VII as compared to class VI for both the schools.

For School 1, class average has increased in class VII as compared to class VI for all the subjects. Only for social science, the class average remains almost same. Hence, for the school 1, Chunauti program proved fruitful soon after its implementation in 2016-17 for all the three subjects- English, Hindi and Maths. For school 2, class average has increased in class VII as compared to class VI for all the subjects except for Maths, where the performance was almost similar. Hence, for the school 2, Chunauti program proved fruitful for the subjects English and Hindi soon after its implementation in 2016-17, but not for the subject Maths.

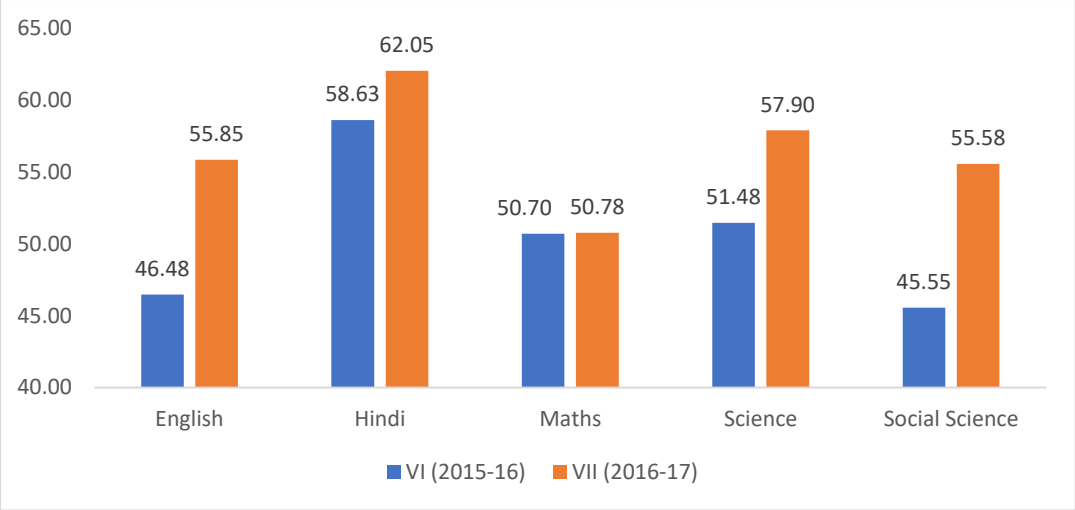
Overall, we can see that soon after the implementation of Chunauti scheme in 2016-17, class average has increased for the subjects English and Hindi in both schools and in Shakti Nagar No.1 (school 1), class average has also increased for the subject Maths.

Figure 3. 18: Comparison of average marks before Chunauti program and soon after its implementation (VI (2015-16) and class VII (2016-17)) for Shakti Nagar No.1 School



Source: Compiled from the data of Controller of the Examination, Govt. Girls Senior Secondary School No.1, Shakti Nagar; Delhi

Figure 3. 19: Comparison of average marks before Chunauti program and soon after its implementation (VI (2015-16) and class VII (2016-17)) for Shakti Nagar No.3 School



Source: Compiled from the data of Controller of the Examination, Govt. Sarvodaya Vidyalaya No.3, Shakti Nagar, Delhi

Table 3. 47: Comparison of paired t test results for both the schools see the effectiveness of Chunauti program from 2015-16 to 2016-17 (Class VI to class VII)

Subjects	**Shakti Nagar No.1 School (School 1)**	**Shakti Nagar No.3 School (School 2)**
English	Improved*	Improved
Hindi	Improved	Improved*
Maths	Improved	Same
Science	Improved	Improved
Social Science	Same	Improved

**Statistically significant differences at the level of significance (0.10) or less*

3.2.3.2 Effectiveness of Chunauti program after four years of its implementation (Comparison of class VI (2015-16) and class X (2019-20) average marks)

To check the effectiveness of Chunauti program after four years of its implementation (Chunauti launched in 2016-17) from year 2015-16 to year 2019-20, average marks of the class are compared for both the schools in five subjects and also students scoring less than 33 marks are being compared for both the classes. Here, 2015-16 is taken because it is the time period before the implementation of Chunauti program and 2019-20. The results in the below table are based on paired t test done in previous sections.

Table 3. 48: Comparison of paired t test results for both the schools to see the effectiveness of Chunauti program from 2015-16 to 2019-20 (Class VI to class X)

Subjects	**Shakti Nagar No.1 School (school 1)**	**Shakti Nagar No.3 School (school 2)**
English	Not improved (same)	Improved (by ~5 marks)

Hindi	Not improved (decreased)	Same
Maths	Not improved (decreased)	Not improved (decreased)
Science	Not improved (decreased)	Not improved (decreased)
Social Science	Improved	Improved

Table 3. 49: Comparison of Percentage of students scoring less than or equal to 33 marks in the year 2015-16 and 2019-20 (Class VI and class X)

	Shakti Nagar No.1 School (school 1)		**Shakti Nagar No.3 School (school 2)**	
Subjects	**VI**	**X**	**VI**	**X**
English	0.00%	0.00%	20.00%	2.50%
Hindi	0.00%	0.00%	5.00%	0.00%
Maths	2.50%	17.50%	17.50%	37.50%
Science	0.00%	32.50%	7.50%	22.50%
Social Science	2.50%	0.00%	17.50%	0.00%

Source: Compiled from the data of Controller of the Examination

Table shows that in school 1, for the subject English, average marks are almost same in class X when compared to class VI. For school 2, average marks have improved in class X when compared to class VI. Also, table shows that percentage of students scoring less than 33 marks have decreased to 2.5% in class X, when compared to class VI (20%) for school 2. Hence, Chunauti program seemed to be effective for subject English during the period 2015-16 to 2019-20 for school 2.

For the subject Hindi, average marks have reduced in class X when compared to class VI for school 1. For school 2, average marks remain same for the period.

For the subject Maths and Science, average marks have decreased in class X when compared to class VI for both the schools. Also, table shows that percentage of students scoring less than 33 marks have increased to 17.5% in class X, when compared to class VI (2.5%) for school 1 and for school 2, percentage of students scoring less than 33 marks have increased to 37.5% in class X, when compared to class VI (17.5.5%). Hence, Chunauti program is not effective for the subject Maths, during the period 2015-16 to 2019-20 for both the schools.

In the subject Social Science, both the schools are performing better and the class average has improved in class X when compared to class VI.

From the above two sections, we can see that Chunauti program is effective soon after its implementation in 2016-17 (class VII), but the results of the same is not effective after few years of its implementation (2019-20), except in the subject English for Shakti Nagar No.3 School. The reason for this could be because of improper implementation of Chunauti

scheme. If the student is performing below average in the subject, he/she will be put in the group of underperforming students, so that particular student can get special attention and his/her learning outcomes can be improved, but as soon as the student starts performing well in the subject, the focus is shifted on other weak students and that particular student is removed from that group. Because of the withdrawn attention from that particular student, he/she is back on the same track as before. Therefore, in the long-term student's performance cannot be improved.

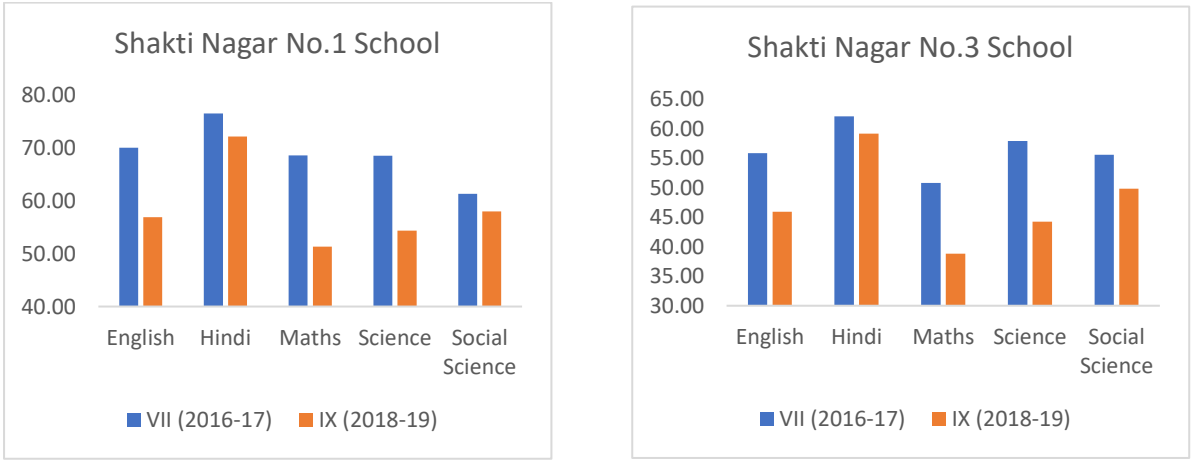
Also, the students' performance has decreased in the subject Science for both the schools, which Chunauti scheme does not focus on.

3.2.3.3 Difference in performance of the class average in terms of highest and lowest average marks over the years for the schools

Table 3. 50: Comparison of paired t test results for both the schools see the difference in performance in terms of highest and lowest average marks over the years

Subjects	**Shakti Nagar No.1 School**	**Shakti Nagar No. 3 School**
English	VII> IX (Decreased by ~13 marks)	VII> IX (Decreased by ~10 marks)
Hindi	VII >X (Decreased by ~11 marks)	X, VII>VIII (Dec. by ~10 marks)
Maths	VII> IX (Decreased by ~17 marks)	VII> IX (Decreased by ~12 marks)
Science	VII >X (Decreased by ~11 marks)	VII >X (Decreased by ~15 marks)
Social Science	X> VIII (Increased by ~8 marks)	X> VIII (Increased by ~16 marks)

Figure 3. 20: Comparison of average marks for the class VII and class IX



Source: Compiled from the data of Controller of the Examination

It can be seen from the table that for the subject English and Maths, in both the schools, average scores are highest in class VII and lowest in class in class IX. In both the schools, average performance has decreased in class IX when compared to class VII in subjects English and Maths.

For the subject Science, in school 1, average marks have decreased by ~11 marks in class X when compared to class VII. For school 2, average marks have decreased by ~ 15 marks in class X when compared to class VII. Also, average marks have shown declining trend after class VII onwards.

For the subject Hindi in school 1, average marks are lowest in class X when compared to class VII. Also, average marks are low in class IX, when compared to class VII. In school 2, class average in Hindi is almost same and highest for class VII and X. But still class averages in both the schools in the subject in Hindi is less in class IX when compared to class VII.

In both the schools, for the subject Social Science, highest class average is observed in class X and lowest in class VIII. Also, class averages in both the schools for the subject Social Science is less in class IX when compared to class VII.

We can conclude that students are not performing better in class IX when compared to class VII for all the five subjects. The average performance of the class is getting reduced in class IX.

Does poor performance in class IX connect to the no-detention policy (NDP)[7]?

"Earlier also the children in schools were not learning, and after the NDP was introduced, the situation has become worse," says Atishi Marlena, to *Newslaundry*. She also says that the situation has worsened with every passing year as batches of students spent more time under NDP. ASER series data showed a declining trend in learning, and the ASER 2012 report noted a correlation between the passing of RTE (NDP), and declining learning levels.[8] Delhi government has also accepted that the NDP is one of the reasons for poor results in Class IX. Also, other reasons like years of accumulated learning deficit, pressure on the teachers to complete the syllabus which leads to inability to bring weaker children to the required level,

[7] Section 16 of the Right to Education (RTE) Act, popularly known as the 'No Detention Policy' (NDP), which guaranteed promotion through class 1-8 for all children, irrespective of their readiness. The now amended policy allows states to frame rules that could re-introduce detention in class 5 or class 8.

[8] https://idronline.org/no-detention-why-did-a-popular-policy-get-scrapped/

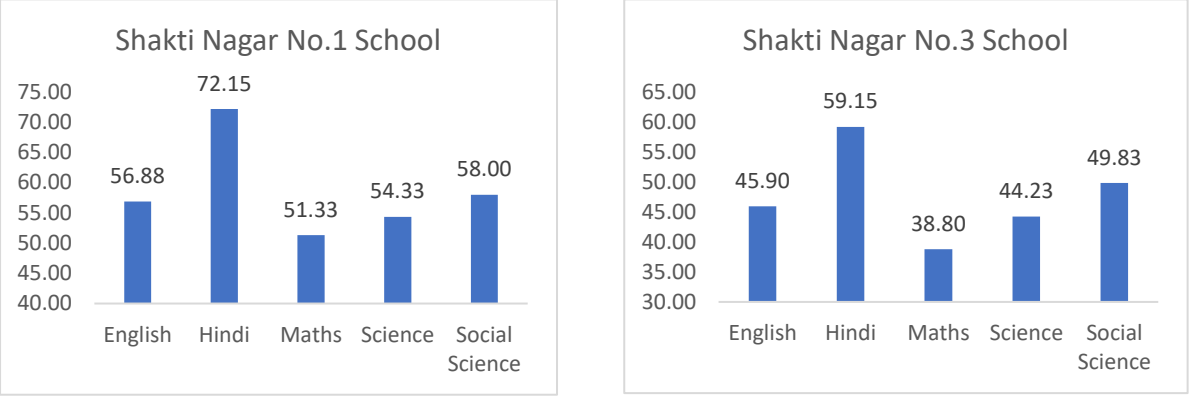
and huge difference in basic skills like reading and writing within a single classroom, lead to poor performance in class IX students.

Hence, we can conclude that poor performance of students in class IX and after, can be due to no-detention policy, which is now amended and allows states to frame rules that could re-introduce detention in class 5 or class 8.

The next section discusses why students perform poor in subject Maths as compared to other subjects.

3.2.3.4 Average marks of the class (class IX) is lowest in the subject Maths for both the schools

Figure 3. 21: Comparison of average marks in class IX (2018-19) for both the schools



Source: Compiled from the data of Controller of the Examination

From the above charts, we can observe that in both the schools in class IX, average marks of the class are lowest in the subject Maths and second lowest in subject Science. Highest average marks of the class are observed in the subject Hindi and second highest in the subject Social Science.

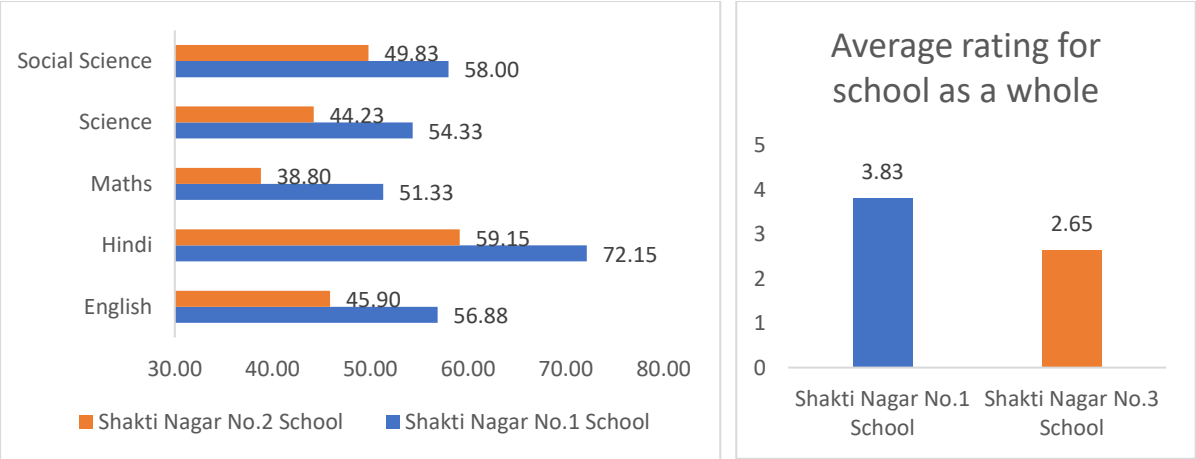
Children's struggle with Maths has been the biggest cause for low pass percentage in CBSE class X examinations in Delhi government schools. The lack of interest, and the lack of connection between the subjects and the students are the main reasons why students under

perform in subject Maths as compared to other subjects.[9] Manish Sisodia, when asked in an interview that why mathematics appears to be such a big problem for students? He said "There is a certain 'maths-phobia'. In schools, rote learning is applied to all subjects, but maths simply cannot work through rote learning." There is a big problem in the manner in which maths in taught in schools.[10]

3.2.3.5 Comparison of average marks (class IX) for all the subjects of both the schools

This section compares average marks of class IX (2018-19) in all the subjects for both the schools.

Figure 3. 22: Comparison of average marks of class IX (2018-19) for average rating of school as a whole given by students for both the schools[11]



Source: Compiled from the data of Controller of the Examination and Field Survey, 2021

From the above figure we can see that the school (Shakti Nagar No.1) in which students gave overall rating between "neutral and good" (Mean=3.83) to the school which includes physical infrastructure, has greater average score in all the subjects as compared to the school (Shakti

[9] https://indianexpress.com/article/education/delhi-schools-board-exam-mathematics-manish-sisodia-cbse-6079432/

[10] https://indianexpress.com/article/cities/delhi/manish-sisodia-big-problem-in-the-way-we-teach-maths-6079447/

[11] The students interviewed during field survey are different from the students whose marks have been taken from the Controller of Examination but belongs to the same school

Nagar No.3) in which students gave overall rating between "bad and neutral" (Mean=2.65) to the school.

Non-parametric test for independent samples (Mann Whitney U test)[12] is used to see whether there is significant difference in the average score of class IX in all the subjects between two different schools.

Table 3. 51: Independent-Samples Mann-Whitney U Test to study performance in average scores of classes IX between two schools

Independent-Samples Mann-Whitney U Test Summary (N=80)	English	Hindi	Maths	Science	Social Science
Mann-Whitney U	454	485	505	571.5	647.5
Wilcoxon W	1274	1305	1325	1391.5	1467.5
Standardized Test Statistic	-3.332*	-3.032*	-2.846*	-2.203*	-1.469
Asymptotic Sig. (2-sided test)	0.001	0.002	0.004	0.028	0.142

**Statistically significant differences at the level of significance (0.05) or less*

From the above table, it can be concluded that average score in Shakti Nagar No.1 School is statistically significantly higher than the Shakti Nagar No.3 School in all subjects except for Social Science ($p < 0.05$). Here, the null hypothesis is that there is no difference in average scores between two schools. As the p value is less than 0.05, we can reject the null hypothesis for all subjects except Social Science, and can infer that Shakti Nagar No.1 School perform better in subjects English, Hindi, Maths and Science as compared to Shakti Nagar No.3 School.

[12] The Mann-Whitney U test is basically used to compare differences between two independent groups when the variable is either ordinal or continuous, and not normally distributed. https://statistics.laerd.com/spss-tutorials/mann-whitney-u-test-using-spss-statistics.php

Chapter-4: Summary of findings and Conclusion

The study attempted to look in the expenditure on education in Delhi and other states, condition of physical infrastructure facilities in Delhi Government schools and learning outcomes of students based on students' scores from 2015-16 (class VI) to 2019-20 (class X), when AAP government came into power in 2015. The first chapter presents introduction, objectives, hypothesis, methodology and relevance of the study. The second chapter deals with literature review on importance of infrastructure facilities in school and Delhi Education Model and related interventions by Delhi government in particular. The third chapter includes data analysis related to infrastructure facilities in two Delhi govt schools and students score analysis for five years based on the data collected from Controller of Examination of the schools. And, finally the fourth chapter presents summary of findings and concludes with final remarks.

4.1 Summary of findings

With respect to physical infrastructure facilities in Delhi Government schools, both the schools (Shakti Nagar No.1 and Shakti Nagar No.3 school) are in good condition in terms of classrooms, toilets, electricity connection and drinking water facilities. But students of Shakti Nagar No.3 school are not satisfied with playground as there is no proper playground in the school. The facilities of separate labs for Physics, Biology, Chemistry, Mathematics are not

there and computer facilities and smart boards are very less in this school compared to Shakti Nagar No.1 school, which is having separate labs for each subject in turn helping students to learn with more interest and also having a well-equipped computer room with adequate number of computers and digital boards. Also, girls are very much satisfied with the menstruation facilities provided in the school. Students (girls) in Shakti Nagar No.1 school gave overall rating of the school between "neutral" and "good" and students for Shakti Nagar No.3 School (boys) gave overall rating of the school between "bad" and "neutral". Overall, it can be seen that physical infrastructure of Shakti Nagar No.1 School is better than Shakti Nagar No.3 School.

With respect to learning outcomes, data on students' marks was collected from Controller of Examination of the schools. For Shakti Nagar No.1 school (girls), class average has increased in class VII (soon after the implementation of Chunauti scheme) as compared to class VI for all the subjects except for social science where the class average remains almost same. For Shakti Nagar No.3 school (boys), class average has increased in class VII as compared to class VI for all the subjects except for subject Maths, where the performance was almost similar. Hence, for the No.1 school, Chunauti program proved fruitful soon after its implementation in 2016-17 for all the three subjects- English, Hindi and Maths and for the No.3 school, Chunauti program proved fruitful for the subjects English and Hindi soon after its implementation in 2016-17, but not for the subject Maths. The reason for this could be improper implementation of this scheme in this school or because of too weak learning foundations and basics of students in this subject.

Chunauti program proved to be effective soon after its implementation in 2016-17 (class VII), but the results for the same are not effective after years of its implementation (2019-20), except in the subject English for Shakti Nagar No.3 School, where the reason can be again because of improper implementation of Chunauti scheme i.e. when the student is performing below average, he/she will be get special attention to improve his/her learning outcomes by putting the student in the group of underperforming students. But as soon as the student starts performing well in the subject, the focus will get shifted to other weak students and that particular student will be removed from that group. And, that student, is back on the same track as before. As a result, in the long-term student's performance cannot be improved.

Also, class average has decreased in the subject Science for both the schools, which Chunauti scheme does not focus on.

Average score is highest in class VII (soon after the implementation of Chunauti program) and from class VIII to class X, average score of the class is falling especially in class IX which can be due to no-detention policy since 2020. Students till class VIII do not focus on studies much as there was rule of no-detention till class VIII, and a result of this, the consequences can be seen in after classes where the student can face detention if he/she does not perform well.

In both the schools, average marks of the class are lowest in the subject Maths and second lowest in subject Science, and the performance in both the subjects have been degraded over the years. Also, the percentage of students scoring less than 33 marks in subjects Maths and Science have increased from class VI to class X. The fear of subject, the way the subject is taught in schools, rote-learning, lack of interest, and the lack of connection are the main reasons why students under perform in subject Maths as compared to other subjects.

School infrastructure plays important role in determining learning outcomes of the students. From our study, we can see that the school (Shakti Nagar No.1 school) in which students (girls) are satisfied with school infrastructure of the school has higher average score in all the subjects compared to school (Shakti Nagar No.3 school) where some facilities related to school infrastructure are lacking and students (boys) are less satisfied. It can also be seen that girls (No.1 school) perform better than boys (No. 3 school). Both the schools have high average scores compared to national average score and Delhi average score for the subjects Maths, Science and Social Science. But for Shakti Nagar No.3 School (boys), margin is little lower.

4.2 Policy Implications and Future Scope of the Study

School infrastructure has improved in Delhi government school during the past five years, but some of the schools still needs little improvement, for example, in our study Shakti Nagar No. 3 School should have proper playground, labs, computers and digital boards for students. As seen from the literature, improvement in school infrastructure contribute to better learning outcomes. Analysis of scores portray that, students underperform in subject Maths as compared to other subjects. For this, Delhi government is trying to work with Math's mentor-teachers to improve the approach, mainly by focusing on subject-specific monitoring. Delhi government is working with Jodo Gyan which is a non-profit organization working on innovative practices in Maths and science, and they have asked them to work with their mentor-teachers from the Maths discipline. Resource persons from higher education institutes

were invited to interact with these teachers. Math's lab is other big initiative by Delhi government in this regard, where the student's concept can get cleared and the interest in the subject is awakened. Subject-specific classrooms or labs equipped with appropriate resources should be there so that students can move in and out as per their time-table. To improve the learning outcomes in class IX and class X, and to reduce the effects of no-detention policy, government should focus on proper implementation of Chunauti scheme as learning outcomes of students have been improved soon after the implementation of the program. Progress of the student, who is weak in a particular subject should not be tracked only for one period but should continuously and consistently monitored to bring him/her to the required level. The focus should be on improving the basic and foundational skills of the students from the beginning itself so that student does not need to struggle much at later stages. Also, government should include the subject Science in the program to improve the learning outcomes of students, as it can be seen from the analysis that the average score in this subject is lowest after the subject Maths. Effective monitoring of school infrastructure facilities and monitoring of students' progress by government and other agencies should be done at proper intervals to make the students perform well academically.

The study covers only two government schools of Delhi. Including more government schools and private schools will give a better understanding of the condition of infrastructure facilities and the difference in the scores of the students in different schools. Also, others dimensions of the model like Mentor- teacher programs and policies for effective teaching can be analysed to build a deeper understanding of the model. The study can also look into the socio-economic conditions of students which can give a broader understanding of education facilities in Delhi.

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APPENDIX

Questionnaire for Students

Identification			
Name		School Name (with add)	
Age		Standard/Division	
Gender	Male Female	Residential Address	
Caste	SC ST OBC Gen Others:	Parent's Phn. No.	
First language	Hindi Urdu	Medium of education	Hindi medium English medium both

Infrastructure: Please rate your satisfaction and improvement with the school on the following parameters:									
	Satisfaction					Improvement			
	Very Dissatisfied	Not satisfied	Neutral	Satisfied	Very Satisfied	Not improved	Slightly improved	Improved to a great extent	Don't know
Proper Blackboards									
Working conditions of Fans									
Quality of desks									
Quality of washrooms									
Classroom cleanliness									
Use of technology									
Modern look of classrooms									
Facility of library									
Sports facilities									
Playground									
Labs									
Safe Drinking water									
Proper Electricity									
Computer facilities									
Menstruation hygiene facilities for girls									

Comments/Suggestions:

Please give rating on the below mentioned parameters from 0-5 where 0 being very bad and 5 being very good:	
Rating on your learning levels (Chunauti, Summer camps)	
Rating on your overall mental well-being (HC)	
Rating on school Infrastructure	
Rating on teacher's engagement	
Rating on your teaching aids	
Rating on parent's involvement (Mega PTMs)	

Overall rating for the school as a whole		
Do you want to study in private/other school or continue with the same school?		

Suggestions/ Comments:

Questionnaire for Principals (Heads of Schools)

Personal Details of the Head Teacher		**School Information**	
Name		Name of the school (with address)	
Gender	Male/ Female	Level of School	
Age		Type of school	Boys/ Girls/ Co-ed
Qualification		Locality of School	Urban/Rural
Teaching Experience		Name of the district	

1. Please provide information about student's marks in the following subjects for the same batch for the past five years (Kindly attach the documents for student's marks)

	2015-16	2016-17	2017-18	2018-19	2019-20
	VI	VII	VIII	IX	X
English					
Maths					
Hindi					
Science					
Social Science					

Infrastructure

1. Availability of rooms

Facilities	**Yes**	**No**
Computer Lab		
Auditorium/Common Hall		
Sports Room		
Library		
Home Science Lab		
Medical Room/First Aid		
Physics Lab		
Chemistry Lab		
Biology Lab		
Yoga Room		
Any Other		

2. Availability of computers

Item	**Model**	**Working condition**	**Non-working**	**Total Nos.**
Computer				
Printer				
Scanner				
Computers connected with Internet				

Comments/ Suggestions:

Analysis of Delhi Education Model: Case Study of Two Delhi Government Schools (2015-2020)

by Pooja Goel

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