

FOSTERING PRIMARY EDUCATION IN ODISHA: THE ROLE OF SCHOOL INFRASTRUCTURAL FACILITIES

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ABSTRACT:

Inadequate physical infrastructure is a common cause of low educational attainment in many countries. An ideal learning environment is one that is fostered by well-maintained physical amenities. What this indicates is that pupils' academic performance is positively impacted by a modern educational infrastructure. Facilities in the infrastructure have a significant impact on aspects like accessibility, safety, comfort, availability of resources, integration of technology, support from educators, community involvement, and diversity, all of which are essential in providing high-quality primary education. This article explores the role of infrastructure development in promoting the expansion of primary education in Odisha state using growth variance parameter and trend analysis in infrastructure results. The findings narrated that, in Odisha, primary schools reportedly lack a boundary wall in over 39% of cases, an electrical connection in 80% of cases, a playground in 77% of cases, and many more amenities. Consequently, it goes without saying that the federal and state governments should carefully assess the allocation and deployment of public funds for basic education in Odisha.

Keywords: Primary Education; Infrastructural Facilities; Net Enrolment Ratio; Classroom Conditions; Growth Trends

INTRODUCTION

Education is the deliberate means of encouraging learning, acquiring knowledge, expanding skills, and producing personality of a student. It is usually implemented through structured instruction in schools, colleges, universities, or other educational institutions. It includes a broad spectrum of experiences and interests meant to foster child's intellectual, social, emotional, and physical growth while providing them with the skills, values, and perspectives needed to get by in life, give back to the community, and pursue their own goals. The great philosopher Plato emphasized that "education was not merely about imparting knowledge but about cultivating wisdom, virtue, and the pursuit of truth."

The general structure of education system in India is three-fold in nature as elementary, secondary and higher education. Again, elementary education is sub-divided into two stage as primary and upper primary education. The aforesaid division may vary from state to state as the pattern of school education is diverse in India. Primary education is the initial learning stage of child's academic schooling which constitute from the age between 6 to 10 years in India or from Grade I to V. The foundation for lifelong learning, personal growth, and social participation is thought to be laid by primary school. It is often considered as a fundamental right and a driving force behind increasing social mobility and decreasing inequality. Furthermore, attaining more general societal objectives like social cohesion, public health, and economic development depends heavily on primary education. Primary education is the initial and essential phase of a student's development, laying the foundation for learning and grasping fundamental concepts crucial to personal development and the economic advancement of the nation. The central and state governments of the country have put forth a number of schemes and programs to accomplish the educational goals with the aim of efficiently fostering primary schooling. An effective education system can take place where there is an optimal provision of school infrastructural facilities for effective teaching and learning (Akhiero, 2011). There is no proper education no effective education will take place where there is no provision of school facilities for effective teaching and learning.

There is a multifaceted and interconnected relationship between primary school outcomes and infrastructure. To achieve the goal of 100 percent enrolment in elementary school, free and compulsory education in between 6-14 years of age, more inclusive and quality education is primarily relied on the infrastructural structure of the country (Boruah, 2017). Infrastructural facilities in schools typically include physical structures and amenities that support the educational environment to make an effective motivational strength among the students. The availability of efficient school buildings, proper classrooms for students, electricity connection at school, boundary wall, computer technology, separate toilet facility, ramp in school, free book bank facility, playground, etc. has a great significance for learning and school outcomes achievements (Bhunia and Shit, 2012), lack of infrastructural facilities resulted for a defective teaching learning process hence, government investments are essential to ensure adequate infrastructure, which also enhances teacher effectiveness, generates conducive learning environments, makes resources easier to access, encourages community involvement, and addresses socioeconomic gaps (Lahon, 2015). School infrastructure facilities have a significant influence on the effectiveness of learning outcomes in classroom (Nugroho and Wibowo, 2019). All of these factors interact to affect educational equity and student achievement, emphasizing the need for comprehensive approaches to infrastructure development to raise primary school outcomes.

In Odisha, typically government primary schools are broadly affected by infrastructural provision by the government in rural as well as urban areas. A number of primary schools in Odisha facing the problem of inadequate and unequal distribution of infrastructural facilities which consists poorly constructed buildings, overcrowded classrooms, lack of playground, toilets and drinking water provision. Addressing these aforementioned infrastructural issues

the government primary schools are not performing well in terms of learning outcomes. Hence, there is the need of concerted efforts from government authorities, educational institutions, civil society organizations, and communities to invest in infrastructure development, allocate resources effectively, and implement sustainable solutions to improve primary schooling outcomes in Odisha.

SIGNIFICANCE OF THE STUDY

The well-equipped infrastructural facilities in schools is crucial for creating an ideal learning environment for students. It improves student engagement, provides necessary educational resources, ensures safety, and promotes effective teaching and learning. Additionally, strong infrastructure fosters community support, integrates technology, and improves retention rates in primary education. A state like Odisha needs to prioritise the existing school infrastructure to promote growth and development in primary education. In conclusion, investing in and maintaining these facilities is essential for enhancing educational outcomes, promoting student success, and cultivating a positive educational environment that supports academic progress and development.

OBJECTIVES OF THE STUDY

1. To study the growth in net enrolment rates in Primary education in Odisha
2. To analyse the trends and pattern of infrastructural facilities under Primary education in Odisha
3. To examine the progress in classroom learning environment for primary students in Odisha

LIMITATIONS OF THE STUDY

The concern study is particularly focusing on the role of infrastructural facilities for the growth of primary school in Odisha not on elementary, secondary or higher education. The has been worked under government primary education and other else types of education is kept is constant i.e., which is not a relevant part of the study.

DATA SOURCES AND METHODOLOGY

The present study is absolutely cantered on secondary data to analyse the role of available primary school infrastructure for the improvement in primary educational outcomes in Odisha from 2002-03 to 2017-18. The data sources constitute RBI¹ annual report, OPEPA² (replaced to OSEPA³) publications, DISE⁴ annual report, SRC⁵ publications and Ministry of Education report in India. The trend and pattern of the study has been analysed with the application of statistical and mathematical tools like time series data, Annual Average Growth

¹ Research Bank of India yearly publications

² Odisha Primary Education Program Authority

³ Odisha School Education Program Authority,

⁴ District Information System for Education

⁵ School Report Card

Rate (AAGR), Compounded Annual Growth Rate (CAGR), Standard Deviation (SD), Mean, and Coefficient of Variation (CV).

Variables of the Study

The contemporary paper has worked on the following educational variables to determine the role of infrastructural facilities for the enhancement in primary school outcomes in the state.

Dependent Variable: Net Enrolment Ratio (NER)

Independent Variable: Infrastructural Facilities

The infrastructural facilities cover girl's toilet, drinking water, boundary wall, ramp in school, electricity, types of school buildings, library, kitchen shed, playground, and computer facilities.

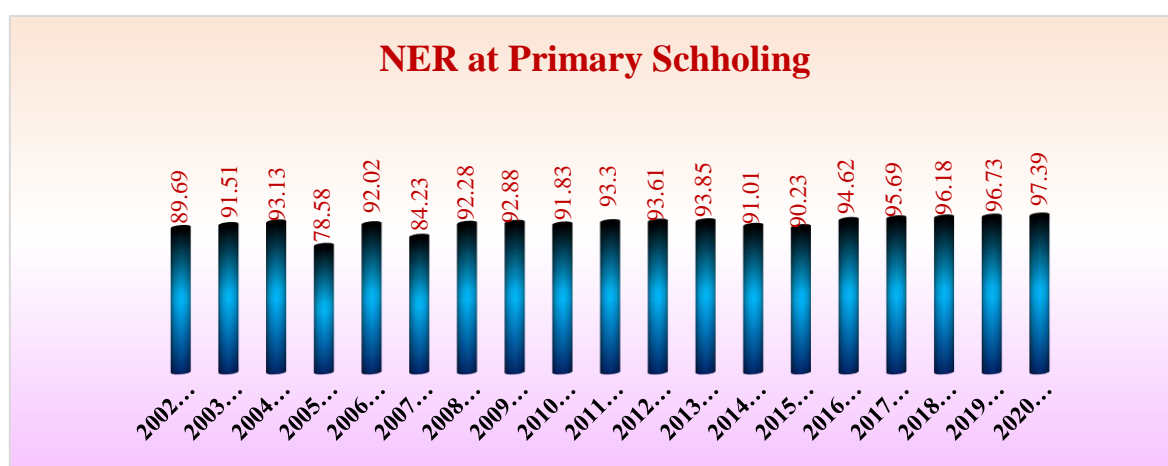
GROWTH IN NET ENROLMENT RATIO (NER) IN ODISHA

The net enrolment ratio (NER) measures the proportion of children of official primary school age (6 to 11 years) who are enrolled in primary school as compared to the total population in between that age. It serves as a critical indicator of access to and participation in primary education. A high NER indicates good accessibility and participation, suggesting effective outreach by the education system and willingness of families to send children to school. Conversely, a low NER may signal barriers like poverty, cultural norms, or inadequate educational infrastructure. The formula used in the study to calculate NER is;

$$NER_{pe} = \frac{\text{Number of Official age Students enrolled in Primary Education}}{\text{Total Population of official age 6 to 11 years}} \times 100$$

Here NER_{pe} = Net Enrolment Ratio in Primary Education

Fig. 1.1: Trends in NER at Primary Education in Odisha



Source: Economic Survey of Odisha, OSEPA and Authors Calculation⁶

⁶ Economic Survey of Odisha (2002-03 to 2006-07), Odisha School Education and Program Authority (2007-08 to 2017-18), Author's Calculation (2018-19 to 2020-21)

Table 1.1: Growth Trends in NER from 2002-03 to 2020-21

AAGR	CAGR	MEAN	SD	CV
0.66%	0.46%	92.04	4.29	4.66%

Source: Author's Calculation

From the above figure 1.1 it can be observed that the net enrolment ratio in the state has improved noticeably from 2002-03 to 2020-21. In 2002-03 the NER at primary school was 89.69 percent which significantly raise to 97.39 percent in the passage of near about two decades. The growth trends denote in the table 1.1 that annually 0.66 percent of improvement seen in NER but when we consider the annual compounded growth it reveals that 0.46 percent has increased in the enrolment rates in primary education. Hence it is found from the figure analysis that Odisha has made a remarkable progress in the studied period by improving the students the net enrolment ratio.

TRENDS IN SCHOOL INFRASTRUCTURAL PROVISION IN PRIMARY EDUCATION

From the past two decades the position of primary school infrastructure has changes a lot in the state. The school infrastructural provision is classified here on the basis of their physical form. It includes; primary school boundary wall which consist that primary schools having school boundary to protect from outside effect, drinking water facility for students within the school premises, book bank facility or the provision of library books, availability of girls toilet in separate, provision of electricity connection for smooth teaching- learning environment, computer facilities for early advancement of children, playground availability for mental and physical growth and ramp facility for the safely of students when entering the classrooms building.

Table 1.2: Trends in primary education infrastructural facilities

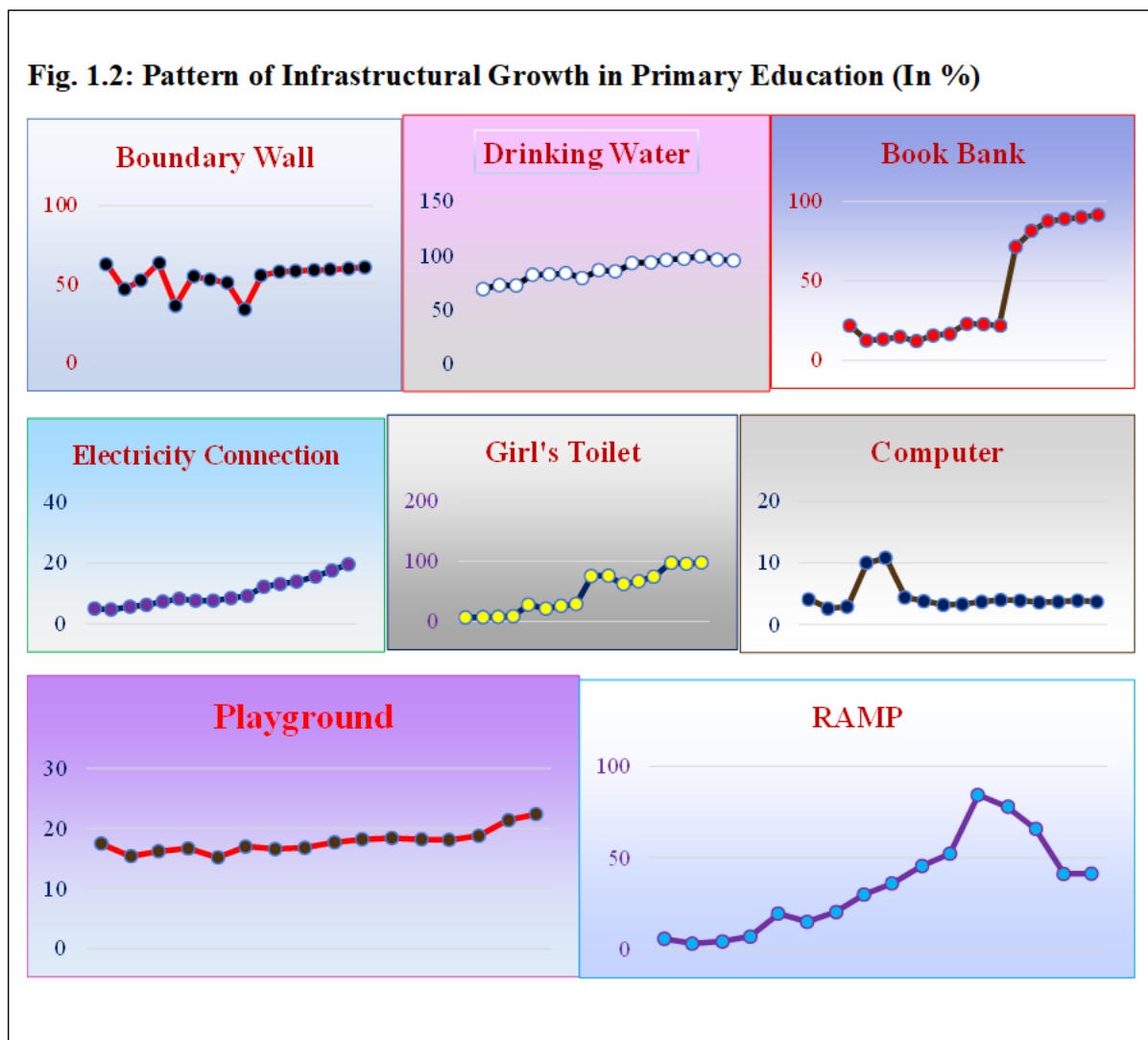
Year	Growth in Infrastructural Provision for Primary Education							
	BW	DW	BB	GT	EC	COM	PG	RAMP
2002-03	62.6	68.8	21.8	6.8	5.0	4.1	17.5	5.9
2003-04	46.7	72.6	12.6	7.1	4.7	2.6	15.4	3.3
2004-05	52.4	72.2	13.2	7.6	5.6	2.9	16.2	4.4
2005-06	63.3	82.2	14.8	9.0	6.2	10.0	16.7	7.1
2006-07	36.2	82.5	12.1	28.3	7.3	10.8	15.2	19.6
2007-08	54.9	83.5	15.7	21.4	8.2	4.4	17.0	15.2
2008-09	52.9	79.2	16.6	25.9	7.6	3.8	16.6	20.5
2009-10	50.8	86.4	23.0	29.0	7.6	3.2	16.8	30.1
2010-11	33.8	85.3	22.7	75.8	8.4	3.3	17.7	36.1
2011-12	55.5	92.9	21.9	76.0	9.2	3.7	18.2	45.6
2012-13	57.8	93.7	71.6	62.3	12.2	4.0	18.4	52.3
2013-14	58.3	95.9	81.7	67.0	13.1	3.9	18.2	84.4
2014-15	58.8	97.1	87.8	74.9	13.9	3.6	18.1	77.9
2015-16	59.2	99.3	89.1	97.4	15.5	3.7	18.8	65.9
2016-17	59.8	96.2	90.1	96.3	17.5	3.9	21.4	41.3

2017-18	60.7	95.4	91.7	98.1	19.6	3.7	22.4	41.4
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Source: State Elementary Education Report Card, NUEPA

Note: BW- Boundary Wall, DW- Drinking Water, BB- Book Bank, GT- Girls Toilet, EC- Electricity Connection, COM- Computer, PG- Playground

Figure 1.2: Pattern of Infrastructural Growth in Primary Education



Source: SRC Report Card (Annual Publications, NUEPA)

Table 1.3: Growth in Infrastructural Provision from 2002-03 to 2017-18aaa

Table 1.3: Growth trends in Infrastructural provision

	BW	DW	BB	GT	EC	COM	PG	RAMP
AAGR	3.24	2.32	18.57	29.78	9.94	10.35	1.87	23.20
CAGR	-0.21	2.20	10.05	19.48	9.53	-0.68	1.66	13.87
MEAN	53.98	86.45	42.90	48.93	10.10	4.48	17.79	34.44

SD	8.36	9.49	33.31	34.08	4.47	2.29	1.86	25.19
CV	15.48	10.97	77.64	69.65	44.30	51.08	10.46	73.15

Source: Author's Calculation

The above table and figure show the trend change in primary infrastructure facilities in the state from 2002-03 to 2017-18. The compounded annual growth in infrastructural provision reveals that besides expenditure for boundary wall and computer allocation all others indicators has persistently increased. A significant improvement has seemed in the provision of drinking water, book bank (library), separate girl's toilet, electricity to school, and ramp facilities to the primary schools. the growth in girl's toilet provision is highest among all with 19.48 percent.

CONDITIONS OF CLASSROOMS AND TYPES OF SCHOOL BUILDINGS

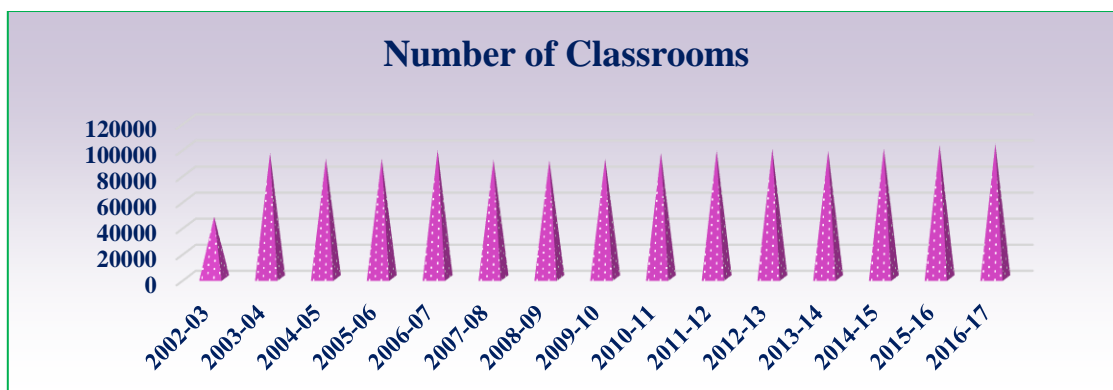
The condition of classrooms at primary level also reveals that it is an important factor for primary school development. The conditions of primary school buildings is not so good in the state even after the emergence of education sector through SSA in the state (Figure 1.4). The present study considered the good condition school, need minor repair, need major repair classrooms, pucca, partially pucca, kuccha, tent and multiple type building as the source of study for the influence to the enrolment. The below table and figure determine the change in primary school infrastructural environment in the state in between 2002-03 to 2016-17.

Table 1.4: Conditions of Primary School Classrooms

Year	Conditions of Primary School Classrooms			
	Total Classroom (In Number)	Good Condition (%)	Required Minor Repair (%)	Required Major Repair (%)
2002-03	47108	40.5	37.6	21.9
2003-04	96046	37.5	38.1	24.4
2004-05	91857	39.6	36.1	24.3
2005-06	91767	44.9	32.6	22.4
2006-07	98282	55.8	24.2	20.0
2007-08	90881	45.3	29.8	24.9
2008-09	90332	48.6	27.9	23.6
2009-10	91490	53.9	25.0	21.1
2010-11	96075	57.0	23.3	19.7
2011-12	97830	57.2	22.3	20.6
2012-13	99157	60.3	20.2	19.5
2013-14	97664	63.2	18.0	18.8
2014-15	99577	65.0	16.5	18.6
2015-16	102132	66.7	15.3	18.0
2016-17	102938	68.2	14.4	17.4

Source: State Elementary Education Report Card, NUEPA

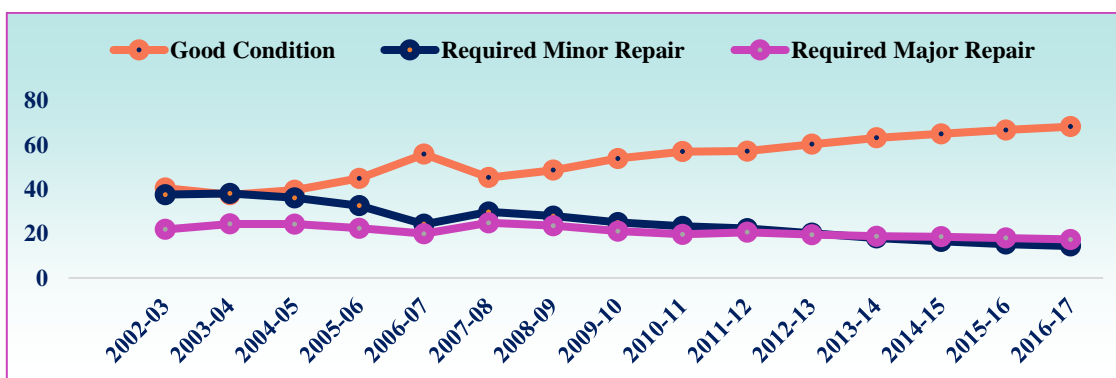
Fig. 1.3: Trends in the growth of total number of classrooms in Primary Schools



Source: SRC Report Card (Annual Publications, NUEPA)

The above figure shows that there is consistent rise in the number of primary classrooms for the maintenance of an effective learning outcomes in the state. In 2002-03, there are 47108 number of primary classrooms are present which increases to 96046 in 2003-04. But from 2003-04 to 2016-17 the rate of growth in stagnant with an annual growth of 0.06 percent annually.

Fig. 1.4: Pattern of changes in Primary School Classrooms



Source: SRC Report Card (Annual Publications, NUEPA)

From the figure 1.4 it can be generalized that the percental growth in good condition classroom has increases whereas the minor repaired and major repaired need schools have declined in the state. But still a significant part needs to improve under primary education for the fulfillment of the increase in students’ enrolment and student development.

Table 1.5: Growth in Conditions of Classroom in Primary Schools

	Total Classrooms	Good Condition	Minor Repair	Major Repair
AAGR	0.08	0.04	-0.06	-0.01
CAGR	0.06	0.04	-0.07	-0.02
MEAN	92875.73	53.58	25.42	21.01
SD	12851.97	9.93	7.75	2.38

CV	0.14	0.19	0.31	0.11
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Source: Author’s Calculation

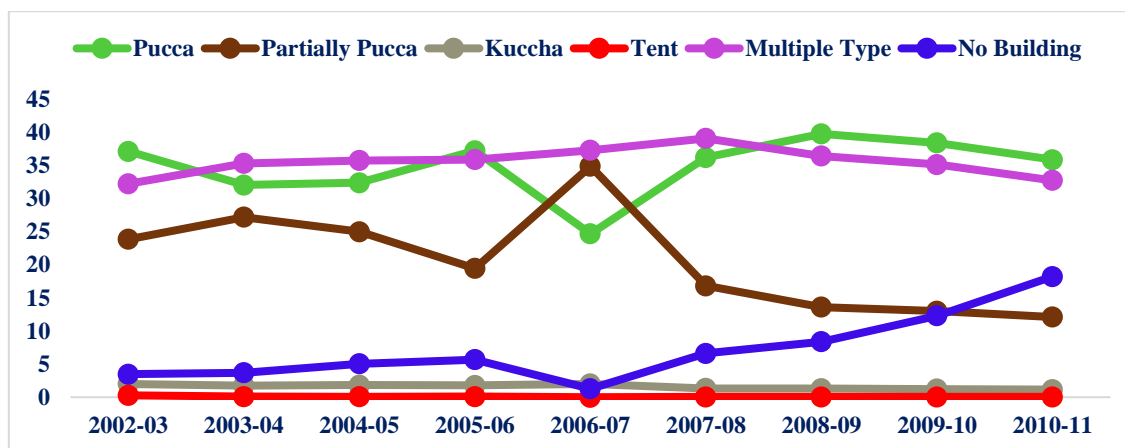
The above table and figures representing the structure of primary school classrooms and their changing conditions in the state. From figure 1.3 it is evident that the number of classrooms in the primary education has constantly increases with an annual compounded growth of 0.06 percent. One among the important outcome seemed from the figure 1.4 that good condition classroom has increases from 40.5 percent to 68.2 percent with a growth of 0.04 percent, whereas the major repaired primary classroom has declined from 21.9 percent to 17.4 percent with an annual reduction in 0.02 percent. Thus, it is needless to say that a sufficient expenditure needs for the repairment of classroom in the state.

Table 1.6: Percentage distribution of Primary Schools by Types of Building

Year	Primary Schools by Types of Building					
	Pucca	Partially Pucca	Kuccha	Tent	Multiple Type	Not Response
2002-03	37.07	23.83	1.99	0.28	32.19	3.48
2003-04	32.01	27.16	1.76	0.08	35.28	3.7
2004-05	32.36	24.97	1.84	0.07	35.71	5.04
2005-06	37.17	19.44	1.77	0.08	35.85	5.68
2006-07	24.64	34.84	2.00	0.00	37.26	1.27
2007-08	36.16	16.79	1.33	0.05	39.04	6.62
2008-09	39.72	13.58	1.31	0.05	36.37	8.37
2009-10	38.37	12.99	1.22	0.04	35.09	12.29
2010-11	35.82	12.09	1.15	0.04	32.7	18.21
CAGR	-0.43	-8.13	-6.63	-21.59	0.20	22.9
MEAN	34.81	20.63	1.60	0.08	35.50	7.18
SD	4.31	7.23	0.32	0.08	1.99	4.91
CV	12.39	35.06	20.11	98.57	5.60	68.36

Source: State Elementary Education Report Card, NUEPA

Figure 1.5: Trend Pattern of Primary school Buildings



Source: SRC Report Card (Annual Publications, NUEPA)

The above table illustrates the changes structure of various types of primary school buildings in the state in between 2002-03 to 2010-11. The study found that many institutions has transferred from the kuccha and tent types buildings to the pucca and partially building in last ten years. Still after ten years of study many primary schools come under multiple types of building in the state which shows that the condition of the primary schools is in bad situation. The annual compounded reduction in pucca and partially pucca primary school of 0.43 and 8.13 percent respectively reveals that schools are going towards worst situation in the state.

RESULT AND FINDINGS OF THE STUDY

Infrastructural provision plays a greater role for the growth and development of any types of educational institutions in the world. In Odisha also it has a vital impact for primary education. The study came to the major denotations after the data analysis of primary infrastructural provision is given below;

- ❖ The Net Enrolment Ratio (NER) has significantly improved in the state by an annual compounded growth of 0.46 percent and reaches to 97.39 percent in the state
- ❖ The infrastructural provision is quite not satisfactory in case of boundary wall (-0.21 percent growth) and computer facility (-0.68 percent growth)
- ❖ Still 80.4 percent primary schools are running without electricity connection and 77.6 percent schools without playground facility for physical and mental growth of the students
- ❖ A substantial growth of 2.20 percent per annum has been found in drinking water provision for primary students.
- ❖ One among the significant improvement seen in case of book bank provision for students with an annual 10.05 percent.
- ❖ The provision of girls' toilet is among the foremost enhancement found with an annual compounded growth of 19.48 percent.
- ❖ Ramp facility allotment also increases fruitfully from 5.9 percent to 41.4 percent in the studied period
- ❖ The total number of primary classrooms has increases in a constant rate of 0.06 percent annually.
- ❖ The good conditioned classroom for smooth study environment has increases with an annual 0.04 percent.
- ❖ The reduction in minor and major repaired classroom has changes from 37.6 percent to 14.4 percent (-0.07 percent for minor repaired classroom) and 21.9 to 17.4 percent (-0.02 percent for major repaired classroom).
- ❖ The pucca school building in coarse of time has declined with 0.43 percent annually.
- ❖ Partially pucca and Kuchha type building also declined with 8.13 percent and 6.63 percent per annum respectively.
- ❖ Primary schools running with multiple type of building has increases with an annual 0.20 percent in the studied period.
- ❖ The overall types of building have not growth satisfactorily.

DISCUSSION AND CONCLUSION

The data accentuate both progress and challenges in primary education infrastructure in Odisha. The data analysis of primary education infrastructure in Odisha reveals a significant improvement in net enrolment ratio (NER) to 97.39%, yet highlights persistent challenges. The negative growth in boundary walls and computer facilities underscores security and technological deficiencies in the state. Widespread lack of electricity (80.4%) and playgrounds (77.6%) remains critical for achievement of UEE in the state. Positive strides include annual growth in drinking water provision (2.20%), book banks (10.05%), girls' toilet access (19.48%) and ramp facilities (5.9% to 41.4%) show a substantial progress. Marginal increases in classrooms and improvement in its condition reflect ongoing maintenance efforts for the primary education. Declines in pucca, partially pucca, and kuccha buildings suggest a shift toward more stable structures, despite varied infrastructure scenarios in primary level. From the above analysis the study came to the notation that while there have been gains in enrollment, drinking water facilities, and amenities like girls' toilets and ramps, deficiencies in boundary walls, computer facilities, electricity, and playgrounds persist in the state. The maintenance and upgrade of classroom conditions are ongoing but need consistent effort from the government. Addressing these gaps comprehensively is crucial for providing a conducive learning environment that supports the holistic development of students in Odisha. Hence, comprehensive efforts are needed to ensure uniform and satisfactory infrastructure development, supporting holistic student growth under primary education in Odisha.

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