

Fostering Holistic Excellence in Higher Education: A Case-Based Framework for Quality Enhancement

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ABSTRACT:

To assess the quality of individual schools in India, the National University of Educational Planning and Administration (NUEPA) created a ten-point grading system based on ten indicators specified under the Right to Education (RTE) Act. However, this framework frequently ignores important factors like the availability of health facilities, access to digital resources like computers, and classroom infrastructure. Furthermore, the grading criteria do not take into account teachers' professional development, a topic that is frequently highlighted in government education policies. In light of this, the current study aims to pinpoint the School Grading System's current and neglected indicators as well as suggest adding other crucial elements that can provide a more comprehensive picture of school quality. The study examines the true picture of educational quality across schools in the Basanti CD Block of the Sundarban region, West Bengal, by contrasting the prior and updated grading results. This case-based survey presents an empirically supported framework for evaluating institutional performance based on primary and secondary data gathered from specific institutions. When analyzed through an essentialist perspective, the results indicate that the suggested model can make a substantial contribution to future school planning and management techniques meant to improve the general standard of education.

Keywords: *Indicators, Indian Sundarban Delta, NUEPA, Quality of Education, School Grading System, etc.*

Introduction:

The quality of educational institutions can be explained and assigned as letters, ranges, percentages, or numbers out of the total through the process of grading. **A ten-point scale (where the 1-lowest grade; and 10-highest grade)** based on ten indicators [*Boundary wall, Playground, Separate Toilet for Boys, Separate Toilet for Girls, Drinking Water, Library, Ramp for Children for Special Need (CWSN), Pupil-Teacher Ratio (PTR), Student Classroom Ratio (SCR), Teacher-Classroom Ratio (TCR)*] is constructed by NUEPA (**National University of Educational Planning and Administration, New Delhi**). **Nine new indicators** [*Number of*

Classrooms, Condition of Classroom, Separate Head Master cum Office Room, Medical facilities in schools, Availability of Electricity in Schools, Professional qualification of teacher, Computer facility, Head Teacher, and Accessibility] are added to the existing NUEPA to modify the list. An attempt to convert the grades into quality is made in this research paper. Based on this, the schools are categorized here on a **five-point scale of quality** viz. *low, not satisfactory, medium, satisfactory, and high* based on grades provided by NUEPA. Further, based on newly selected indicators, a new grade for each school is also assigned. Therefore, the significance of the revised set of indicators is discussed here to conclude whether the revised set is more capable of assessing the quality of a school or not.

Research Objective(s):

The research is made to highlight and analyse also the overall changes in the school's quality grading pattern. A picture of the distribution of schools based on grades provided by NUEPA (National University of Educational Planning and Administration, New Delhi) along with some newly added indicators as discussed in this paper along with to model the significance of the entire system empirically and validate it with the help of statistical software.

Materials and Methods:

- An extensive literature review is done to get a detailed overview of existing NUEPA indicators and at the same time to identify the limitations of the same.
- Some additional indicators are added to the existing NUPEA system.
- Then data collection and analysis are done to draw an inference that must satisfy the research objective(s) altogether.

The entire steps of constructing this research paper are discussed stepwise below:

Literature Review:

The quality of an institution is described as an interlinked action among supply, demand, and learning processes. Input-output-process indicators of quality education are selected by *Hawes et al.*, where learning resources such as textbooks, and blackboards, along with teacher and pupil are notified as input; assessment scores measuring pupil's achievement are considered as outputs; and the time spent for task, class management, and constructivist way of child-centred learnings are taken as the process (*Hawes and Stephens, 1990; Shaeffer, 1992; Heneveld, 1994; Stephens, 1997; Abagi and Odipo, 1997*). The quality of the experiences gathered in the classroom by Indian students is considered an important parameter for measuring their educational achievement and more statistical value is encompassed if the socio-economic condition of their family is accounted for, as proclaimed by the Coleman Report (*Coleman et al., 1966*). The feasibility of an indicator is determined by certain basic information carried by some components of an indicator (Monitoring and Evaluation Reference Group (MERG); *UNAIDS; 2010*)[see. Table -1 below:].

Table -1: Components of an Indicator

Component	Explanation of Component	Example from Research
Title	A clear title/heading that catches the focus of an indicator	PUPIL-TEACHER RATIO (PTR)
Definition	A brief description of an indicator	PTR is the number of students who attend an institution divided by the number of teachers in that institution in an academic year
Rationale	Why the indicator is needed- the Logic that supports the development of an indicator	This measures the class size
Method of measurement	What is the data collection tool and process of measurement-the logical order to measure indicators?	Class size affects the teaching-learning process within a classroom
Numerator	The top number above the line of a common fraction	Review of literature and quantitative analysis
Denominator	A bottom number above the line of a common fraction	Number of students in a school in an academic year (100)
Calculation	Deliberate process to determine the indicator value	Number of teachers in a school in an academic year (5)
Data collection method	Primary method (survey) and secondary method (record,journal) can be used	Numbers of students in a school in an academic year (100)/ Numbers of teachers in a school in an academic year (5)
Data disaggregation	Separation of information into subgroups to understand and analyze the trends more precisely	School report card
Strength and weakness	An outline of what the indicator can perform well or not so well	Strength- class size Weakness-quantitative not qualitative
Challenges	Barriers or obstacles that may have an impact on the use of an indicator or the validity of the finding	Different norms and standards for different categories of schools

Component	Explanation of Component	Example from Research
Relevant source of additional information	Reference to indicator-related information	The Right of Children to Free and Compulsory Education Act, 2009; Ministry of law and justice

Source: Modified after UNAIDS Monitoring and Evaluation Fundamental, 2010

A variety of strategies are used by policymakers to revamp instruction, enhance the professionalism of teachers, and restructure the relationship between schools and their clients (Elmore, 1990). While access to education for all children in India is mentioned by the Right to Education Act of 2009, a demand is felt for the improvement of the quality of education. The need for quality improvement across the school education system is strengthened by data from assessments such as the Annual Status of Education Report and the National Achievement Survey (*School Education Quality Index, NITI Aayog, 2019*). A credible regular assessment of the performance and effectiveness of policy across the States and Union Territories in India is developed in close alliance with the Ministry of Human Resource Development, sector experts, and the World Bank (Kant, 2019). An index consisting of 33 indicators is made collaboratively by MHRD, sector experts, and the World Bank. Two major categories of that index, namely Outcomes and Governance processes aiding outcomes, are shown in **Table -2**. Four domains i.e. Learning Outcomes, Access Outcomes, Infrastructure and facilities, and Equity Outcomes are categorized in the first category. Domains related to student and teacher attendance systems, teacher and administrative adequacy, training, as well as accountability, and transparency are included in the Governance Processes category. Scores in this category are primarily driven by a state's performance on indicators related to school leadership, teacher availability, and transparency in teacher/school leader recruitment.

Table -2: Number of indicators for School Education Quality Index, NITI Aayog

Category	Domain	Number of indicators
1. Outcomes	1.1 Learning outcomes	3
	1.2 Access outcomes	3
	1.3 Infrastructure and facilities for outcomes	3
	1.4 Equity outcomes	7
2. Governance processes aiding outcomes	Covering attendance, teacher adequacy, administrative adequacy, training, accountability and transparency	17
Total		33

Source: School Education Quality Index, NITI Aayog, 2019

NUEPA (National University of Educational Planning and Administration) is built by the Ministry of Human Resource Development for capacity building and research for the planning and management of education in India.

Data Analysis and Interpretation-

Data Collection - The data is collected from Department of Sundarban Affairs, West Bengal, school Database of U-DISE-Unified District Information System for Education, a web-enabled database maintained by NUEPA (National University of Educational Planning and Administration, New Delhi) (NUEPA, 2023).

Sampling Technique Used-Random sampling.

Sample Size-339

Locality- This study is done in the Basanti Community Development Block of the Indian Sundarban Delta. Basanti CD block, located at 22.1983°N and 88.71389°E.

Results & Discussion:

Existing and Modified Indicators- Ten indicators [Boundary wall, Playground, Separate Toilet for Boys, Separate Toilet for Girls, Drinking Water, Library, Ramp for Children for Special Need (CWSN), Pupil-Teacher Ratio (PTR), Student Classroom Ratio (SCR), Teacher-Classroom Ratio (TCR)] is constructed by NUEPA (National University of Educational Planning and Administration, New Delhi) is listed below (Table-3). Nine new indicators [Number of Classrooms, Condition of Classroom, Separate Head Master cum Office Room, Medical facilities in schools, Availability of Electricity in Schools, Professional qualification of teacher, Computer facility, Head Teacher, and Accessibility] are added to the existing NUEPA to modify the list and the list of modified indicators are presented (Table-4).

Table -3: List of Existing Indicators

1	Boundary wall
2	Playground
3	Drinking water
4	Boys' toilet
5	Girls' toilet
6	Library
7	Ramp for Children for Special Need (CWSN)
8	Pupil-Teacher Ratio (PTR)
9	Student-Classroom Ratio (SCR)
10	Teacher-Classroom Ratio (TCR)

Source: NUEPA, Author's assumptions

Table -4: List of Revised Indicators

1	Boundary wall
2	Playground
3	Drinking water
4	Boys' toilet
5	Girls' toilet
6	Library
7	Ramp for Children for Special Need (CWSN)

8	Pupil-Teacher Ratio (PTR)
9	Student-Classroom Ratio (SCR)
10	Teacher-Classroom Ratio (TCR)
11	Numbers of Classroom
12	Condition of Classroom
13	Separate Head Master Room Cum Office Room
14	Medical Facility
15	Electricity
16	Computer Facility
17	Teachers with Professional Qualification
18	Head Teacher
19	Approachability in all Weather Road

Source: NUEPA, Author's assumptions

An overall attempt is taken to present a comparative analysis (Figure-1) between the existing quality calculated from the NUEPA indicators and the quality of schools calculated from the modified list of nineteen indicators (Table 3, Table 4).

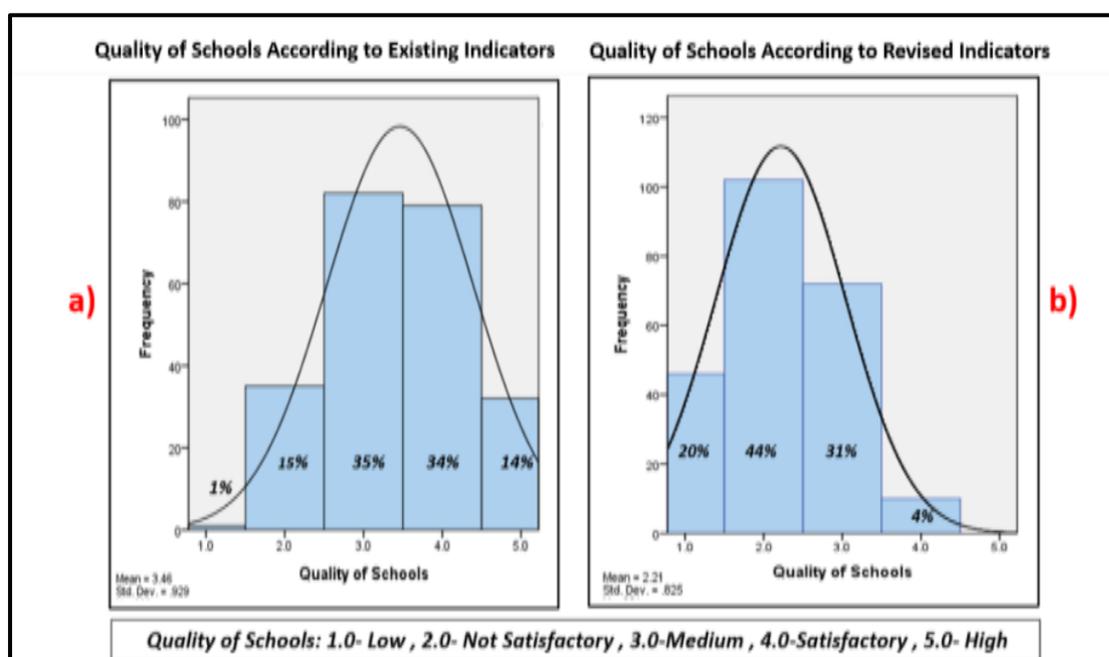


Figure-1: Comparison between Quality of Schools According to Existing and Revised Indicators (Source: Ghosh & Ghosh,2021)

Among the total number of schools, 35% and 34% of schools are observed as medium and satisfactory quality schools based on the NUEPA indicator. A significant rise for the category of not satisfactory schools from 15% to 44% and for low quality schools from 1% to 20% is depicted when the revised indicators are considered. A decreasing trend is observed for the medium category schools. Overall, it is concluded that an increase in the percentage of schools

is observed for low and not satisfactory quality conversely, the decreasing trend in medium, satisfactory, and high-quality schools is demonstrated (Figure -1). An attempt has been made to compare the changes in school quality through the map afterward.

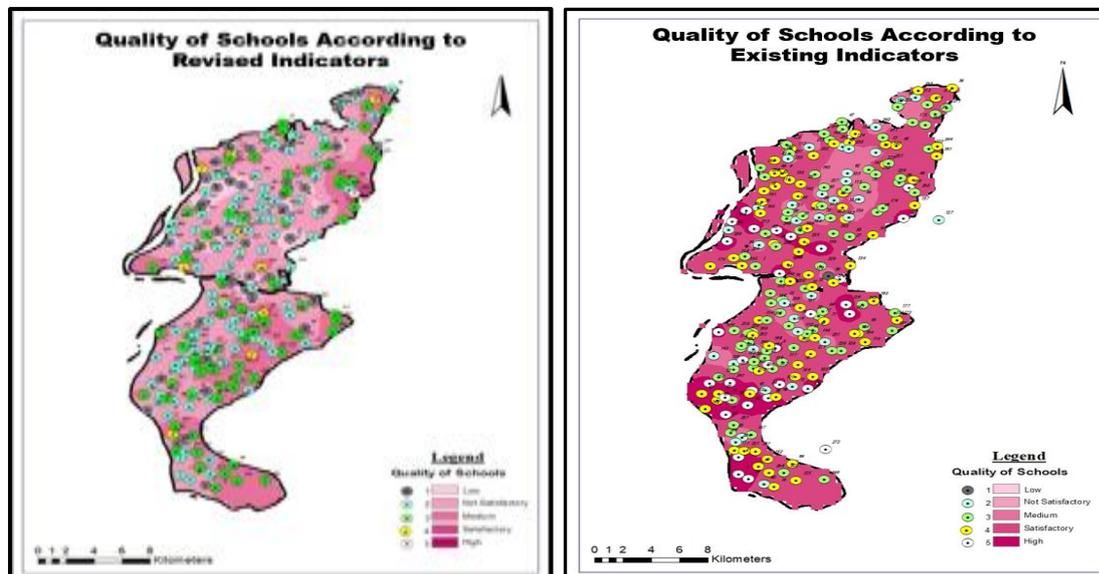


Figure-2: Map Showing Distribution of School Quality According to Existing Indicators
 (Source: Ghosh & Ghosh,2021)

Figure-3: Map Showing Distribution of School Quality According to Revised Indicators
 (Source: Ghosh & Ghosh,2021)

Discussion- A comparative analysis of the distribution of school quality is shown in Figure 2 and Figure 3. Medium and satisfactory quality schools are dominant based on NUEPA indicators (Figure-2). On the other hand, the dominant proportion of not satisfactory schools is observed when revised indicators are taken into account (Figure -2, Figure - 3).

Data Validation- Data validation is done through software and the subsequent results are discussed below:

Statistical Tools Used for Data Validation-

- I. Factor Analysis
- II. Regression Analysis

I. Factor Analysis- Using the statistical tool SPSS, the factor analysis is performed over the aforesaid available data set, and the results obtained and interpreted as discussed below:

A. Total Variance Explained - The number of extracted factors whose sum should be equal to the number of items are subjected to factor analysis. All the factors extractable from the analysis along with their Eigen values are shown here. For analysis and interpretation purposes, extracted sums of squared loadings are considered. Here, the factors for 20.637%, 14.495%, 8.383%, and 6.768% are accounted as significant. All the remaining factors are not significant (Table-5).

Table -5: Total Variance Explained by Principal Component Analysis

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.127	20.637	20.637	4.127	20.637	20.637	4.116	20.578	20.578
2	2.899	14.496	35.132	2.899	14.496	35.132	2.864	14.320	34.897
3	1.677	8.383	43.516	1.677	8.383	43.516	1.577	7.883	42.781
4	1.354	6.768	50.284	1.354	6.768	50.284	1.501	7.503	50.284
5	1.065	5.326	55.610						
6	1.022	5.109	60.720						
7	.894	4.472	65.192						
8	.851	4.253	69.445						
9	.800	4.002	73.447						
10	.760	3.799	77.246						
11	.713	3.566	80.812						
12	.661	3.304	84.116						
13	.594	2.970	87.086						
14	.558	2.788	89.873						
15	.492	2.461	92.334						
16	.449	2.245	94.579						
17	.380	1.898	96.477						
18	.353	1.765	98.242						
19	.210	1.048	99.290						
20	.142	.710	100.000						

Extraction Method: Principal Component Analysis.

(Data Source: DISE 2017-18; by SPSS)

B. Scree Plot—A graph of the Eigen values against all the factors is called a scree plot. Here, Factor 4 onwards have an Eigen value of less than 1, so four (4) factors are retained (Figure-4).

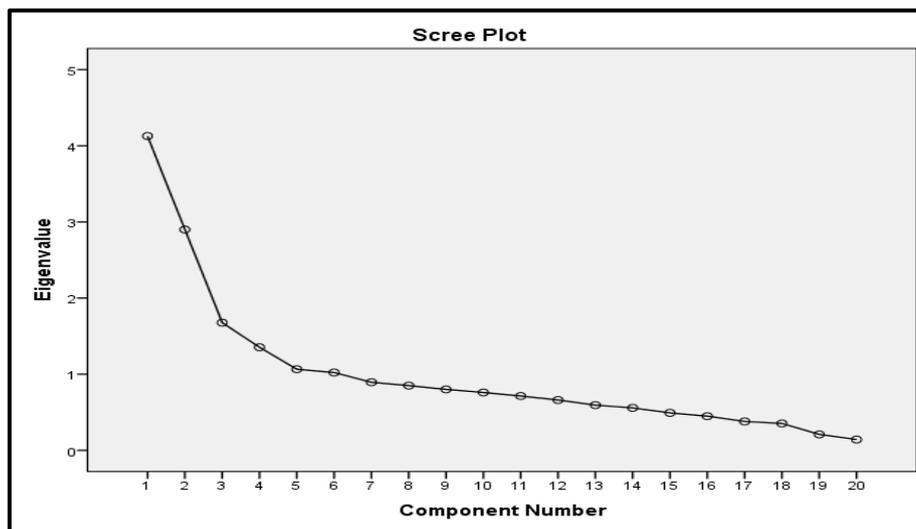


Figure -4: Scree Plot of Eigen Value
 (Data Source: DISE 2017-18; by SPSS)

C. Rotated Component Matrix—Looking at the table below, it is seen that PTR, SCR, TCR, etc. are substantially loaded on Factor 1 while PGROUND, MEDCHK, RAMPS, etc. are substantially loaded on Factor 2 and ACCESS is present in Factor 3 and PROF QUAL is on Factor 4 (Table - 6).

Table - 6: Rotated Component Matrix by Principal Component Analysis

Indicator	Rotated Component Matrix			
	1	2	3	4
BNDRYWALL-CD	-.012	.595	.091	-.189
PGROUND_CD	-.076	.518	-.136	-.115
TOILETB_CD	-.073	.757	.090	.476
TOILET G-CD	.074	.772	.081	.564
PTR_CD	.802	.013	-.052	.069
RAMPS_CD	.024	.674	.162	-.023
CL NO-CD	-.041	.624	.553	.124
CL GOOD CD	-.006	.714	.414	-.005
MEDCHK_CD	.006	.521	-.148	-.108
ELECTRIC_CD	-.073	.773	.149	.043
CAL-CD	.122	.746	-.632	.103
HEADTCH-CD	.747	-.238	-.443	-.167
SCR_CD	.897	-.050	-.003	.007
DRNK WTR_CD	-.063	.673	.149	.033
TCR_CD	.796	-.029	-.033	-.044
HMROOM_CD	-.004	.678	-.096	-.104
ACCESS_CD	.481	.042	.618	.284
PROF QUAL_CD	.634	.018	.066	.886
NUEPA CD	.750	.617	.002	.004
MODIFIED CD	.887	.813	.717	.871

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.

(Data Source: DISE 2017-18; by SPSS)

D. Factorization-Based on the above analysis the four factors are mainly identified and named as Factor 1, Factor 2, Factor, and Factor 4 based on which further analysis takes place in the next section (Table-7). Here the list of indicators selected by NUEPA is coded as NUEPA CD and the modified list of indicators is coded as MODOFIED CD as discussed in this paper before.

Table -7: List of Factorization

Factor 1	Factor 2	Factor 3	Factor 4
PTR Pupil-Teacher Ratio	PGROUND_CD Playground	ACCESS_CD Accessibility	PROF QUAL_CD Professional qualification
SCR Student-Classroom Ratio	TOILETB_CD Boys Toilet		
TCR Teacher-Classroom Ratio	TOILET G-CD Girls Toilet		
HEADTCH Head-Teacher	RAMPS_CD Ramp for Disable children		
	CL NO-CD Number of classrooms		
	CL GOOD CD Classroom goods		
	MEDCHK_CD Medical Room		
	ELECTRIC_CD Electricity		
	CAL-CD Computer Facility		
	HMROOM_CD Head-teacher cum office room		
	BNDRYWALL-CD: Boundary wall		
	DRNK WTR_CD Drinking Water		
NUEPA CD	NUEPA CD		
MODIFIED CD	MODIFIED CD	MODIFIED CD	MODIFIED CD

(Data Source: DISE 2017-18; by SPSS)

II. Regression Model-

A. Model Formulation-The linear regression model is presented for NUEPA CODE and MODIFIED CODE:

Table - 8: Linear Regression Model (Dependent: NUEPA CD)

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	FACTOR 1 FACTOR 2		Enter

a. Dependent Variable: NUEPA CODE
 b. All requested variables entered.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.714 ^a	.510	.501	.6554	1.904

a. Predictors: (Constant), FACTOR 1, FACTOR 2
 b. Dependent Variable: NUEPA CD

Data Source: DISE 2017-18; by SPSS

Table -9: Linear Regression Model (Dependent: MODIFIED CD)

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method
1	FACTOR 1 FACTOR 2 FACTOR 3 FACTOR 4		Enter

a. Dependent Variable: MODIFIED CD
 b. All requested variables entered.

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.945 ^a	.892	.889	.2743	1.926

a. Predictors: (Constant), FACTOR 1, FACTOR 2, FACTOR 3, FACTOR 4
 b. Dependent Variable: MODIFIED CD

Data Source: DISE 2017-18; by SPSS

Model Interpretation- R value of NUEPA CD and MODIFIED CD are shown in **Table-9** and **Table-10**. The correlation between predicted and observed job performance is depicted by the R-value. The adjusted R^2 of the NUEPA model is 0.501 with the $R^2 = 0.510$. Therefore, 51% of the variance in the data is explained by the linear regression of the NUEPA model. On the contrary, The adjusted R^2 of the MODIFIED model is 0.889 with the $R^2 = 0.892$. Therefore, 89% of the variance in the data is explained by the linear regression of the modified model. It is concluded that a higher R-value is carried by MODIFIED CD (revised set of indicators) than the NUEPACD (indicators selected by NUEPA) (Table-9, Table-10).

C. Multiple Regression Model Formulation with existing qualifiers- Lastly, a Multiple Regression Equation Model is generated. The multiple regression equation model for NUEPA is formulated below.

$$[Y = aP + bQ + K]$$

Where,

Y=NUEPA CD

P= Factor 1 (PTR, SCR, TCR)

Q=Factor2(PGROUND_CD, TOILETB_CD, TOILETG_CD, RAMPS_CD, BNDRYWALL_CD, DRNK WTR_CD, LIBRARY_CD)

K= Constant

For the multiple regression equation model for NUEPA, it is concluded that the value of Y will be changed in the NUEPA model for every unit change of P and Q. For example, the overall quality of the school will be changed for the change of PTR (Pupil-Teacher Ratio) value.

D. Multiple Regression Model with MODIFIED qualifiers-

$$[Y1 = aP1 + bQ1 + cR + dS + K]$$

Where,

Y1=MODIFIED CD

P1= Factor 1 (PTR, SCR, TCR)

Q1= Factor 2 (PGROUND_CD, TOILETB_CD, TOILETG_CD, RAMPS_CD, BNDRYWALL_CD, DRNK WTR_CD, LIBRARY_CD, CLNO_CD, CL GOOD_CD, MEDCHK_CD, ELECTRIC_CD, CAL_CD, HMROOM_CD, HEADTCH)

R= Factor 3 (ACCESS_CD)

S= Factor 4 (PROF QUAL_CD)

For the multiple regression equation model for MODIFIED, it is concluded that the value of Y1 will be changed for every unit change of P1, Q1, R, and S. For example, the overall quality of the school will be changed for the change of PROF QUAL (professional qualification of teacher) value.

Model Interpretation- Ten existing indicators are considered to build a multiple regression model with NUEPA qualifiers and a revised list of indicators with nineteen indicators is considered to build a multiple regression model with MODIFIED qualifiers. It can be said that a revised set of indicators is used by the Multiple Regression Model with MODIFIED

qualifiers, and it is more significant than the Regression Model with NUEPA indicators, according to the validation of the data discussed above.

Conclusion:

From the validation of the data discussed above, it can be concluded that a revised set of indicators more capably assesses the quality of a school. Some important indicators are overlooked in the NUEPA list which is included in the modified list. Thus, a revised set of indicators is suggested and recommended to assess the school's quality. As a future Scope of the Research, it can be said that a lack of areas in terms of facilities, such as schools devoid of computer facilities and schools devoid of drinking water, etc. can be identified through this study. An inter-block and inter-district analysis of the quality of education can be performed using the above-discussed model built by a revised set of indicators.

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