Relationship between Public Education Spending and Education Outcome Indicators: A Case Study of Assam

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Abstract:
Provision of basic education as a merit good with resource constraint is a challenging commitment for any government, especially in a developing country. That's why, efficiency of spending in education matters the most. The aim of the study is to analyse the relationship between public education expenditure by Government of Assam and educational outcome variables. The study finds that trend of public education spending and Gross Enrolment Ratio of elementary education has been moving in opposite direction during the study period. Moreover, lack of available teachers at secondary level of education is found to be a main drawback of the education system of Assam during the study period.

Introduction:
Influential relation between investment in education and outcome indicators have been investigated back in the early 50s and 60s in the "Human Capital Theory". Mincerian thory has investigated impact of average years of schooling on individual's earning. (Mincer, 1974). Different studies at different time period and different geographical region have found significant impact of Government intervention on education and nation's economic prosperity. (Barro, 2001; Cooray, 2009; Gupta & Ifa, 2018). Some of them, however, got some exceptional findings. (Bils and Klenow, 2000). Many of the studies attempted to find spillover effect of education on other sectors.
In a developing country public investment in education sector is necessary to bring vast majority of its people within the umbrella of education system, removing the barrier of poverty and regional disparity through enhancing labour productivity. To take advantage from its largest demographic dividend and maintain competitive advantage globally, quantity and quality of education must be promoted. Given the resource constraints as well as

mounting fiscal and revenue deficit of the states, it is important for the researcher to study the trend, pattern and composition of public educational expenditure of the government at federal level considering direct and indirect benefit of education in socio-economic development and enhancing the quality of life. However, given regional disparity and inability of the people in taking care of their own educational needs, it is one of the major responsibility of welfare state to provide equitable opportunity of education to all of its citizen, because education is more or less responsible for the development other socio-economic sector.Due to poverty, rural-urban disparity and ignorance people of most of the people can't afford formal education and remain out of education system. Here arises the critical role of government in providing basic educational services. Government always has to battle with two opposing goals- economic growth and social development. With limited resources how to fulfil the needs of all sectors, is a task. Here, efficiency in resource allocation is the only solution.Different states allocate different amounts of funds towards education sector depending upon the relative priorities towards both the goals. Government of most of the countries invests a major portion of social sector spending on education. However, investigation of efficiency of education spending requires impact assessment which means to find if there is any significant relationship between public expenditure on education and education outcome variables like gross enrolment ratio, literacy rate, and student- teacher ratio etc.In a state like Assam who is lagging behind the major states of the country in terms of growth and social development indicators, public subsidization is the only way to ensure equity and equality in education and to make sure that even disadvantaged group must not be out of the system. In terms of literacy rate, the state ranks lowest among North Eastern States. Thus, lowering of educational investment in any of the level may harm its education outcome even further. In order to take full advantage of its natural resources, investment in both physical as well as human capital is essential. Thus, it is the responsibility of researcher and policy maker to evaluate the impact of education expenditure of the government on its educational outcomes in order to introduce a sound expenditure policy. Keeping this in mind, this study makes an attempt to analyse the education scenario of Assam, an economically backward state under North Eastern Region.

Literature Review:

Different cross-country as well as inter-state study remarked education sector as a crucial head of social sector and empirical findings reveal that public spending on education not only enhances economic growth but also impact educational outcome indicators positively.

Roy Allen et al (2000) conducted a study on education expenditure by taking panel data of fifteen major states of India and found that actual expenditure on education of the poor income states are lower than their needs.The study found a positive relation between expenditure per child and enrolment ratio implying underutilization of capacity in primary and secondary education in terms of no of school and teachers.

Barro (2001) conducted a study to analyze the growth effect of education by taking data from a panel of almost 100 countries from the period 1965 to 1995. Important findings were- average years of schooling of male at secondary and higher level positively impact on economic growth. However, average years of schooling of male members at primary level

were insignificant to growth. Moreover, female education indirectly influenced growth through lowering fertility rate.

One of the great enthusiasms among researchers is to investigate probable causation among education, health and economic growth and several cross country and national level studies are conducted for the purpose. One of the studies remarked that effect of education on health is two-fold, as a curative instrument it helps in curing disease by providing appropriate health facilities and its preventive element fight against mal-nourishment and water contamination. (Guisan & Exposito, 2010).

Cooray (2009) conducted a study to examine the relationship between economic growth and combined quantity and quality education. The proxy variables used for quantity educationwere- GER at all the levels separately, education spending as a ratio of GDP and per capita expenditure at all levels as a percentage of GDP per capita. The quality was measured by-survival rate, repetition ratio, PTR, trained teachers in primary education and mathematics scores. The results showed that GER positively impact on GDP. However, impact of public spending on economic growth was somewhat ambiguous. The study remarked that government expenditure might enhance economic growth through improvement in education quality.

In a study based on public expenditure on education of European Union and its members as well as BRICS countries found that impact of education expenses on economic growth was highest for India among the BRICS countries. Again, Italy, Luxembourg and Slovenia achieved highest growth within EU as one percent increase in expenditure on education lead to more than one percent enhancement of growth in these countries denoted by increased value of log (GDP). (Zoran Tomic, 2015).

Kaur B & Misra S (2013), in their analysis of role of public spending in health and education sector of India covering a sample of fifteen non special category states for the period 1985-86 to 2000-01 found that relationship between expenditure on primary education and student enrollment is strong and positive for poorer states as it helps in reducing regional disparities and gender gap. Bils and Klenow (2000), however, found a contrasting result about the relationship between schooling and economic growth and remarked that the relation is weak in the sense that impact of years of Education on Economic growth could explain not more than one-third by cross country evidence.Jha et al (2001) remarked that public spending on health and education has significant impact on poverty reduction of India. Among different levels of education, expenditure on higher education as well as technical and vocational education can lead to more income earning opportunities and thereby reducing poverty as compared to primary and secondary education.

Analyzing the relation between social sector spending and human development index, Mittal (2016) concluded that states with lower social spending have lower value of HDI, for example, Bihar, Uttar Pradesh, Odisha, MadhyaPradesh and Assam. In contrast to that, states that spend higher proportion of per capita social expenditure achieved high rank in HDI, for example, Kerala, Himachal Pradesh Jammu & Kashmir, Tamil Nadu and Goa.

Suryadarma D (2011) remarked that although higher public expenditure on education is necessary but not sufficient condition for enhancing students' enrolment. Administration needs to be strong enough to combat corruption under the system so as to achieve fuller

benefit of public spending. One of the major finding of the study was that government expenditure enhanced enrollment in schools of those districts where corruption rate were low.

Methodology:

The area of the study is the state of Assam situated in North-Eastern part of the country. The study is based on secondary data. Data on public expenditure on education of Assam has been collected from report of Comptroller and Auditor General of India (CAG), various issues. State level data on various educational variables like Gross Enrolment Ratio, Pupil Teacher Ratio, Number of Education Institution, Number of Teacher etc. have been collected from Statistical Handbook of Assam, Directorate of Economics and Statistics, Government of Assam. In order to fulfil the prime objective, which is to analyze the relationship between public education spending by Government of Assam and educational outcome variables of the state, trend of outcome variables of education like GER, PTR, Literacy Rate, Number of Education Institution etc. have been compared with trend of aggregate public education expenditure. After that, pairwise correlation matrix has been used to show the association of dependent and independent variables.

Trend of Aggregate Education Expenditure and Education Outcome Variables:

For analyzing trend of dependent variables, the following variables of education have been chosen-

1. **Gross Enrolment Ratio (GER) of Elementary Education:**
   GER of elementary level of education is defined as total enrolment of students from class-I to class-VIII, regardless of age, expressed as a percentage of population in the age group 6 to 13 years. Elementary level of education includes lower primary (class I-V) and upper primary (class VI-VIII) education. It is expected that aggregate public spending on education positively related with GER of elementary education.
2. **Gross Enrolment Ratio (GER) of Secondary Education:**
   GER of secondary level of education is defined as total enrolment of students from class-IX to class-X, regardless of age, expressed as a percentage of population in the age group 14 to 17 years. GER of secondary education is also expected to positively related with public education spending.
3. **Literacy Rate:**
   As per Census, 1991, literacy rate is defined as the total percentage of population aged seven years and above in a particular area at a particular time who can read and write with understanding. It is expected that public expenditure on education at all the levels positively impact on literacy rate.
4. **Pupil-Teacher Ratio at Elementary level:**
   Pupil-Teacher Ratio at elementary education is defined as the ratio of number of student to teacher at elementary level. It is a negative indicator and thus it is expected that with the increase in education expenditure of the government PTR is going to reduce.

5. **Pupil-Teacher Ratio at Secondary level:**
   PTR at secondary level is defined as average number of students per teacher at secondary level. The relationship between government expenditure on education and PTR at secondary education is expected to be negative.
6. **HSLC Pass percentage:**
   It is defined as number of students passed HSLC examination, expressed as a percentage of number of students appeared on the exam. There is expected to have a positive relation between public expenditure on education and HSLC pass percentage.
7. **Number of education institution:**
   The relation between education expenditure of government and number of education institution is expected to be positive. It includes government primary, upper primary and high schools.
8. **Teacher per institution:**
   It implies average number of teacher per education institution and thereby indicating availability of teacher in a school. The relation between public education expenditure and teacher per institution is expected to be positive.

The independent variables taken are-

1. Aggregate Education Expenditure of government.
2. Public Expenditure on Elementary and Secondary education.
3. Public Expenditure on Higher Education.

Trend of Gross Enrolment Ratio of Elementary and Secondary Education and Aggregate Government Expenditure on Elementary and Secondary Education:

Annual growth rate of gross enrolment ratio and aggregate expenditure on education of Assam has been shown in table-1

Table-1: Annual Growth Rate of GER of Elementary & Secondary Education and Aggregate public expenditure on education

Year	Aggregate Public Expenditure on Education (in crore)	Annual growth rate	Elementary & Secondary Education Expenditure of government (in crore)	Annual Growth rate	GER,Elementary	Annual Growth Rate	GER,Secondary	Annual Growth Rate
2000-01	1924.24		1670.55		90.0%		40.2%	
2001-02	1862.52	-3.21%	1625.91	-2.67%	63.8%	-29.2%	33.4%	-16.86%
2002-03	1989.43	6.81%	1726.46	6.18%	71.3%	11.8%	33.5%	0.45%
2003-04	2306.43	15.93%	2053.31	18.93%	75.2%	5.6%	33.3%	-0.77%
2004-05	2433.11	5.49%	2145.31	4.48%	68.4%	-9.1%	33.5%	0.58%
2005-06	2458.69	1.05%	2159.05	0.64%	68.0%	-0.5%	33.4%	-0.31%

2006-07	2619.81	6.55%	2316.58	7.30%	67.0%	-1.5%	32.0%	-4.08%
2007-08	2928.15	11.77%	2486.53	7.34%	64.4%	-3.9%	34.9%	9.13%
2008-09	3245.97	10.85%	2857.78	14.93%	68.3%	6.1%	35.2%	0.79%
2009-10	3962.64	22.08%	3419.15	19.64%	80.6%	17.9%	43.8%	24.44%
2010-11	5587.34	41.00%	4695.82	37.34%	90.4%	12.2%	46.7%	6.61%
2011-12	6041.48	8.13%	5097.57	8.56%	91.9%	1.6%	46.3%	-0.92%
2012-13	6831.65	13.08%	5705.71	11.93%	92.5%	0.7%	45.9%	-0.92%
2013-14	8290.44	21.35%	7041.88	23.42%	69.1%	-25.3%	49.2%	7.21%
2014-15	9812.07	18.35%	8255.35	17.23%	69.5%	0.7%	54.2%	10.17%
2015-16	9347.03	-4.74%	8105.31	-1.82%	64.2%	-7.7%	52.5%	-3.15%
AAGR, 2000-2015		11.63%		11.56%		-1.4%		2.16
CAGR, 2000-2015		11.1%		11.1%		-2.2%		1.8%

Source: Author's own calculation based on data from Office of Comptroller & Accountant General (Audit), Assam & Statistical Handbook of Assam, various issues.

From table-1, it is seen that government expenditure on elementary & secondary education and gross enrollment ratio of elementary level of education moves in the opposite direction during the study period. While elementary & secondary spending has grown at Average Annual Growth Rate (AAGR) of 11.56 percent and Compound Annual Growth Rate (CAGR) of 11.1 percent, GER of elementary education has shown negative AAGR (-1.4%) and CAGR (-2.2%). In contrast to elementary level, secondary GER has grown at 2.16 percent of AAGR and 1.8 percent of CAGR during the same time. During 2002-03 and 2003-04, both expenditure and enrollment have increased. But after 2003-04 only education expenditure has increased without corresponding increase in enrolment till 2008-09. After that some improvement has been seen in enrollment scenario of both elementary and secondary level, but during 2013-14 annual growth rate of elementary enrollment has reached at -25.3 percent. However, secondary enrolment was slightly better than elementary level during the study period.

From the analysis of education expenditure and corresponding gross enrolment scenario of Assam, it can be said that government's allocation of resources to different sectors of education is not being able to achieve so far the goal of universalization of education in terms of enrolment. One of the main aims of government's Centrally Sponsored Scheme "Sarva Siksha Abhiyan" was to provide universal access to elementary education, maintain retention and transition rate. This scheme was implemented in 2001. However, from enrolment figures highlighted in table-1, it can be remarked that the state has to go a long way to achieve universal enrolment. Moreover, huge difference in enrolment with every increase in the level of education creates certain concerns. After implementation of "Sarva Siksha Abhiyan" government expenditure on elementary education has increased gradually which is seen from

positive annual growth rates. But, enrolment rate has shown fluctuations, increased during 2002-03 to 2003-04, but after that couldn't maintain its consistency. Again, after implementation of "Right to Free and Compulsory Education Act" in 2009 which came into force in 2010, both spending and enrollment spiked up, but GER of elementary education couldn't maintain its previous level and showed a negative growth during 2013-14.

Trend of Pupil Teacher Ratio of Elementary and Secondary Education:

Pupil Teacher Ratio (PTR) indicates average number of students per teacher. It is a negative indicator such that bigger value represents worst case scenario and vice versa. Lower Pupil-Teacher Ratio is helpful for students to cater individual attention of teacher. The trend of Pupil-Teacher ratio of elementary and secondary level of education of Assam is shown in table-2

Table-2: Growth Rates of PTR of Elementary and Secondary Education

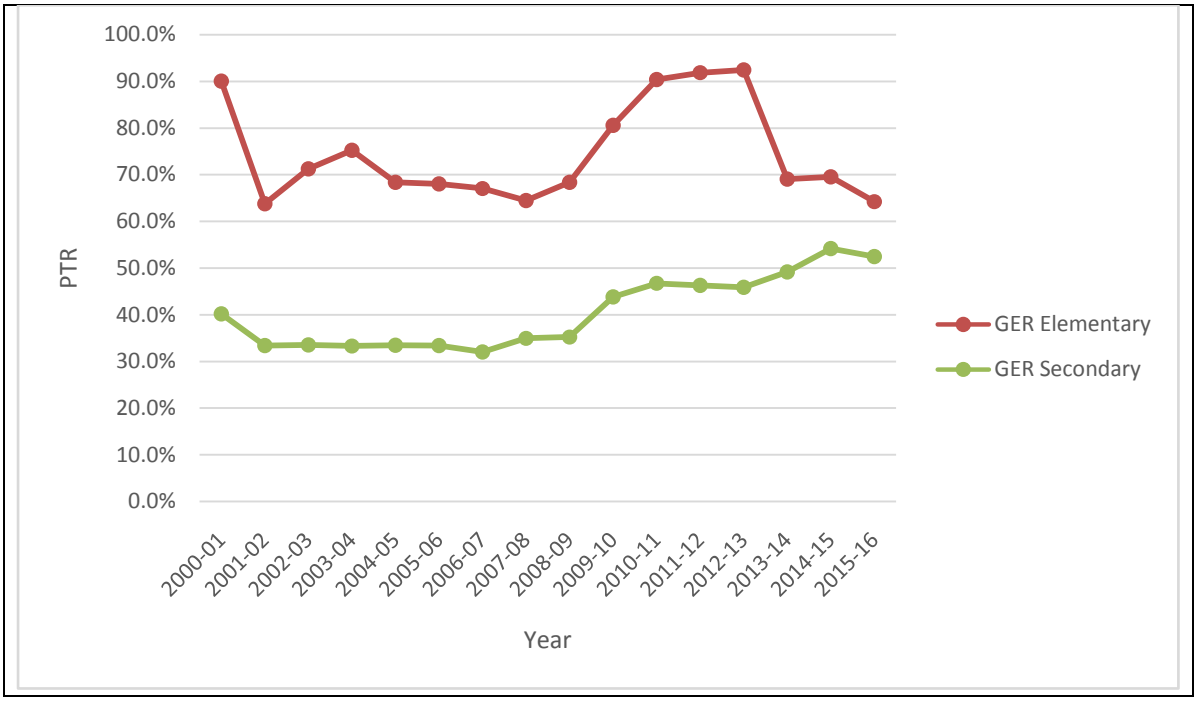
Year	Annual Growth Rate of Public Expenditure on Elementary & Secondary Education	Annual Growth Rate of PTR of Elementary Education	Annual Growth Rate of PTR of Secondary Education
2000-01	-----	--------	-------
2001-02	-2.67%	33.76%	-16.14%
2002-03	6.18%	-53.43%	6.74%
2003-04	18.93%	75.84%	-1.31%
2004-05	4.48%	-1.66%	1.80%
2005-06	0.64%	-7.05%	-0.99%
2006-07	7.30%	5.62%	-4.95%
2007-08	7.34%	-6.53%	10.76%
2008-09	14.93%	-2.37%	0.41%
2009-10	19.64%	7.38%	26.24%
2010-11	37.34%	5.30%	22.31%
2011-12	8.56%	25.61%	-2.27%
2012-13	11.93%	-22.10%	0.00%
2013-14	23.42%	-10.36%	8.21%
2014-15	17.23%	-23.96%	21.88%
2015-16	-1.82%	3.58%	35.11%
AAGR, 2000-2015	11.56%	1.98%	7.19%
CAGR,2000-2015	11.1%	-1.87%	6.38%

Source: Author's own calculation based on data from Statistical Handbook of Assam, various issues.

From table-2, it is seen that with the increase in public education expenditure over the years Pupil-Teacher Ratio of elementary education has been declined as shown by negative CAGR of -1.87 percent and thus showing a favourable picture, although growth rate of elementary &

secondary education spending has been much higher. However, PTR of secondary education has been increasing at CAGR of 6.38 percent during the study period. It is difficult to find any particular corresponding pattern of Pupil-Teacher Ratio and government's elementary &secondary education expenditure. Annual growth of public expenditure on elementary education has been positive except one or two years. But student-teacher ratio has been fluctuating showing a combination of positive and negative annual growth rates. From the above table, it can be remarked that government's various schemes has been more or less successful in reducing Pupil Teacher Ratio at elementary level, but failed to achieve success at secondary level so far. Pupil-Teacher Ratio of both elementary and secondary level from 2000-01 to 2015-16 has been shown in figure-2

Figure-2: Pupil-Teacher Ratio of Elementary and Secondary Education



Source: Statistical Handbook of Assam, various issues

From figure-2 it is clearly highlighted that Student-Teacher Ratio of secondary education has been gradually increasing after 2008-09, while that of elementary education has started declining after 2013-14.

Trend of Literacy Rate and HSLC Pass Percentage:

As we know that census provide only decadal data on literacy rate, therefore, literacy rate has been projected for the study period in order to compare its growth rate with the growth rate of education expenditure. Annual growth rates of literacy rate and HSLC pass percentage of student has been presented in table-3

Table-3: Annual Growth Rate of Literacy Rate and HSLC pass percentage

Year	Annual Growth Rate of Literacy rate	Annual Growth Rate of HSLC Pass percentage	Annual Growth Rate of Education expenditure
2000-01	----	----	----------
2001-02	-14.01%	1.91%	-3.21%
2002-03	22.81%	1.96%	6.81%
2003-04	7.93%	1.96%	15.93%
2004-05	12.90%	1.96%	5.49%
2005-06	6.59%	1.96%	1.05%
2006-07	0.89%	1.96%	6.55%
2007-08	2.58%	1.96%	11.77%
2008-09	6.85%	1.96%	10.85%
2009-10	4.87%	1.96%	22.08%
2010-11	2.71%	4.75%	41.00%
2011-12	11.33%	2.23%	8.13%
2012-13	-1.07%	2.23%	13.08%
2013-14	1.55%	2.23%	21.35%
2014-15	-13.14%	2.23%	18.35%
2015-16	1.27%	2.23%	-4.74%
AAGR, 2000-2015	3.60%	2.23%	11.56%
CAGR, 2000-2015	3.21%	2.23%	11.10%

Source: Author's own calculation based on data from Census Report and Statistical Handbook of Assam.

From table-3, it is seen that over the years, literacy rate of Assam has been increasing at an annual average growth rate of 3.60 percent and a compounded rate of 3.21 percent. Over a period of fifteen years, HSLC pass percentage also has grown at a positive compound annual growth rate of 2.23 percent. Both the variables have shown a positive association with government's aggregate education expenditure as education expenditure also has grown at a positive rate. But compounded rate of growth of education spending is much higher than rate of growth of literacy and HSLC pass percentage.

Trend of Number of Education Institution and Teacher per Institution:

Educational access and availability is determined by number of schools, colleges, universities and other educational institutions. One of the main aims of "Right to Education" act is to provide universal access and infrastructural base to elementary education. Over the years number of public education institution has been increasing tremendously. Again, teacher is considered as one of the main input in the teaching-learning process of education system. Availability of teacher per education institution is an important variable that helps to

determine education outcome of pupils. Annual growth rate of number of education institution and teacher per institution is shown in table-4

Table-4: Annual Growth Rate of Number of education institution and teacher per institution

Year	Annual Growth of Number of institution	Annual Growth of Teacher per institution	Annual Growth of Government Expenditure on elementary and secondary education
2000-01	----------	----------	----------
2001-02	0.15%	0.28%	-2.67%
2002-03	-5.95%	8.54%	6.18%
2003-04	0.30%	7.01%	18.93%
2004-05	0.04%	-0.51%	4.48%
2005-06	5.03%	-7.07%	0.64%
2006-07	2.94%	2.60%	7.30%
2007-08	0.22%	-0.22%	7.34%
2008-09	0.40%	2.23%	14.93%
2009-10	15.38%	-4.39%	19.64%
2010-11	0.78%	-20.09%	37.34%
2011-12	0.35%	18.97%	8.56%
2012-13	9.85%	0.05%	11.93%
2013-14	-0.44%	-0.89%	23.42%
2014-15	0.66%	-21.53%	17.23%
2015-16	-2.47%	18.50%	-1.82%
AAGR, 2000-2015	1.81%	0.23%	11.56%
CAGR, 2000-2015	1.70%	-0.38%	11.10%

Source: Author's own calculation based on data from Statistical Handbook of Assam, various issues.

From table-4, it is seen that with the increase in public education expenditure, number of education institution has been grown at a positive compounded rate of 1.70 percent over a period of fifteen years. However, during the same period, teacher per institution has been grown at negative compounded rate of -0.38 percent. Negative growth of teacher per institution may be because of increased number of schools at a high rate as compared to number of teachers available in the schools. Moreover, growth of number of education institution is much lower than growth of public education expenditure implying ineffective use of government expenditure. Thus, from table-4, it can be remarked that government expenditure on education has not been succeeded in providing adequate number of teachers to schools which may create additional burden to the existing teachers and thus may affect education quality.

Relation between Education Expenditure of Government of Assam and Different Outcome Variables of Education:

The relationship between dependent and independent variable is shown by pairwise correlation analysis. Pairwise correlation implies pairwise association of variables. It basically shows the direction of two variables or how do the variables move. In this study, we are mainly concerned of analysing relationship between three independent variables such as aggregate public education expenditure, public expenditure on elementary education, public education expenditure on higher education and eight dependent variables such as GER of elementary education, GER of secondary education, PTR of elementary education, PTR of secondary education, number of institution, teacher per institution, literacy rate and HSLC pass percentage. The results of correlation analysis is shown in table-5

Table-5: Result of Pair-wise correlation matrix.

	TPEE	PEEE	PEHE	GEREE	GERSC	PTREE	PTRSE	NOEE	TPE	LR	HSLCPP
TPEE	1										
PEEE	1.000**	1									
	0										
PEHE	.989**	.984**	1								
	0	0									
GEREE	0.104	0.088	0.186	1							
	0.701	0.746	0.49								
GERSE	.934**	.931**	.941**	0.348	1						
	0	0	0	0.186							
PTREE	-0.285	-0.292	-0.244	0.338	-0.233	1					
	0.284	0.272	0.362	0.2	0.385						
PTRSE	.916**	.923**	.871**	0.08	.896**	-0.347	1				
	0	0	0	0.769	0	0.188					
NOEE	.940**	.935**	.954**	0.296	.940**	-0.123	.828**	1			
	0	0	0	0.265	0	0.651	0				
TPE	-.732**	-.722**	-.771**	-0.297	-.788**	0.026	-.668**	-.713**	1		
	0.001	0.002	0	0.264	0	0.925	0.005	0.002			

LR	.964**	.964**	.951**	0.118	.882**	-0.212	.869**	.937**	-.580*	1	
	0	0	0	0.664	0	0.431	0	0	0.018		
HSLCPP	.754**	.750**	.766**	0.301	.697**	-0.002	.587*	.813**	-0.298	.880**	1
	0.001	0.001	0.001	0.257	0.003	0.995	0.017	0	0.262	0	

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
Note: TPEE= Total public Education Expenditure
PEEE= Public Expenditure on Elementary Education
PEHE= Public Expenditure on Higher Education
GEREE=Gross Enrolment Ratio of Elementary Education
GERSE=Gross Enrolment Ratio of Secondary education
PTREE= Pupil-Teacher Ratio of Elementary Education
PTRSE= Pupil-Teacher Ratio of Secondary Education
NOEE= Number of education institutions
TPE= Teacher per institution
LR= Literacy Rate
HSLCPP=HSLC Pass percentage

From table- 5, it is highlighted that, correlation between government's education expenditure, both at elementary and higher level, and Gross Enrolment Ratio of elementary education is very poor and insignificant. However, there exists strong positive correlation between GER of secondary and aggregate public expenditure at all the levels of education. Again, correlation coefficient between education expenditure of government and PTR of elementary education is negative and insignificant, but coefficient with PTR of secondary education is positive and highly significant. The probable reason for increasing PTR of secondary education with increase in public education expenditure is the high growth of students' enrolment as compared to the growth of number of teachers which pushes up the numerator value and thereby Pupil-Teacher Ratio. By analysing actual data from Appendix-2, it is found that enrolment of secondary education has been grown at CAGR of 3 percent from 2000-01 to 2016-17, while teacher of secondary education has shown a negative compounded rate of growth of -3.37 percent. Moreover, aggregate expenditure on education and number of institution has been moving in a positive direction over the years and showing high correlation. In contrast to that, teacher per institution has shown a significant but negative relationship with aggregate public expenditure on education. Here again low growth of number of teachers as compared to rate of growth of number of education institution may be a reason. CAGR of number of institution has been 1.43 percent as compared to only 1.19 percent of compounded growth rate of number of teachers at both elementary and secondary level. Thus lack of teacher in government schools is found to be an issue during the study period which may affect learning outcomes of students. This problem actually justifies government's recent policy of recruiting teachers, conducting Teacher Eligibility Test (TET)

and other policies since last two or three years. Finally, HSLC pass percentage and literacy rate have shown positive and significant relation with aggregate education expenditure at all its levels.

Number of education institution and PTR of secondary education is found to be highly positively significant. On the other hand, correlation coefficient is negative between teachers per institution and PTR of secondary education. This is because of low growth of number of teachers as against high growth of students' enrolment and number of institution. Again, correlation between number of institution and teacher per institution is found to be negative and significant. Interestingly, teacher per institution is the only variable, with whom correlation of almost all other variables are found to be negative which is an exception. This shows the requirement of more teachers at all the levels of education.

Major Findings:

The key findings from the study is highlighted as follows-

- The trend of public education spending by Government of Assam and Gross Enrolment Ratio of the state has been moving in the opposite direction during the study period. However compounded growth rate of GER of secondary education is positive. Thus, it can be said that government's allocation of resources to different sectors of education is not being able to achieve the goal of universalization of education in terms of enrolment so far.
- Pupil-Teacher Ratio of elementary education is improving over the years. But PTR of secondary education has grown at a positive compounded rate of 6.38 percent. High growth of PTR of secondary education is due to high enrolment growth as compared to the growth of teachers. Secondary enrolment rate has been grown at a CAGR of 3.1 percent in contrast to the negative teacher growth rate of -2.9 percent during the study period.
- The study finds that there has been increase in the number of education institution during the study period. In contrast to that teacher per institution has grown at a negative CAGR of -0.38 percent. Thus, deficit in the number of required teachers is found to as one of the main drawbacks of education system during the study period.
- Results of pair-wise correlation matrix indicate that there has been high positive correlation between public education spending and GER of secondary education, number of education institution, literacy rate and HSLC pass percentage. However, a strong but negative correlation has been found between public education expenditure and teacher per institution. This is because of high growth of number of schools as compared to the increase in number of teachers.

Conclusion:

Given the scarcity of government resources, it is the topmost responsibility for any government to use its resources efficiently. This study makes a detailed analysis of relationship between public resources earmarked for education sector of Assam and various educational outcome indicators. Lack of availability of teacher is found as one of the main constraints which may affect quality of education. This is highlighted by increased Pupil-Teacher Ratio of secondary education and reduced teacher per institution during the study period. Therefore, government should take immediate steps for recruitment of new teachers,

filling earlier vacant posts, conducting special tests for teacher recruitment etc. Again, in order to increase accessibility and availability of education, number of schools and colleges need to increase. For this, government has to enhance its resources earmarked for education sector as education expenditure has immediate and direct impact on number of education institutions as compared to other outcome variables.

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Appendix:

Appendix-1: Data on Education Outcome Variables as well as expenditure used in Correlation analysis

Year	Total Education Expenditure(in crores)	Secondary Education Expenditure	Higher Education Expenditure	PTR, Elementary	PTR,Secondary	GER,Elementary	GER,Secondary	No. of Institutions	Teacher per institution	HSLC Pass %	Literacy Rate (%)
2000-01	1924.24	1670.55	253.7	29	12	90.0%	40.2%	45324	4	38.7	64.7
2001-02	1862.52	1625.91	236.6	39	10	63.8%	33.4%	45391	4	33.28	65.9
2002-03	1989.43	1726.46	263.0	18	11	71.3%	33.5%	42691	5	40.87	67.2
2003-04	2306.43	2053.31	253.1	32	10	75.2%	33.3%	42819	5	44.11	68.5
2004-05	2433.11	2145.31	287.8	31	11	68.4%	33.5%	42836	5	49.8	69.8
2005-06	2458.69	2159.05	299.6	29	10	68.0%	33.4%	44991	5	53.08	71.2
2006-07	2619.81	2316.58	303.2	31	10	67.0%	32.0%	46313	5	53.55	72.6
2007-08	2928.15	2486.53	441.6	29	11	64.4%	34.9%	46413	5	54.93	74.0
2008-09	3245.97	2857.78	388.2	28	11	68.3%	35.2%	46598	5	58.69	75.5
2009-10	3962.64	3419.15	543.5	30	14	80.6%	43.8%	53764	5	61.55	76.9
2010-11	5587.34	4695.82	891.5	32	17	90.4%	46.7%	54184	4	63.22	80.6
2011-12	6041.48	5097.57	943.9	40	17	91.9%	46.3%	54372	4	70.38	82.4
2012-13	6831.65	5705.71	1125.9	31	17	92.5%	45.9%	59728	4	69.63	84.2

2013-14	8290.44	7041.88	1248.6	28	18	69.1%	49.2%	59463	4	70.71	86.1
2014-15	9812.07	8255.35	1556.7	21	22	69.5%	54.2%	59854	3	61.42	88.0
2015-16	9347.03	8105.31	1241.7	22	30	64.2%	52.5%	58373	4	62.2	90.0

Source: Statistical Handbook, Assam, Various issues and office of Comptroller General of India, Government of Assam

Appendix-2 Annual Growth rate of enrolment, teacher and education institutions

Year	No. of Institutions	Annual Growth Rate	Teacher, both Elementary and Secondary	Annual Growth Rate	Teacher of Secondary Education	Annual Growth Rate	Elementary Enrolment	Annual Growth Rate	Secondary Enrolment	Annual Growth Rate
2000-01	45324		222879		80654		5234221		885498	
2001-02	45391	0.15%	301905	26.18%	78535	-2.63%	5599258	6.97%	922535	4.18%
2002-03	42691	-5.95%	219365	-37.63%	79026	0.63%	4026520	-28.09%	778438	-15.62%
2003-04	42819	0.30%	233906	6.22%	75486	-4.48%	4570757	13.52%	793677	1.96%
2004-05	42836	0.04%	233004	-0.39%	77039	2.06%	4900420	7.21%	799392	0.72%
2005-06	44991	5.03%	228039	-2.18%	77253	0.28%	4522606	-7.71%	816045	2.08%
2006-07	46313	2.94%	240479	5.17%	78954	2.20%	4572519	1.10%	825733	1.19%
2007-08	46413	0.22%	240479	0.00%	80874	2.43%	4575521	0.07%	803933	-2.64%
2008-09	46598	0.40%	242491	0.83%	80874	0.00%	4467034	-2.37%	890445	10.76%
2009-10	53764	15.38%	264465	8.31%	82394	1.88%	4811689	7.72%	910886	2.30%
2010-11	54184	0.78%	212454	-24.48%	82434	0.05%	5760967	19.73%	1150471	26.30%
2011-12	54372	0.35%	258056	17.67%	68963	-16.34%	5704044	-0.99%	1177158	2.32%
2012-13	59728	9.85%	281421	8.30%	70565	2.32%	5806184	1.79%	1177158	0.00%

2013-14	59463	-0.44%	277984	-1.24%	70565	0.00%	5853278	0.81%	1177158	0.00%
2014-15	59854	0.66%	254181	-9.36%	70565	0.00%	4378077	-25.20%	1273779	8.21%
2015-16	58373	-2.47%	245272	-3.63%	52234	-25.98%	4415103	0.85%	1416451	11.20%
2016-17	56854	-2.60%	269499	8.99%	46583	-10.82%	4083346	-7.51%	1384655	-2.24%
AAGR,2000-2016		1.54%		0.17%		-3.02%		-0.76%		3.17%
CAGR,2000-2016		1.43%		1.19%		-3.37%		-1.5%		2.8%

Source: Statistical Handbook of Assam, Various Issues