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Preparedness and Performances of Teachers in Implementing the Intended Grade 8 Science Curriculum 2012 in Bangladesh

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ABSTRACT

This study explored the readiness of teachers and their class performances in implementing Grade 8 National science curriculum 2012 in relation to the requirements of that intended curriculum in Bangladesh. Mixed-method research design was employed. The population of this study was the Grade 8 science teachers in Bangladesh. In data collection, 320 teachers were surveyed, 24 teachers were interviewed and 48 teachers class activities were observed around the country. A survey questionnaire, semi-structured interview schedule, and observation checklist were used. Descriptive statistics and inferential statistics were used to analyse the data. For the interview, thematic categories for commonalities were found. The results of the indicated that the initiatives undertaken to enhance teachers' competences were not successful. Teachers were found having serious limitations in understanding the intention Grade 8 Science curriculum and in applying its instructions in the learning process. Lectures was the principal teaching method used in delivering lessons in contrast to the requirements of intended Grade 8 science curriculum. Observations of teaching practice indicated that most of the teachers entered into the classrooms without adequate preparation. Most of the teachers were found to read out from the textbooks. From the findings of the study, the researchers believe that teachers' readiness and schools' preparation should be made before the implementation of a new education program. There should be policy guidelines to develop professionalism among teachers. Training should also be designed and conducted on the basis of teachers' needs.

Keywords: Preparedness, Performance, Science Curriculum, Implementation

INTRODUCTION

Secondary school education (Grade 6 to Grade 12) in Bangladesh is highly centralized. Ministry of Education (MoE) in Bangladesh is responsible for secondary education. In Bangladesh, most of the secondary schools are owned and managed by private sector. The total number of secondary schools in Bangladesh is 19,847. Only 1.71% (339) schools are state-owned schools. The rest of the schools (around 98%) are owned and managed by private sector (BANBEIS, 2016). However, 90% of these private institutions are government aided as teachers' salaries; physical infrastructural development, in-service trainings and supplies teaching equipment are provided by the government (BANBEIS, 2016). These schools are operating as the mainstream secondary education institutions and called MPO (Monthly Payment Order) schools. The rest 08% of schools are Self-Financed (SF) and operated by school own management. Furthermore, around 70% (13893) of the secondary schools are situated in rural Bangladesh and the rest of the schools (5954) are located in urban Bangladesh.

In Bangladesh, students begin to learn science from Grade 3 and continue it up to Grade 8 as a compulsory subject that bears 100 marks in every Grade. Grade 8 is the last stage to Bangladeshi students for studying equal weight of science. At Grade 9, students have to choose a specialized stream from the possible three Streams-Humanities, Science, and Business Studies. At Grades 9 and 10, science stream students' study 300 marks science which includes 3 science subjects. Two subjects are Physics and Chemistry and third one is either Biology or Higher Mathematics. Out of 300 marks, 25% marks of each of the three subjects are allocated for practical examination. Students other than science stream at this level study 100 marks science. Grade 10 is the last stage for a non-science stream student for studying science, i.e., at Grade 11, non-science students do not

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have any opportunity to study science (NCTB, 2012). Teachers recruitment rules for secondary schools (for Grade 6 to Grade 10) in Bangladesh indicate that candidates having at least a B.Sc. degree either in Biological science (combination of Botany, Chemistry and Zoology) or in Physical science (combination of Chemistry, Mathematics and Physics) can apply for teaching science (DSHE, 2016). In Bangladesh, total number of teachers in a schools are 12. Every school has the opportunity to recruit 2 BSc teachers, one for Mathematics and one for Science. The average class size at Grade 8 Science in Bangladesh in 78. National Curriculum and Textbook Board (NCTB) is responsible for secondary school curriculum development and Directorate of Secondary and Higher Education under MoE is responsible for curriculum implementation.

BACKGROUND OF THE STUDY

Major advances have been achieved in the recent years in the provision to secondary education in Bangladesh. The success rate of this education, specially in school enrolment, reduction of gender parity and in public examination, is very much remarkable (Hossain, 2014). However, the standard of science education is not satisfactory. The situation of science education in secondary schools in Bangladesh is a big concern to all including government and the society at large (Hossain, 2019). The alarming situation for Bangladesh is that students are significantly turning away from science education at secondary level, posing a challenge to country's development. BANBEIS (2014) showed that the ratio of science examinees in the SSC examination decreased by 14 percent in the last 15 years. Eminent scientists and science educators express their concern as science is losing its appeal in an alarming shift of choice. Shamima (2009) mentioned that the situation of science teaching in schools and colleges in Bangladesh is far from satisfactory. In recent times, there has been a growing public anxiety about the teaching and learning of science in schools. A large number of students seem to learn very little science at school, learning tends to be by rote and students find learning of science to be difficult.

The quality of science teaching and learning has also been questioned over time by parents, science educators, and the general public and even by the government. Qualified teachers and properly equipped laboratories are few and far between and could hardly be found in most of the schools. The teaching methodology and teachers cannot inspire the serious and meritorious students to take up science for their studies. As a result, enrollment in secondary and post-secondary science steadily fell over the last 10 years (Kabir and Choudhury, 2007*).* Ware (1992) identifies that there are many factors to consider when attempting improving student achievement in science. These include: the appropriateness and currency of the curriculum; the availability and quality of textbooks; the appropriateness of the assessment system; the availability of laboratories and scientific equipment; the school environment in which learning takes place; and the quality of the science teacher. Of all these factors, the one which is perhaps most frequently overlooked is the quality of the science teacher. It should never be forgotten that teachers are the front-line agents of educational innovation. The educational qualifications of secondary science teachers, their ways of presenting science to their students and their attitudes toward science have all been shown in various studies to have a significant impact in the implementation of science curriculum.

Implementation of Intended Curriculum

Curriculum implementation process involves helping the learner to acquire knowledge and experience. Mkpa (2007) describes the concept of curriculum implementation as the actual engagement of learners with planned learning opportunities. Therefore, putting the curriculum into operation requires an implementing agent and teacher is the agent in the curriculum implementation. Implementation is the manner in which the teacher selects and mixes the various aspects of knowledge contained in a curriculum document or syllabus into practice. Labane (2009) defined curriculum implementation as the task of translating the curriculum document into the operating curriculum by the combined efforts of the students, teachers and others concerned. According to Fullan (2007), this requires a change in their beliefs, teaching approach and use of materials. Research indicates that teachers require a thorough understanding of the meaning of educational change before there is an acceptance and adoption of new program and approaches. Brain, Reid and Boys (2006) agree that the success of any education policy depends on how the practitioners, namely the teachers, accept the mandated policy and adopt the desired practices. According to Sariono (2013), the most important factor in the implementation of curriculum is the readiness of the implementers of the curriculum. No matter how good the curriculum used, it depends on the readiness of teachers to implement them (Febriya & Nuryono, 2014). Bantwini (2010) describes the concept of curriculum implementation as the actual engagement of learners with planned learning opportunities. Ummah (2013) argued that the competence is a set of knowledge, skills, and behaviors that teachers should have, internalize, control and realize in carrying out their professional duties shown from their work. The role of teachers in the curriculum process is to help students develop an engaged relationship with the content. Active learning will increase the focus and retention of the curriculum, resulting in an exciting learning environment.

Grade 8 Science Curriculum in Bangladesh

The objectives of Grade 6 to Grade 8 science education as describes in the Science Curriculum 2012 in Bangladesh are to -

1. familiarize with different matters and incident and to make inquisitive and curiosity about them.

2. achieve the knowledge of concepts, laws, principles and theories of science and attain skills to express these issues in graphs, charts, tables, symbol, model as well as in language

3. achieve problem solving skill, creative thinking skill and critical thinking skill by practising scientific and experimental method

4. ensure the personal and social security and to achieve life skills and attitudes to overcome the adverse situations by practising science

5. be involved in lifelong learning by realizing the developing and changing mode of science

6. be science-minded and rational and logic driven thinker free from superstition by practising science

Guiding Principles for Teaching Science in Bangladesh

Science Curriculum 2012 in Bangladesh provides a set of guiding principles for its implementation. Students learn best when they are actively involved in their own learning rather than being passive recipient of knowledge and facts. The science curriculum at Grade 8 emphasizes the importance of students' learning 'how to learn' rather than simply 'what to learn'. Science is best understood when it is related to real-life situations. It is important to present science to students with an emphasis on country's contexts and issues. Teaching in local contexts allows students to be aware of how Science influences their everyday lives and how it can inform personal, community and government decisions (NCTB 2012, p10).

STATEMENT OF THE PROBLEM

The quantitative expansion in the provision of secondary education in Bangladesh has perhaps inevitably been attained at the expense of the quality of education (SESIP 2006). National Curriculum and Textbook Board (NCTB) in Bangladesh conducted a study named "A study Curriculum Evaluation and Needs Assessment at Secondary Level in Bangladesh 2010". This study revealed that National Curriculum 1995 had not been implemented properly as it was intended. This study found a large gap between the intended and the implemented curriculum. There was a very little coherence found between the intended and the implemented Science Curriculum at Grade 8. In respect of curriculum implementation, the major challenges identified in the studies were: overloaded curriculum, emphasizes on the use of teacher-centered learning strategies in learning process, scarcity of learning aids and equipment, inconsistencies in assessments, poor school infrastructure, absence of academic supervision and monitoring and shortage of qualified teachers. The same study also revealed that in classroom, most of the teachers used lecture method and cited from textbooks. They were not able to relate Science study with the students' real life. As a result, students could not learn how to apply their classroom-based knowledge to the real-world situations. In most cases students did not get opportunities to visit the nature outside of the school. Grade 8 students reported that no practical work was conducted at their level although curriculum instructed to do this. In fact, the theories were not practiced in practical classes at Grade 8 science (NCTB, 2010). After 17 years, NCTB revised the National Science Curriculum 1995 at Grade 8 and introduced the Science Curriculum 2012 in 2013. A significant shift took place in the Science Curriculum 2012 at Grade 8 in the areas of contents, pedagogy and assessment (Hossain, 2015). Whenever new innovations or concepts are introduced there is a natural apprehension by teachers to accept the proposed change. This creates a possibility of developing a gap between the intended and implemented curriculum (Sethole, 2004). Therefore, to make the implementation of intended curriculum a success, narrowing the gap between the intended and the implemented curriculum is of immense importance. Therefore, the specific objectives of this study are to –

1. examine the measures undertaken to enhance the competencies of science teachers to cope with the requirements of Science Curriculum 2012 at Grade 8
2. assess the science teachers in terms of their classroom performance in contrast to the requirements of Science Curriculum 2012 at Grade 8

THEORETICAL FRAMEWORK OF THE STUDY

This study is guided by TIMSS (Trends in International Mathematics and Science Study) framework for curriculum analysis which has been used internationally (Robitaille, et. al., 1993; Valverde, et. al., 2002). The TIMSS framework is based on a model of curriculum that has three components: the intended curriculum, the implemented curriculum and the attained/achieved curriculum.

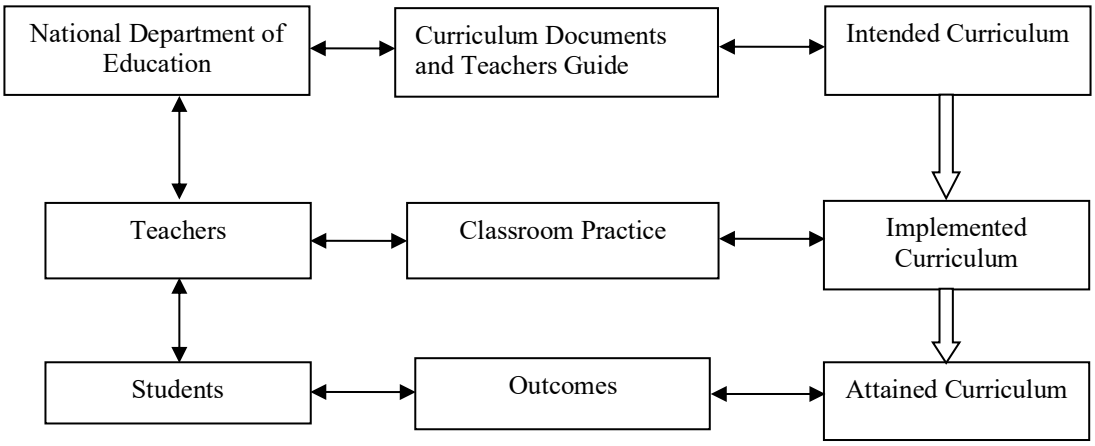

Figure 1: TIMSS Framework of Intended and Implemented Curriculum

In this model (figure 1.), the intended curriculum is at the educational system level. It is seen in national policies and official documents which reflect societal visions, educational planning, and official or political sanctioning for educational objectives. Intention and objectives at the level of the teacher and the classroom activity are considered as the implemented curriculum. Implemented curriculum is made up of what is actually taught in the classroom, who teaches the curriculum, and how it is taught. The attained curriculum is at the student level, and according to the TIMSS includes what students have learned, and their attitudes towards mathematics and science. This study will not explore third component (attained curriculum) as it is not within the scope of this study.

RESEARCH METHOD

This study employed a mixed method approach because of the nature of the research problem. A mixed-method approach provides rich and comprehensive data, because data from one source could enhance, elaborate or complement data from the other (or another) source (Creswell, 2005). Biesta (2012) explains that a qualitative-quantitative research design helps "to generate interpretive understanding that is giving an account of why people act as they act, where quantitative information can be added to deepen the interpretation and provide a more robust confirmation of the understandings acquired through the collection of qualitative data" (p. 149).

Population and Unit of the Study

The population of this study was the Grade 8 Science teachers in 32 districts in Bangladesh. The study unit was the Grade 8 Science teachers under the selected schools in these 32 districts only. Secondary schools were identified in terms of their locations and financial types. In terms of location, schools were classified as rural schools and urban schools in these 32 districts. On the other hand, in terms of financial status, schools were classified as Govt. schools. Monthly Payment Order (MPO) schools (Govt. aided) and Self-Financed (SF) schools.

Sampling Techniques and Sample Size

For quantitative data, all schools offering Grade 8 science in Bangladesh were considered. Out of 64 districts, 32 districts were selected by using simple random sampling techniques and 10 schools were selected from each of 32 districts by using stratified random sampling techniques. 320 survey teachers were selected from 20449 Science teachers in Bangladesh (BANBEIS, 2014). A purposive sampling technique was employed in selecting teachers for interview. 24 Science teachers who used to teach at Grade 8 were interviewed from 24 schools. 24 schools were selected from 8 districts under 8 divisions taking 3 schools from every district by keeping existing rural and urban schools' ratio.

Data Collection and Research Instruments

Survey

Questionnaire was used to collect survey data. Survey questionnaire constitutes an important and popular technique that is widely used to study the attitudes, opinions, perceptions and preferences in the field of educational research (Reid, 2006; Dörnyei 2007,). Creswell (2009) described questionnaires as "an important instrument of research, a tool for data collection. It is considered a set of questions arranged in a certain order and constructed according to specially selected rules" (p. 149). Questionnaires may give three types of data about respondents, which are: 1. Factual 2. Behavioural and 3. Attitudinal (Creswell, 2009). The questionnaire in the present study was characterized by its advantages. The advantages were as: 1. the questions were the same for all respondents, 2. anonymity of the participants was respected, 3. it was a relatively economical method in terms of both cost and time and 4. it allowed time to carefully check the content of the questions that are likely to yield more accurate information. The survey questionnaire was developed by using theme approach which were drawn from the research objectives.

Interview

Dörnyei (2007) and Talmy (2010) argue that interviews are one method most often used as a means of obtaining in-depth information about a participant's experiences, attitudes, perceptions, beliefs, thoughts, knowledge, and feelings of a problem being researched. Since the aim of this study is to identify the challenges and recommendation to implement the intended Science Curriculum at Grade 8 in Bangladesh, adopting the interview method as a means of data generation, as it allows to enter into the inner world of the teachers and to gain a better understanding of their perspectives (Johnson & Christensen, 2008). Semi-structured interview schedule was used and it was developed into same themes as in the survey questionnaire. Each interview session lasted between 25 minutes to 40 minutes. All the interviews started in local language Bangla. Common and familiar English words were used when teachers felt a need for clarification or elaboration or expression for making a clear understanding of the questions to teachers.

Class Observation

Classroom observation is "a process of gathering information by observing and watching the behavioural patterns of people in certain situations or at a research site, to obtain information about the phenomenon of interest" (Creswell, 2005, p. 211; Johnson & Christensen, 2008, p. 211). Carless (2004) stresses that in analysing the success of an innovation, it is crucial to learn how teachers carry out the innovative curriculum in the classrooms. Classroom observation was adopted due to several factors. First, the dynamics of any classroom interaction discourse cannot be effectively captured without observation. Classroom observation is a "highly developed data collection approach typical of examining learning environments" (Dornyei, 2007, p. 176). Second, the interaction patterns to be observed are not set-up or pre-planned but occur naturally in the context of teaching and learning. Hence, classroom observation yields first- hand data (Dörnyei, 2007) as it provides the opportunity to record information and the description of behaviour as it occurs in a setting, naturally (McMillan, 2004).

Piloting and Validation

Piloting the instruments for data collection is of critical important to ensure that the items are not ambiguous, confusing or poorly prepared (Wiersma & Jurs, 2009). A pilot study is conducted sometime prior to the main study to refine the techniques and tools a researcher plans to use (Ashley, 2012). In this study, the pilot study aimed at ensuring the comprehensibility of the tools so that teachers would have no difficulty understanding them. Instruments' were reviewed by three science curriculum experts who developed Grade 8 science curriculum. Then the instruments were pre-tested by Grade 8 Science teachers. The piloting of the questionnaires helped to check the clarity of the questionnaire items, instructions and layout and also to gain feedback on the validity of the questionnaire items. Piloting helped in removing ambiguities and difficulties in wording of the questionnaire and also helped to identify omissions, redundant and irrelevant items. The pilot study suggested that that the questionnaire required (on average) 30 minutes for completion. The study also recommended for excluding some sub-questions of main questions. In addition, instructions needed to be provided with an example of how to respond. Furthermore, the layout of the questionnaire was revised in terms of ensuring consistency of font size and box size. The study further showed that the levels of questionnaire language for some questions were found not suitable for teachers.

Data Analysis and Interpretation

The survey questionnaire generated a large amount of quantitative data. Spreadsheets were developed using statistical package for social science (SPSS) version 21. The quantitative data was classified and tabulated according to the theme approach as drawn from the objectives of the study. The quantitative analysis focused on providing descriptive statistics and establishing statistically significant relationships between the variables. The t-test was used to compare the opinions of rural and urban teachers in order to determine the significant difference that exists between their mean scores. On the other hand, ANOVA was used to compare the opinion of Govt., MPO and SF teachers in order to determine the significant difference that exists between their mean scores. These data were then converted to frequencies that were used to help to develop numeric data from the response of each category. Triangulation techniques were used to combine all sorts of data using thematic approach. In the social sciences, it refers to the combination of two or more theories, data sources, methods or investigators in one study of a single phenomenon to converge on a single construct, and can be employed in both quantitative (validation) and qualitative (inquiry) studies (Creswell, 2009).

RESULTS AND FINDINGS

Teachers Qualification

Education

It was found that a significant number of the teachers were identified teaching at Grade 8 Science without having a science degree. This number found highest in rural schools and least in Govt. schools. Data shows that 11.7% (30) rural teachers, 8.4% (10) urban teachers were non science graduates teach science at Grade 8. On the other hand, 5.0% (2) Govt. teachers, 8.9% (27) MPO teachers and 36.6% (11) SF teachers were found not having a science degree teaching science.

Professional Degree

A significant number of teachers were identified teaching Grade 8 Science without having a professional degree (B.Ed.). This number found highest in rural schools and least in Govt. schools. Data shows that 24.7% (63) of the rural teachers and 9.24% (11) of the urban teachers do not have any kind of professional degree. On the other hand, 2.5 %(1) of the Govt. teachers, 18.21% (55) of the MPO teachers and 60.0% (182) of the SF teachers do not have any kind professional degree.

In-service Trainings

A significant number of Grade 8 teachers did not get in-service trainings. This number found highest in rural schools and least in Govt. schools. Study finds that 45.1% (115) of the rural teachers and 24.4% (29) of the urban got curriculum dissemination training (CDT). On the other hand, 27.5% (11) Govt. teachers, 33.5% (101) MPO teachers and 68.8% (22) SF teachers got curriculum dissemination training (CDT). This study also reveals that 28.3% (72) of the rural teachers and 19.4% (23) of the urban teachers had practical science teaching training (PST). On the other hand, 25.0% (10) of the Govt. teachers, 21.9% (66) of the MPO teachers and 40.7% (13) of the SF teachers also did not get practical science teaching training (PST).

Initiatives undertaken by the Ministry of Education

Ministry of Education in Bangladesh conducted two in-service trainings. The first one was 3 days' curriculum dissemination training (CDT) and the second one was 5 days' practical science teaching (PST) training. These two in-service trainings were arranged in 2014 and 2016 respectively. In the survey questionnaire, a set of ten statements was used, one set for Curriculum Dissemination Training (CDT) and one set for Practical Science Teaching (PST) training based on the intentions of these trainings. The intentions of in-service trainings were found consistent with the intended Science Curriculum 2012 at Grade 8. A five-point Likert scale was used with five possible responses. These were 'strongly agree (SA)', 'Agree (A)', 'No opinion (NO)', 'Disagree (D)', and 'Strongly disagree (SD). The scores for these five possible responses were 5 for SA, 4 for A, 3 for NO, 2 for D and 1 for SD. Hence, mean score above 3 indicates positive response in favor of the statements where 5 beings the strongest agreement. On the other hand, mean score below 3 expresses negative response against the statements where 1 being the strongest disagreement. Responses are presented in four consecutive tables (1 to 4) in terms of frequency, mean and standard deviation. Independent-samples t-test and ANOVA were used at the .05 level of significance. The t-test was used to compare the opinion of rural and urban teachers in order to determine either teacher's opinion was statistically significant (S) or statistically insignificant (NS) between their mean scores. On the other hand, ANOVA was used to compare the opinion of Govt., MPO and SF teachers

in order to determine either teachers' opinion were statistically Significant (S) or statistically Not-Significant (NS) between their mean scores.

TABLE 1
Rural and Urban Teachers' Opinions about CDT Training

Sl.	Statement	Teacher		Teacher's view			
				Mean	Std. D	Sig. (2-tailed)	Remarks
1.	I understood the aims & objectives of the grade 8 science	Rural	114	4.43	.515	0.067	NS
		Urban	71	4.58	.552		
2.	I understood the changes made in grade 8 science curriculum	Rural	114	4.32	.658	0.148	NS
		Urban	71	4.46	.605		
3.	I learned strategies of science classroom management	Rural	114	4.39	.542	0.013	S
		Urban	71	4.59	.523		
4.	I achieved hands-on experiences on student-centered teaching-learning strategies	Rural	114	4.49	.584	0.040	S
		Urban	70	4.67	.557		
5.	I achieved practical experiences on the usage of investigating learning strategies	Rural	113	4.26	.704	0.131	NS
		Urban	71	4.42	.750		
6.	I understood the importance of field visit by students for learning	Rural	114	4.18	.673	0.128	NS
		Urban	71	4.34	.653		
7.	I learned to develop learning outcome-based lesson plan and its strategy	Rural	114	4.39	.659	0.043	S
		Urban	70	4.59	.625		
8.	I understood the strategies of using course work and its record keeping in continuous assessment	Rural	114	4.25	.673	0.003	S
		Urban	71	4.55	.650		
9.	I understood the strategies for assessing student's behavior and values and its record keeping	Rural	114	4.25	.649	0.067	NS
		Urban	71	4.45	.789		
10.	I learned the techniques for preparing students annual performance report	Rural	114	4.22	.675	0.014	NS
		Urban	71	4.48	.714		

Table 1 represents the opinions of the rural and urban teachers' opinion about their learning from curriculum dissemination training. This table that the mean scores of all ten statements appears above 4.0 which indicate that teachers from both rural and urban areas teachers were confident regarding their learning from curriculum dissemination training and hold positive views about this training. This table also reveals that rural and urban teachers differ significantly (S) as p was found less than .05 (i.e., $p < .05$) for four items 3, 4, 7, 8 and 10 in terms of their mean rating. This indicates that rural and urban teachers' express different opinion about their leaning on items 3, 4, 7, 8 and 10 in terms of their mean rating. On the other hand, opinion of rural and urban teachers' opinion was found to be statistically Not-significant (NS) as p is greater than .05 (i.e., $p > .05$) for rest of the items i.e., for items 1,2,5,6 and 9 in terms of their mean rating.

TABLE 2
Govt. MPO and SF Teachers' Opinions on CDT Training

Sl.	Statement	Teacher		Teacher's view			
				Mean	Std. D	Sig.	Remarks
1.	I understood the aims & objectives of the grade 8 science	Govt.	24	4.54	.588	.773	NS
		MPO	154	4.47	.526		
		FS	7	4.57	.535		
2.	I understood the changes made in grade 8 science curriculum	Govt.	24	4.38	.576	.978	NS
		MPO	154	4.38	.658		
		FS	7	4.43	.535		
3.	I learned strategies of science classroom management	Govt.	24	4.63	.576	.311	NS
		MPO	151	4.44	.537		
		FS	7	4.43	.535		
4.	I achieved hands-on experiences on student-centered teaching- learning	Govt.	24	4.79	.415	.090	NS
		MPO	154	4.52	.597		

	strategies	FS	6	4.67	.516		
5.	I achieved practical experiences on the usage of investigating learning strategies	Govt.	24	4.25	.897	.823	NS
		MPO	153	4.33	.706		
		FS	7	4.43	.535		
6.	I understood the importance of field visit by students for learning	Govt.	24	4.42	.654	.379	NS
		MPO	154	4.22	.669		
		FS	7	4.14	.690		
7.	I learned to develop learning outcome-based lesson plan and its strategy	Govt.	23	4.65	.573	.279	NS
		MPO	154	4.43	.665		
		FS	7	4.57	.535		
8..	I understood the strategies of course work for marking scheme and for record keeping	Govt.	24	4.67	.482	.056	NS
		MPO	154	4.31	.700		
		FS	7	4.43	.535		
9.	I understood the strategies for assessing student's behavior and values and its record keeping	Govt.	24	4.38	.770	.873	NS
		MPO	154	4.32	.711		
		FS	7	4.43	.535		
10.	I learned the techniques for preparing students annual performance report	Govt.	24	4.50	.590	.348	NS
		MPO	154	4.29	.721		
		FS	7	4.43	.535		

In line with rural and urban teachers, Govt., MPO and FS teachers also show positive views about their learning from curriculum dissemination training. Means scores of all ten statements appears above 4.0 which indicated that Govt., MPO and SF teachers were confident on their learning from curriculum dissemination training and hold positive views about this training (table 2). This table also reveals that Govt., MPO and SF teachers did not differ significantly as p is greater than .05 (p>.05) for all of the ten items in terms of teachers' mean rating.

TABLE 3
Rural and Urban Teachers' Opinion on PST Training

Sl.	Statement Teacher's view	Teachers		Teacher's view			
				Mean	Std. D	Sig.	Remarks
1.	I understood the objectives of the Grade 8 science	Rural	145	4.59	.494	.038	S
		Urban	77	4.73	.448		
2.	I understood the new changes made in Science curriculum	Rural	143	4.37	.624	.019	S
		Urban	77	4.57	.548		
3.	I learned the strategies of Science practical teaching	Rural	146	4.56	.551	.023	S
		Urban	76	4.74	.526		
4.	I learned concept change model	Rural	144	4.23	.697	.285	NS
		Urban	77	4.34	.754		
5.	I learned constructivist teaching learning approach	Rural	144	4.22	.684	.051	NS
		Urban	76	4.41	.636		
6.	I learned the demonstration-based learning approach	Rural	146	4.55	.512	.072	NS
		Urban	76	4.68	.496		
7.	I learned the investigation teaching-learning approach	Rural	144	4.27	.712	.005	S
		Urban	77	4.55	.640		
8.	I learned to make low cost no cost learning aids	Rural	146	4.62	.565	.307	NS
		Urban	76	4.71	.690		
9.	I learned to collect and preserve learning aids	Rural	146	4.60	.546	.176	NS
		Urban	77	4.70	.563		
10.	I learned the use of learning outcomes in preparing lesson plan	Rural	145	4.56	.512	.402	NS
		Urban	77	4.62	.608		

Table 3. represents the rural and urban teachers' opinions about their learning from practical science. As shown in table 3, mean scores of all ten statements appears above 4.0 which indicate that for both rural and urban teachers were confident on their learning from PST training and hold positive views about this training. This table also reveals that rural and urban teachers' opinion differ statistically significant as p is found less than .05 (i.e., p< .05) for four items 1, 2, 3 and 7 in terms of their mean rating. These indicate that rural and urban teachers expressed difference of opinion about their leaning mentioned in the items 1, 2, 3 and 7. On the other hand, opinions of rural and urban teachers do not differ significantly as p is found greater than .05 (i.e., p>.05)

for rest of the items. These also indicate that govt., MPO and SF teachers' opinion about their learning on the areas mentioned in items 4, 5, 6, 8, 9 and 10 do not differ significantly in terms of their mean rating.

TABLE 4
Govt. MPO and SF Teachers' Opinions on PST Training

Sl.	Statement Teacher's view	Teachers view					
		Teacher		Mean	Std. D	Sig.	Remarks
1.	I understood the objectives of the Grade 8 science	Govt.	23	4.70	.470	.645	NS
		MPO	185	4.62	.486		
		FS	14	4.71	.469		
2.	I understood the changes made in Grade 8 science curriculum	Govt.	23	4.52	.511	.534	NS
		MPO	183	4.42	.623		
		FS	14	4.57	.514		
3.	I learned the strategies of science practical teaching	Govt.	23	4.78	.422	.253	NS
		MPO	185	4.61	.531		
		FS	14	4.50	.855		
4.	I learned the concept change model	Govt.	23	4.35	.775	.828	NS
		MPO	184	4.26	.683		
		FS	14	4.21	1.051		
5.	I understood the constructivist teaching learning approach	Govt.	22	4.27	.703	.919	NS
		MPO	184	4.28	.683		
		FS	14	4.36	.497		
6.	I learned the demonstration-based learning approach	Govt.	23	4.78	.422	.099	NS
		MPO	185	4.59	.515		
		FS	14	4.43	.514		
7.	I learned the investigation teaching-learning approach	Govt.	23	4.48	.511	.662	NS
		MPO	184	4.35	.731		
		FS	14	4.43	.514		
8.	I learned to make low cost no cost learning aids	Govt.	23	4.83	.388	.146	NS
		MPO	185	4.65	.600		
		FS	14	4.43	.852		
9.	I learned to collect and preserve learning aids	Govt.	23	4.74	.449	.587	NS
		MPO	186	4.62	.568		
		FS	14	4.57	.514		
10.	I learned use of learning outcomes in lesson plan	Govt.	23	4.52	.665	.855	NS
		MPO	185	4.59	.536		
		FS	14	4.57	.514		

Table 4. represents the opinions of Govt. MPO and SF teachers about their learning from practical science teaching training. As shown in the table 4, mean scores of all ten statements appear above 4.0 which indicated that both govt., MPO and SF teachers were confident on their learning from PST training and hold positive views about this training. This table also reveals that govt., MPO and SF teachers do not differ statistically significantly as p is found greater than .05 ($p>.05$) for all of the ten items in terms of teachers' mean rating.

All interviewed teachers, irrespective of their locations and types, failed to explain the new inclusions and changes that occurred in the National Curriculum 2012 at Grade 8 Science. These teachers failed to explain the aim and objectives of Grade 8 Science. In fact, these teachers admitted that they learnt question-answer techniques, brain storming, group work, pair work, individual work, demonstration method from in-service trainings. Respondent teachers also recognized serious limitations in using some other teaching learning strategies like investigation, project-based learning, social constructivism, practical science teaching and concept development model. Teachers recognized of having difficulties in understating the new assessment system. Around one third respondent told that they did not get this training. They were using their own assessment system. These teachers also complained that all of them did not get in-service trainings. The training manual contents and its explanation were not satisfactory. Training class was not appropriate for conduction training. Training class size was very large (1:53).

Teachers Class Performance

In view of identifying the techniques usually used in classroom by the survey teachers, 10 teaching-learning techniques were designed and offered to respondents. Teaching learning strategies 2, 3, 5, 7, 8, 9 and 10 were

taken from Grade 8 science curriculum. In in-service training, teachers were given training to cope with these strategies (SESDP, 2013). Rural and Urban teachers and Govt., MPO and SF teachers were participated in survey. A 4-point Likert scale response was used to determine the frequency the teachers used the T&L strategies. Each of these strategies was categorized into four possible options. These options were Always Used (AU), Sometimes Used (SU), Rarely Used (RU), and Never Used (NU). The scores for these four possible responses were 4 for AU, 3 for SU, 2 for RU and 1 for NU. Hence, scores above 2 indicates positive response in favour of the statements and scores below 2 express negative responses against the statements. Independent-samples t-test and ANOVA were used at the .05 level of significance. The results are documented in table 5& 6.

TABLE 5
T&L Strategies used by Rural and Urban Teachers

Sl. No.	T & L Strategies	Teacher		Mean	Std. D	Sig. (2-tailed)	Remarks
1.	Continuous lecturing	Rural	188	2.54	.955	.004	S
		Urban	85	2.18	1.002		
2.	Use past experience' and link it with new lesson	Rural	189	3.74	.517	.845	NS
		Urban	88	3.73	.562		
3.	Use of real-life examples	Rural	188	3.65	.532	.525	NS
		Urban	88	3.69	.554		
4.	When students ask questions, I myself give the answer	Rural	190	3.42	.750	.021	S
		Urban	86	3.19	.847		
5.	Allow wait time to respond to a question or solve a problem	Rural	188	3.48	.607	.259	NS
		Urban	87	3.57	.640		
6.	I demonstrated the practical before the students	Rural	187	2.95	.788	.699	NS
		Urban	87	2.99	.934		
7.	Engage students in work	Rural	189	3.44	.630	.024	S
		Urban	87	3.62	.595		
8.	Engage students in making low cost and no cost learning aids	Rural	190	3.07	.810	.343	NS
		Urban	87	3.16	.608		
9.	Students' visit outside classroom to observe real life situation	Rural	187	2.61	.785	.556	NS
		Urban	88	2.67	.827		
10.	Students' engagement in affective domain activities	Rural	189	3.20	.785	.265	NS
		Urban	87	2.67	.827		

Table 5 shows the positive views of the research participants in favour of the statements (sl. 2, 3, 5, 7, 8, 9 and 10) which indicated that a student-centered learning culture was prevailing in Grade 8 science classes. These statements are indicating student-centered teaching learning activities. Both rural and urban teachers were the regular users of these student centered teaching strategies. On the other hand, these teachers were sometimes users of teacher-centered teaching techniques (items 1, 6). This table further discloses that student centered technique mentioned in item 9 were not regularly used by both rural and urban teachers. The same table also finds that although rural teachers were used regularly item 10 but urban teachers were used sometimes item 10. Statistical significant difference was found in items (2, 3, 5, 6, 8, 9 and 10) but not statistical significant difference was found in items 1, 4 and 7.

TABLE 6
T& L Strategies Used by Govt. MPO and SF Teacher

Sl. No.	T& L Strategies	Teachers		Teachers views			
				Mean	Std. D	Sig.	Remarks
1.	Continuous lecturing	Govt.	29	2.07	.961	.010	S
		MPO	219	2.42	.985		
		FS	25	2.88	.833		
2.	Use past experience and link it with new lesson	Govt.	30	3.77	.430	.940	NS
		MPO	222	3.73	.552		
		FS	25	3.72	.458		
3.	Use of real-life examples	Govt.	30	3.83	.379	.186	NS
		MPO	221	3.64	.559		
		FS	25	3.64	.490		
4.	When students ask questions, I myself give the answer	Govt.	29	3.17	.759	.135	NS
		MPO	222	3.34	.813		
		FS	25	3.60	.500		

5.	Allow `wait time' to respond to a question or to solve a problem	Govt.	30	3.60	.498	.119	NS
		MPO	220	3.53	.630		
		FS	25	3.28	.614		
6.	I demonstrated the practical before the students	Govt.	29	2.86	.953	.513	NS
		MPO	221	2.95	.841		
		FS	24	3.13	.612		
7.	Engage students in work	Govt.	30	3.60	.563	.142	NS
		MPO	221	3.51	.615		
		FS	25	3.28	.737		
8.	Engage students in making low cost and no cost learning aids	Govt.	30	3.17	.592	.432	NS
		MPO	222	3.11	.753		
		FS	25	2.92	.909		
9.	Students' visit outside classroom to observe real life situation	Govt.	30	2.70	.750	.570	NS
		MPO	220	2.64	.796		
		FS	25	2.48	.872		
10.	Students engagement in affective domain activities	Govt.	30	3.03	.809	.649	NS
		MPO	221	3.17	.785		
		FS	25	3.20	.913		

Like rural and urban teachers, Govt., MPO and SF teachers also reported their positive views (table 6) in favour of the statement mentioned in items 2, 3, 4, 5, 7 and 10. These findings indicate that Govt., MPO and SF teachers were always users of most of the student centered teaching techniques mentioned in the On the other hand, these teachers were sometimes users of teacher-centered teaching techniques mentioned in the items 1 and 9. This table further discloses that Govt., and MPO teachers were sometimes user of item 6 whereas SF teachers were always user of the same item. Govt., and MPO teachers were always users of item 8 whereas SF teachers were sometimes users of the same item. There was no statistically significant difference of opinion found among research respondents in all items except item 1.

Interview findings in relation to classroom teaching did not support the survey findings. Respondent teachers acknowledge their limitations regarding the pedagogical changes incorporated in Science Curriculum at Grade 8. In interview, all interviewed teachers admitted of using students-centered teaching learning strategies. They acknowledge that they had identified the past experience of the students and linked it with evolved situation to generate new knowledge and they had also tried to avoid traditional lecture method in class teaching. By asking questions, teachers identified students' prior knowledge. As teachers told, questions depend on content of the lesson. Learning progress was checked by asking questions. Teachers allowed a 'wait time' to students for responding questions but failed to mention the basis of allocating 'waits time'. Wait time should depend on the difficulty level of question. Group work is very popular to teachers in engaging students in the learning process. The way respondent teachers explained the ways they formed group which support curriculum instruction. Practical science teaching is a new inclusion at Grade 8 Science Curriculum. Respondent teachers' statements disclosed a depressing scenario of practical science teaching. Teachers frankly admitted that students at Grade 8 did not get access into practical. Teachers explained the reasons. At Grade 8, students have to sit JSC examination. Practical is not a part of the JSC examination. Head teachers and guardians run behind for a good result. Furthermore, large class size, inappropriate class room, scarcity of instruments, inappropriate class routine and small class duration are identified as constraints in conducting practical science teaching. Science Curriculum at Grade 8 put emphasizes on applying investigation and project-based leaning approach in classroom teaching**.** All teachers admitted that they did not use investigation and project-based leaning approach method due to their insufficient knowledge and skills. Although Science Curriculum at Grade 8 emphasizes for using low cost no cost teaching aids but most of the interviewed teachers reveal that they used very traditional teaching aids which had no impact on students learning. Only two teachers admitted of using low cost no cost teaching aids. Teachers had given in-service trainings in this regard. Science Curriculum at Grade 8 emphasizes on field visit for students. All teachers recognized that they could not arrange field visit. However, they also added that field visit is significant teaching learning strategy to help the students for appreciating the relevance of what they learned in the classroom. They also reported that it was difficult for them to bring students outside classroom or to organize a field visit without head teachers' co-operation.

Observed Class Findings

In class observation, teacher-student activities were observed. 10 activities were designed from Grade 8 science curriculum which were supposed to be used in class activities. Each of these activities were rated in three possible scales as 'Satisfactory', 'Need Improvement' and 'Not done'. A 3-point Likert scale response was used to determine the frequency the teachers' activities in class. Class observation findings were completely reverse of survey and interview findings. Class observation findings indicate that a lecture-based teaching learning

culture is prevailing at Grade 8 Science classes in contrast to the requirement of the intended Grade 8 science curriculum.

TABLE 7
Teachers-students' Activities

Sl. No.	Indicators	Level of performance (%)	Observed Classes				
			Rural (33)	Urban (15)	Govt. (5)	MPO (39)	SF (4)
1.	Link students' prior knowledge to the content	Satisfactory	0	0	0	0	0
		Need Improvement	12.1	13.3	20.0	2.6	0
		Not Done	87.9	86.7	80.0	97.4	100.0
2.	Content explanation using real life examples	Satisfactory	0	0	0	0	0
		Need Improvement	9.1	20.0	20.0	5.1	0
		Not Done	90.9	80.0	80.0	94.9	100.0
3.	Students engagement in practical work	Satisfactory	3.0	0	0	0	0
		Need Improvement	15.1	6.7	0	5.1	0
		Not Done	81.9	93.3	100.0	94.9	100.0
4.	Teacher demonstrate practical work	Satisfactory	0	0	0	0	0
		Need Improvement	12.1	26.7	20.0	17.9	0
		Not Done	87.9	73.3	80.0	82.1	100.0
5.	Provide task to lower order thinking	Satisfactory	0	0	0	0	0
		Need Improvement	69.7	73.3	60.0	74.3	75.0
		Not Done	30.3	26.7	40.0	25.7	25.0
6.	Provide task to higher order thinking	Satisfactory	0	0	0	0	0
		Need Improvement	0	0	0	0	0
		Not Done	100.0	100.0	100.0	100.0	100.0
7.	Provide task for affective learning outcome	Satisfactory	0	0	0	0	0
		Need Improvement	0	0	0	0	0
		Not Done	100.0	100.0	100.0	100.0	100.0
8.	Use of learning aids	Satisfactory	18.2	20.0	0	23.1	0
		Need Improvement	36.4	46.7	40.0	41.0	50.0
		Not Done	45.4	33.3	60.0	33.3	50.0
9.	Interactions	Satisfactory	15.2	20.0	20.0	17.9	0
		Need Improvement	21.1	26.7	40.0	20.5	25.0
		Not Done	63.7	53.3	40.0	61.6	75.0
10.	Continually assess students by using CA instruction	Satisfactory	0	0	0	0	0
		Need Improvement	0	0	0	0	0
		Not Done	100.0	100.0	100.0	100.0	100.0

Teachers-student's activities in relation to curriculum intentions were found very frustrating irrespective of schools' locations and schools' types. As seen in table 7, level of performance against the indicators reveal that teacher-centric learning culture was prevailing at Grade 8 Science in contrast with the curriculum requirement.

Link Students' Prior Knowledge to the Content

Most of the teachers did not identify student' prior knowledge and experiences and did not link it with new content although curriculum strongly emphasizes it. Only a few teachers (12.1% rural, 13.3% urban, 20.0% govt. and 2.6% MPO) took attempt to use students' prior knowledge at dissatisfactory level. Most of the teachers, 90.9% (30) of rural, 80.0% (12) of urban, 80.0% (4) of Govt., 94.9% (37) of MPO and 100.0% (4) of SF, were found explaining the content without linking it with real life situation.

Content Explanation using Real Life Examples

Teachers explained content exactly as it was in the textbook. Only a few teachers 9.1 % (3) rural, 20.0% (3) urban, 20.0 % (1) govt. and 5.1 % (2) MPO, used real life situation which were not consistent with the learning outcomes. No SF teachers were found in using real life examples.

Students' Engagement in Practical Work

Practical either done by students or demonstrated by teachers both was in severe gloomy state. Only 3.0% (1) of rural schools engaged students in practical work by meeting the level of expectation. 15.1% (5) of the rural

teachers, 6.7% (1) of the urban teachers and 5.1% (2) of the MPO teachers engaged students in practical at unsatisfactory level. No Govt. and SF schools were observed doing practical activity. On the other hand, no teacher was found successfully demonstrating the practical activity. Around 80% observed teachers did not demonstrated practical work and no SF teacher was also found demonstrating practical work. Around 80% irrespective of locations and types, engaged students in theoretical activities but none was found doing in expected level.

Provide Task to Lower Order Thinking

Around two third teachers engaged students in group work with lower order thinking activities. Teachers did not engage students in higher order thinking activities. Problems were taken directly from the textbook. Students copied the answer from the textbook and used textbook language. A significant number of teachers, 30.3% (10) rural, 26.7% (4) urban, 40.0% (2) govt. and 25.7% (10) MPO and 25.0% (1) SF, did not engage students in hands-on activities. Only 3.0 %(1) rural teacher used learning outcomes correctly mentioned in the curriculum and gave appropriate activities to students. A few teachers, 12.1 %(4) rural, 26.7% (4) urban, 20.0 %(1) govt. and 17.9% (7) MPO, attempted to give activities to students were not relevant and consistent with learning outcomes. Activities around 80.0% were inconsistent with learning outcomes.

Provide Task for Affective Learning Outcome

In class teaching, affective domain learning outcomes were not used. This finding is consistent with the interview findings. In interview, teachers recognized not using affective domain in class teaching as they had a very little knowledge on affective domain.

Use of Learning Aids

Some teachers, rural 18.2 %(6) rural, 20.0% (3) urban, 23.1 %(9) MPO, used appropriate learning materials. Those teachers used locally collected materials such as flower, roots etc. No Govt. and SF teachers used appropriate learning materials. Around 40% observed teachers, irrespective of locations and types, didn't use appropriate learning materials. A large number of teachers, 45.4% (15) rural, 33.3% (5) urban, 60.0 % (3) govt. 33.3% MPO (13) and 50.0 % (2) SF, did not use any learning materials. Only a few teachers, around 10%, used writing boards.

Interactions

As seen in the table, only a few classrooms, 15.2% (5) rural, 20.0% (3) urban, 20.0% (1) govt. and 15.4% (6) MPO and 25.0% (1) SF, were rated as 'satisfactory' level of performance regarding the interactions between teacher-students and students-students. In these cases, teachers used more time than students. They invited questions from students and gave answer to students. A significant number of classrooms, 63.7% (21) rural, 53.3% (8) urban, 40.0% (3) Govt., 61.6% (24) MPO and 75.0% (3) SF, were found in the observation where teachers were dominating in the classroom.

Continually Assess Students by using CA Instruction

No evidence was found in the observed classes to use continuous assessment instructions in relation to keep records for students learning development. This finding is very much consistent with the interview findings. In interview teachers acknowlwdged of not using curriculum prescribed continuous assessment guidelines. They admitted of not having enough knowledge and skill to use the newly introduce continuous assessment system. They also added that as continuous assessment is not a part of public examination, school authorities did not any show any interest on it.

DISCUSSION

Curriculum implementation equates with instruction, or the actual teaching and learning that happen in class. It is the engagement of learners with the curriculum and the planned learning opportunities (Kelly,2009, Fullan 2007). The teacher has a key role in the implementation of a curriculum innovation in the classroom (Akker, 2010). Putting a new curriculum into practice requires teachers to learn new roles. With their knowledge, experience and competencies teachers are central to curriculum improvement effort, they are responsible for introducing the curriculum in the classroom and outside the classroom as well. Students learn best when they are actively involved in their own learning rather than being passive recipient of knowledge and facts (Hossain, 2007). The science curriculum at Grade 8 in Bangladesh emphasizes the importance of students' learning 'how to learn' rather than simply 'what to learn'. To make learning more interesting, meaningful, stimulating and

motivating for the students, the Science Curriculum at Grade 8 recommended that student-centered classroom practices should be adopted as much as possible instead of the conventional teacher centered classroom practice (Hossain, 2015). In order to create strong curriculum teachers must play an integral role in every step of the process.

A teacher cannot practice what he is not trained for. Non science graduates should not teach science. Teachers should have professional degree and in-service trainings to cope with the need of curriculum. This study finds serious limitations in the qualifications of Grade 8 Science curriculum. Ministry of Education Bangladesh's initiatives to prepare teachers to cope with the requirement of science curriculum at Grade 8 could not be identified as successful. Teachers failed to show curriculum documents in their possession. Teachers could not explain the objectives of Grade 8 science curriculum and failed to identify the key departures of newly revised Grade 8 science curriculum. Science teachers class performance confirmed as failure initiatives. Teachers' class performances in contrast with the intention of Science Curriculum 2012 at Grade 8 were found very unsatisfactory. Although survey findings completely indicated that a student-centered learning cultures were prevailing in Grade 8 science classes but classroom observation revealed that traditional teacher centric teaching practice were dominated in science classes just like 'teaching was telling, learning was listening, and knowledge was facts" (Lanier, 1992). This view of the teaching learning exchange is being replaced in Grade 8 Science Curriculum by a more "agile" pedagogy, which recognizes the students' own active role in the learning process, and views the teacher as a facilitator of this process (NCTB, 2012). Babu (2016) reported that, in reality, almost every teacher was unaware of the curriculum and did not have the TG. He further added that half of the teachers sampled reported not preparing for classes. He mentioned that they prepared class by reading science textbook. Bablu (2016) further showed that the Science teachers need to study the subject matter given in curriculum and teacher's guide (TG) carefully prior to conducting lesson. Sarkar (2012) revealed that teachers found difficulties in conceptualizing many of the curriculum-identified values and consequently, found it difficulties to find, develop and implement suitable teaching approach to promote the values. Students' involvements in hands-on learning and in practical activities as prescribed in the curriculum were found almost absent from the classroom teaching.

Teachers spent most of their time in classroom by using traditional monotonous lecture. Most of the teachers read out from textbook in delivering their lessons. Classroom teaching contributes nothing to develop creative thinking and critical thinking among students. Classroom teaching did not help to develop scientific attitudes and values among students. Class teaching did not reflect the Science Curriculum intentions. These situations were prevailing in almost all schools irrespective of their locations and financial types. Teachers' presentation skills and professional attributes were also found unsatisfactory. Effective science teaching practice in school is a must to ensure good science education (Babu 2016). He argued that according to ideal teaching learning methods of science, students are expected to think rationally and solve problems in their daily life through science education. Science Curriculum 2012 mentioned that science cannot be learnt solely by reading textbook; therefore, science teaching through 'learning by doing' is strongly emphasized (NCTB 2012). Most of the teacher did not engage students in hands-on activities. Teachers engaged students in group work with lower order thinking activities very similar to BANBEIS (2016) report which stated that Science teachers do not help student to practice group discussion, group or individual work, activity and experiments. Rahman and Begum (2012) showed that, in Bangladesh, teachers are facing problems in explaining the science content, in providing reallife examples in linking the principles of science with real life examples and, in providing current ideas regarding science content.

CONCLUSION

The role of teachers in the curriculum process is to help students develop an engaged relationship with the content. Active learning will increase the focus and retention of the curriculum, resulting in an exciting learning environment. Teachers had serious limitations in understanding Grade 8 Science Curriculum and in applying its instructions in the learning process. Lecture being the principal method used in delivering lesson. Teaching practice indicated that teachers entered into the classrooms without adequate preparation. Most of them directly readout the contents from the textbooks and were hardly comfortable in delivering the lessons. Teachers' readiness and school's preparation should be made before the implementation of new education program. Teachers should have regular in-service training opportunities. In-service training should be designed and conducted on the basis of teacher's needs. Inadequate and ineffective training can be a potential barrier to curriculum reform implementation. According to O'Sullivan (2002), in order to ensure successful and effective implementation, the professional support given to teachers need to be given careful consideration.

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