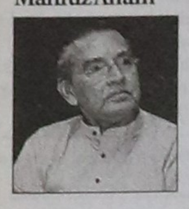
The Daily Star
BANGLADESH ACADEMY OF SCIENCES
ROUNDTABLE-12 JULY 2008

Science Education Needs a Boost

Mahfuz Anam



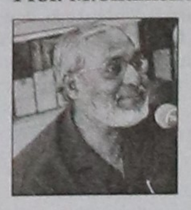
We at The Daily Star felt from the very beginning that science education as a discipline, as an area has been neglected in Bangladesh. Science is not just an educational subject, it is a way of thinking; it is a culture. But it is not being given due importance by the relevant authorities by society or by the state. We observe with great concern that the interest in science studies among students is waning, and as a result the number is decreasing gradually. There is both qualitative and quantitative decline in science education. The present world is constantly looking at science to solve various problems. It is through the application of science we are getting developed seeds to grow more rice; we are getting right kind of fertilizer and irrigation methods. Everything evolves through the use of scientific knowledge.

The other concern is the issue of climate change in Bangladesh. We hear so many things about the impact of climate change. No doubt this is a big challenge before Bangladesh. And if we have to do something then it has to be done through the application of scientific knowledge. If salinity increases in water, we shall have to develop a variety of rice seed that will sprout in saline water. We shall have to develop a seed that will sprout and grow under water. May be our urban areas will look different in the future. May be our highways will be above water. There are all sorts of options and we shall have to think about them. And this can only be possible through research and study of science.

Against this backdrop, we in the Daily Star thought whether we could do something together with your organisation to bring science in the centre stage of our thoughts and in the mainstream of education. That is why you all are here to discuss. You are the scientists; you are the repository of knowledge. We can only be facilitators; we can only be partners in an intellectual journey in which you will provide the leadership. It is not a one short affair. We want to have a series of public awareness programmes aimed at policy formulation. We can think of a national convention of scientists where we can invite hundreds of scientists from all over the country to demand in a loud voice to give proper recognition to science education. Resource allocation is an important element in government policy formulation. Let us find out what we can do about that, how we can organise many smaller programmes, whether we can organise programmes in the district towns and so on.

I would now request Dr Shamsher Ali to moderate the session.

Prof. M. Shamsher Ali



I want to thank Mr Mahfuz Anam and his team from The Daily Star for taking this initiative. I appreciate his remarks "respect for science." Respect for learning in general and respect for learning in particular is the key to success. I think this roundtable conference is very timely. Because we can see that enrolment in science education has dramatically gone down this year. It is a global phenomenon but it is more acute in Bangladesh. Enrolment in science group in HSC in 2000 was 1, 26,015. In 2008, the figure stands at 97, 576 that mean there has been 30 percent decline in the number of candidates. In BSC in 2001, the number was 19,906 and in 2008 it came down to 11,790, which means a decline by 45 percent or more. These figures tell us that science education is in a bad shape, in a mess. There are many factors working behind this decline. It begins at the primary level. There is no laboratory in schools. Some of them are very ill-equipped. There are no qualified science teachers. There is lack of motivation and incentives. Other factor is employment opportunity. What will they do by studying science? When we could be a manufacturing country, we have reduced ourselves to an indenting country. We do not have any assembling line where science graduates could find work. There was no political commitment at the highest level to use science and technology as an instrument of change. Because of the weak base, there is no scope to do better at the university level. We do not have proper laboratory facilities to do a PhD programme. Countries in the region are spending state money to send students to do research and PhD programme. There is no such policy in this country. We hope to crystallize our thoughts today so that we can focus on the development of science education in the country.

Prof. Mohammad Kaykobad

I am giving some historical perspective of science education in Bangladesh. Up to 1964, science used to be taught in class 8. In class 9 and 10 more meritorious students used to study higher mathematics. From 1964 to 1982, there was a separate science stream and some of the science syllabus of intermediate level was included in SSC level. From '82 to '96, science stream students were given a condensed syllabus where chemistry and physics were unified. All male students were forced to take agriculture and female student home economics and religion as compulsory subjects.

From the statistics of SSC level of the period between 2001 and 2006 we see that in science group 2, 64,000 had appeared in 2001; 2,33,000 in 2003 and 2,2000 in 2006. On the other hand, enrolment in the arts and business studies had increased. In science groups enrolment had reduced by 25 percent in 2006 from 33 percent in 2002. But rate of success in science groups increased because of GPA system. In HSC level, 1,26,000 students appeared in SSC science group and it came down to 82,000 in 2006. While 24 percent of students were from science stream, it came down to 19.9 percent in 2006. There has been an absolute fall in the number of candidates. When our population is increasing, the number of science students is decreasing.

In the recently published SSC results, GPA system failed to differentiate among the 52, 500 students. All are GPA-5 holders. Then the government gave the decision that there would be no admission test for college admission. It will be done on the basis of SSC result. But there was problem here. Then it was announced that candidate's date of birth would be necessary. In India, exams are still evaluated on number basis. They mention who came first, second or third in merit list. But that is not good enough. For admission in college they have to sit for examination. Those who want to get admitted to ITT centres they have to sit for joint entrance examination, which is very competitive. For admission in medical or engineering institutes one has to sit for separate admission examination.

In our country, enrolment in science subjects is going lower every year. Many who are studying BSC are not taking mathematics as a subject.

Our industries including ICT could not perform anywhere near expectation of the common mass. This must have resulted in the set back of science enrolment. In the name of globalisation, multinational companies are penetrating into the country with their products for which we are acting as agents or sales persons only. This has perhaps increased the interest in business studies. Even good students with skill in physics, chemistry and mathematics are opting for business studies. The textbooks are not written with the objective of creating inquisitiveness in children. For example, the biology book of class V and VI has been stuffed with so many Latin words. This cannot encourage children to study science subjects.

Science education is hard and could only attract top students schools and colleges. It is because of lack of teachers and poor lab facilities. Teaching profession no longer attracts the meritorious graduates. With the introduction of grading system students are more interested in ensuring highest grades in all subjects. This is discouraging students from attaining skill in mathematics and other science subjects. We need to write good science books. Salary and other benefits of teachers should be given due consideration. Commitment of the government to create science and technology driven economy to face challenges of the 21st century is important. We can organise many competitive events to popularise science among the children. Olympiad type events do not require huge funds.

Prof. Zafar Iqbal

I visited 10 schools and colleges in Sylhet and talked with the teachers and students in those institutes. I also went around the laboratories to have some idea. I tried my best to understand the reasons for the sudden decline in the interest to study science subjects. In fact, it is not a sudden phenomenon rather it has been happening for a long time and we have talked about this in the past. In one word, science books are in terrible state, they are really bad. Students cannot understand the texts on their own. When I asked them, they said they do not understand anything. Here I have photos of some texts. Look at the quality of the paper. Some of the pages are red, some white. The papers are so thin that prints on one side can be seen on the other side. Print quality of photographs is also very bad. Now, look at the binding. Some of the texts have gone inside the binding ad as a result students cannot read what is written there until they tear out the pages. The text itself is totally devoid of any sense. I had to read one paragraph five times to understand the message. But the same thing could be written in a much simpler way. Why not make the textbook easy to read and easy to understand?

Next, what I have observed is teachers cannot or do not teach properly in the class. It is as plain and simple as that. They do not have the ability to teach in the class. That is why students need to go to private tutors to study science. But it is expensive and only the affluent can afford it. As a result, only a small fraction will get the chance to study medical, engineering at the universities. No opportunity for the rest.

Coming back to science practical I want to say that we know there is 25 percent marks for practical. It is a big number. But it is commonly believed that it is a short syllabus that can be finished in 5 to 7 classes. Therefore, one does not have to take many classes. Though one practical class is to be taken every week but teachers do not take that class. In most schools practical classes start from class X. No class is taken in class IX. In most schools practical classes are taken after the test examination. It has been noticed that 80 percent of the students get 90 to 100 percent marks without giving much effort. They get 24 or 25 out of 25. Anyone who attends the practical class gets pass marks. Generally students have lot of fun doing practical classes but unfortunately they are not given the opportunity. The fun part is missing in whatever they do now in the name of practical.

I have seen a small laboratory room crammed with students. I could not understand how so many students could do a biological practical in that small room. In another school I have seen the same room being used as physics, chemistry and biology lab. But interestingly, the computer lab looks well equipped and neat and clean. Computer literacy is necessary in schools and colleges but they could do without a lab. I have been told by a teacher that there is no laboratory in 40 percent of the schools in the rural areas. In the rural areas attendance is a major problem. But there are many coaching centres in each area. University students run these centres. They say they would coach them and as a result students do not go to college regularly. Pressure from the higher authorities is a recent development. They create pressure on teachers to give more marks. A script was sent back to a teacher for giving poor marks. College authorities want to show that more students pass from their institutes.

Under the present system, one can become a science graduate without even studying mathematics. This was a great damage done to the science education because the same graduates are now finding it difficult to teach math in schools. They cannot teach with confidence. They encourage students to memorise everything. But there is a new decision which I find quite encouraging. For registration purpose, teachers will have to sit for an examination. Only those who will pass will be considered for employment.

My observation is, science is still a favourite subject to good students. But science is no more a subject for the rural or an economically deprived student. This is a fact. Science is for the very rich people now. My recommendations: We need good textbooks; no more guidebooks; only classroom teaching; no private coaching; real practical class; compulsory higher mathematics for science students; computer literacy for every higher secondary and higher secondary student and compulsory math for BSC level students. We also need more budgetary allocation in the education sector.

Prof. Jamilur Reza Choudhury

We are all concerned about the decrease in the number of students opting for science group at different levels. Comments have been made about the lack of motivation among students to excel in studies after the recent introduction of the GPA system where numerical marks between 80% and 100% carry the same grade. It is difficult to statistically justify the reliability of current testing method, particularly when we look at the rapid fluctuation in the overall pass rate in SSC and HSC from year to year. One year it is 70% but next year it could be 40%. Many countries have moved away from the numerical grading system under which merit positions are announced among very large numbers of students. I feel that the present GPA grading system should be reviewed; one solution may be to introduce the percentile ranking method based on numerical grading which would motivate the students to perform well and be included among the topmost percentile.

In our national budget, the total allocation for education is Tk. 8,600 crore, which is about 16% of the revenue budget and 16% of the development budget. This is for primary, secondary and university education. The annual expenditure per student at SSC level is around Tk. 5,000 in government schools and Tk. 1,200 in non-government schools. In government colleges it is Tk. 5,000 per student and in non-government colleges it is Tk. 3,500. In Cadet Colleges the figure is Tk.70,000 per student per year. The average of expenditure in all public universities (excluding Open University and National University) is about Tk. 40,000 per student per year. One estimate shows that if we include development expenditure and investment in infrastructure, building, land etc., it would be around Tk. 1,00,000 per student per year. It is extremely difficult to calculate separately the budget allocation for science education; for that we have to dig deeper to get the data which to be collected from the finance and education ministries.

Among the major weaknesses we have already heard about curriculum, teachers, textbooks etc. I have seen students of class V or VI trying to memorise how an atomic reactor works from a textbook. They did not understand anything. The introduction of unsuitable or inappropriate topics and the poor quality of text books are among the major reasons why students are losing interest in studying science. In a recent meeting some college principals commented that as getting better grades in commerce group is relatively easier than in science group, some private colleges are thinking about closing down science section at HSC level. This is a dangerous development. Another fact motivating the students to prefer Commerce group is the easier access to jobs with relatively higher salary. For example, holders of engineering degrees from BUET very often face difficulties in getting employment and the starting salary may be 50% (say Tk. 12,000 per month) of what a BBA degree holder gets. This is a reason why more students now want to study BBA.

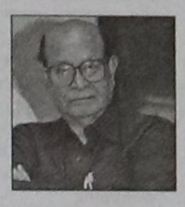
Use of ICT in education has yielded some positive results. I believe deficiencies in teaching materials, textbooks and laboratory facilities can be overcome to some extent through the use of ICT. We at BRAC University, in cooperation with a local software firm, have developed a set of CDs which include topics on science courses for SSC level students, including detailed explanation and simulation of experiments. These have been made available to various schools and have been quite helpful, particularly in schools which lack proper laboratory facilities, some of which have been highlighted by Dr. Zafar Iqbal. They will have at least some idea about practical experiments. Hopefully, Internet facilities will reach most schools within the next few years, along with low cost laptop computers. Another medium we are neglecting is the use of TV channels. The BTV educational channel unfortunately was closed down. My suggestion is to use TV channels in a more structured way. The UK Open University (OU) may be cited as a successful example here. The OU educational programmes, particularly covering science and technology related subjects, telecast over BBC TV, are of very good quality; these may be translated into Bangla and shown here through BTV terrestrial network.

Taking nation-wide tests for teachers' recruitment is a positive development. We have already discussed teachers' training. I would further like to suggest introduction of examinations for promotion of teachers along with financial incentives for those who perform well. In most countries, Summer Schools for teachers are organized to help teachers develop their knowledge and skill. Financial incentives like special scholarships for students who want to study science may also be introduced so as to attract more students to science stream.

In the past, every year science weeks including fairs and festivals used to be organised at the local, district and national levels. Students used to come to participate and display these innovative projects and top performers used to get recognition in the form of prizes and awards. Unfortunately, these are not being held regularly now. During the last few years, we have been organizing Mathematical Olympiads at different parts of the country as part of "Mathematics Festival". These have generated lot of interest among our students, guardians and teachers. Our national team has been participating in International Mathematical Olympiads and its performance is improving every year. There are two other similar initiatives, viz. Informatics Olympiad and Astro Olympiad. Experience of other countries shows that these science related Olympiads generate a lot of enthusiasm and help in improving the overall performance of the young generation.

Short Comments

National Professor Dr. M.R. Khan



I thank Mr Mahfuz Anam and The Daily Star for joining with us for a noble cause. We look forward to a sustained effort through which the country will improve in the science arena. I hope the national science policy which is pending for the last six years will soon see the light of the day. Examination system should improve. We have to turn our attention to the problems like science instrument and equipment, textbooks in easy language, employing science graduates, giving them good remuneration etc.

Prof. Shamima Karim Choudhury

The problem of decline of students in science education is not only a problem in our country but it is a global problem. Recently I attended the First International Conference on Science Education in Asia and the Pacific held in Bangkok and there it was revealed that this declining trend is obvious in may other countries like Thailand, India, Australia, Malaysia, Canada, Pakistan, U.K. and so on because of the poor job market for the science graduates. However, Singapore is an exception as a separate attractive pay scale and other incentives for science teachers have been introduced there. For our country to improve the situation we need to attract better trained teachers for science education, offer them good training, equip the classes with proper laboratory facilities and over and above introduce attractive salaries for science teachers. If we cannot have good science teachers, students will not be attracted to Science education. To revive interest in science education we need technological improvement and creation of proper job market for science. Accordingly we have to plan for the next 5-10 years for improvement of science education. We have to create mass awareness about science.

National Professor A.K.M. Aminul Haq

Political involvement in teacher recruitment is a big obstacle. TV channels are searching for actors and singers but they are not searching for scientists.

Mahfuz Anam

I often use a quotation of Einstein. He said that every crisis is an opportunity. We are going to have a crisis following climate change. In one way it is an opportunity for science. The threat can be faced only through science. This is a science in which the whole society has to be involved.

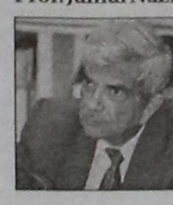
You have talked about textbook simplification. So, we can create a committee from amongst members of the science academy who will take up the issue of textbooks. Then we can think of establishing laboratory or assembling plants. Our future economy will be science based. So, suddenly scientists are in the fore front of survival, security and advancement.

Prof. Quazi Abdul Fattah

Textbook Board should involve Bangladesh Academy of Sciences in writing science books, editing, preparation, printing etc. If textbooks are bad, how can we have good science graduates? The science books read by English medium students look so beautiful. But the Textbook Board's books look so uninteresting. Mr Mahfuz can allocate at least half a page every week for science related articles and features. BAS members can help them in this regard.

There can be an examination centre where all sorts of examinations will take place. Stop using schools and colleges as examination centres.

Prof. Jamal Nazrul Islam

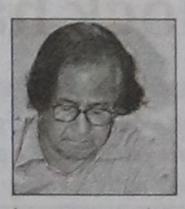


I think it is a very good effort and it should be done on a regular basis. Mathematics should be given importance. Every country in the world, big or small, has the means to be self sufficient. The ultimate thing is we have tremendous possibilities in this country. Our people are highly resilient. We can face all odds courageously. Why we cannot face the present grave situation in science education? With cooperation from all concerned we will definitely reach our goal of improved science education and have better skilled people in science and technology.

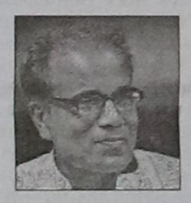
Prof Ali Asgar

We have to make science economically viable, so that we can see that science education has given us benefit, our production has increased and we have been able to compete with the developed countries.

We need to innovate. Our existence in the world competition is such that we have to find our own place, the way small fishes co-exist with big fishes. If we cannot make education creative and relevant, only getting good grades in exams will not do. Mr Mahfuz Anam said correctly that a crisis is an opportunity to be creative and also the opportunity to find a solution. I believe integration is needed among science education, technical education, engineering education, industrialisation and commerce.



Prof. Sushanto Sarker



Last year 32 thousand students got GPA 5, this year 52 thousand got this grade. Does it mean that the education standard has developed so drastically in one year? Laboratory equipment is the main problem in schools and colleges. Regarding admission in HSC my suggestion is to have admission exams soon after SSC. But the government instruction is not to take any admission test. Now, how can we select 1200 students for my college from 8 thousand applicants? The college authorities should have the authority to take decisions in this regard. From the grades we do not know who obtained 95 and who obtained 80.

Prof. Zafar Iqbal

We do not want use of notebooks but nowadays newspapers are devoting a page for giving suggestions. Aren't they replacing notebooks? There can be a page on science but that should not be in the form of question and answer. One can even find answers in cell phones these days! We should look into these matters.

Prof. Aminul Islam

I want to talk about the Kudrat-e-Khuda Commission in which there were recommendations for examination system from primary to university level. The Commission had recommended that without mathematics one will not be able to study B.Sc. With mathematics one will be able to study botany or zoology. But those recommendations were not implemented in the country.

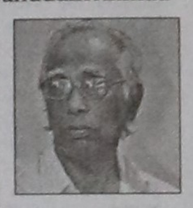
Dr. Mazed

If we want to develop science then I believe scientists will have to be given some freedom. Science education should be need-based and job-oriented.

Dr. K.M.S. Aziz

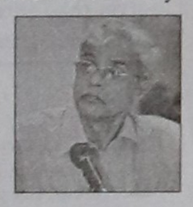
Let us find out how we can train up people to make them skilled so that the present remittance can be increased from 10 billion to 20 billion.

Prof. Mesbahuddin Ahmad



Whatever form of government we may have, there has to be a political will. They will have to support and advocate the cause of science. So, we have to create an impact. Teachers training is a vital issue. Today, one is getting into teaching profession after passing M.Sc without having any kind of training.

Prof. Naiyyuum Choudhury



The present roundtable discussion has been organized to collate views of the experts to improve the present gloomy situation in science education. The Bangladesh Academy of Sciences organized another two-day workshop on science education recently where science teachers from different schools and colleges were invited and different problems were discussed. Some of the problems identified and also which came up in today's discussion are lack of qualified science teachers, lack of laboratory facilities for science experiments at school and college levels, lack of training for science teachers, lack of proper incentives for the well-trained science teachers, lack of adequate fund, lack of quality science books to make it attractive to the students etc. All these shortcomings must be overcome. IT technology probably is working behind good results of SSC students of rural background. IT facilities, computer labs should be further improved.

According to 2007 data, 3, 50,000 students had passed HSC examination. Out of them 11,140 got GPA 5 and 80,000 got GPA 4. But the total admission capacity of all the public universities is 24 thousand. Therefore, even if students wanted to study science they would not get any chance. So, it is not hundred percent correct to say that students do not feel attracted to study science. We cannot provide the enough facility for proper education.

The media can play a very significant role in creating science awareness about science education in the mind of the policy makers and the people. The Daily Star deserves special appreciation for coming forward with this important national issue. May I request the Editor to dedicate half a page for "Science" every week.

RECOMMENDATIONS

1. Science has to be accepted by the policy makers as an instrument of change for poverty alleviation and for better quality of life through its application in socio-economic development.
2. Science is the answer to the natural quests of a child and its education should be designed to attract students and not scare them off.
3. Major changes in the curricula, text book design and teaching style are needed to make science education relevant, attractive and useful. Sufficient budget should be allocated for science education.
4. Science week, science festivals, science Olympiads, science debates etc. should be organized regularly to attract the young people to science. Government should provide adequate financial support to the different scientific societies organizing these events. The NMST should be activated to organize these events. The Bangladesh Academy of Sciences should be the umbrella organization to organize these events
5. One television channel and one radio channel should be dedicated to promotion of science and science education.
6. The Bangladesh Academy of Sciences should take initiative to develop equipment from indigenous sources for practical experiments at the secondary and higher secondary levels in remote schools and colleges of the country
7. Indigenous technology based small industries should be encouraged to create job market for the science graduates. We must change ourselves from a trading nation to a manufacturing nation.
8. Science clubs should be promoted in all educational institutions under the guidance of a science teacher to encourage the students to design indigenous apparatus. The government schools throughout the country may be centres of such science clubs.
9. The scientific community should aim for demonstrated credibility that scientific activities can contribute to the development of the nation and enhance the living standard of the common people.
10. The talented science graduates should be motivated to understand their responsibility to the society which has nurtured them and sacrificed a great deal to give high level education to them.

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