| SPOTLIGHT |

SCIENCE ON THE DECLINE

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PHOTO: KAZI TAHSIN AGAZ APURBO

Very few schools and colleges have well equipped laboratories for science students.

Md Shujon Mia wanted to be an electronic engineer. Beside his small study space lies his tidy toolbox that contains different kinds of screwdrivers, circuits, old batteries, and different parts of old cell phones and computers, which he purchases from repairmen whenever he can save some money—a testament to his love for electronics. The 16-year-old cannot buy these gadgets as he has to support his family with his earnings as a domestic help.

Shujon studied at a charitable school for underprivileged children. It was his hope that he would study science after passing his Junior School Certificate (JSC) exam. However, Shujon learnt that his school did not offer science courses as they were too expensive and too difficult for most of its students. Shujon decided to switch to a different school, requesting his employer to support his education. Once again, he was thwarted—none of the schools agreed to enrol Shujon in science as he did not get 80 percent marks in mathematics in his JSC exam.

"But how could I have scored higher?" laments Shujon, "We did not have any permanent mathematics teacher in our school. Sometimes our Bangla teacher used to teach us mathematics; sometimes our English teacher did. And, they used to tell us to memorise some selected math problems to prepare for the JSC exam. I used to try to solve the problems on my own." Shujon managed to get 68 percent marks in maths, whereas none of his friends got more than 60 percent.

Rejected, Shujon enrolled in business studies for his Secondary School education (grade 9 and 10) like all of his friends. But the subject did not interest him. Disenchanted by formal education, Shujon joined a mobile repair shop as an apprentice technician. He now passes his days repairing damaged mobile phones to earn a living, dreaming of an alternate reality where he is working with complex integrated circuits in a research laboratory.

Reports of Bangladesh Bureau of Educational Information and Statistics (BANBEIS) substantiate Shujon's unfortunate experience and reveal the appalling condition of science education in Bangladesh. They highlight that an overwhelming number of students cannot study science, and an increasingly large number of Bangladeshi students are not at all interested to study science.

Bangladesh Freedom Foundation, a non-governmental organisation, conducted a study in 2012 among 140 students of grade 8. As many as 73 percent of those students stated that they wanted to study science after passing grade 8 (students have to choose either science or business or humanities in Bangla-medium schools). However, less than 20 percent finally chose science in grade 9.

While some of the reasons for students' apathy towards science may be personal, others are structural. For instance, many schools and colleges do not even have a science department, although all educational institutions in Bangladesh have business studies or humanities departments. Of the institutions which have science departments, very few have well-equipped laboratories. According to the 2014 BANBEIS report, in 2013, there were 4081 secondary level schools under Board of Intermediate and Secondary Education, Dhaka, but 662 of these schools did not have a science department nor did they have any students in their science department. In the same year, there were 906 higher secondary institutions under this board, but 157 of these did not have a science department. In other education boards, the number of institutions without a science department is much higher.

The report also highlights that there is a huge scarcity of well-trained science teachers and quality textbooks. Again, as a student has to choose either science, business studies or humanities after passing grade 8, schools often impose qualifying marks on students who are interested to take science due to limited seats. Those who do not or cannot take science after passing grade 8 cannot formally study science for the rest of their lives. As a result of the resource constraints and existing restrictions, the number of students studying science is decreasing alarmingly in Bangladesh. According to another BANBEIS report published in 2015, the number of students studying science in secondary level has reduced at a rate of 48 percent from 1993 to 2015. The rate is 36 percent at the higher secondary level between 1995 and 2015.

According to experts, the reason behind Bangladeshi students' apathy towards science and the failure of interested students to continue in science lies in the textbooks and teaching-learning environment of our educational institutions. Quazi Afroz Jahanara, Professor at the Institute of Education and Research (IER), University of Dhaka, has been researching science education for more than three decades. She says, "In junior secondary and secondary level science textbooks, students learn a lot of abstract theories, which they cannot always relate to. On the other hand, there is not enough focus on earth and life sciences, which are more relatable." She argues that earth and life sciences should constitute 45 percent of a science textbook. However, in Bangladesh, they are less than 35 percent.

In fact, the BANBEIS reports also suggest that many students find it difficult to comprehend subjects such as Mathematics, Physics, and Chemistry. Professor Jahanara believes that the teaching-learning environment is also a significant reason behind this situation. "There is a massive scarcity of science educators in our secondary and higher secondary institutions. Again, most of the teachers do not follow the curriculum and teachers' guidelines before conducting a class."

"In the guidelines, different methods of teaching have been proposed for different lessons, such as peer learning, group study, and practical learning, but we have observed that most of the teachers do not follow these instructions," she states. She also blames class pressure, scarcity of teachers, and non-science background teachers teaching science.

According to a study conducted by Professor Dr S M Hafizur Rahman from IER titled "Situation of Secondary Science Education in Bangladesh 2014", more than 55 percent of science classes are conducted by non-science teachers in grades 6 and 7—when students are introduced to basic science. "Its consequences are severe," Dr Rahman says, "As these teachers do not know how to teach science using a constructivist approach, the students develop very poor basic knowledge, which significantly affects their later academic life."

With the introduction of creative questions, the situation has deteriorated. "To devise creative questions, a teacher not only needs sound knowledge of scientific content, but also proper training on how to teach science subjects. Our research suggests that most of our teachers of secondary level institutions meet none of those two essential requirements. Students are still taught in traditional ways, but they find creative questions in the exam," adds Dr Rahman.

On the other hand, teachers blame the scarcity of teachers and mounting class pressure. On conditions of anonymity, a mathematics teacher of a prominent school in Dhaka, says, "I am a specialised math teacher, but sometimes I have to take social science and Bangla classes. I have to take at least eight classes every day. I learned innovative techniques of teaching maths in training, but due to class pressure and limited class-time of 50 minutes, I have to conduct the classes in a traditional manner." However, he also adds that he applies those innovative techniques in private coaching classes, which makes him a very popular figure amongst his students.

In rural areas, most of the institutions do not have any science departments. Md Afsaruddin, Principal of Bhedorganj College of Shariatpur, says that if he opens a science department in his college, he has to recruit at least four extra teachers, but no more than 10-to-15 students will enrol. In addition, he argues that science graduates do not want to teach in rural areas.

The impact of this vicious cycle is very visible in the classrooms of public and private universities. According to a 2014 report published by University Grants Commission, the rate of decline of science students in public universities is one percent every year. Very few private universities have science departments and the number of students studying in these departments is insignificant compared to social science or business studies. The reason is obvious: lack of interested students.

Eminent academician and vice-chancellor of University of Asia Pacific, Professor Dr Jamilur Reza Chowdhury, says, "Our students and guardians think that they have to study science only to be doctors and engineers. None of our brilliant students want to study pure science subjects like mathematics or theoretical physics. If it goes on like this, we have to provide special scholarships to convince them to pursue science," he adds.

PHOTO: KAZI TAHSIN AGAZ APURBO

Students are reluctant to study science due to difficult and incomprehensible textbook contents.

Secondary level science students hardly get the opportunity to attend practical classes

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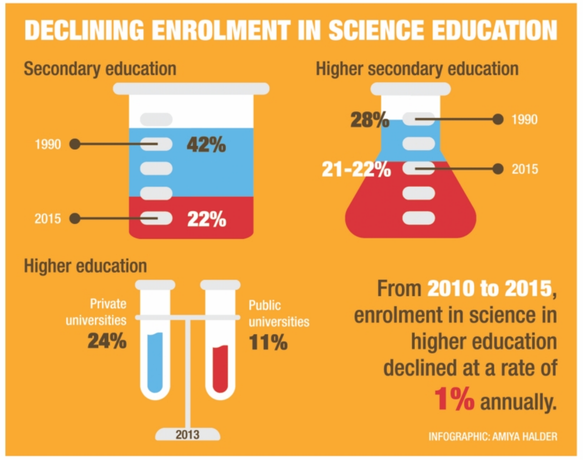

However, very recently, the government has taken some steps to ensure quality science education at the school level. After the introduction of the new curriculum in 2012, textbooks have been re-designed, in which learning objectives and chapter summaries have been added at the beginning and end of each chapter. Trainings have been arranged for secondary level science teachers under Teaching Quality Improvement Project. Based on the curriculum, a teachers' guideline for primary level teachers has also been devised for each subject. This was provided to teachers in January 2017.

Kh Md Monjurul Alam, Specialist, National Curriculum and Textbook Board, argues "In this guideline we have showed how a teacher can empower students in the classroom and ensure joyful learning by using constructivist approaches. We are also arranging training for the teachers so that they can follow the guidelines properly."

These initiatives are praiseworthy, but compared to the crisis, they are far from adequate. Although our current education policy says, "Only science education can take a nation to its desired destiny," our Ministry of Education does not have any separate budget for science education. It is neglected in all tiers of our education system. As a result, passionate learners like Shujon drop out from schools and the remaining students are mostly reluctant to study science subjects due to their fear of science.

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