

Concerns and Issues in Science Education at High and Higher Education Level in Kashmir

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ABSTRACT

Daily we interact with scientific gadgets or machine which safe our life and make it easy. Science not only educate but also develop the ability of reasoning, curiosity, creativity, positive attitude and problem solving approach and these are the ability must be developed in each and every citizen. For the betterment and development of every country the education of science is essential. Science especially at secondary level is very important for students of the 21st century. Secondary education is the cornerstone of education system as it is the gateway to the opportunities and benefits of economic and social development. Now India is well known all round the world for its scientific outputs and its effective performance in the field of IT. Great efforts have been made over the last quarter century to improve science education across the country. India is lagging in science and technology compared to developed countries. The well-known challenges in science education today include overcrowded class size, lack of funds and student interest. To overcome this situation it is essential to have strong effective policies and High quality of science teachers must be actively pursued. The paper is based on the field experiences of the authors and reflects what are the issues and concerns in science education at high school level which needs a serious rethink on the part of planners and teachers to synchronize education.

Key words: Science Education, Issues, Challenges.

Introduction

We are living in scientific age where all of us, directly and indirectly depend on scientific gadgets and technologies. Daily we use machines and other scientific gadgets to make our life easy like mobile, television, CD player, vehicle, solar energy etc. we know the importance of science in our life even we are dependent on science so much that we cannot thing life without it. Some illiterate people don't believe it but somehow they use scientific material. Farmer use fertilizers for better farming similarly each and every person use medicine to life and transportation to move from one place to another. Science not only makes our life easy in the form of machines but also safe it with the development of vaccination, medicines and different operating instruments. Science education develop ability, reasoning, curiosity, creativity, positive attitude and problem solving approach and these are the ability must be developed in each and every citizen. For the betterment and development of every country the education of science is essential. The quality of science education depends on teaching and learning which is continues to be an area of concern. In the second half of the 20th century, various programs have been established worldwide to support and improve the science education in their countries. For the development of science research India's Former Prime Minister Dr. Manmohan Singh in 99th Indian Science Congress announced that spending would be doubled by the end of 12th plan in 2017. Ultimately for the betterment and development of science research it is necessary to have strong basic science education. Science curriculum aims to create future scientists and for that it holds a position of unique among school subjects. There is widespread concern about the outcomes of science education at school. Science especially at secondary level is very important for students of the 21st century. The focus of secondary education has largely been on science as a practical subject and partly

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an empirical subject. Secondary education is the cornerstone of education system as it is the gateway to the opportunities to youngsters and benefits of economic and social development.

Scientific progress is the hallmark of a dynamic society. The scientific temper is probably the best answer to ignorance, superstition and hypocrisy. It encourages a logical, quantitative and systematic approach to life, rapidly empowering and enriching those who embrace it in their lives. India took many moves to increase and improve scientific activity. The feeling today however, is that many aspects of our scientific development have been unsatisfactory. When compared with what other countries, notably China, have achieved within a similar time period, the Indian contribution is singularly lacking in both quality and quantity. This article attempts to provide a status of the present scene in science education and research and to suggest possible solutions. At the outset, it is important to specify the kind of science one is speaking about. There is science as a scholarly activity, industrially-oriented science, science in society, science for the student, and science for strategic purposes. The aims and goals of these varied kinds of science are indeed distinct, as are the methods employed to achieve success in any of them. Developing rocket technology is not the same as publishing high impact scientific papers, which in turn is different from discovering a new drug or solving the drinking water problem in our villages and towns. However, there is a common theme that links all these activities, and that is the importance of having a critically large and competent scientific work-force. In turn this means that one needs to impart a modern and sensible science education across a wide cross-section of youth in order that they might reasonably develop themselves as scientists or scientifically inclined people of the next generation. Any attempt to divorce science education from the rest of science is therefore doomed to failure, as we have now realised to our very great cost.

Part I: Issues and Concerns at High School Level

This paper is based on the field experiences of the authors and reflects what are the issues and concerns in science education at high school level which needs a serious rethink on the part of planners and teachers to synchronize education. During our teaching practice, we went to different schools for inspection and administered computer awareness test to science teachers and found it low. Action research was conducted in ten identified government high schools. In the pre demonstration session, the opinion of science and mathematics teachers towards Information and communication Technology (ICT) was somewhat rigid and less favourable. The teachers had limited knowledge of Educational websites. They were not given any practical training in constructing low cost improvised teaching aids on zero cost budget and level of willingness to the use of teaching aids was found low. Lack of electricity in these schools is one big impediment in application of technology in these schools. Computers have been supplied to these schools without complete accessories. We found that in some schools, they are being operated directly on the mains or low voltage which puts them on risk. The limited computers which are available in schools are used for administrative activities. Due to lack of internet facility, teachers cannot access online professional development literature. Lecture-cum-demonstration lessons were conducted in 10 identified schools, about the application of information and communication technology (ICT) in science and mathematics. A manual was distributed among the participants which contained practical guidelines for learning internet skills, and a computer awareness test for teachers. The author transferred educational documents in the computer of schools. We encountered one problem. 80% of the schools had no Acrobat Reader version loaded in their computers which is necessary for reading PDF files. Since most of the educational documents are in PDF format, so we first loaded, all the computers in these schools with a Acrobat Software. Then we sensitized the teachers about the professional development literature available online. They were demonstrated about

the online texts, educational CDs on fractions, locus, genetics available on NCERT website www.ncert.nic.in. The authors found that the teachers had no knowledge about two important journals “the primary teacher” and “school science” published by NCERT. They were given practical lessons how to write for educational journals meant for school teachers. They were supplied with useful website addresses on science and mathematics which we had painstakingly compiled after intensive navigational skills on the internet. We are looking forward when all the schools will have their own Interactive Educational Websites and, we will join the race of preparing globally competitive students . Opinion of many science and mathematics teachers was studied. We found that the number of active research workers in the field of science and mathematics education is too small. Our science teachers are not in the habit of reading professional journals even those which cost as little as a cup of coffee, for example school science journal (NCERT). The capacity building and training programmes conducted for science teachers are mere repetition of conventional methodology already taught in schools. There is nothing new to offer in these programmes. Many science teachers are not aware about National Curriculum Framework for School Education 2005. There are 120 ways of being talented, but when we enter the science classrooms of our colleagues we observe that there is focus on only one type of talent; that is academic talent and that too confined to mere statistics of pass or fail. This raises the issue: Should schools be all about statistics? We are creating a band of students in our classes who do not have the courage to ask why, how and where of a phenomenon. Take the science text book of your class 9th and 10th recommended by state board of school education. These books have been revised casually. Most teachers have reason, therefore, to think that they have little to say about the changes made from time to time in syllabi and textbooks. Even there are cases where a textbook has a factual error; no complaints are made by teachers asking for correction of error. There is no established procedure or official forum to mobilize teacher vigilance and participation in curriculum improvement. It is unfortunate that many science teachers intuitively feel that it is not their business to critically examine the syllabus and the texts they teach. Research in science education should be emphasized to develop the scientific temper. What are the basic ingredients of scientific temper? How can it be assessed accurately? Which strategies are most appropriate to inculcate the spirit of science in the students? Research in science education awaits answer to these questions. We made the following observation regarding science practical in our schools. Even currently the laboratory services comprise heterogeneous group of untrained and non technical personnel mostly from the non science stream. The observations are dictated to the students from the old practical science copies. Without doing any experiments, observation are recorded in science practical copies and validated by the teachers. This exercise injures the scientific temper in the students, breeds an element of corruption in our future generation. We should record our experimental observations carefully and systematically and do not manipulate our results under any circumstances. There is no quality control or monitoring cell regarding purchase of laboratory equipment. If anything is purchased, it is either too inferior, outdated, or non functional. The insensitivity of the scientific community at all levels on the existing state of affairs of laboratories and laboratory services has further compounded the problem. Due to lack of proper planning no attempt has been made so far to establish a recognized training institute to train manpower for laboratory services in the state. There is a need for recognizing laboratory services as a professional career at 10+2, undergraduate and postgraduate level. The level of willingness to the use of teaching aids of our science teachers was found low. We do not want teachers say, ‘I do not have test tube so I cannot teach science’. Our focus should be on the development of low cost improvised teaching aids .We made the content analysis of the matriculation board papers for science of the last three years. The study revealed that the

Board Question Papers are set in the crude manner; they do not test the comprehension, application and higher mental processes of the students. No item analysis of the question papers is done, nor is there discrimination index and difficulty index calculated. No proper standard procedures for vetting the question papers by the experts are being followed in setting the papers. So when there is failure at the matriculation level the poor teacher is a scapegoat. A radical and wilful change in the examination system at the secondary school stage must be made. We have to utilize local wisdom in teaching science. For example to explain the working of electric motor we can take the services of electric motor mechanic. During inspecting practice teaching schools we observed that students ask many questions, but most of these questions were teacher tailored and very few asked creative questions. To look at usual things in an unusual way is the first lesson of science. The vast potential of ICT in the field of science education has been well recognized, it still remains largely untapped in our secondary schools in J&K. The efforts have been sporadic. The Internet opens up vast possibilities; it could provide an e-platform for discussion of topics relevant for school children - both curricular and co-curricular - where students and teachers could post queries, provide answers, discuss with experts and exchange views. Innovative scientific experiments using a PC could be. Now we shall talk about the training of science teachers. There is a close relationship between education and training. With proper training we shall chalk out practical intervention strategies to realize the theoretical objectives of education. Various educational commissions have recommended the training of teachers and significant portion of public funds are earmarked for it. But there are some missing links in the training of teachers which need be addressed by conscious educational fraternity. In the initial days of Sarva Shiksha Abhiyan (SSA), the training sessions had an environment charged with enthusiasm. Participants came in groups of 32; they came on time and took interest in the proceedings. The discussions were meaningful and the participants were present for the entire duration in the training hall. Even outside the training room, there was an environment of debate and discussion. A strange glow could be seen on the faces of the participants when they came out from the training sessions, so much so that even in the bus the talk was about the issues of training, the presentations and the quality of presentations. Apart from dealing with educational issues, these training sessions brought people emotionally closer to each other. People made new friends and shared their problems, their achievements. All in all, the training sessions were an exhilarating experience. Even officers came in to listen to the sessions every second or third day, and thus became a part of it. In a way the officers considered the teachers to be their colleagues. But the situation has changed altogether. In connection with data collection, last winter I attended a ten day training programme organized by school education department for capacity building of school teachers. Thirty teachers were issued orders for joining the training but only eight turned up. One teacher just marked the attendance and left. This made others laugh. Since the room was almost empty, resource person was hardly enthused about imparting training. A low turnout does not create an atmosphere where you would like to talk about various topics. Informal talks were held with participants. During these informal talks, nearly all teachers admitted that these training sessions were becoming exceedingly meaningless. The teachers found them unpleasant. As I see it, there are many reasons for this. Firstly, there is a lack of discipline in the training centres. People come and go at their own sweet will. There is nothing new and innovative to offer in these training sessions because resource persons repeat the traditional chalk and talk method, have limited exposure to new techniques of teaching, do not read educational journals and inhibit cross fertilization of ideas. The level of willingness to learn new things is low. I administered self-constructed general awareness test, logical reasoning test and standardized teacher attitude test to participant teachers

and found these low. This is reflected in their students as tomorrow they fail to crack any competitive exam.

The objective of the training is not to increase the quality of education but to earn money. All eyes are fixed on the huge amount of money that comes for the training sessions. There are some teachers who think that it is their fundamental right not to attend trainings and to be present for a session is below their dignity. Money plays an important role here. It happens like this – they meet some corrupt official and say, "You take my TA / DA for the training and sign on my behalf." After the trainees leave at the end of the training, the corrupt official forges the signatures of the absent teachers and is able to make quite a bit of money. This practice needs to be checked. At a training session one humble teacher put up a proposal that a medical kit be kept in primary schools which would contain medicines for common ailments like fever, cough, cold etc. He suggested that there should be two-days training for teachers on how to use this kit. The ZEO criticized his proposal at once, saying, "If the trained teacher is absent on the day the child falls sick, then this kit will remain unused like the sports and science material". If this is the way suggestions are responded to, then where is the scope to improve

- The transfer norms are rarely followed properly and only those teachers are transferred who do not have proper contact with the people at the helm of the affairs despite the fact that their stay at their place is immature and school needs their presence.
- The wrong implementation of transfer policy has led to the seemingly shortage of teachers at some places and keeping up at many places.
- It is an admitted fact that the irrational distribution of staff is one of the main problems facing School Education Department. One question why our bureaucracy and political leaders are in a state of inertia on the above listed topic when they know. It is the single factor that has rotten the system from within.
- To make the concept of rationalization of the science staff a reality, teacher forums have to play a instrumental role.
- Another important issue is too much involvement of science teachers in non-academic activities such as election duty, census etc. In the government sector we have already lesser number of working days due to frequent holidays and strikes and therefore under such conditions involving science teachers in non-academic activities wastes a lot of their academic work.
- Now let us have a look within the school. Science teachers are also used for managements and serving mid day meals and keeping records like maintaining vouchers etc. wastes lot of their time which affects the science teaching.
- Another issue is that many science teachers are deputed to ZEO / CEO and direction offices regarding settlement of various non-academic issues which affects science teaching.
- Another issue is that training under various centrally sponsored schemes for capacity building of school teachers is not taken serious and lethargy, gossiping during school hours is noticed and this virus of lethargy is transferred to newly recruited teachers who otherwise are willing to deliver. These all issues and concerns which have been reflected in this paper need to be addressed in letter and spirit.

Part II: Issues and Concerns at Higher Education level

The basic objective of teaching science at higher education level is to inculcate critical scientific skills among students. The majority of the students doing a B.Sc degree in our colleges do so only because they are unable to secure admission to professional courses. Taking admission in colleges is just a

formality. Most of the time they spend preparing for medical and engineering tests. Even it has been observed that many college teachers are serious in coaching business than teaching at colleges. The part of the curriculum that is being offered for science education at undergraduate level is outdated and contains expired knowledge elements. The members of the Board of Undergraduates studies who are assigned the job to revise the curriculum do not come prepared and make cosmetic changes in the curriculum. Students pursue science education at undergraduate level without any direction or objective. Practical notebooks are being maintained without conducting any experiments. Lab work is the biggest casualty due to non-serious approach of teachers and students. Whatever is available in the laboratory is dust-ridden, expired chemicals, without electricity and lack of water facilities. The system of evaluating the science undergraduates is subjective. Non formal approach to science teaching that is teaching science outside the four walls of the class room is hardly encouraged at undergraduate level. The rigid bifurcation into fixed combinations insisted upon at the B.Sc level severely limits the competence of science graduates for interdisciplinary advanced courses. This shall seriously affect the choice based credit system introduced by the University of Kashmir at the P.G. level. Newly established colleges are generally ill equipped, overcrowded and poorly staffed. Contractualism, non-advertisement of sanctioned posts, administrative inertia is another problem in the field of science education. Generally teaching has divorced from research even at P.G. level.

At UGC Academic Staff College I asked many newly recruited science lecturers how many of you would attend the orientation / refresher course if it would not have been linked to your vertical career mobility. 80% of the teachers honestly reported with the big NO? After passing undergraduate examination most of the science students appear for entrance test in the state universities where the number of seats is limited. At this critical juncture lot of science talent is wasted because most of the science graduates make a transition to non-science streams like education, law and take job in non-science organizations. Our universities have turned into coaching centers. Research is being sacrificed at the cost of IAS/KAS coaching. In the rooms of research scholars hostel you will locate books for IAS/KAS and other competitive exams instead of research material. If we classify research into the category of potent and sterile research, most of the researches in arts and social sciences conducted in State University falls in the basket of sterile research. Non-extension oriented research is being promoted in state university. Except for career mobility, job prospectus and doctor tag before the name, research thesis / dissertation remain confined to the shelves of departmental libraries and 7th floor of Allama Iqbal Library. In the olden days we had no money we had the people. Now we have to give up docility; sycophancy and sheepish mentality. Today we desperately need to create a dedicated work force capable of teaching. They only can serve better, teach better

Suggestions for the improvement of secondary school science education:

1. High quality of teachers must be actively pursued.
2. Teacher is one who can make science easier or difficult for pupils. Therefore it is very first step for teacher to be effective, learning promoter and interactive. Teacher can motivate student for science by telling them its importance in today's world.
3. Suitable teaching methods and aids must be used to enhance students' learning.
4. To build up student interest in science subject it is necessary to correlate it with outside classroom learning.
5. Field teachers can be pursued to better address women especially for those who hold strong religious views etc.

6. Children can be inspired through their parents, so field teachers can be pursued to develop parents mind.
7. Facility of all experimental material must be provided in all secondary science school along with proper guider to help student avoid accidents. This can be only possible with increase budget facilities.
8. Regular training facility and inspection.
9. Control on population.
10. Free secondary science education for those who are not able to pay.

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