

Science and Technology for the Welfare of People

by Dr M Muniruzzaman

Mass awareness of problems, is a vital step towards their solution. It must be said however, that our educational

institutes need to do better in developing skills of the students in relation to environmental protection, energy

CIENCE and technology As we step into the next millennium the question imporprofoundly Influenced the way we live and think. Scientists have put man and machine into space. explored the farthest corner of our known universe, broken the code of human genome, cloned animals, genetically engineered fruits and vegetables, created a virtual world was well as a whole new domain known as cyberspace. Hundred years ago scientists questioned the existence of atoms and knew almost nothing about space, time and the universe. Today, they can arrange individual atoms on a surface and make an image of benefit of common man. The the result. Technology also surareas are (1) Population, (2) rounds us in many ways that Energy and Environment, (3) we no longer notice. From com-Bio-diversity, (4) Weather and puters to cellular phones, in-Climate, (5) Information ternet to home entertainment, Technology. hovercraft to magnetically levitated trains, airline bookings to traffic lights - technology makes our life, run smoothly and comfortably. The close connection between science, technology and the economy of a country has also been long established. A major part of all

US economic growth is a result

of technological progress.

Technology helps build capi-

tals, jobs, new goods and often

new industries. Without doubt,

technology is the principal

driving force behind Japan's

economic success. In fact, ac-

cording to the Office of Science

and Technology Policy (OSTP),

USA "technology is the single

most important factor in sus-

tained economic growth."

Keeping Population in Check: October 12, 1999 was observed as "Day of Six Billion" on the planet. This number is nearly two and a half times as many as in 1948. The last billion was added in 12 years. The average population increase of 2.5 fold that we witnessed in the last fifty years will probably not be repeated in the next fifty due mainly to mass awareness and availability of improved contraceptive techniques. The population of Bangladesh is about 126 million with an annual growth rate of 1.6 per cent. That Bangladesh has cut population growth rate by half in 25 years is a remarkable achievement indeed. However according to experts the popu-

tant to us all is how can we use the knowledge of science and technology to change the lives of the ordinary Bangladeshis? Despite the huge progress made by the industrialized west, the scarcity of the simple things in life clean drinking water, health care, basic education, housing, and employment still plagues the lives of most people. Rather than trying to predict what Bangladesh will be like in 2025, it might be more worthwhile to focus on the areas where science and technology can be fruitfully used for the

ous other ingredients of a meaningful life for all its citizen. The challenges of course will be more acute if the population is at the higher end of the projected range than if it at the lower end. As part of the strategy, the government, NGOs and other relevant organizations should strive for the lower end of the population range. This could be addressed by emphasizing on, for example, the optimum size of a family for social and economic benefits. In this respect the education of women is of prime importance. The present method — and the always improving contraceptive techniques should be employed whenever possible to avoid unwanted births. **Energy Needs and Protection**

of the Environment: In 1998 a staggering 6.3 billion tons of carbon dioxide was released into the atmosphere mostly by the industrialized west, Japan

COULD YOU PLEASE LET THOSE PROTESTORS,

COME TO THE FRONT ? -

lation of the country could sta-

bilize in the next century with a

population somewhere between

175 million and 225 million in

2025. Most of the challenges

that Bangladesh will have to

overcome - at least during the

first quarter of the next century

- are sustained food produc-

tion, clean drinking water, en-

ergy, housing, health care, edu-

cation, employment and vari-

and to a lesser extent by China, India and Brazil. It is estimated twenty-five years from now this figure would rise to about 10 billion tons. This huge amount of carbon dioxide released into the atmosphere would raise its concentration to about 500 parts per million - almost 1.75 times more than the pre-industrial level. The hard to control green house gases could also lead to a global warming of 0.5°C to 1.0°C. It is generally believed, but yet to be firmly established, this increase in temperature could lead to melting of polar ice caps with subsequent inundation of low-lying areas around the world. Although Bangladesh contributed very little to this increased concentration of carbon diexide and other green house gases, we have however, unwillingly become a party to its effect. Bangladesh may not have contributed much to global degradation of environment, however the opposite is true locally. The threat of arsenic poisoning to half the population, the smog, soot and dangerously high level of lead concentration

in Dhaka's air, the shrinking

forest, the dwindling number of

rare species of animals, birds

and plants all point to the utter

negligence with which we have

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treated the environment.

utilization and preservation, limiting population as well as interdisciplinary thinking. As the need for energy increases with increased industrialization it is all the more imperative that new sources of energy be explored. Unless new reserves of fossil fuel is discovered the present reserve even in conservative estimates could not last the next quarter century. We should plan carefully now to face the challenges ahead. Necessary R&D should be instituted and put in place to study the various energy option scenario. Efficient emission reducing technology should be installed and incentives to deploy the best provided. The "zerocarbon" energy sources like fission (if we can manage to avoid accidents like Chernobyl in Russia and more recently at Tokai in Japan) and fusion (although still at the experimental stages) hydro, solar, wind, etc., should be carefully examined in the various energy mix scenario.

> about two million have so far been identified and recorded. The Global Bio-diversity Assessment estimated "that up to a third of the species in tropical forests - the largest reservoir of bio-diversity on the planet - may be lost over the next several decades". If this estimate is true even to orders of magnitude then we are at risk of losing the invaluable species that are unique to our tropical forests. The records of species much less the biota of our country is very difficult to come by. We must remember that extinct species are "irreplaceable

> losses". In spite of the tremen-

dous advances in biotechnology

UR national politics

dominates the daily lives

of the ordinary peace-

loving citizens so much that we

feel embarrassingly pampered

(if not victims), making it impossible for us to think of or

plan any personal, private,

business or professional work

without the powerful influence

of politics, directly or

indirectly. Politicians are

always in the background, (like

the air we breathe, or the

mosquitoes, which are coming

in the winter to compete with

them!). Their omnipresence and

omnipotence cannot be ignored.

but, alas, it is simply at the

mundane, not moral plane.

ample doses in these capsule

Don't pellets, to penetrate the

thick skin, and closed minds of

our formidable politicians, who

have eyes that do not see, ears

that do not hear, and feelings,

that are motivated the wrong

This is not a hate cam-

Hyperbole has been used in

Preservation of Bio-diver-

sity: There are between ten mil-

lion and twenty million species

on the planet of which only

there is no way these species can ever be recovered. Preservation of bio-diversity is essential not only for fresh air, water and clean environment but also for recycling soil and its constituents, for natural control of diseases etc. The genetic information contained in these species could be used to produce better fruits, crops and vegetables. There is a great interest in recent times on herbal cure of previously incurable diseases. The Chinese and Indians in particular have made great progress in this area. Studies of traditional herbal medicines are being pursued with renewed vigour and results obtained are now being brought into the rigours of science. The medicinal value of Tulsi, Neem and Bashuk are well known to all. Who knows,

> our country but also to understand and preserve the delicate balance that sustains diversity. Understanding Climatic Changes: The injection of huge amounts of carbon dioxide and other green house gases into the atmosphere and to a lesser extent the deforestation have combined to contribute to the changing global weather patterns we see today. The changed weather pattern was manifest recently as El Nino and La Nina. The draught in Sub-

Saharan Africa, the unprece-

dented flooding in China,

the cures of cancer, AIDS and

other deadly diseases may not

be found in herbs! If, however

we destroy the bio-diversity we

may never really know what

'information' these contained.

Our scientists and technologists

have great opportunities not

only to record and analyze the

huge bio-diversity available in

Korea, parts of South America even the severe snowfall in parts of North America and Europe have all been attributed to changes in weather system. Cyclones and floods are almost yearly occurrences in Bangladesh. The diminishing productivity of agriculture, the damages to life and property both in magnitude and extent, old and new diseases are all

likely to be caused by these changes. In the days ahead we need to understand the complex climate change phenomenon. their impact, better still to predict these changes. To do so we have to invest heavily in the science of atmosphere and climate. For both long term and short term weather predictions the latest technology in forecasting ought to be installed, active research pursued in institutions and academies and regional collaborative programmes forged.

Information Technology: had not intended to write on Information Technology (IT) as it merits an article on its own. However, the tremendous potential it offers in terms of cmployment and capital inflow is the logic behind this discussion. The availability of PCs at a reasonable price, the e-mail. cellular phones, access to the internet have all changed the lives of many Bangladeshis even at the village level. It is predicted to be one of the largest growth sectors world wide. The large number of visitors at the recently concluded computer exhibition at the IDB Bhaban in Dhaka testifies to the public and especially students' growing interest in the field. I hope this kind of exhibition can be held regularly and sometimes

outside Dhaka. How can we benefit from IT services in Bangladesh? The thought that comes to mind are data entry, software development, designing computerized system for customized needs

cient manpower to handle such jobs at the international level? The answer is a yes and no. Let me explain we have highly trained and skilled individuals both at home and abroad who can take on jobs, but to form groups at home like a software firm for instance and complete the job to international standards would be very difficult. May I take the liberty to narrate a personal experience that may clarify the point further. A friend, an IT Professional and owner of a related firm in the USA visited Bangladesh some years back. Knowing my interests in the subject, on his return to the USA, he sent me a computer software for debugging, with the stipulation that complete the job in a given time. Debugging programmes are time consuming and manpower in the USA is expensive. so he was looking for cheap alternatives. I tried to find experts to collaborate with me. Needless to say I failed in my attempts. Things have surely improved since then. But the fact remains that unless we have institutional and professional support to build and organize the manpower it will be difficult competing in the international IT market. Conclusion: The areas dis-

etc. These are jobs requiring a

lot of skill. Do we have suffi-

cussed are by no means unique to Bangladesh. Various combinations of the above can be found in almost all developing countries. Mass awareness of problems, is a vital step towards their solution. It must be said however, that our educational institutes need to do better in developing skills of the students in relation to environmental protection, energy utilization and preservation, limiting population as well as interdisciplinary thinking.

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Some "Dont's" by Alif Zabr

paign, but just a kind of protective device for the unarmed and powerless citizens, like the mosquito repelent.

- Don't brag and sermonise; since we all do it (a common trait). Be different, as a leader (which means to lead - there. I'm sermonising!). You cannot compete with three billion under-developed minds in the Third World (the school children are included). Try the subtle British approach: the art of the under-statement. Try to say We also try', the brooms and not the stand for

Talk at peer level; and forget for a while you are a politician. Hide your vocation! Lock up the ego while going out. Remember: the chances are we have heard it before. Be original

(that's a tall order!). - Don't chase the opposition. There is nothing in the chase. Sit with us (not standing

please, hiding behind the mike).

We could mould the future (if you know what we mean). - Pay attention to the ladies They are the better half (it is time they did, to come up as the equal partner). They rock the cradle which rule the world (the rate has come down to 1.9 per

cent per annum, from 3.5). - Like to be called a genius? Uncover Dhakal

- How to be unpopular and remain in power? Wipe out the mastaans; starting with homecleaning. You have some option: dry clean or wet clean. Wash the dirty linen in public,

as is being done in the case of Ershad Sikdar. Don't play Dr Jekyll and Mr Hyde.

 Resist temptation: spe-cially while gazing longingly at empty plots, river banks, and water bodies. River banks and bank loans have something in common (it is too elusive for the layman to decipher). The next .DCC Mayor's election may be decided on this, according to a recent public poll (DS report). Practice sunnota, the mystique of Zero (Zen). Remember zero is above one. Zero does not mean nothing; it is one of the great secrets of Cosmic consciousness.

 Define 'parliament'; but do not stick to your version. - Patronisation is the noble practice of helping others. Don't

Pilfered by PDB, DESA and DE-SCO. Don't be so generous! Recharge, and come back. You can't get rid of us!

American System of Education

Interesting and Enjoyable Process of Learning

by M Afsaruddin

The US education system puts great emphasis on analysis, observation and creativity. It never encourages memorisation. Knowing facts and having ideas from class lectures and reading are not sufficient. Students must analyse, synthesise and evaluate them. Their creative faculty is thus exercised.

levels: elementary, secondary and higher education. Vocational training, adult education, schools or classes for special types of children and kindergartens also form part of the programme in most states. The vast majority of students in the primary and secondary levels go to public schools. Most of those who attend private schools go to Church sponsored parochial schools. The academic duration of a

DUCATION in the United

States has three basic

school year is usually nine months, from early September to mid-June. The common pattern of organisation, referred to as the 6+3+3 plan, includes elementary school from grades 1 through 6. junior high school from grades 7 through 9 and senior high school from grades 10 through 12. However, the older 8+4 plan, in which grades 1 through 8 were the elementary school and 9 through 12 the high school, continues in many localities. There is also a 6+6 plan, grades 1 through 6 in elementary school and 7 through 12 in secondary school. Today, unified systems operating in both elementary and secondary schools most commonly use the 6+3+3 plan or the 1+6+2+4 variation. However, many variations on the patterns exist in the United States. A child's introduction to

formal education is usually in kindergarten classes operative in most public school systems. Many systems also provide nursery schools. The age group is commonly four and five years. These pre-school education programmes maintain a close relationship with the parents, and aim to expose children to useful experiences which will prepare them for elementary school. The programmes are flexible and designed to help the child grow in self-reliance. learn to get along with others. and form good work and play habits. The main purpose of the el-

ementary school is the general intellectual and social development of the child from 6 to 12 or 15 years of age. Curricula vary with the organisation and educational aims of individual schools and communities. Promotion from one grade to the next is based on the achievement of specified skills in reading, writing, spelling. arithmetic, history, geography, music and art.

At secondary school level, most public institutions follow a course that includes English and physical education. Elective subjects may be chosen in the fields of foreign languages. fine arts and vocational training. Pupils usually elect about half of their subjects in grades nine to twelve.

The vocational programme may impart training in four

fields: agricultural education which prepares the students for farm management and operation; business education, which trains students for the commercial field; home economics, which trains students for home management, child care and also for taking care of the sick; and trade and industrial education, which provides training for jobs in mechanical, building manufacture and other trades. This programme prepares students either for employment or further training.

I have to mention here that

the educational system of USA

cult to make.

In USA the terms "college"

and "university" are often used

interchangeably, although the

former often is a part of the lat-

ter. An American college typi-

cally offers a blend of natural

and social sciences and hu-

manities studies. Students tra-

ditionally 18 to 22 years old, at-

graduate schools and profes-

United States has evolved two

unique institutions. They are

the two-year junior college, or

community college as it is popu-

larly called, and the four-year

fer academic programme suit-

able for transfer to four-year

institutions, and also terminal

technical and vocational

courses. This is the preparatory

phase for various technical

fields of education. These insti-

tutions usually serve local pop-

ulations within specific areas.

In addition to these, there are

also a few private two-year col-

leges to prepare students for transfer to four-year colleges

leges are institutions that

mainly offer programmes of

general undergraduate educa-

tion including studies in the

humanities, language, arts, so-cial sciences and physical and

natural sciences and also pro-fessional study programmes for

up to four years. These liberal

arts colleges that offer four-

year bachelor's degree are

mostly non-public or indepen-

dent. This phase of education is

completed (usually) in prepara-

tion for graduate and profes-

sional schools. Major universi-

ties also offer undergraduate

liberal arts programmes like

state and private four-year col-

leges. Many of these were for-

merly teacher training colleges

and offer only official pro-

grammes or special training

along with liberal arts. Credit

from these colleges is normally

recognized by universities for

admission into graduate and

There are also a great many

these colleges.

Four-year liberal arts col-

Two-year colleges usually of-

liberal arts college.

and universities.

sional schools and facilities.

may be understood in the context of Plato's idea of education. Plato considered a sound educational system as the basis of social justice. Though in his idea of education, Plato advocated education for all, he actually entertained the view that higher education should be meant for the students with extraordinary merit. In elaborating his scheme Plato proposed the study of literature, music and mathematics for students up to the age of 17 to 18 years and the practice of rigorous physical exercise and military training for those between ages of 18 and 20 years, and the study of mathematics for a smaller number of brilliant students through selection between the ages of 20 and 30 years. The study of dialectics/philosophy and ethical education was to be set aside for selected groups of students between the ages 30-35. These selectively educated students would be appointed to various positions in the higher sections of State Administrative Management bodies within the age of 35-50 years so that they could gather experience of the practical life. Finally, these students would achieve perfection in their practical and theoretical knowledge and employ their time and knowledge in enhancing the qualities of State Administration.

The western countries have tried to follow some fundamental principles to establish Plato's educational scheme in their own educational system. In the USA though educational system apparently has enormous diversities in structure, form and grading, the basic philosophy of the system always imbibes Plato's idea of education. The structure of the American educational institutions seems to be classificatory. The classifications are difficult to make because of decentralised administration and control. For example, there are some universities that do not offer degrees beyond bachelors while there are some colleges that offer doctoral degrees. So generalisation about

institutions on the basis of professional studies. their official titles is very diffi-

The US Universities impart graduate, undergraduate and professional education (post bachelor's degree). These universities usually offer bachelor's, master's and doctoral degrees and in many instances also professional programmes in medicine, law and engineer-

There are also other types of tend classes for approximately institutions specially for secrefour years to receive, if they tarial training, trade and vocasuccessfully complete all retional programmes, some adult quirements, a bachelor's degree education and extension serin arts of sciences. A university, vices, some health related proon the other hand, is usually grammes and other trainings composed of an undergraduate such as computer programcollege of arts and sciences plus ming. The training imparted here is mainly profit-oriented and not for further study in Higher education in the other colleges or universities.

Courses in US colleges and universities are of many different categories. For instance, lecture courses, independent study, courses seminars, laboratory courses and courses in research work. Technical institutions provide firsthand experience with necessary tools and equipment. But what is more important and needed is an extensive work outside the class. Assignments are also given by teachers.

Most American university degrees are awarded on completion of specified number of courses which earn students credits or points. The number of credits awarded for each course relates to the number of hours of work involved. At the undergraduate level a student generally takes about five 3 hours aweek courses every semester. Semesters usually run from September to early January and late January to late May. Most students complete 10 courses per academic year and it usually takes them around four years to complete a bachelor's degree requirement of about 40 three-hour courses or 120 cred-

The US education system is both practical and academic in its objective. Emphasis is given to gaining practical knowledge from experience and observa-tion all the way. Sometimes it seems quite different from the academic system of other countries from where students arrive for study in USA. What makes US education system stand out is the following:

The US education system puts great emphasis on analysis, observation and creativity. It never encourages memorisa-

tion. Knowing facts and having ideas from class lectures and reading are not sufficient. Students must analyse, synthesise and evaluate them. Their creative faculty is thus exercised. Even the examination may include new problems that were

not encountered before. In matters of grading, the final examination is not crucial; class attendance, level of participation in discussions and periodic quizzes contribute greatly to final grading. Written paper, if required must be completed in due course. Work load is very heavy and many students have to spend busy hours outside class.

It is not the teacher rather the students who have the greatest responsibility for their own learning and generating a spirit of acquisition of knowledge. Students have to work hard to solve problems given in class. The credit of success or failure goes directly to the students.

The academic atmosphere is highly informal and teacher-

TOM & JERRY

student relationship is most casual. This aspect of intellectual development through interaction makes students feel greatly inspired and stimulated.

The greatest offence in the US academic system is plagiarism and cheating. One cannot write paper for others as take material from other's writing and pass it under his own name. The cases of cheating and plagiarism are severely dealt with and may even result in expulsion from University.

The US system of education is thus highly challenging. But the teacher-student relationship is greatly informal, cooperative and congenial. It renders the whole process of learning interesting and enjoyable. The students may freely communicate with the teachers and the teacher's accessibility facilitates continuous exchange of ideas. Students receive guidance and work on their own respon-

American teachers are expected to be highly qualified. Only extraordinary scholars

with great academic and intellectual attainments are allowed to become teachers in colleges and universities. What struck me most is their devotion and sincerity to their profession. They are wholly dedicated to learning and teaching. What is most expected of them, however, is their publication. It is a must for their career. There goes a saying everywhere in American academic arena : "publish or perish". Original publication is essential for them, failing which they cannot continue as teachers. Also a system for evaluating teachers competence by the students is in existence. Students ask questions in class, keenly observe the way teachers deliver lectures and fill out an evaluation form at the end of the semester to be considered by the authority concerned.

The teacher enjoys a great deal of academic freedom and gets enough time for research. American teachers are approachable and highly cooperative.

The cultural difference represented by the general American lifestyle creates an impact on foreign students. They face problems adjusting to the American way of life. In the initial period, this becomes a cultural shock for them. This may frustrate a newcomer. Even the

simple everyday activities like getting on a bus, buying groceries, making friends seem difficult.

The American people consist of different ethnic, racial, linguistic and cultural groups. But in this heterogeneity there can be found some general and common characteristics among

In American society the greatest emphasis is given on individuality. Individual success and achievements are greatly valued. Everyone has to take up his own responsibility. Family does not wok as a complete supporting system. Americans attach great importance to the proper use of time. They are so time-conscious that they budget their time and spend it in a calculative way so time is never wasted. What is to the greatest advantage of the foreigners is the friendly and informal nature of the American people. They even address them after a few minutes of acquaintance by the first name. But friendship does not mean any unlimited access. People think many times before they ask favour of a friend. Friendship. however, provides emotional support and shared interests. This aspect of the American character helps foreigners to adjust with an alien society or culture very easily and quickly.

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By Hanna-Barbera

