

# Quality Education through Education Grid – The Nagaland Initiative

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## **PREAMBLE**

On January 9<sup>th</sup> 2008 Nagaland University (NU) and Indian Institute of Information Technology-Kerala and Management (IIITM-K) signed an MOU to closely and jointly work to develop, innovate, establish and commission various systems, processes and conduct capacity building exercises related to effective deployment and practice of technology enhanced learning and teaching methods in the Nagaland University campus. This is to be done with the objective of improving the quality of education offered in the University very substantially. The parties will also work together in areas of common interest in programs related to education, R&D and capacity building in fields related to technology enhanced learning and teaching, information and computational sciences and applications of IT in diverse domains as identified jointly time-to-time.

On 5th May 2008 the School of Engineering and Technology of the Nagaland University has successfully installed and commissioned EDUCATION GRID GATEWAY SYSTEM (EGGS) developed by the Indian Institute of Information Technology and Management – Kerala (IIITM-K). The first advanced portable E-Learning Server was brought by the team from IIITM-K and integrated with the LAN and Internet of the School of Engineering and Technology at Dimapur. Using the server, the team also commissioned 1400 hours of recorded video lectures by eminent academicians in their respective field under the MHRD funded NPTEL (National Program on Technology Enhanced Learning) program executed by the IITs and IISc. The video lectures cover over 30 courses and they are made available as video-on-demand service over the network. The video lectures were packaged by the NPTEL team at IIT Madras and specially sent to Nagaland University for the workshop. This is the first time NPTEL has sent such packaged video courses to any institution in India. The sophisticated portable E-Learning Systems has been developed by the IIITM-K as part of its Education Grid initiative that aims to improve quality of higher education through collaborations across premier institutions and universities. On 5th and 6th May 2008, the team from IIITM-K conducted intensive hands-on workshop for 40 participants in understanding technology enhanced learning, teaching and evaluation methods using the server and other internet accessed content. The university is working closely with IIITM-K and NPTEL to groom its young teachers and enable them to conduct quality engineering education.

On 12th July 2008 Nagaland University established the first and longest (3800Km) terrestrial education grid connection between two extremes of the nation, IIITM-K at Thiruvananthapuram in the south west and Nagaland University's School of Engineering and Technology, Dimapur in the North East with the help of Optical Fiber Cable network of RailTel. This was the beginning of supporting quality education for the twenty first century by **CONNECT, COMMUNICATE** and make **EDUCATION** as an **ENGINE OF CARING AND SHARING, GROWTH, TRANSFORMATION AND DEVELOPMENT** for Nagaland. The journey on the less travelled road has now begun with a firm footing.

## HISTORY

Sophists were ancient Greek teachers of rhetoric. Through them and Socrates, moral philosophy began. In 393 B.C.E., Socrates was sentenced to death by an Athenian court for impiety and corrupting the youth of Athens. This could be said to be the beginning of true education in the western civilization. This argumentative approach in understanding and questioning nature led to the first schools and colleges of higher learning.

Socrates wrote nothing but is famous for *Socratic (dialectic) method*. Plato the famous student of Socrates founded the Plato academy in 387 BCE. It was the first multi subject, multi teacher institution of higher learning in Western civilization. Plato was most famous for his *Theory of Forms and his two-realm doctrine: two separate worlds with two types of knowledge*. The Academy survived for nine centuries, until emperor Justinian closed it to protect Christian youth. His scholarship included written works of Apology (*Dialogue in which Socrates is seen defending himself*), Meno (*Dialogues about knowledge*), and the first dialogue book Republic (*Compares Goodness to the Sun, set forth his famous Theory of the Divided Line and explains the Myth of the Cave*). Plato's most distinguished pupil was Aristotle (384-322 B.C.E.), on whom Plato had a tremendous influence. Aristotle systemized all that was then known, and, as if that were not sufficient, he extended the limits in of knowledge in every existing subject, including biology, psychology, zoology, physics, and astronomy, ethics, politics, aesthetics, metaphysics and logic. In 335 BCE Aristotle formed his own school at the Lyceum, in Athens. Aristotle was also a teacher of Alexander the Great, and Alexander attributed his happiness to his teacher, Aristotle.

Thus Socrates, Plato and Aristotle are examples of mentors. Mentors are the guiding lights, the bright stars who show the path and guide towards the right direction. Mentoring, if followed in the right sense, can contribute substantially in changing the society for the better.

Ashram\*, Madrasah\*\* and Morung\*\*\* are educational traditions that have their roots in India. They are essentially examples of the Mentoring concept.

Mentor can be compared to a *STEM CELL \*\*\*\**. A *stem cell* has the unique property of not only self-renewal but also the ability to differentiate. *Self-renewal* in this context means producing another teacher and thereby preserving a small but effective population of teachers. *Differentiation* on the other hand means producing a large population of doctors, engineers, businessmen, sports men and women, musicians etc.

## PARADIGM SHIFT IN EDUCATION

The future is uncertain, but education should lead to general enrichment during our lifetime. A good and effective teacher prepares the youth to mould his or her behavior pattern in a manner suitable for the long marathon of life. To keep abreast of knowledge evolution enhanced by technological revolution, teacher development is essential. Teacher development is a continuous process and is only possible when teachers are actively involved as innovators in the classroom and does research. Teachers need to do introspection with regard to their own teaching, confront held beliefs and attitudes and evaluate results. Portfolio assessment is one of the many alternative assessment tools that help access rich and descriptive information about the processes and products of learning. In this, learners are asked to think about their needs, goals, weakness and strength in subject learning and are enabled to take responsibility for their own learning and in the process enable them to become autonomous learners. It is found that this approach helps to promote teacher and learner reflection vis-à-vis **meta-cognitive awareness**.

Without fundamental changes in the delivery of education and reforms in the examinations system, our education will not gain the sanity to equip graduates capable of addressing real world problems or with capacity to soar into the sublime world of abstractions and synthesize extensions to theories. India figures at a lowly 25<sup>th</sup> rank in the 2007 International Math Olympiad while Russia, China, Vietnam, South Korea and USA take the top five positions. It is time we ponder on how come we are failing to educate and set right the distortions that has crept into the system at those higher and tertiary levels. Without well-thought out education reforms, India will never emerge a leader in the emerging knowledge driven world order.

The real challenge of 21<sup>st</sup> century is to produce quality students to perform various roles and functions. Just like we are not clear how to isolate and identify a true *Stem Call*, in the 21<sup>st</sup> century we do not know what kind of **effective teacher** we are looking for.

An **effective teacher** can be benchmarked by the number of students they have produced by the criteria of Prof Francois Jacob, “to my surprise, those who achieved the unexpected and invented the possible were not simply men of learning and method. More than anything else, they were creatures of amazing vision. Those in the front ranks displayed exotic blends of passion and indifference, of rigor and whimsy, of naiveté and the will power, in a triumph of individuality.”

Sir J. J. Thomson produced several brilliant students of which 8 went on to win Nobel Prize. His student Sir Rutherford produced outstanding students and 13 of them went on to win Nobel Prize. Sir J J Thompson and Sir Rutherford are examples of **effective teachers** showing the ability of self renewal and produce students who differentiated to create new disciplines and departments which did not exist before.

One thing is very clear that every aspiring youth is eager to acquire new skills so that they can take advantage of the opportunities available in the technology driven knowledge world. Let us also fondly remember the inspiration by an unsung effective teacher who have guided us to achieve our goals.

## ISSUES FACING NAGALAND

Youth of Nagaland are aspiring for innovations in agriculture, development of industries, information communication technology and knowledge driven enterprises. Though this is the 61<sup>st</sup> Independence year, the first professional college came into Nagaland only in October 2007. More than 50% of the youth are below 25 years and employment opportunities are minimal. The demand for jobs far outweighs the supply. There are not enough skilled youth available due to lack of professional education.

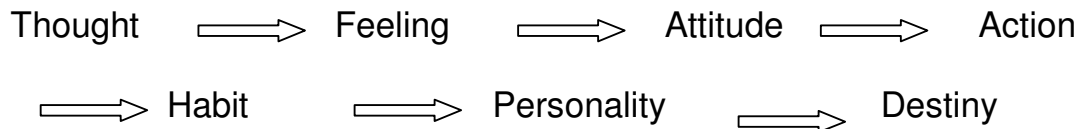
Textile mills, sugar mills were in existence in India for some centuries. To become industrialized, the nation had to focus on technical and professional education. The British rulers of India realized the need for highly skilled engineers to keep the economy going. They set up the first engineering colleges and medical colleges. The first IIT at Kharagpur though established after independence was set up on the recommendations of the Sarkar Committee that was submitted in 1945. After independence the numbers of engineering colleges steadily grew. Many advances were possible due to team efforts and group activities.

## RETHINKING ON EDUCATION FOR NAGALAND

For students to compete in the 21<sup>st</sup> century, we need a new model in education with a greater emphasis on technology enhanced skills development. Also one should free oneself

to chart one's own career by taking courses suited to one's capacity in various disciplines including humanities and arts. We need to produce all round students who can appreciate developments in as many fields as possible. In college education we are too compartmentalized and we need to free ourselves from creating artificial boundaries in education. Cross flow of information across different subjects is essential for knowledge and wisdom evolution!

More than anything else, it is essential to inculcate the importance on the process of learning rather than promoting insensibly examinations oriented product. One needs to instill these processes namely



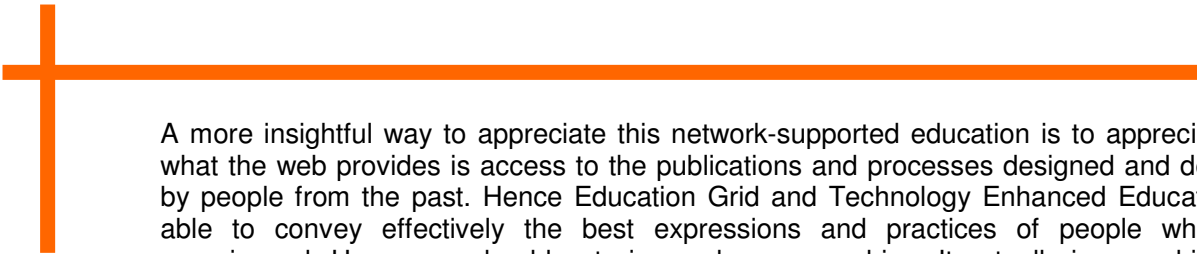
Can we take advantage of revolutions in ICT technology? National Program on Technology Enhanced Learning (NPTEL) is a project on e-content developed by over 350 professors of IIT's and IISc and funded by MHRD. Necessity is the mother of invention. This proverb is apt as we have more engineers without quality. Unemployable engineers have become a serious issue and one is left with no choice but to focus on quality education; further compounded by the fact that it is very difficult to attract the best teachers to the Northeast. Conventional methods have not enabled our Nagaland University to be part of the mainstream. Nagaland University decided to innovate the professional engineering education: Information Technology (IT), Electronics and Communication Engineering (ECE), Computer Science and Engineering (CSE), and BT (Biotechnology) and Agricultural Engineering (AE).

### **EDUCATION GRID**

Conventional methods have to be supplemented by innovations such as Educational Grid. The Education Grid is designed to integrate knowledge awareness through augmentation, deployed and managed as a powerful subject community system. This is expected to augment both teachers and learners, linking the lessons and experiences from the past with the future in ways that are powerful to impart high quality education.

The concept of Education Grid involves a suite of systems and processes over a network of institutions. Under the NPTEL, for each course there is a suite of about 40 hours of recorded video lectures delivered by the best available faculty that is readily accessible. There are more than 110 such suites of lectures already released by the NPTEL. There are more than 130 supplementary web based courses. In addition there are other open sources available from premier universities on the Internet. The World Wide Web (WWW) is fast evolving in to Web 2.0 and in areas with the features of Web 3.0, sometimes referred to as the Semantic Web. Organization of web-accessed information in the Semantic web sense allows a whole world of formats and languages to search and access related information spread across the entire globe. It is essentially a harmonization where search engine tools convert different formats and languages appearing in the WWW into an internationally agreed common format and language.

If machines can do the routine work of searching, compiling, write all the information in a single accepted format, reason and arrive at it logically then what is going to be the role of a teacher? Is the teacher a manager or a leader?



A more insightful way to appreciate this network-supported education is to appreciate that what the web provides is access to the publications and processes designed and deployed by people from the past. Hence Education Grid and Technology Enhanced Education are able to convey effectively the best expressions and practices of people who were experienced. Hence we should not view web as a machine. It actually is a sophisticated repository and communicator of the collective wisdom and codified processes of communities over space and time, from the past into the future. This community-wisdom driven approach is the one that created the Wikipedia. Hence it is very important to incorporate effectively systems and processes in education. Like use this web-accessed content and processes as augmentation in our education system.

As a country, India has not developed the culture of servicing online scientific databases in any area of importance to our needs and culture. IT is no more a technology of connectivity and content as it was in the 20<sup>th</sup> century. Now people build services, make available online databases and societies communicate their different viewpoints on the net. A student gets exposed to various ideas and evolution of ideas and concepts, areas in which non-internet savvy teacher will feel disoriented.

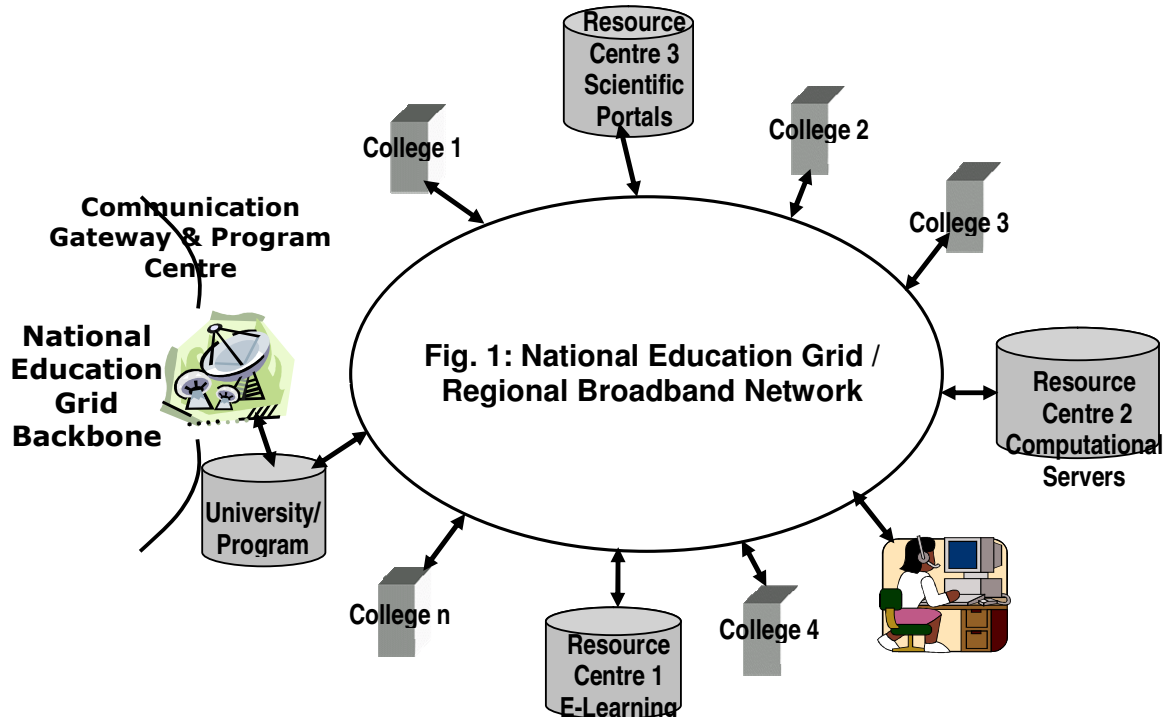
The teacher has to provide more time for acquiring information by students. The hours of actual contact teaching has to be tremendously reduced and preserved for well-designed interactions between the students and teachers. The teacher will also have to pour through not only all possible sources of information but be able to help the student how to convert information into knowledge. The teacher has to develop skills on how to examine and evaluate a student. He or she as a teacher has to move from definition to analysis and interpretation of a given set of data. This kind of contact teaching may take several hours rather than the routine one-hour that we assign in timetable. The examination has to be a system of evaluation by the teacher with feedback to assist students in knowledge acquisition rather than assessment of information acquired through rote learning. In the present rote learning, a teacher is relegated to a nonfunctional entity. That is why tutorial coaching classes are thriving and growing, training students through question banks to answer questions to get high marks without understanding the subjects. In this environment, the role of the teacher in enabling a student to be a thinking person rather than a parrot has been lost.

Thanks to advances in technology it is possible to establish an alliance of academia, industry and government to modernize the higher education system through Technology Enhanced Learning, Teaching and Evaluation (TELTE) in the universities, colleges, institutions and through open distance/supported learning. One may call it Education Grid Global (EGG) alliance.

Education is a lifelong marathon rather than a 100 meter dash. Unfortunately we treat education as a 100 meter dash and we don't know whom to blame. We need a new education policy that is shaped in the light of a National Education Grid which is implementable. The new National Education Policy should make the National Education Grid as the reference network backed by a web-accessed portal in every subject or course, supported by experts and experienced academicians in the field and equip teachers and learners through orientation and academic programs in their own respective locations.

## National Education Grid

We briefly outline how the National Education Grid can be built and what it should be doing. Firstly as illustrated in Fig. 1, it should connect every college, study centre and university in a region over an Education Grid network. This allows a student or a teacher anywhere to access learning resources and the opportunity to do the study or research from wherever they are connected. They get e-learning related content, online access to libraries and scientific databases, access to web-resources like Computational Portals, interactive rich media content, etc., participate in classes through tutored vide instruction, etc.



The National Education Grid aims at providing quality educational content, resources, instructional process, learning ambiance and aims to amplify the effectiveness of instruction by the teachers. The different components and processes have to be owned and managed by appropriate groups at the national/university/college levels and ably supported by effective technologies and services. We illustrate this in Fig.2.

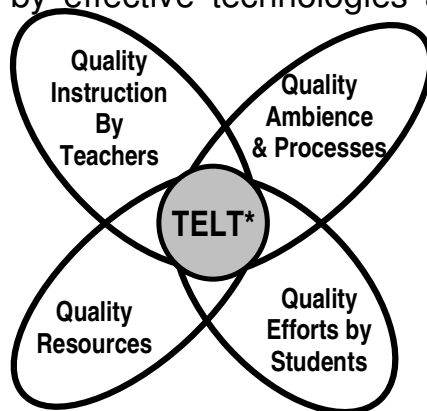
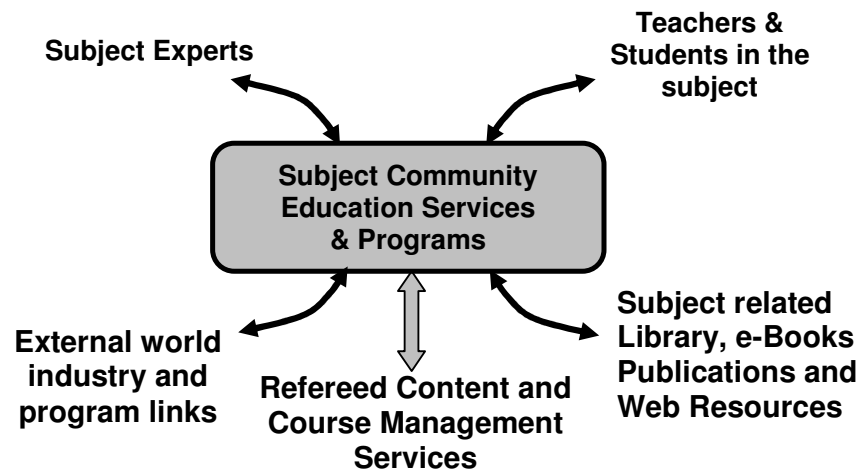


Fig. 2: National Education Grid and Quality Educational Processes

\* TELT – Technology Enhanced Learning and Teaching

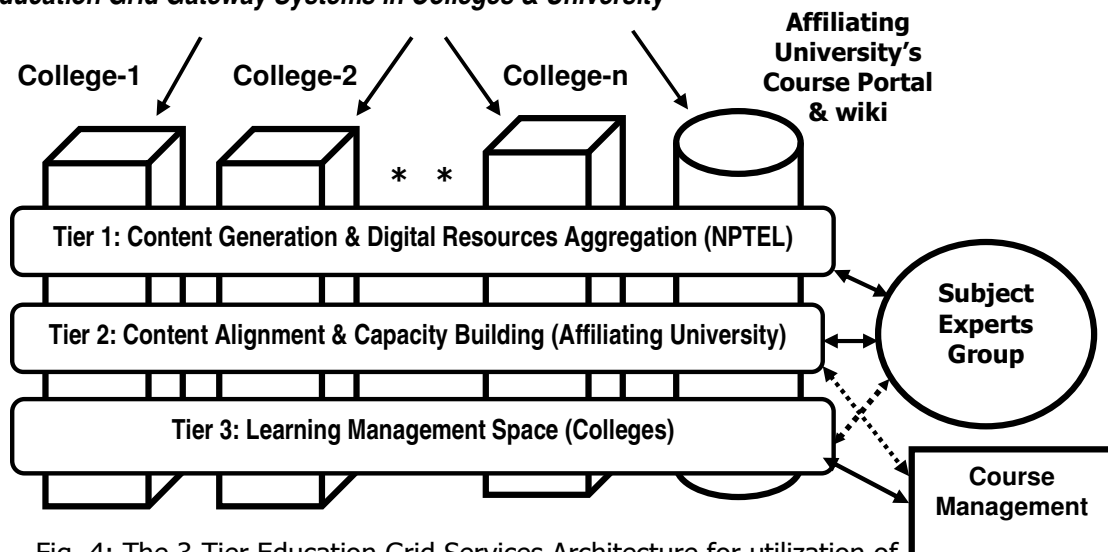
To realize the above we need two interdependent systems. One is that we have subject/course specific collaboration portals coordinated/moderated by experienced academicians in the area, much like the way online refereed journals are edited and managed. They also require effective technology support to run such portals. In other words, we need to support effective communities of practice that include experts on one hand, the teachers and learners on the other as illustrated in Fig. 3.



**Fig. 3. Communities of Practice Servicing Courses**

To be able to effectively service and run all the above systems and processes, we need effective ownership and management of each component systems and process. At the IIITM-K, in Thiruvananthapuram, where the Education Grid was initiated and is being developed, several systems and processes to develop such subject/course specific processes as explained above are put together as illustrated in Fig. 4.

***Education Grid Gateway Systems in Colleges & University***



**Fig. 4: The 3-Tier Education Grid Services Architecture for utilization of**

The approach is to take advantage of IT, connectivity, internet, content and service TELT in the tertiary education sector. It should be possible to deliver education at the doorstep of the student and through video conferencing have a real time synchronous learning.

## CONCLUSION

With an explosion of information in all fields, a student can pursue several courses simultaneously provided they are exposed to a holistic approach. The undergraduate program should be broad based with courses in science, arts, commerce, humanities and culture rather than just one area as is being done presently. Platform technology knows no boundaries and each field can take advantage of technology like computer and software that are having impact in all fields. Education should provide flexibility and adaptability rather than rigidity. Everybody need not pursue education to do PhD but should have access to skill development and earn his/her livelihood. Thanks to the ability to connect and communicate, there is a room for each person to bring out the best in them rather than being pushed to become only a doctor or an engineer! The world has become flat and any student who has the risk taking ability can make giant leaps like Sergey Brin and Larry Page of Google Inc.

On 12<sup>th</sup> July 2008, the longest terrestrial broadband optical fiber link (3800Km) was established between Indian Institute of Information Technology and Management, Trivandrum and School of Engineering and Technology, Dimapur and formally inaugurated by Shri Mani Shankar Aiyar. This is paving the way for the first virtual classroom in a *university*.

This terrestrial link is the platform for not only for making functional the National Program on Technology Enhanced Learning (NPTEL), an initiative of MHRD but also provide inclusive quality education under the National Mission on Education. Over 16 faculties would be available from IITM –K to mentor the young, enthusiastic nascent engineering faculty through virtual class room. We hope to link several institutions of eminence, not only in engineering but also management in the first phase. This initiative in the future will provide quality education to every village of Nagaland and thereby strengthen the Village Development Board (VDB) and Communitization initiative of the Govt. of Nagaland.

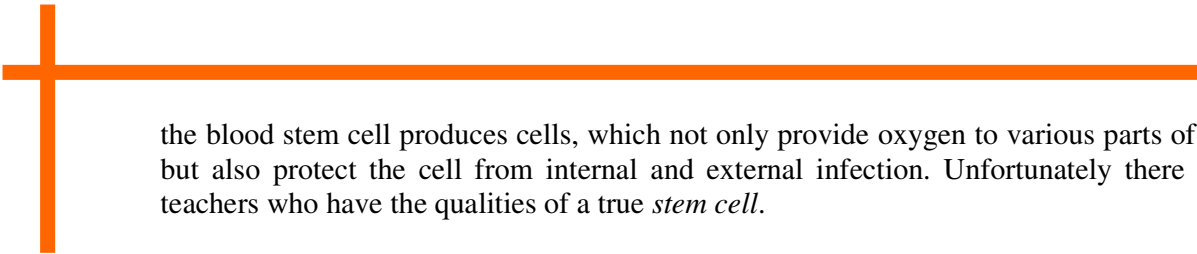
\*An **Ashram** is a Hindu hermitage where sages lived in peace and tranquility amidst nature. Today, the term ashram is sometimes used to refer to an intentional community formed primarily for spiritual upliftment of its members, often headed by a religious leader or mystic. Traditionally, ashrams were located far from human habitation, in forests or mountainous regions, amidst refreshing natural surroundings conducive to spiritual instruction and meditation. The residents of an ashram regularly performed spiritual and physical exercises, such as the various forms of Yoga. Many Ashrams also served as Gurukuls or residential schools for children. The word ashram is derived from the Sanskrit term "aashraya", which means *protection*. Ashrams have been a powerful symbol throughout Hindu history and theology. Most Hindu kings until the medieval ages are known to have had a sage who would advise the royal family in spiritual matters, or in times of crisis, who was called the raj guru which literally translates to *royal teacher*. A world-weary emperor going to this guru's ashram, and finding solace and tranquility, is a recurring motif in many folktales and legends of ancient India. Sometimes, the goal of a pilgrimage to the ashram was not tranquility, but instruction in some art, especially warfare. In the Hindu epic Ramayana, the protagonist princes of ancient Ayodhya, Rama and Laxman, go to the Rishi Vishvamitra's ashram to protect his Yajnas from being defiled by emissary-demons of Ravana. After they prove their mettle, the princes receive martial instruction from the sage, especially in the use of enchanted weapons, called Divyastras (Sanskrit Divya: Enchanted + Astra: Missile Weapon).

The Sanskrit word 'astra' means missile weapon, such as an arrow; as opposed to 'shastra', which means a hand-to-hand weapon, such as a mace.) In the Mahabharata, Lord Krishna, in his youth, goes to the ashram of Sage Sandiipanii, to gain knowledge of both intellectual and spiritual matters. An outstanding example of the dialogues between the teacher and the taught could be found in Yogavaasishta. Here Sage Vasishta, the great teacher instruct the great student Rama. At the end of every year, the student Rama was given the right to question the teacher on any topic. In his years of schooling under Vasishta, Rama queried his teacher and he too replied in detail. It is stated that in his graduating year, Rama concludes with one question: "Each year I asked the same question, and each year you gave different answers, why?" Vasishta replied, "Dear Rama, the answer to your question depended upon the level of maturity you have gained each year. As you matured over the years, I too deepened the level at which I answered!" The present examinations oriented education misses this basic tenet of education that it is about communicating concepts and competencies and examination (like the medical examination) is essentially a tool in the hands of teachers to point out knowledge gaps to students and asking them to take efforts to overcome the same.

\*\**Madrasah* literally means "a place where learning/teaching is done". The word is also present as a loanword with the same innocuous meaning in many Arabic-influenced languages, such as: Urdu, Bengali, Hindi, Persian, Turkish, Kurdish, Indonesian, Malay and Bosnian.<sup>[1]</sup> In the Arabic language, the word مدرسة (madrasah) simply means the same as *school* does in the English language, whether that is private, public or parochial school, as well as for any primary or secondary school whether Muslim, non-Muslim, or secular. Unlike the understanding of the word *school* in British English, the word *madrasah* is like the term *school* in American English, in that it can refer to a university-level or post-graduate school as well. For example, in the Ottoman Empire during the Early Modern Period, Madrasahs had lower schools and specialized schools where the students became known as danismends. The correct Arabic word for a university, however, is جامعة (*jāma'at*). The Hebrew cognate *midrasha* also connotes the meaning of a place of learning.

\*\*\*The indigenous Education system of Nagaland is based on community centric model. Similar community centric model was probably practiced in the rest of North Eastern states of India. Morungs worked as educational institutions among Naga tribes. Both boys and girls were trained independently in the training school called **Morung**. Given the limited knowledge and basically having oral tradition, people in ancient times have organized themselves in such a way to insure the basic characteristics for the survival of a community such as equality, fare justice for all, security and a decent livelihood for all its members in the community. Boys and girls were trained in both skill development and education from the ages of 12 to 25. They focused on agriculture and defense. It was an inclusive model. Every activity was based on interests of the community and leaders were selected and not elected. North East though classified as a tribal population has very interesting characteristics. According to Horam, "Tribal life makes for a basically classless society; there being no high or low, no rich or poor, there is no social stratification. They are classless in economic, social and political aspects. Therefore when the father of communism, Karl Marx wrote about class struggle, his theory did not contribute to new system for the tribal people. The community centric education led to individualists and respect of individuality in others, they are socialists without outside coercion and possess a marked predilection for democracy.

\*\*\*\*In real life, the blood stem cell divides into two cells one of which retains the original property and the other can multiply and differentiate. Differentiated stem cells are red blood cells, T cells, B cells, platelets, neutrophils, macrophages, eosinophils and basophiles. Thus



the blood stem cell produces cells, which not only provide oxygen to various parts of the cell but also protect the cell from internal and external infection. Unfortunately there are few teachers who have the qualities of a true *stem cell*.

# On the occasion of the Golden Jubilee celebration of UGC, on December 28<sup>th</sup>, 2003, Hon'ble President Dr A P J Abdul Kalam set the agenda for excellence in Higher Education. He said

- 1) Build education grid, which connects Universities for resource sharing, content, content generation on their core competence, e-learning, tele-education, universal certification.
- 2) Enlist great teachers of the nation from various sectors who love teaching.
- 3) Build a common digital library for all universities and provide them seamless access to the literary resources.
- 4) Evolve a transparent system of university performance evaluation scheme. Evaluation criteria may include areas such as quality and quantity of research contribution to societal transformation, utilisation and performance of the students, quality and standing of the teaching staff, promotion of e-governance, transparent examination system and student-centric responsive administration.
- 5) Build performance evaluation results which could be used to plan merger of some universities for promoting synergy and excellence and reducing managerial overheads.
- 6) Create a dynamic curriculum review mechanism relating to current socio-technical needs of the country.
- 7) Envisage "World Knowledge Platform" which will integrate the core competencies of the partner countries to develop knowledge products.' (Vision for Nagaland, Missions for the University, 15th March 2007, 2<sup>nd</sup> Convocation address of Nagaland University.

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Papers of K.R Srivathsan available for download from the publications page of Education Grid Portal, [www.edugrid.in](http://www.edugrid.in), as Papers, 1, 6, 7, 13, 14, 19, and 29 respectively.

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**Guest article for the forth coming issue of 'Development-North East' (DNE). 10-08-08**