Global University System
with
Globally Collaborative Innovation Network

Abstract

Global University System (GUS) aims to create a worldwide consortium of universities to provide the underdeveloped world with access to 21st Century education via broadband Internet technologies. The aim is to achieve "education and healthcare for all," anywhere, anytime and at any pace.

1. Background

Economic interdependence among nations and cultures is spawning a global economy. Globalisation also highlights clashes of divergent cultures and belief systems, both political and religious. If global peace is ever to be achieved, global-scale education, with the use of the modern digital telecommunications, will be needed to create mutual understanding among nations, cultures, ethnic groups, and religions. The Internet is the future of telecommunications and can be a medium for building peace.

GUS [Utsumi, et al, 2003] has a long history of concept development and testing of multiple hardware configurations suitable for remote Internet access. These initial steps are summarized in our recent book, *Global Peace Through the Global University System* [Varis, et al, 2003]. The purpose of this book is to make internationally known the philosophy, past and present actions, as well as future plans of the GUS, which have resulted from years of development and a seminal working conference at the University of Tampere, Finland, in 1999, with fund from the World Bank, the US National Science Foundation, British Council, etc.

2. Global University System

GUS is a worldwide initiative to create advanced telecommunications infrastructure and educational programs for access to educational resources across national and cultural boundaries for global peace. Education and job skills are the keys in determining a nation's wealth and influence.

GUS has task forces working in the major regions of the globe with partnerships of higher education and healthcare institutions. Learners in these regions will be able to take their courses, via advanced broadband Internet, from member institutions around the world to receive a GUS degree. These learners and their professors from participating institutions will form a global forum for exchange of ideas and information and for conducting collaborative research and development with emerging global GRID computer network technology.

a. Model Infrastructure

Modern e-learning and telemedicine require high-speed access to the World Wide Web. Multi-media requirements might include two-way audio, full-motion videoconferencing up to MPEG4 quality, television-quality netcasting, and high-resolution image transfer for telemedicine. The objective of increasing quality of audio/video delivery, high interactivity, and broadband throughput can be seen as a global objective of closing the digital divide to improve e-learning and e-healthcare services in rural/remote areas of developing countries.

As diagrammed in Figure 1, GUS programs and services will be delivered via regional satellite hubs, typically located at a major university, that connect via high-speed satellite (~ 45 Mbps) to educational resource cites in the E.U., U.S., and Japan. In a sense, the regional satellite hub is to be the major Internet Service Provider (ISP) for not-for-profit organizations in the region and the gateway to the outside world.

The major university may also be connected to very high speed broadband Internet, as similar to the optical fiber network at 3 Gbps of the Multimedia Broadband Internet (MBI) of the Ethiopian government.

Regional hubs link to branch campuses or other regional educational institutions via micro-wave (~ 45 Mbps) over relatively short distances (25-50 miles). Communication from the hub and branch campuses to local sites, over distances up to 10 miles, is to be achieved by spread-spectrum wireless (~ 2-10 Mbps) Internet networks, which do not require licenses in most countries.

The buildings with a broadband Internet connection will then also become relay points for the low-cost "Wi-Fi (wireless fidelity)" networks at 10 Mbps that are now rapidly appearing in Japan, USA and Europe. This advanced wireless communication with laptop computer will make e-learning possible for anyone, anywhere, and anytime with capabilities of Internet telephony, fax, voice mail, e-mail, Web access, videoconferencing, etc. This is not only to help local community development, but also to assure close cooperation among higher, middle and lower levels of education.

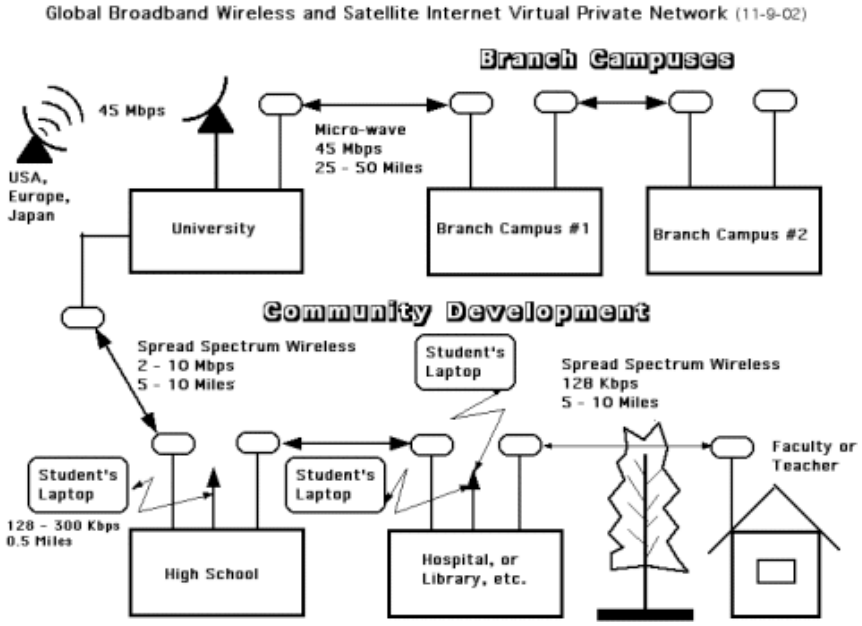

Figure 1

b. Current GUS Projects

The major university will then connect to secondary and elementary schools, libraries, hospitals, local government offices and NGOs, etc., with broadband wireless Internet at drastically discounted rates or free of charge. GUS projects are now starting in Siberia, Turkey, Sierra Leon, Ethiopia, and Nigeria in Africa, Mongolia in Asia, etc., and have received inquiries for the same from others, too.

We are now encouraging our colleagues in those countries to form consortiums of higher educational and healthcare institutions to aggregate their Internet usages through the trunk line from the hub university to outside world for bringing drastic cost reduction.

c. Organization

GUS is headquartered at the Global E-learning Center at the University of Tampere in Finland, under the direction of the UNESCO/UNITWIN Networking Chair, held by Dr. Tapio Varis. Currently, institutions with faculty members who are participating in GUS development projects are numerous in every continent.

GUS will serve as an educational broker for universities, thus helping them gain international influence and access to students that they would otherwise not reach.

d. Distributed Learning

"Distributed learning" is a term used to describe educational experiences that are distributed across a variety of geographic settings, across time and across various interactive media [Dede, 2004]. It is a culture of learning in which everyone is involved in a collective effort of understanding. Its four characteristics are;

- Diversity of expertise among its members who are valued for their contributions and given support to develop,
- A shared objective of continually advancing the collective knowledge and skills,
- An emphasis on learning how to learn,
- Mechanisms for sharing what is learned.

This is a radical departure from the traditional view of schooling, with its emphasis on individual knowledge and performance, and the expectation that students will acquire the same body of knowledge at the same time.

To fully prepare students for 21st century work and citizenship, the education system must transform to provide support for inquiry-based learning in classrooms, in homes and in communities since this is how complex skills such as systems thinking, creativity and collaborations are acquired.

e. GRID Technology

Grid-based technology enable the sharing, exchange, discovery, and aggregation of resources (processors, storage, scientific devices, information, knowledge, etc.) across geographically distributed sites. Many now consider GRID technology as the next generation Internet, which concept I initiated in 1972 [McLeod, 2000]. It has demonstrated all of the effectiveness in the scientific domains as becoming a de-facto e-Science technology infrastructure.

Grid technology has great potential in education, offering a framework that opens new ways of teaching and learning that have not been possible before. E-mail and multimedia World Wide Web of Internet so far contributed significantly to the world society on the dissemination of information. The next phase of the Internet development with global neural (or GRID) computer networks should be the globally collaborative experiential (the so-called "hands-on") learning and constructive creation of wisdom with interactive actions on virtual reality simulation models of joint global research and development projects on various subjects. It is said "Knowledge applied with interaction becomes Wisdom." Globally collaborative experiential learning through broadband Internet, across national, continental and oceanic boundarie would realize such wisdom creation. The principle of the 21st century education should be inheriting wisdom more than the mere transfer of knowledge.

f. Globally Collaborative Innovation Network (GCIN)

Spreading the culture of creative and innovative society (which is based on a firm democratic principle) can only be done with education -- and this is much better, effective and peaceful way of spreading democracy rather than using any weapons! Thanks to the advent of global broadband Internet and GRID networking technology, this can now be done more readily than before - and more so, in globally collaborative fashion. Globally Collaborative Innovation Network (GCIN) with a globally distributed computer simulation system will foster creativity of youngsters around the world.

When the new development of the web conferencing feature [BusinessWeek, 2005] will accompany with the distributed computer simulation system through GRID network, it will create Globally Collaborative Innovation Network at down-to-earth, end-users' level, which may also be used by youngsters around the world – this may correspond to the neuron of global brain with regard to the "neural computer network

(*).” This will be the future direction of e-learning, more than web-oriented teaching (for one-way knowledge transfer).

(*) In 1981, I coined the phrase "Global Neural Computer Network" in which each participating game player, with his/her own desktop computer, database and sub-model, would correspond to a neuron, router to synapses, with the Internet serving as nerves in a global brain.

3. Expected Benefits

With rapid advancement of computer simulation with GRID networking technology, such a network of mini-supercomputers around the world can also be used by researchers, even in developing countries to perform with their counterparts in developed countries for joint collaborative researches with virtual reality and virtual laboratory of various academic and engineering subjects.

Our GUS/UNESCO/UNITWIN Networking Chair project aims to construct global scale knowledge forum with advanced Information and Communication Technologies (ICTs), i.e., with the use of massive parallel processors of globally distributed and yet interconnected mini-supercomputers through global neural computer network. This is a paradigm shift of research and development in global scale, a positive direction from the so-called “Ivory Tower” approach. It is expected that GUS will provide the following benefits to students and participating universities:

- Broadband Internet connection, supporting modern distance education via the World Wide Web
- Help member universities build a network of facilitators to support e-learners
- Learners may take courses from different member universities, obtaining their degree from the GUS, thus freeing them from being confined to one academic culture of a single university or country
- Learners and faculties can promote the exchange of ideas, information, knowledge, and joint research and development of Web-based teaching materials
- Researchers in developing countries can partner with colleagues in more advanced countries, and perform joint collaborative research and development with the use of virtual reality/virtual laboratories for experiential/constructive learning and creation of knowledge through the emerging global GRID networking technology
- Learners, faculties, and public policy makers can promote community development and many other advances at a local, regional and even on a global scale.

4. Financing GUS and GCIN

During the Okinawa Summit in July 2000, the Japanese government pledged US$15 billion to close the digital divide in developing countries and for the eradication of poverty and isolation. During the G8 Summit in Canada in June of 2002, and at the Environment Summit in South Africa in September of 2002, they also pledged US$2 billion to aid education and healthcare in developing countries, respectively.

GUS projects will combine (1) the Japanese government's Official Development Assistance (ODA) funds and Japanese electronic equipment with (a) the Internet technology and (b) content development of North America, Europe and Africa.

5. Conclusions

The GUS program is a comprehensive and holistic approach to building smart and creative communities [Eger, 2003-a and Eger, 2003-b] in developing countries for e-learning and e-healthcare/telemedicine. Initiatives are underway to create the necessary infrastructure and educational liaisons, and some near-term educational access is expected.

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