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Globally Collaborative Experiential Learning

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ABSTRACT

The Global University System (GUS) [Utsumi, et al, 2003] is a worldwide initiative to create advanced telecommunications infrastructure for access to educational resources across national and cultural boundaries for global peace. 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.

The GUS works 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 from member institutions around the world to receive a GUS degree. These learners and their professors from partner institutions will also form a global forum for exchange of ideas and information and for conducting collaborative research and development with emerging global GRID computer network technology.

Globally Collaborative Environmental Peace Gaming (GCEPG) project [Utsumi, 2003] with a globally distributed computer simulation system, focusing on the issue of environment and sustainable development in developing countries, is to train would-be decision-makers in crisis management, conflict resolution, and negotiation techniques basing on "facts and figures." The GUS will supply game players from around the world.

Keywords: **The Global University System (GUS), Globally Collaborative Environmental Peace Gaming (GCEPG), Neural Computer Network.**

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 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.

The editors' paper in the book, "Creating Global University System" [Utsumi, et al, 2003] emphasizes the important role of higher educational institutions not only as the knowledge centers of their community but also as the gateway to the world for collaboration of creating new knowledge in global knowledge society of the 21st Century. This paper summarizes GUS accomplishments and shows that GUS is poised to begin implementation of broadband Internet access and academic programs in remote areas of the world.

GLOBAL UNIVERSITY SYSTEM

GUS is a worldwide initiative to create satellite/wireless telecommunications infrastructure and educational programs for access to educational resources across national and cultural boundaries for global peace.

GUS aims to build a higher level of humanity with mutual understanding across national and cultural boundaries for global peace. The GUS helps higher educational institutions in remote/rural areas of developing countries to deploy broadband Internet in order for them to close the digital divide and act as the knowledge center of their community for the eradication of poverty and isolation.

The GUS education will promote world prosperity, justice, and peace, based on moral principles rather than political or ideological doctrines. Education and job skills are the keys in determining a nation's wealth and influence.

The 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.

PROPOSED 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, which was recently deployed with the Official Development Assistant (ODA) fund of the Japanese 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.

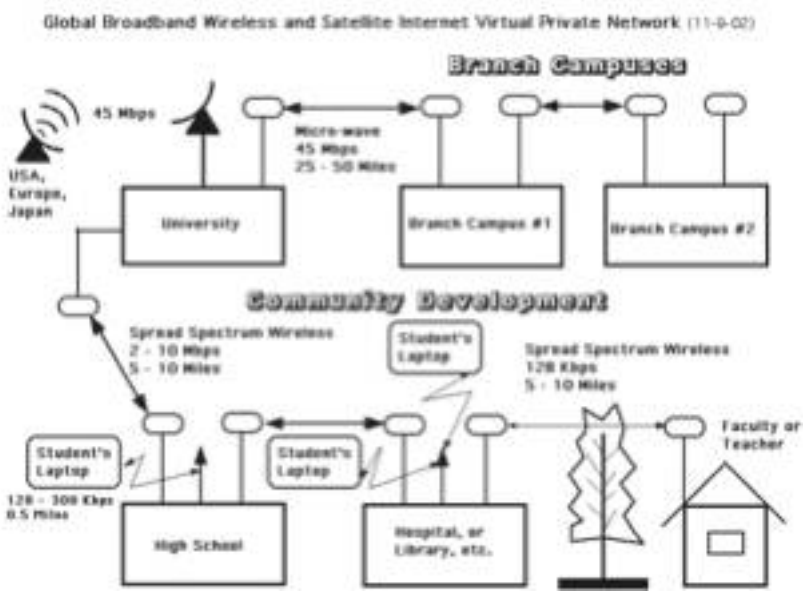


Figure: 1

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.

CURRENT GUS PROJECTS

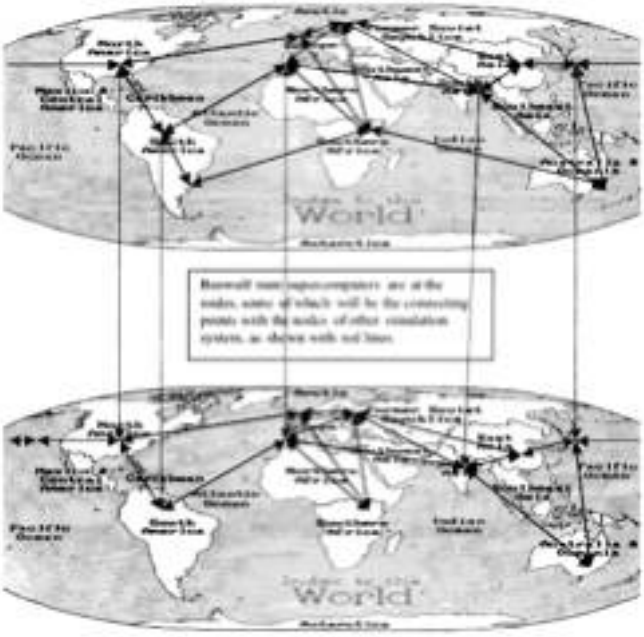
The major university will then connect to secondary and elementary schools, libraries, hospitals, local government offices and NGOs, etc., with broadband wireless Internet at drastically discounted rates or free of charge. GUS projects are now starting in Ethiopia, Nigeria, Malawi and Ghana in Africa,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

GLOBALLY COLLABORATIVE ENVIRONMENTAL PEACE GAMING (GCEPG)

Globally Collaborative Environmental Peace Gaming (GCEPG) [Utsumi, 2003] with a globally distributed computer simulation system, focusing on the issue of environment and sustainable development in developing countries, is to train would-be decision-makers in crisis management, conflict resolution, and negotiation techniques basing on "facts and figures."

The Global University System will supply game players from around the world. With global GRID computer networking technology and Beowulf mini-supercomputers of cluster computing technology, we plan to develop a socio-economic-environmental simulation system and a climate simulation system in parallel fashion, both of which are to be interconnected in global scale – see Figure 2.

Globally distributed climate simulation system



Globally distributed socio-economic-environmental simulation system

Figure: 2 Globally collaborative environmental peace gaming networks

The GCEPG with a globally distributed computer simulation system is a computerized gaming/simulation to help decision makers construct a globally distributed decision-support system for positive sum/win-win alternatives to conflict and war. The idea involves interconnecting experts in many countries via global Internet to collaborate in the discovering of new solutions for world crises, such as the deteriorating ecology of our globe, and to explore new alternatives for a world order capable of addressing the problems and opportunities of an interdependent globe. Gaming/simulation is the best tool we have for understanding the world's interwoven problems and the solutions we propose for them. System analysis for systemic change at the global level is a precondition for any significant resolution to today's global-scale problems. The understanding gained with scientific and rational analysis and critical thinking basing on "facts and figures" would be the basis of conflict resolution for world peace, and hence ought to provide the basic principle of global education for peace.

The purpose of an interactive gaming mechanism is to help find appropriate alternative policies by establishing consensus among participating parties. It is suggested here that globally distributed computer simulation should be tested interactively with the game player inserting pseudo-policy parameters into the models whenever necessary, during the execution of simulation. This is called peace gaming/simulation [Utsumi, 1977] similar to war games practiced by military strategists [Schram et al., 1971]. With the advent of global broadband Internet and standard interface protocols for interconnecting various dispersed, dissimilar host computers, the potential exists for ensuring the coordination of international efforts by providing more frequent communications and an environment for shared development, enabling more credible simulation study than was previously possible.

The GCEPG project proposes to utilize the semantic benefits of gaming simulation on a global scale to aid decision makers in appreciating the impact of their decisions on interwoven global problems, i.e., the construction of Globally Distributed Decision Support System (GDDSS) with Distributed Computer Simulation Systems (DCSS), which deals with coordination of the distributed sub-models and their experts via the global Internet for global crisis and ecology management for plus sum, peace game. Senator Fulbright once said;

"Learning together and working together are the first steps towards global peace."

GRID TECHNOLOGY

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. This technology promises to do what the Internet has done with data on the applications. Grid computing extends the scope of distributed computing to encompass large-scale resource sharing, including massive data-storages, high-performance networking and powerful computers, highly expansive equipments (i.e., microscopes, telescopes, 3D Cave), etc. GRID technology defines a new powerful computing paradigm by analogy to the electric Power Grid. Users of the GRID will then be able (a) to use his/her private workplace to invoke any application from a remote system, (b) to use the best suited system for executing their desired particular application, (c) to access data securely and consistently from remote sites, (d) to exploit multiple systems to complete complex tasks in an economical manner, or (e) to use multiple systems to solve large problems that exceed the capacity of a single one. In this vision, the sharing doesn't mean simply exchange of data or files but rather a concrete access to resources (e.g., computers, software, data, etc.).

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." The principle of the 21st century education should be inheriting wisdom more than the mere transfer of knowledge.

Here, 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.

GLOBALLY COLLABORATIVE EXPERIENTIAL LEARNING WITH ELEGI AND NOMADIC

European Learning GRID Infrastructure (ELeGI) Project [Allison, et al, 2003], which is now funded by the European Commission, aims to design and implement advanced service-oriented Grid-based software architecture for learning. This project will develop a new paradigm focused on knowledge construction using experiential based and collaborative learning approaches in a contextualized, personalized and ubiquitous way. This will replace the current information transfer paradigm, which is based on content, and on the key authoritative figure of the teacher who provides information. GCEPG project could be a complete and powerful demonstrator of ELeGI Project to shows :

- **the advantages coming from using advanced technologies (i.e., GRID for accessing to computing resources and collaboration environments) for supporting simulations execution, data analysis, etc., and**
- **simulations for learning through the definition of innovative pedagogical models (i.e., socio-constructivist contextualized learning approach), and**
- **to show all the benefits coming from the harmonized and synergistic use of advanced technologies together with innovative pedagogical models for learning (i.e., ELeGI).**

Another project "Knowledge Management over a Digital Communication Space (Proposal acronym: NOMADIC)" is the outgrowth of the ELeGI and is based at the University of Rome. This is for the consortium of 9 prominent European organizations including the University of Tampere, Finland, and will explore the frontier of applying the most advanced web and GRID networking technologies to e-learning and e-healthcare/telemedicine. Within this NOMADIC project, our GUS and GCEPG projects will be administered at the University of Tampere, Finland.

The cooperation with those ELeGI and NOMADIC projects will assure the development of globally collaborative experiential, distributed learning with globally distributed simulation system for joint research and development on various subjects by youngsters around the world. This will then foster their creativity, and hence promoting mutual understanding among them, also, -- which is the first step toward the global peace.

EXPECTED BENEFITS

With rapid advancement of computer simulation with GRID computing network 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. They can also be used in micro-biology, meteorology, chemical molecular study, DNA analysis, medicine/bioscience, 3D animation of human anatomy, agriculture, commerce, finance, nanotechnology, joint advanced engineering design, astronomy, etc. [Sterling, 2001].

In a sense, our GUS/UNESCO/UNITWIN Networking Chair project aims to construct global scale knowledge forum with advanced Information and Communication Technology (ICT), i.e., with the use of massive parallel processors of globally distributed and yet interconnected mini-supercomputers through global neural computer network. This will be a paradigm shift of research and development in global scale, out of 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 computer 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.**

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 include the University of Tampere, UK Open University, 6 federal universities of Amazonia, Havana Institute of Technology, University of Malawi, Uganda National Council for Science and Technology, McGill University in Canada, University of Tennessee in Knoxville, Cornell University, Texas A&M University, Maui Community College, University of Milan, University of Salerno, University of Twente, Catalunyan Open University, and many others in Ethiopia, Nigeria, etc. 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. Those institutions affiliated with GUS become members of the GUS/UNESCO/UNITWIN Networking Chair Program.

FINANCING GUS

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;

- **the Japanese government's Official Development Assistance (ODA) funds and**
- **Japanese electronic equipment with**
  - **the Internet technology and**
  - **content development of North America and Europe.**

CONCLUSIONS

The GUS program is a comprehensive and holistic approach to building smart communities [Eger, 2003] 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.

GUS and GCEPG are clearly ambitious programs, one that cannot be achieved by any one group, university, or national government. The programs require substantial collaborative contribution of ideas, expertise, technology resources, and funds from multiple sources. Those who value the visions of GUS and GCEPG are invited to join this great and noble enterprise.

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