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Globally-Distributed Collaborative Learning and Human Capacity Development in the Knowledge Economy

Derrick L. Cogburn[1]
University of Michigan

ABSTRACT

This chapter presents initial findings from a pilot investigation, comprising three six-month field studies, examining geographically distributed collaborative learning between students and faculty in developed and developing countries. The investigation focuses on an interdisciplinary seminar involving graduate students at two universities in the United States and two in South Africa. Each semester, students were randomly assigned to one of five global virtual teams, with no more than two team members from each university. A collaboratory infrastructure was developed for the seminar using a suite of commercially available web-based tools, and included a virtual seminar room, a collaborative file management system; and archived e-mail discussion lists. Over the course of a semester, each team was given a series of tasks (ranging from simple to theoretically complex) that required global collaboration to complete. Data for the study are drawn from surveys of seminar participants, e-mail archives, logs of software usage, and observer-observation. Key findings include the following: (1) while 61% of the participants had a preference for the physical presence of the professor during the lecture, 22% of participants had a preference for the lecture without the physical presence of the professor; (2) a majority of students (73%) enjoyed most or all of the lectures; (3) a majority of students (71%) would register for this or another seminar taught in this manner; (4) a majority of students (76%) saw their global virtual team as a learning community, with nearly all of the students (91%) seeing value in the pedagogical model used in the seminar.

Key Words: Globalization, Collaboratories, Collaborative Learning, Global Virtual Teams, US and South African Cooperation, Distributed Knowledge Work, Global Information Infrastructure, Global Information Society.

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[1] Comments are appreciated please send inquires to: Prof. Derrick L. Cogburn, 301 West Hall, 550 East University Avenue, School of Information, The University of Michigan, Ann Arbor, Michigan, 48109, dcogburn@umich.edu.

Introduction

The transformation of the global economy and the era of globalization are having a significant impact on the organization of global society (see, inter alia, Castells, 1996, 1997, 1998). Some scholars refer to this transformation as the emergence of a Global Information or Knowledge Society (Mansel & Wehn, 1999) and argue that it represents a fundamental shift in the underlying techno-economic paradigm of society (Kodama, 1991; Freeman, 1997). In this historical period, the knowledge, skills and abilities required for socio-economic development are changing rapidly and dramatically, and include the need to better understand how to manipulate symbolic knowledge and to work in global virtual teams (Reich, 1991; Cogburn, 1998).

One mechanism that facilitates global knowledge work is the concept of a collaboratory blending the words "collaboration" and "laboratory" (Wulf, 1993). In 1989, William A Wulf called the collaboratory "a center without walls, in which the nation's researchers can perform their research without regard to physical location—interacting with colleagues, accessing instrumentation, sharing data and computational resources, [and] accessing information in digital libraries. The Computer Science and Telecommunications Board of the National Research Council (NRC) further clarified the collaboratory concept and

raised awareness within the scientific community about its application in a report entitled *National Collaboratories: Applying Information Technology for Scientific Research*.

A collaboratory is more than an elaborate collection of information and communications technologies; it is a new networked organizational form that also includes social processes, collaboration techniques, formal and informal communication, and agreement on norms, principles, values and rules within the network. To date, most collaboratories have been applied largely in the sciences (e.g. physics, upper atmospheric research, and astronomy) and have been applied recently to additional areas of research such as HIV/AIDS (Teasley & Wolinski, 2001). Since the emergence of these collaboratories, a substantial and growing knowledge base has emerged to help us understand their development and application in science and industry (National Research Council, 1993; Finholt & Olson, 1997; Olson & Olson, 2000; Finholt, in press).

An additional body of knowledge exists for understanding the application of information and communications technologies to learning at nearly all levels, and for understanding the implications for pedagogical strategies and a myriad of learning styles. These approaches, driven by both public and private sector initiatives, include computer-mediated communications (CMC), collaborative and cooperative learning,

technology-enhanced learning, and other forms of what might be called "distance" education. It appears that the majority of these initiatives explore primarily asynchronous computer-assisted learning (Hazemi, Hailes & Wilbur, 1998).

Nature of the Problem

While we have advanced our knowledge of technology-enhanced learning, there are still many outstanding questions, particularly related to globally-distributed synchronous collaborative learning and the science of learning that could emerge (The Learning Federation). Exploring these concepts at the intersection of collaboratory research and research on computer-supported cooperative learning can strengthen our knowledge of this area. This research should move beyond the laboratory, taking findings uncovered in these tightly controlled experiments to the field, to see if they generalize to quasi-experimental settings. Further, even more questions exist about the particular challenges of actively involving developing countries in the conduct of globally distributed collaborative knowledge work. This chapter attempts to address these problems, by presenting initial findings from a three-year field study of a pilot initiative between universities in developed and developing countries to teach multiple students in a geographically-distributed collaborative learning environment using synchronous and asynchronous approaches.

Literature and Theoretical Framework

Given the transformation of the global economy to a more knowledge-based, innovation-mediated, and geographically-distributed form, it is increasingly important for universities to be able to equip students with additional skills required for this period. These skills include an interdisciplinary approach; problem identification; acquiring, critiquing, managing and disseminating information; cross-national and cross-cultural negotiations; and working in geographically distributed virtual teams.

Tiffin and Rajasingham (1995) suggest that the balance between *human-interaction and computer-interaction* is a critical factor in the success of a virtual learning environment. Brown and Duguid (2000) suggest that this balance is even more important when the learning environment becomes more complex, and geographically distributed. Thus, we would expect to find that those students and teams that achieve higher success in the *Globalization Seminar* (as measured by final grades at "B" or above) will be those that have most fully adapted to the computer supported collaborative learning environment developed for the seminar. Our Virtual Teams are constructed as Global Syndicates, comprising approximately two students from each university. These learning teams are further challenged by the adoption of a "stakeholder" perspective in

the world-system (i.e., global and multi-national corporations, developed country national governments, developing country national governments, intergovernmental organizations, and non-governmental organizations).

Brown and Duguid (2000) argue that learning is a social process, and that "peer networks" are an equally important resource to faculty and university resources. Hiltz (1990) finds that "*collaborative learning*" enhances student ratings of virtual courses. Thus, we expect that students engaged in virtual teams (Global Syndicates) that evolve into "learning communities" will have more collective and individual success in the seminar, and will have a higher degree of satisfaction with the seminar.

Most of the computer-supported collaborative learning experiments have focused on asynchronous technologies (Hazemi, Hailes and Wilbur 1998). However, nearly all of the literature suggests that *the mixture of technologies* is important to increase the: (1) creation and manipulation of virtual spaces; (2) multiple forms of representation; (3) continuous but not continual communication; (4) management of the metaphor; (5) diversity of access points; (6) interactivity; and (7) socialization (McLellan, 1997; Norman, 1998; Tiffin and Rajasingham, 1995). We expect to find that the students overcame what may have been initial fears to become comfortable using both the synchronous and asynchronous technologies

used in the seminar. Further, we expect that the students would find both the synchronous and asynchronous technologies of equal value.

Research Questions

Based on this theoretical perspective, the primary research question in this chapter is as follows: "To what degree can a suite of commercially-available web-technologies be used to successfully create a globally-distributed, synchronous, collaborative, learning environment for advanced post graduate studies between South Africa and the United States?" Three subsidiary questions explore further this research question by examining the impact of several critical factors on the development of complex cross-national virtual teams within this learning environment. These three subsidiary questions are:

1. *Subsidiary Research Question 1*: What is the appropriate mixture of human-interaction/computer-interaction (Hi/Ci) to facilitate success in a globally distributed learning environment?;
2. *Subsidiary Research Question 2*: Is it possible for the *Global Syndicate* teams to emerge as collaborative learning communities?;
3. *Subsidiary Research Question 4*: What is the appropriate mixture of technologies to support the globally distributed learning environment?

The Study

In order to begin answering these questions, researchers at the University of Michigan School of Information established in 1999 a Collaboratory on Technology-Enhanced Learning Communities (Cotelco) with the support of the W.K. Kellogg Foundation (WKKF), the Alliance for Community Technology (ACT) and the United Nations Educational, Scientific, and Cultural Organization (UNESCO).[2] Cotelco is designed to facilitate research that enhances our understanding of the factors contributing to successful distributed knowledge work between developed and developing countries. Using a suite of commercially available web-based collaboration tools, Cotelco brings together faculty, staff, and students from the University of Michigan (Ann Arbor, MI), the American University (Washington, D.C.), the University of the Witwatersrand (Johannesburg, South Africa), and the University of Fort Hare (Alice, South Africa), to develop and conduct collaborative research, share data, and engage in distributed research team meetings. From January to April, Cotelco also uses this collaboratory infrastructure to deliver a weekly, geographically-distributed synchronous graduate seminar entitled "Globalization and the Information Society: Information Systems and

[2] The author of this chapter is the founder and director of the Collaboratory for Technology Enhanced Learning Communities (Cotelco) at the University of Michigan.

International Communications Policy" between the participating institutions.

The *Globalization Seminar* is an advanced, interdisciplinary, graduate seminar addressing questions of international regime formation for the emerging Global Information Infrastructure and Global Information Society.

Administratively, the project director, Dr. Derrick L. Cogburn, holds faculty appointments at each of the participating universities (with the exception of the University of Fort Hare) and was ultimately responsible for the seminar at each location. There was substantial institutional support at each University (University of Michigan: the Alliance for Community Technology; American University: School of International Service; University of the Witwatersrand: Learning, Information, Networking and Knowledge (LINK) Centre; and the University of Fort Hare: Department of Computer Science and Communications).

A computer lab on each campus was reserved to conduct the seminar, and a site coordinator was appointed at each location. Each lab also included a data projector to display a standard audience members interface to the global seminar room. The technologies used to support the *Globalization Seminar* involved a suite of commercially available web-

based tools rather than a single, integrated package. This allowed us to use the course website as a portal, creating an integrated environment of the most robust tools—best of breed–for the required function (rather than settling for close approximations integrated into a single package).

The three primary collaboration technologies used to create the distributed learning environment were (1) Placeware Conference Center 3.0; (2) O'Reilly WebBoard 3.5, and; (3) Xerox DocuShare 1.5. Several other collaboration tools supported the seminar such as presence awareness packages (AOL Instant Messenger and ICQ) and web-based virtual reality (Active World's EduVerse).

Placeware Conference Server 3.0 was the primary collaboration tool in the seminar and was used for delivering weekly audio lectures in real-time (voice over IP (VOIP, Internet audio) using PowerPoint slides, live Web pages, and anonymous polls as visual pedagogical tools. In addition the professor's lecture, Placeware allowed for formal and informal student questions and presentations to the seminar, real-time communication within teams, voting, and comments and questions from the audience.

O'Reilly WebBoard 3.5 served as a venue for online discussions (threaded), listserv activity, group announcements, brainstorming, and exchange of files (through attachments), while its built-in HTML chat added a synchronous (real-time) component.

Last, Xerox DocuShare 1.5 was used as a document management system and a virtual "teamspace" that supported submitting and retrieval of assignments, group calendars, collaborative (asynchronous) editing of documents, announcements.

All of these tools were integrated via the course Website, served by Netscape FastTrack 3.01. Here, there was seamless access to the course syllabus, reading list, digital library (password protected), seminar participants, contact and logistical information, and links to relevant Web resources. In selecting these tools for the Global Graduate Seminar, the course planners tried to avoid those that required anything other than a standard browser (Microsoft Internet Explorer or Netscape Communicator) of 4.x vintage or newer, which could be downloaded for free from the Web. Even plug-ins and helper applications were frowned upon. With these self-imposed restrictions, an environment was built where a student at any location, in front of any computer equipped with at least a 28.8 kbps connection and a relatively recent Web browser, could engage in the following synchronous and asynchronous activities:

Synchronously:

- Participate interactively in weekly lectures and seminar discussions;
- Ask questions directly to the professor and to the other seminar participants;

- Give their own presentations to the seminar and receive instant feedback;
- Participate in real-time chat sessions with other students;
- Discuss presentations with their fellow virtual team members as the presentation is being heard; and
- Engage the professor and site coordinators in virtual office hours.

Asynchronously:

- Read messages posted by other students on a discussion board and respond to them;
- Submit assignments to the instructor;
- Download a paper or presentation being worked on by her group, contribute changes/additions, and upload it back;
- Check the date and time of a scheduled, online meeting of her group;
- Access recorded lectures;
- Check reading assignments and access some of the required materials; and
- Approach the instructor or the assistants with questions and comments.

Each semester, students at one of the participating universities registered for the *Globalization Seminar* on their campus. The seminar

was conducted over a thirteen (13) week period. At the beginning of the semester, the professor randomly assigned students to the course's five Global Syndicates (virtual teams) by selecting names off each participating university's list of registered students in alphabetical order. Each GS reflected a unique stakeholder perspective (i.e., multi-national corporations, developed country governments, developing country governments, non-state actors) in the globalization and emerging information society debate. GS team members decided on an institutional identity consistent with the assigned stakeholder perspective in the course's opening weeks.

As the three-year pilot study unfolded, we were able to develop a very effective instructional template for the distributed learning environment. It consisted of the following elements, in chronological order: (1) assignment of students to virtual teams constructed as Global Syndicates; (2) introductory training sessions on the technologies used in the seminar, the rationale behind the distributed learning environment, and training on the culture and practices of virtual teams; (3) an introductory presentation, which allows the students to become even more familiar with the technology by introducing themselves to the seminar participants; (4) a Global Syndicate pilot project, which encouraged the GS to get moving on its protocol development and administrative matters; (5) a mid-term

paper and presentation that allowed the students to present their individual perspectives on the seminar material; (6) a final syndicate paper, presentation, and debate bringing together all of the material and perspectives in the seminar.

Method, Data and Analysis

Following Cresswell (1994) this study uses a mixed-methodology, dominant/less-dominant research design and takes a case study approach. The study is largely qualitative, but uses some quantitative techniques where possible. Primary data for the study are drawn from seminar participants, who are required to complete an 80-question evaluation survey including (25) open-ended and (55) closed-ended questions. The questions are divided into six parts. Part I focuses on demographic data, Part II on general perspectives on the seminar and the virtual learning environment, Part III on the Global Syndicate approach and their virtual learning community; Part IV on institutional issues, such as support and infrastructure; Part V on amount of preparation for the seminar; and finally Part VI on the collaboration technologies used in the seminar.

The data are analyzed through qualitative and quantitative techniques. Given the limited sample size (aggregate n=55; 1999 n=23; 2000 n=16; 2001, n=16), the surveys yielded data sufficient only for rigorous descriptive statistical analysis. The case study method from the

qualitative research tradition was also used to evaluate the learning experience of each Global Syndicate. Thick-narrative case descriptions of the five Global Syndicates from each year were prepared using data gathered from (1) the messages that team members posted on WebBoard, and (2) the students' essay responses to Global Syndicate questions on the course evaluation. The qualitative research goals were description and understanding, and attention was directed at identifying some universal points for comparing the Global Syndicates. The following points of comparison emerged: development as a learning community, use of course technologies, communication patterns, group processes, and trusting relationships. Data from each year are compared/contrasted with that of previous years and similar studies.

The Global Syndicates were distinguished by the varied cultural backgrounds of their team members. Data on the students' cultural backgrounds were obtained from their introductory PowerPoint presentations delivered at the start of the course. There was considerable cultural diversity in the seminar with even the US students representing African-American, Caribbean-American, Indian-American, Peruvian-American, Armenian-American, and Arab-American cultures. At least four of the U.S. American students were born in another country and emigrated to the United States after spending childhood years overseas.

Findings and Discussion

The analysis and findings presented in this chapter are still in the very early stages of development. Significant caution is urged when interpreting them. Our primary research question was: "To what degree can a suite of commercially-available web-technologies be used to successfully create a globally-distributed, synchronous, collaborative, learning environment for advanced graduate studies between South Africa and the United States?" To begin answering this question, we explored student satisfaction with the seminar, as measured by three variables, which are: (1) feelings about course lectures; (2) willingness to register for a similar seminar; and (3) willingness to recommend the course to a friend. Regarding the feelings about the course lectures, we found that a majority of students (n=33, 73%) enjoyed most or all of the lectures, with only a very small number (n=3, 7%) reporting that they did not enjoy most of the lectures.

In terms of *willingness to register* for another seminar taught in the approach of the Global Graduate Seminar, we found that a majority (n=32, 71%) of the students would register for a similar seminar, with a small number (n=3, 7%) qualifying that statement by adding "but only with this professor." Only one student (2%) indicated that they would not register for another seminar like the GGS. However, a much smaller number of

students (n=25, 56%) would *recommend the course* "as is" to a friend, with a large number of students (n=14, 31%) simply responding unsure.

To explore further the question of success in the seminar, we examined the final grades in the seminar. Of those students completing the entire semester, a majority (n=37, 79%) received a "B-" or above, considered to be the minimum passing grade in U.S. graduate programs. An even higher majority (n=43, 92%) received a "C-" or above. However, these data are misleading because they only include those students that actually completed the semester. If one were to factor in those students that did not complete the semester (i.e., dropped out of the course before the end of the term), these percentages would be much lower.

Nonetheless, from these measures of student satisfaction, we can begin to suggest that the Cotelco environment is a "successful" learning environment for the delivery of an advanced graduate seminar between the United States and South Africa.

To continue the investigation of this learning environment, especially its use of geographically distributed collaborative learning teams, we examined three subsidiary research questions. These questions explored factors that we expected to have an important impact on this learning environment.

Appropriate mixture of human-interaction/computer-interaction

In the *Globalization Seminar* we focused on creating a geographically distributed learning environment that was conducive to maximizing interaction between the professor and the students, and between the students themselves. Our intention was to facilitate communication and feedback irrespective of the physical or virtual presence of the professor. In the final evaluation survey, students were asked what approach—physical, virtual, or gradations thereof—they preferred for the professor's lectures.

A large number of the students (n=27, 62%) had a "definite" or "slight preference for the **physical** lecture." However, a substantial number of students (n=11, 25%) had either a "definite" or "slight preference for the **virtual** lecture." Also, we must note that the "physical lecture" in this case, is still a "virtual" lecture delivered simultaneously to students at all four locations. The "physicality" only denotes the location of the professor, whose primary means of interacting with students in that physical location is still via the computer interface (although they can see facial expressions, eye contact, and other forms of "body language".

Interestingly, none of the students responded that ""I didn't really learn anything" when the professor was at another location. However, a large number (n=11, 25%) said that they only learned a little when the

professor was away. A plurality of students (n=21, 48%) felt that they "enjoyed the experience, after getting used to it, and learned a lot." Three students (one from each year, one with a final grade of A+, another with a final grade of A-, and one with a final grade of C) felt that the *Globalization Seminar* was "sometimes better than being there" in the Stornetta and Hollen (1992) sense.

The Global Syndicate as a Collaborative Learning Communities

At the beginning of the semester, all students are randomly assigned to a virtual team constructed as a *Global Syndicate*. Each Global Syndicate (GS) takes on a stakeholder identity as described above, and engages in a series of assigned and informal assignments and tasks. Thus, these Global Syndicates are an important part of the environment for this research.

There is evidence that learning communities developed within the Global Syndicates in the seminar. The majority of students (n=34, 76%) reported that their GS became "a 'learning community' e.g. assisted each other with understanding the material and concepts in the seminar," with a large number (n=13, 29%) even asserting that the GS was "a critical component of the learning. Further, a large number (n=9, 31%) said that "in addition to my GS," other learning communities emerged in the seminar. Nearly all of the students (n=41, 91%) felt that the Global

Syndicate approach was valuable, with a large number (n=22, 49%) of those students responding that there was "tremendous" value in the approach. A majority of students (n=28, 62%) believed that the Global Syndicates had helped them to understand the "challenges and opportunities of global virtual teams," with several of those (n=13, 29%) responding that they felt "ready to participate in one" professionally.

When exploring the data, aggregated by Global Syndicate, there are some pretty interesting findings. In Table 1. presented below, boxes that have "shading" indicate the high for that category, and the boxes that have "lines" indicate a low in that category. On the "Learning Community" variable, the closer to "1.0" the greater the perception of the virtual team as a learning community, while the closer to "5.0" the weaker the perception of the virtual team as a learning community. On the "Understanding Virtual Teams" variable, the closer to "5.0" the higher the confidence in future participation in virtual teams, the closer to "1.0" the weaker the confidence in participation in future virtual teams. On the "Distance Education" variable, "1.0" would indicate significant experience with distance education, while "4.0" would indicate intent, but no experience, and "5.0" no experience.

Table 1. Aggregate Attributes of Global Virtual Teams 1999-2001					
Virtual Team	Grade	Seminar Score	Learning Community	Virtual Teams	Distance Education
GS1	B/B-	86.36	3.0	2.86	3.57
GS2	A/A-	93.13	2.0	4.38	3.63
GS3	B+	83.56	1.29	4.0	3.57
GS4	A-/B+	88.86	2.13	2.5	3.50
GS5	B/B-	82.13	2.13	3.75	4.25

From this Table, we see that GS2, representing "developed country national governments" scores highest on three out of five key variables. GS5, representing "non-governmental organizations" scores lowest on 3 out of 5 key variables. While all of the virtual teams had very low levels of previous experience with distance learning or technology enhanced learning, GS5 had the lowest aggregate level. We also see that no one GS was saddled with all of the negative aspects of the seminar. However, from this analysis, GS5 appears to be the most challenged virtual team; with GS2 being the most productive. This is interesting, because the stakeholder identity for GS5 is non-governmental and community-based organizations, consistently the most popular ideological perspective in the

seminar; while GS2 represents developed country national governments, an ideological perspective that is consistently eschewed in the seminar (along with GS1, Global and Multi-National Corporations).

Appropriate Technology Mixture

The third and final factor explored in this study is the impact of the technology mixture. Most of the computer-supported collaborative learning experiments extant in the literature have focused on asynchronous technologies (see Hazemi, Hailes and Wilbur 1998). However, nearly all of the literature suggests that a variety of technologies are important to increase the: (1) creation and manipulation of virtual spaces; (2) multiple forms of representation; (3) continuous but not continual communication; (4) management of the metaphor; (5) diversity of access points; (6) interactivity; and (7) socialization (McLellan, 1997; Norman, 1999; Tiffin and Rajasingham, 1995).

In the geographically distributed learning environment built for the Globalization Seminar we used a wide range of commercial-off-the-shelf-technologies, all of which were web-enabled. We then surveyed the seminar participants to gauge their perspectives on the technologies used in the seminar.

Following the framework briefly described above regarding the uses of technology in the computer supported collaborative learning environment, we have found the following.

(1) Creation and manipulation of virtual spaces;

Of the technologies used in the geographically distributed learning environment for the *Globalization Seminar*, the one most supportive of the creation and manipulation of virtual spaces is Placeware Conference Center, a web-based, real-time conferencing tool. Although the virtual auditorium itself is pre-made and cannot be manipulated (which seems consistent with the metaphor: after all, one can not redecorate the walls or move chairs around at will in a real auditorium, either), within it students are allowed significant freedom of movement (e.g. leaving and entering the auditorium, moving to a different row). They are also encouraged, even required, to contribute to the ongoing activity in this virtual space, e.g. by sending questions to the presenter, delivering their own presentations, engaging in small-group discussions, etc. Students become active participants and co-creators of every online session.

(2) Multiple forms of representation;

Again, the most important tool in the seminar in this respect would be Placeware, which offers an impressive array of forms of representation, including: voice (VoIP), mood indicators, anonymous voting, textual chat,

graphical markup, sketching, recorded sessions, visuals (slides and Web pages), seating chart, etc.

(3) Continuous but not continual communication;

Our tools also provide for this aspect of infrastructure development, and facilitate continuous communication. Tools in this category would be WebBoard, Docushare, and the presence awareness packages (i.e., AOL Instant Messenger and ICQ). However, most students (n=14, 38%) failed to take advantage of the virtual office hours of either the professor or the site coordinators. A smaller number (n=11, 30%) did take advantage of these virtual communication tools to meet for virtual office hours "2-5 times" during the course of the semester.

A majority of students (n=21, 57%) would like to see more synchronous technologies used in the seminar, while a small number of these (n=3, 8%) would like for all of the technologies to be synchronous. Also, a majority of students (n=27, 73%) felt comfortable using this CSCL environment to ask questions, with a small group (n=6, 16%) responding that they "asked a question in nearly every class."

(4) Management of the metaphor

The primary collaboration tool for the seminar, and the one that best illustrates this design point is the Placeware Conference Room. Placeware uses the metaphor of a seminar room, with clearly defined "stage",

audience area, rows of seats, display screen, etc., thus making the virtual learning environment much less abstract and alien than it might have been otherwise. Nearly all of the students (n=34, 97%) feel that Placeware contributed to a positive learning environment and positive learning environment in the *Globalization Seminar*.

(5) Diversity of access points;

Since all of our collaboration tools are web-enabled, they can be accessed from anywhere on the planet where there is Internet connectivity. While we provide for a computer lab where our students are expected to attend the seminar, there have been numerous occasions when students, faculty, and/or guest lecturers have attended the seminar from home or work, and from geographical locations as diverse as Tokyo, Canada, Cairo, Switzerland, and Hawaii.

(6) Interactivity

Interactivity has been a key design feature of our information infrastructure environment. All of the tools, from Placeware to Docushare provide for interactivity. For example, in Placeware, during a seminar session, students are not only able to hear the voice of the lecturer, they may ask questions of the presenter at any time, and chat (via voice or text) with their virtual team members “sitting next to them” during the lecture (where “sitting next to them” could mean Johannesburg, Washington,

D.C., Ann Arbor or any points between or beyond). ActiveWorld's Eduverse takes the interactivity to even higher, nearly physical level, allowing participants to walk in and out of three-dimensional structures, see other participants as "avatars", wave to them, follow them around, move objects. The vast majority of students (n=31, 91%) feel that the Placeware Conference Center had a "positive impact" on their interaction with the professor, and a larger majority (n=33, 94%) feels that Placeware had a "positive impact" on their interaction with other seminar participants. Webboard, received a slightly lower endorsement for increasing interaction with the professor (n=17, 50%), but still had a positive impact (n=30, 86%) on interaction with students.

(7) Socialization

Finally, our collaborative infrastructure does allow for socialization, primarily within Placeware, and secondarily within EduVerse. However, analysis of the WebBoard messages, reveals a noticeable amount of social conversation that occurs within and between Global Syndicates during the course of a semester. These social uses of the technology are to be supported, in that they assist in the building of trust and social cohesion within the virtual teams.

The course technologies themselves may have played a supportive or hindering role in the group learning experience. GS3's use of WebBoard to

hold synchronous team meetings on nearly a weekly basis gave its members a regular opportunity to discuss the course readings and exchange opinions. By contrast, in the case of GS5, some early failed attempts at synchronous WebBoard meetings (due to firewall problems) generated frustration among the team's members and hindered the building of collaborative learning processes. In all the Global Syndicate cases, the data indicates that the use of Placeware for synchronous chats on seminar days added to class learning and strengthened Global Syndicate group processes when those in place were already strong.

Conclusions and Future Research

In summary, this study reinforces the findings of the recently released year 2000 University of Illinois *Online Pedagogy Report* (written as a result of the discussions of sixteen tenured professors at the university), which suggests there are no differences based on gender and that there can be high quality learning online. The low number of respondents in the Global Graduate Seminar who preferred the professor's virtual lectures to his physical lectures parallels student preferences reported in earlier studies (Webster & Hackley, 1997). These earlier findings show that students in remote sites are less involved with learning than those at the site where the professor is physically present (Webster and Hackley, 1997). This points to the need to continuously involve

distant participants in the seminar discussions and a conscious mental shift on the part of the instructor to overemphasize the distant participants during a seminar session.

Further, Riel and Harasim's (1994) suggestion that evaluations of Web-based collaborative learning should assess online social interactions is supported by our study. We captured rich data on learning community development, communication patterns, group processes, and trust captured through our qualitative analysis of the WebBoard messages posted by students in each Global Syndicate. On the whole, our study goes beyond all these earlier writings to demonstrate in a preliminary way the significance of cultural, group process, and social dynamic issues in cross-national collaborative learning.

One of the weaknesses in almost all studies of distance-independent education is the failure to focus on faculty member and university-wide organizational learning as a result of involvement in distance education. Our Global Graduate Seminar experiment resulted in both faculty learning and institutional learning, especially in the realm of technological know-how. While this chapter itself concentrates on cross-national collaboration and student learning, we argue it is important not to overlook the learning that goes on among faculty and administrators as well as technology providers at each of the sites.

Within Global Syndicates, factors that inhibited the development of learning communities included the absence of group process skills, occasional low levels of participation by South African teammates, uneven distribution of work across team members, and inadequate communication between teammates due to technology problems and the time difference. Moreover, insufficient opportunities for social communication and bonding, the time constraints and personal problems of some team members, failure to respond to the initiatives of individual team members, and cross-cultural differences in communication, academic expectations, and work ethic hindered the building of learning communities.

In their evaluation essay responses, the students were more likely to cite barriers to collaborative learning than to discuss those factors that facilitated the development of a learning community. However, our review of the Global Syndicate cases identified the following factors that helped teams become learning communities: the presence of at least one person who brought group dynamics skills to the GS experience; the active participation of at least one South African team member who overcame serious technological challenges through a commitment to the group learning process; and the use of enthusiastic, supportive, and positive communication by most members of the Global Syndicate.

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Author's Bio

Derrick L. Cogburn is Assistant Professor of Information at the Universityof Michigan School of Information. He is also Assistant Professor of African Studies in the Center for Afroamerican and African Studies, where he chairs the faculty advisory committee on the South Africa Initiative Office. Professor Cogburn's research publications are in the area of international regime transformation in response to globalization and the emergence of the information society. He is also exploring the socio-technical factors influencing geographically distributed collaborative knowledge work, especially between developed and developing countries (www.cotelco.net). The United Nations has appointed Dr. Cogburn to several committees, including the High-Level Working Group on Information and Communications Technologies in Africa, the Committee on Development Information, and the Technical Advisory Committee of the African Development Forum. He is an active member of the Partnership for ICTs in Africa (PICTA) led by the United Nations Economic Commission for Africa, and served for two years as a member of the European Commission's Government On-Line steering committee. Dr. Cogburn has served in a number of policy advisory roles for the South African government, private sector, and non-governmental organizations. He is currently completing a book, Globalization, the Information Economy and State Autonomy: Information Society Regime Formation and Telecommunication Sector Restructuring in South Africa. His doctorate is from Howard University where he served as a W.K. Kellogg Doctoral Fellow in the Ralph J. Bunche International Affairs Center.

REFERENCES

Adler, P.S. (1995). "Interdepartmental interdependence and coordination: The case of the design/manufacturing interface." *Organization Science*, 6, no. 2, 147-167.

American Federation of Teachers and National Education Association, *What's the Difference: A Review of Contemporary Research on The Effectiveness of Distance Learning in Higher Education*, The Institute for Higher Education Policy, Washington, D.C., April 1999

Atkins, D.E.; Cogburn, D.L.; Levinson, N., Mulvihil, M; Weilbut, W (2000). "Crafting Virtual Collaborations: Cross-National (US and South Africa) Learning Teams," Presented at the 2000 Annual Meeting of the International Studies Association, Los Angeles, CA.

Brown, J.S and Paul Duguid (2000). *The Social Life of Information*, Boston: Harvard Business School Press.

Castells, M (1996). *Rise of the Network Society: The Information Age – Economy, Society and Culture*, vols 1,2, 3, London: Blackwell Publishers.

Castells, M (1997). *The Power of Identity: The Information Age – Economy, Society and Culture*, London: Blackwell Publishers.

Castells, M (1998). *The End of Millennium: The Information Age – Economy, Society and Culture*, London: Blackwell Publishers.

Chidambaram, L. (1996). "Relational development in computer-supported groups." *MIS Quarterly*, 20, no. 2, 143-165.

Cogburn, D.L. (1998) "Globalisation, Knowledge, Education and Training in the Information Age" *International forum on information and documentation*. 23, no. 4, (1998): 23 (7 pages)

Cresswell, J.W. (1994). *Research Design: Qualitative & Quantitative* Approaches. Thousand Oaks, CA: Sage.

Duderstadt, James (2000). *A University for the 21st Century*, Ann Arbor: University of Michigan Press.

Finholt, T.A. (in press) "Collaboratories." In B. Cronin (ed.), *Annual Review of Information Science and Technology*.

Finholt, T.A., and Olson, G.M. (1997). "From Laboratories to collaboratories: a new organizational form for scientific collaboration." *Psychological Science*. 8(1), 28-35.

Freeman, C. and Soete, L. (1997). *The Economics of Industrial Innovation, 3rd edition*. Cambridge, MA: MIT Press.

Garmer, A.K. and C.M. Firestone, eds. *Creating a Learning Society: Initiatives for Education and Technology*, Washington, D.C.: The Aspen Institute, 1996;

Gersick, C.J.G. (1988). "Time and transition in work teams: toward a new model of group development." *Academy of Management Journal*, 31, no. 2, 9-41.

Gersick, C.J.G. and J.R. Hackman (1990). "Habitual routines in task-performing groups." *Organizational Behavior and Human Decision Processes*, 47, no. 1, 65-97.

Grant, L. and Fine, G.A. (1992). "Sociology Unleashed: Creative directions in classical ethnography. In M.D. LeCompte, W.L. Millrowy, & J. Preissle (eds.), *The handbook of qualitative research in education* (pp. 405-446). New York: Academic Press.

Harasim, L, S.R. Hiltz, L. Teles, and M. Turoff (1995). *Learning networks: A field guide to teaching and learning online.* Cambridge, MA: MIT Press.

Harasim L., T. Calvert , and C. Groenboer (1997). "Virtual-U: A web-based system to support collaborative learning. " In B.H. Khan (Ed.), *Web-based instruction*
(pp. 149-158). Englewood Cliffs, NJ: Educational Technology Publications.

Hazemi, R., Hailes, S., and Wilbur, S. (eds.) (1998). *The Digital University: Reinventing the Academy.* London: Springer.

Hiltz, R. (1990). "Evaluating the virtual classroom". In *Online education: Perspectives on a new environment*, ed. Linda M. Harasim and Murray Turnoff, 133-183. New York: Praeger.

Hofstede, G., (1980) *Culture's Consequences*. Beverly Hills, CA: Sage.

Hofstede, G., (1997). *Cultures and Organizations: Software of the Mind.* New York: McGraw-Hill.

Hsu, S. Oge Marques, M. Khalid Hamza, and Bassem Alhalabi, "How to Design a Virtual Classroom," *The Journal: Technological Horizons in Education*, September 1999 (Volume 27, Number 2).

Jarvenpaa, S.L. and D.E. Leidner (1998). "Communication and trust in global virtual teams." *Journal of Computer-Mediated Communication* 3, no. 4. [journal on-line]; available from *http://jcmc.huji.ac.il/vol3/issue4/jarvenpaa.html*; Internet. Check for 2000 article

Jick, T.D. (1979, December). "Mixing qualitative and quantitative methods: Traingulation in action." *Administrative Science Quarterly*, 24, 602-611.

Kodama, F. (1991). *The Techno-Paradigm Shift: Analyzing Japanese High-Technologies*. London, Printer Publishers.

The Learning Federation, website accessed on the World Wide Web at: http://www.thelearningfederation.org/

Lipnack J. & J. Stamps (1997). *Virtual teams: Reaching across space, time, and organizations with technology*. New York: John Wiley & Sons.

Mansell, R. and Wehn. U (1999). *Knowledge Societies*, London: Oxford University Press.

McLellan, H. (1997). "Creating virtual communities on the Web." In B.H. Khan (Ed.), *Web-based instruction* (pp. 185-190). Englewood Cliffs, NJ: Educational Technology Publications.

Mendels, P. "Study on Online Education Sees Optimism with Caution." *New York*
Times on the Web, 19 January 2000.

Munitz, B. (2000). "Changing Landscape: From Cottage Monopoly to Competitive
Industry." *EDUCAUSE Review*, January-February, 12-18.

National Research Council (1993). *National Collaboratories: Applying Information Technology for Scientific Research*. Washington, D.C.: National Academy Press.

Norman, K. (1998). "Collaborative interactions in Support of Learning: Models, Metaphors and Management." In Hazemi, Hailes and Wilbur (Eds.), *The Digital University: Reinventing the Academy*. London: Springer.

Olson, G.M. and Olson, J.S. (2000). "Distance Matters." *Human-Computer Interaction*, 15, 139-179.

Palloff, R. & K. Pratt (1999). *Building learning communities in cyberspace: Effective
strategies for the online classroom*. San Francisco: Jossey-Bass.

Pearce, J.L., S.M. Sommer, A. Morris, and M. Frideger (1992). "A configurational approach to interpersonal relations: Profiles of workplace social relations and task interdependence." Graduate School of Management, University of California, Irvine. Quoted in S.L. Jarvenpaa and D.E. Leidner (1998). Communication and trust in global virtual teams. Journal of Computer-Mediated Communication 3, no. 4. [journal on-line]: available from *http://jcmc.huji.ac.il/vol3/issue4/jarvenpaa.html*; Internet.

Putnam, R.D. (2000). *Bowling Alone: The collapse and revival of American community*. New York: Simon & Schuster.

Ravitz, J. (1997). "Evaluating learning networks: A special challenge for web-based instruction." In B.H. Khan (Ed.), *Web-based instruction* (pp. 361-368). Englewood Cliffs, NJ: Educational Technology Publications.

Reich, R (1991). *The Work of Nations: Preparing Ourselves for 21st Century Capitalism*. (London: Oxford University Press).

Riel, M. and L. Harasim (1994). "Research perspectives on network learning." *Machine-Mediated Learning*, 4(2-3), 91-113.

Russell, T.L. (1999). *The no significant difference phenomenon*. Chapel Hill, N.C.
North Carolina State University.

Salmi, J. "Higher Education: Facing the Challenges of the 21st Century, *TechKnowLogia*, found at http://www.TechKnowLogia.org/TKL_active_...IssueNumber=3&FileType=HTML&ArticleID=56; Internet.

Schoorman, F.D., R.C. Mayer, and J.H. Davis (1996). "Social influence, social interaction, and social psychology in the study of trust." *Academy of Management*. The Academy of Management Review, Mississippi State, April 1996.

Schrage, M. (1991). *Shared minds: The new technologies of collaboration*. New York: Random House.

Teasley S., and Wolinsky, S. (2001). Scientific collaborations at a distance (HTML file; accessible from the *Science* magazine site). *Science, 292*(5525), 2254-2255.

Tiffin, J. and L. Rajasingham (1995). *In Search of the Virtual Class: Education in an Information Society*, New York: Routledge.

Walther, J.B. and J.K. Burgoon (1992). "Relational communication in computer-mediated interaction." *Human Communication Research* 19, no. 1, 50-88.

Webster, J. and P. Hackley (1997). "Teaching effectiveness in technology-mediated
distance learning." *Academy of Management Journal*, 40, no. 6, 1282-1309.

Weilbut, W.V. (1999) paper, "Quantum Mechanics of Education, or: How to Teach in Several Places at the Same Time," available, *http://www.communitytechnology.org/courses/globalization/1999/vlad_paper.html*

The World Bank, The African Virtual University: Feasibility Study and Preparation of Prototype Service Phase. Nd, pg. ii.

Wulf, W.A. (1993), "The Collaboratory Opportunity." *Science*, New Series, Volume 261, Issue 5123 (August 13, 1993), 854-855.

Wulf, W.A. (1989), "The National Collaboratory – A White Paper." Appendix A in *Towards a National Collaboratory*. An unpublished report of the National Science Foundation invitational workshop held at Rockefeller University, New York, 17-18 March, 1989.