

## A Decade of Globally Distributed Collaborative Learning: Lessons Learned from Cross-National Virtual Teams

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### Abstract

*A plethora of challenges confronts the modern university system, many of which may be addressed with the increased adoption of virtual organization models. From 1999-2008 several universities around the world, initially from South Africa and the United States and later expanding to include participants from India, Mexico, Canada, and the West Indies, participated in an historic exploration of geographically distributed collaborative learning in a graduate seminar on globalization and the information society. The underlying goal of the project was to better understand the sociotechnical infrastructure required to support cross-national teaching and learning models and to build human capacity for a knowledge-intensive global economy. This paper asks one overarching research question: To what degree can a suite of commercially available web-based technologies be used to create a globally distributed, synchronous and asynchronous, collaborative learning environment for advanced graduate studies between South Africa and the United States? In answering the question, we review good practices and lessons learned from ten years of delivering the Globalization Seminar. Data for the study include participant observation, narrative student evaluations, and limited post hoc surveys of student participants. Our findings focus on three areas: 1) technical infrastructure; 2) social processes and pedagogy; and 3) administrative infrastructure. The study suggests that with the right technology, training, administrative support, and pedagogical approach, globally distributed virtual learning teams can become valuable learning communities.*

**Keywords:** distance learning, cyberinfrastructure, virtual teams, collaborative learning, collaboratories.

### 1. Introduction

Universities around the world are facing a multitude of diverse challenges, including: 1) global economic crises; 2) increased global competition; 3) a student body steeped in new technologies; 4) preparing students for a rapidly changing knowledge-intensive global economy; 5) attracting, retaining and supporting faculty members who are highly mobile; 6) national, regional, and global pandemics (such as the current H1N1 crisis); and 7) the environmental considerations of “going green” to decrease the carbon footprint of their institutions. Organizations of all types have worked to develop strategies for dealing with these monumental challenges, including developing “global” strategies for building networks, fostering cooperation, and expanding their geographic reach. New applications of information and communication technologies (ICTs) and networked organizational models have converged to help facilitate these strategies.

However, reorienting the traditional university towards an institutional model that can handle these challenges is difficult, at best. Most of their human capital is organized into four distinct categories: 1) administrators; 2) faculty; 3) staff; and 4) students. Inertia and administrative structures keep most faculty members working within segmented “silos” of academic units on one campus.

Could this change? Could universities start to develop new economic models to achieve economies of scale and efficiency by collaborating across campuses and around the world? Could universities start to produce and deliver learning experiences that prepare students for a global knowledge economy and take advantage of the new ways students are learning, and not work against them? Could faculty members start to feel the flexibility of research and teaching not only across academic units, but also across campuses, and around the world? Could universities be prepared to handle any pandemic, while also reducing travel costs for administrators, faculty, staff, and students?

We believe the answer to these questions is yes; but they remain empirical questions. If universities were to move closer to those goals, what are strategies for harnessing the potential of these new technologies? Virtual organizations might facilitate an "authentic" global collaborative learning environment. Specifically, the scientific collaboratory, which blends the words "collaboration" and "laboratory" [1] could be an appropriate model. From the initial conception, Wulf expected these collaboratories to span multiple university campuses, to involve interdisciplinary research and researchers, and to include elements of "legitimate peripheral participation [2]."

A substantial and growing knowledge base has emerged to help us understand collaboratories and their applications beyond science [3], [4], [5], [6]. The National Science Foundation has recently even convened a task force on "Cyberlearning [7]." However, there are still many outstanding questions about how this model might facilitate globally distributed collaborative learning and the science of learning that should emerge [8]. The empirical results of this study are designed to contribute to that debate.

### 1.1. Purpose

The purpose of this paper is to better understand the socio-technical infrastructure required to support innovative cross-national teaching and learning models to build human capacity for a knowledge-intensive global economy. These approaches should integrate lessons from virtual organizations such as collaboratories and cyberinfrastructure that allow diverse geographically distributed learners to collaborate in ways that are at times "beyond being there" or more interactive than if they were located in the same laboratory or seminar room [9] and to engage in cyberlearning [7].

In the following section, we outline the literature that guides this paper. We then present our research questions and the design of the seminar to help answer those questions. Next, we present the findings and conclude with a discussion of the implications for university administrators, faculty, and students.

## 2. Literature Review

Six broad interdisciplinary streams of literature have guided this study, which are: 1) education in a knowledge economy; 2) group/team dynamics 3) trust in virtual teams; 4) culture in virtual teams; 5) distributed collaborative learning; and 6) infrastructure for collaborative learning.

### 2.1. Education in a Knowledge Economy

"The information society may prove to be a telesociety with a revival of rural areas and a return to the cottage industries that existed prior to the industrial revolution. [10]" This project draws upon this monumental shift towards a global knowledge-based information economy. Colleges and universities must move rapidly to meet these challenges [11]. As a result, the project is oriented towards equipping students with skills appropriate for this new era.

### 2.2. Dynamics in FTF and Distributed Groups

One strategy to deal with these changes that has become common in the corporate, non-profit and scientific sectors is working in distributed teams. In order for our students to gain additional experience each was assigned to a global "virtual" team with no other members from their university. These teams were highly diverse in terms of nationality, geographic region, technology, professional expertise, and rationale for participation. From the social psychological literature on group dynamics, we know we must account for a range of relevant factors that affect group work, including: 1) social facilitation and loafing; 2) deindividuation; and 3) leadership style.

### 2.3. Trust in Global Virtual Teams

Studies by [12] on global virtual teams in university settings, examined whether trust can exist in virtual teams, how it develops, and types of communication behaviors facilitate trusting relationships in virtual teams. They reported that global virtual teams can develop trust but suggest it may take the form of "swift, depersonalized, action-based trust" rather than a more "interpersonal and socially based trust". Virtual teams must work at building trust at all phases of their development because they "have only their shared trust in one another as their guarantee for the success of their joint work [13]". These findings encouraged us to design specific "trust building" activities into our distributed learning environment.

### 2.4. Culture in Global Virtual Teams

Considering the impact of culture on virtual teams, [12] also suggest that, "electronically facilitated communication may make cultural differences irrelevant" by eliminating most nonverbal cues such as dress, gestures, greeting styles, and accents. As cultural differences become less noticeable, perceived similarity among virtual team members may rise [12]. This finding contrasts with those relating to culture in

the pilot-phase of this study. Some studies [14] have found that cultural differences profoundly influenced the development of trust in the Global Syndicates, including pronounced differences in economic ideology and attitudes towards capitalism.

## 2.5. Distributed Collaborative Learning

Hiltz [15] finds that “collaborative learning” enhances student ratings of virtual courses. We anticipate that if a student perceives their virtual team as a “learning communities” they will have more success in the seminar, and a higher degree of satisfaction. It is argued in [11] that “learning is a remarkably social process” which also influences our focus on building the seminar participants into a healthy community of practice.

## 2.6. Infrastructure for Collaborative Learning

Our goal was to create a learning experience that would be difficult or impossible to replicate in a strictly physical setting [14]. As [10] put it, “...what we are seeking is a new paradigm of education with new standards and outcomes, something that may have no resemblance to classrooms as we know them.”

In terms of physical infrastructure, [10] suggests that learners could participate in this virtual learning environment from almost anywhere, including their home, school or “local community center.” That is exactly approach taken in this seminar, which is supported by the recent work on “edgeless universities” [35].

Much of the CSCW literature suggests that the appropriate *mixture* of technologies is important to support the development of distributed learning communities. More sophisticated and media-rich CMC environments, such as those that include video, audio, electronic messaging, multi-media visual stimuli, and shared tools, may help minimize differences between CMC and FTF environments [16]. Also, some students are more willing to interact with professors in CMC environments than FTF [16], [17].

From this literature, seven key design considerations have influenced our technology choices, including: 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; 6) interactivity; and 7) socialization [10], [18], [19].

## 2.8. Gaps in the Literature

This project seeks to contribute to three key areas that are under-explored in the existing literature: 1) empirical studies of long-term virtual teams composed of both developing and developed nations, 2) studies that focus on the interaction between cross-cultural communication and team effectiveness, and 3) longitudinal examinations of cross-national virtual teamwork at the university level. This case study provides such a long-term view of cross-national ICT-enabled virtual teams at public and private universities in developed and developing nations.

## 3. Research Questions

Based on this literature, we ask the following grand tour research question to guide us:

Grand Tour Research Question: To what degree can a suite of commercially available web-based technologies be used to create a globally distributed, synchronous and asynchronous, collaborative learning environment for advanced graduate studies between South Africa and the United States?

Three subsidiary questions deepen the analysis:

Subsidiary Research Question 1: What factors appear to influence satisfaction in a distributed collaborative learning environment?

Subsidiary Research Question 2: To what degree can learning communities develop in a distributed collaborative learning environment?

Subsidiary Research Question 3: What is the appropriate mixture of technologies to support the distributed collaborative learning environment?

## 4. Methodology

This study takes a QUAL+quant mixed methods approach, with an emphasis on evaluating the qualitative data to describe the experiences of administrators, faculty, students, and staff involved with the seminar, supplemented by survey data [20].

### 4.1. Seminar Structure

In 1999, researchers at the University of Michigan School of Information established the Collaboratory on Technology-Enhanced Learning Communities (Cotelco) with the support of the W.K. Kellogg Foundation, the Alliance for Community Technology and the United Nations Educational, Scientific, and Cultural Organization. Cotelco was designed to study the socio-technical factors contributing to successful distributed knowledge work between developed and developing countries. Using a suite of commercially available web-based collaboration tools, Cotelco

brought faculty, staff, and students from Michigan, together with those at American University and Howard University in the US and the University of the Witwatersrand and the University of Fort Hare in South Africa. In 2004, Cotelco moved to Syracuse University. This collaboratory infrastructure was used to deliver a thirteen week global graduate seminar called “Globalization and the Information Society: Information, Communication and Development.” Over the decade of delivering the seminar we explored different delivery models and research designs, but the basic structure of the seminar remained constant.

**4.2. Socio-Technical Infrastructure**

The CSCL environment for the seminar is based on models of scientific “collaboratories” [1], [22], and “cyberinfrastructure” [14]. We organize the seminar as a “learning” collaboratory, taking a blended approach to designing the infrastructure to support the seminar and our global virtual teams. Each semester, the students are randomly divided into one of five cross-national virtual teams that we call “Global Syndicates.” Each Global Syndicate represents a different stakeholder group in the Information Society, namely: Global and Multi-national Corporations; Developed Country National Governments; Developing Country National Governments; Intergovernmental Organizations; and Non- Governmental Organizations. These teams are highly complex, cross-national global virtual teams, including members from different: 1) disciplines; 2) stages in their careers; 3) institutions; 4) levels of technology expertise; 5) technology support; 6) time zones; and 7) cultures, and languages.

We also paid considerable attention to the social environment, including our explicit efforts to build trust in virtual teams [23], [24]. Also, in order to minimize the potential for social loafing [25] in our Global Syndicates, we tried to design the assignments to be as realistic and challenging as possible, and to require the teams to present regularly in order to highlight the contributions of each team member.

**4.2. Delivery Models**

Over the decade of the study, we have experimented with various delivery models for the seminar as well as the concomitant instructor roles. These models are summarized below in Table 1.

**Table 1. Overview of Delivery Models**

Delivery Model	Key Features
Circuit Rider	Students in campus lab, professor spends equal time with each
Student Socialization	Students in campus lab, professor only virtual
CyberSeminar	Lab available for students, virtual option encouraged, professor only virtual

In 1999, we started the seminar using a “circuit-rider” model. In this model, each university had a designated computer lab where we held the seminar. Each university also has a “site coordinator,” which is a staff person assigned to be the primary administrative point of contact for the seminar. In the circuit-rider model, the faculty member moves amongst the various partnering university locations and is physically “present” on one campus, while “virtually” present on the other participating campuses. While this approach has tremendous advantages, allowing the faculty member to spend relatively equal amounts of time physically with each group of students, the costs are generally seen to outweigh the benefits. It is both fiscally and physically costly to move a faculty member around between multiple universities on two continents. However, this foundation allowed us to conceive of and explore alternative delivery models.

The second delivery model was called the “student socialization” model. Here, the instructor is present at each location only in the “virtual” mode, not meeting physically with any of the students. However, in this model, the students continue to participate in the seminar from a designated computer lab on each campus, taking advantage of the socialization opportunities and assistance from their fellow classmates, even those from different teams. During this phase we conducted a number of experiments and studies to help us understand the impact of this shift, and the impact of different modes for organizing the Global Syndicates, especially comparing the satisfaction and performance of students working in Face-to-Face teams with students working only in virtual teams [26], [27], [29].

The final delivery model was called “CyberSeminar.” In this model, while each university still reserves a computer lab for the delivery of the seminar should any of the students choose to come on campus, students are encouraged to participate from any convenient location. Both the students and the professor operate through completely computer-mediated or “virtual” interactions. In other words, neither the faculty member nor the students are required to have face-to-face contact during the semester. By most accounts, participants preferred this approach because of the tremendous flexibility.

**4.3. Data Collection**

Six main data sources inform our discussion: (1) annual qualitative, reflective statements compiled by each student; (2) professor and research assistants

observations; (3) computer logs and session recordings; (4) final student performance indicators; (5) reflective conversations among faculty, administrators and staff support personnel; and (6) a limited number of participant surveys.

While, as noted above, one university (Syracuse University) replaced another (University of Michigan) in the course of the decade several universities joined the Collaboratory (Ft. Hare and Howard University in Washington, DC), the professor and two universities (University of the Witwatersrand and American University) remained constant.

## 5. Findings

The findings presented in this paper are still in the early stages of development and are organized according to our three subsidiary research questions.

### 5.1. Creating a Globally Distributed Learning Environment between South Africa and the US

Our first subsidiary research question asks, “What factors appear to influence satisfaction in a distributed collaborative learning environment?” 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. Our intention was to facilitate communication and feedback irrespective of the physical or virtual presence of the professor. We will first look at the available survey data from six years into the study.

#### Physical vs. Virtual Presence

Where students were asked what approach—physical, virtual, or gradations thereof—they preferred for the professor’s lectures, we find a large number of the students (n=23, 61%) had a “definite” or “slight preference for the physical lecture.” See Figure 1.

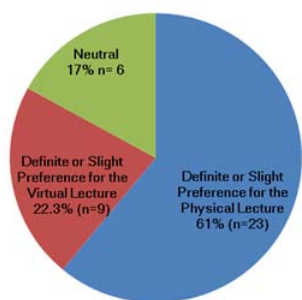


Figure 1 -- Lecture Format Preferences: Virtual vs. Physical n=38

A substantial number of students (n=8, 22.3%) had a “definite” or “slight preference for the virtual lecture.” The “physical lecture” in this case, is still a “virtual” lecture delivered simultaneously to student’s 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.

None of the students believed that they “*didn’t* really learn anything” when the professor was virtual. However, a large number (n=9, 25%) said that they only learned a little when the professor was away. A slim majority of students (n=18, 50%) felt that they “enjoyed the experience, after getting used to it, and learned a lot.” Two students (one from each year, one with a final grade of A+, and another with a final grade of A-) felt that the Globalization Seminar was “sometimes better than being there,” in the [9] sense.

#### Age and Experience

There was a relatively even age distribution in the sample. Some interesting age differences emerged. Of the two respondents that indicated that the “virtual experience was ‘better than being there,’” both were over 30. Negative responses to the virtual experience appear to come from the 24-27 age range (n=5, 50%), who believe that they were only “able to learn a little” when the professor was away.

Another interesting note is that several of the students (n=12, 32.4%) reported having participated in some form of distance learning or technology enhanced learning. However, the majority (n=24, 65.6%) had never participated in any distance or technology-enhanced learning experience before.

#### Gender

Most of the participants were women (n=23). Many women (n=10, 43%) had a “slight preference for the physical lecture,” while a majority of men (n=4, 34%) had a “slight preference for the virtual lecture.” A large majority of the men (n=10, 83.3%) said that they would register for another course like this, while a lower majority of women (n=13, 56.5%) agreed. A larger number of the women (n=8, 34.8%) were unsure, compared to a much lower number (n=2, 16.6%) of men. Of the two persons who indicated that the “virtual experience was sometimes ‘better than being there,’” both were men.

Trust, Culture and Ideology

Of all of the important variables explored in this study, these three are perhaps the most underexplored. This is primarily because the quantitative data for these variables was not collected consistently in the seminar. These limitations notwithstanding, the presence or absence of trust among Global Syndicate members emerged as an overarching factor in learning community development. In each instance of a failed or less successful learning community, problems with trust were present from the team’s inception. This is particularly true for GS1, which has consistently had a low self-perception as a “learning community.” In particular, ideological differences have held to be major stumbling blocks to GS1 becoming a learning community (the stakeholder grouping for GS1 is Global and Multi-National corporations).

Our limited data suggests that cultural factors are at work in cross-national collaborative learning processes, and may affect the level of trust that develops among team members. Students in GS1 and GS4—the two teams that experienced the least success in building a learning community—reported that U.S.-South African differences in communication and academic styles likely contributed to the low participation rates of South African team members. This low participation rate, in turn, generated a relationship of low trust between the U.S. students and their teammates in South Africa. These issues go beyond the U.S. and South Africa. The seminar involved students with a myriad of cultural backgrounds, including several U.S. students who were born overseas and spent part of their childhood in cultures as diverse as Jamaica, UAE, Peru, and Iran.

**5.2. Global Syndicate Learning Community**

Our second subsidiary research question asks, “To what degree can learning communities develop in a distributed collaborative learning environment?” There is evidence that learning communities developed within the GS in the seminar (see Table 2). The vast majority of students believe their GS became “a ‘learning community’ e.g. assisted each other with understanding the material and concepts in the seminar,” with a large number even asserting that the GS was “a critical component of the learning and equally that they felt “ready to participate in one.”

**Table 2. Perception of Global Syndicate as a Learning Community n=38**

Statement	Agreement
The GS became a learning community	n=30, 81%
GS was “a critical component of the learning	n=13, 35%

In addition to my GS, other learning communities emerged in the seminar.	n=,43%
The Global Syndicate approach was valuable	n=36, 97%
The GSs had “tremendous” value	n=19, 51%
Global Syndicates had helped them to understand the “challenges and opportunities of global virtual teams,”	n=28, 76%
I feel ready to participate in one professionally	n=13, 35%

Nearly all of the students felt that the Global Syndicate approach was valuable, with a large number responding that they had “tremendous” value.

In terms of gender differences, a large majority of men (n=8, 67%) believed the Global Syndicates were of “tremendous value.” Women reported fewer external learning communities (n=3, 25 %).

**5.3. Appropriate Technology Mixture**

Our third and final subsidiary research question asks, “What is the appropriate mixture of technologies to support the globally distributed learning environment? Nearly all of the literature suggests that combining a variety of technologies is important. We used a wide range of COTS web-based technologies to support the seminar. Participants were surveyed to gauge their perspectives on the seminar technologies, and we found the following:

(1) Creation and manipulation of virtual spaces.

The technologies most supportive of the creation and manipulation of virtual spaces is webconferencing. Webconferencing helps to create the feel of a virtual seminar room. Students are allowed substantial freedom of movement and manipulation of content. They are also encouraged 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. Students become active participants and co-creators of every online session. Over the ten years of the seminar, we moved selectively amongst multiple webconferencing platforms, starting with Placeware (now Microsoft LiveMeeting), moving to Centra (now called Saba Centra), and ending up with Elluminate.

(2) Multiple forms of representation. The most important tool in the seminar in this respect would again be webconferencing. These tools offer an impressive array of forms of representation, including: VoIP, mood indicators, anonymous polling, text chat, graphical markup, and recorded sessions.

(3) Continuous but not continual communication. WebBoard, DocuShare, WebCT, and presence awareness packages (i.e., AIM) were used in this

category. Interestingly, most students failed to take advantage of the virtual office hours.

**Table 3. Use of Virtual Office Hours within the Globalization Seminar**

0-1	n=14, 37.8 %
2-5	n=11, 29.7 %
1/month	n=5, 3.5 %
1/week	n=3, 8.1 %
Several times/day	n=4, 10.8 %
Total	n=37, 100.0 %

A majority of students (n=21, 56.7%) would like to see more synchronous technologies used in the seminar, while a small number of these (n=3, 8.1%) would like for all of the technologies to be synchronous. Also, a majority of students (n=27, 73.0%) felt comfortable using this CSCL environment to ask questions, with a small group (n=6, 16.2%) responding that they “asked a question in nearly every class.” Table 5 summarizes student perspectives on the seminar technologies.

**Table 4. Summary of Student Perspectives on Seminar Technologies**

Technology	Positive Learning Experience	Positive Learning Environment
Placeware	n=34, 97.4%	n=34, 97.4%
Docushare	n=29, 82.9%	n=25, 71.4%
Webboard	n=28, 80%	n=26, 74.3%

(4) Management of the metaphor. Again, webconferencing best illustrates this design point. For example, Placeware embeds the metaphor of a seminar room, with a clearly defined “stage”, audience area, rows of seats, display screen, etc., thus making the virtual learning environment much less abstract and alien. As Table 5 above illustrates, nearly all of the students (n=34, 97.4%) feel that Placeware contributed to a positive learning environment. These webconferencing applications have continued to evolve, and they have become even more intuitive and important to distributed collaborative learning environments [30].

(5) Diversity of access points. Since all of our collaboration tools are web-enabled, they can be accessed from anywhere with reasonable Internet connectivity (28.8 kbps). While we provide for a computer lab on each campus, on numerous occasions students, faculty, and/or guest lecturers have attended the seminar from home, work, or various locations as diverse as Tokyo, Toronto, Cairo, Geneva, and Hawaii.

(6) 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 level (before SecondLife); allowing participants to walk in and out of three-dimensional structures, see other participants as “avatars”, wave to them, follow them around, and to move objects.

(7) Socialization. Socialization occurs primarily within webconferencing, and secondarily within EduVerse. However, during the course of the semester a noticeable amount of social conversation occurs on the team discussion boards.

## 6. Discussions and Implications

From the findings above, it is clear we were able to create a globally distributed learning environment for advanced graduate studies between the US, South Africa and beyond. Most students enjoyed the experience, and felt the global virtual teams become learning communities. As we think about lessons learned and good practices emerging from this study, we will focus on three areas: 1) students; 2) instructors; and 3) university administrators.

### 6.1. Facilitating Learning: A Student Focus

During the first three years of the seminar, the technology was relatively new. Students were not completely familiar with these technologies nor were they patient with technological glitches. Today students have had more experience using collaboration technologies and the technologies themselves have improved tremendously. In the early days, the role of the site coordinator was vital to the effectiveness of the seminar. Site coordinators welcomed students, fixed technological glitches, served as key resource persons, and helped to reassure nervous students about the structure of the seminar. The seminar truly extended beyond the physical walls of the computer lab. The instructor used the distributed infrastructure to involve students in a wide variety of “real-world” events, including WSIS, ISA and UN GAID meetings, and to have those policy-makers, corporate leaders, and activists participate with the students. This approach is similar to the “edgeless university” concept being discussed currently [35].

These early efforts highlight the importance of several critical success factors for students: comfort

with using technology and with possible technological glitches and the interest and ability to work in a cross-national learning community. In the first year of teaching the seminar, the instructor observed the importance of a “socialization” period for a cross-national team early on. In many ways, this socialization period is similar to the “getting to know each other” and trust building that occurs in initial meetings in a traditional face-to-face seminar. Having recognized this importance in the second year of the seminar, we followed [23] and instituted a suite of exercises to build trust and to foster effective cross-cultural communication at the very beginning of the course. Without such a foundation, teams could not “gel” and cross-national communication and learning were hindered. This practice truly made a difference and provided the skills, respect and motivation to help create a positive team learning experience.

Today the introductory trust-building portion of the course is taken for granted. It includes a structured period of information sharing and personal disclosure within each team, and within the seminar (including both the students and the professor). Within the teams, there are two early decision-making assignments that are designed to encourage the Global Syndicates to uncover the diversity of talents, cultures, and perspectives within their teams and to work together to develop a team culture and team charter. These team charters are then presented to the entire seminar.

A final critical success factor is the realism of the team tasks. This approach was taken to reduce the potential phenomenon of “social loafing” [25] and to engage students in the seminar [26].

## 6.2 Facilitating Learning: An Instructor Focus

As noted, the role of the instructor is necessary in facilitating student learning. Collecting frequent feedback both directly from students and from on-site personnel makes a difference. The burden is greater in situations, such as the CyberSeminar model, wherein there is no on-site lab presence required. This is why we include numerous opportunities for anonymous feedback on the syllabus and the seminar itself via a discussion thread in the course LMS (WebCT). There is also a formal mid-term evaluation of the seminar (including a peer-review mechanism, where the team members anonymously evaluate their own contribution relative to their team members), which is repeated after the final assignment is submitted.

Creativity on the part of the instructor is a final success factor. No two teams are exactly alike. Creative interventions and observations can get a team back on track and maximize learning. However, it is vital to have frequent and just-in-time feedback to

students. From the supporting technologies the instructor can identify which students are communicating frequently, and which ones are not.

## 6.3 Facilitating Learning: Administrator Level

Finally, this project has implications at the university and administrator level. For these issues, we return to the broader questions we raised at the beginning of this paper. *Could universities start to develop new economic models to achieve economies of scale and efficiency by collaborating across campuses and around the world?* In this case, the Globalization Seminar became part of the WISE Consortium [29], headquartered at Syracuse University. WISE is exploring just these economic models of sharing courses, faculty, and students across multiple campuses. *Could universities start to produce and deliver learning experiences that take advantage of the new ways students are learning, and not work against them? Could faculty members start to feel the flexibility of research and teaching not only across academic units, but also across campuses, and around the world?* Many universities today still have neither faculty consensus on virtual learning collaborations nor administrative champions. However, in this study, we have shown that distributed collaborative teaching, learning is possible, but only when facilitated by enlightened administrators who make it possible. First, administrators in each participating university have to agree to appoint one faculty member who has a full-time academic appointment in another institution, as a member of the faculty in their own institution. Second, they have to review, accept, and assign a course number to the seminar. Third, they need to review its appropriateness for fulfilling specific degree requirements and delineate the ways in which the seminar contributes to their own curriculum. Fourth, they need to provide physical space with appropriate technology-related support, and a research or lab assistant. These requisite administrative functions do not easily fit existing academic regulations or cultures. Even today, it is unusual to have one faculty member teaching on multiple campuses. *Finally, Could universities be prepared to handle any pandemic, while also reducing travel costs for administrators, faculty, staff, and students?* The most sophisticated component of the cyberinfrastructure for the seminar was the webconferencing application used to create the synchronous virtual seminar room. Webconferencing is a powerful tool that creates virtual meeting spaces that can in some ways become more powerful than those available on most campuses. For example, a webconferencing tool allows us to break large sessions (of students or staff) into small groups so they can

work in virtual meeting spaces, uninterrupted by student chatter and work in other groups. It even allows us to ‘visit’ with and learn from each group. These are just a few examples of how students and staff can reduce travel costs without losing interactive capabilities for their classrooms or meetings.

## 7. Conclusions

Our findings have implications for building educational methods and systems for the future. There are three dimensions here: a historical or longitudinal dimension, a substantive dimension, and a research methods dimension.

Historically, this paper reports on a decade long project and concomitantly on changes made to the project over time. While each of these dimensions is rooted in the nature of the universities in which we worked, there are implications for technology-related learning innovations in higher education writ large. Further, these can apply to both U.S. and non-U.S. university systems, since our work has spanned U.S. and non-U.S. universities, public and private universities, and urban and rural universities. The factors reported in this paper that facilitated our work were learned over time; similarly, we implemented solutions to barriers such as the absence of effective cross-cultural communication or the absence of trust in cross-national teams built at the initiation of this decade long ‘experiment’ over time. As our students have learned in these settings, we too have learned. While more and more students and faculty have access to the Internet now and the media has highlighted more and more experiments in cross-national learning, these factors have not disappeared. Nor has the key need for administrative support and champions gone by the wayside. In sum, what we have learned and incorporate in this paper continues to be important in technology-related interventions in learning in cross-national settings today.

With regard to the substantive dimension, our findings are aligned with those emerging from many colleagues, including recent work by the NSF on cyberlearning [7] and in the UK on “edgeless universities [35].” In the conclusion to the NSF cyberlearning report, a key recommendation is that perhaps “new organizations need to be chartered” to take advantage of these new opportunities in distributed collaborative learning. Bradwell [35] argues that the boundaries of universities are blurring, to include both formal and informal learners. Not only do we agree, but also we have shown with this study that it has been possible to “go edgeless” for the past decade. The Globalization Seminar has allowed a substantial number of civil society and NGO activists

from around the world to participate, both as students and as advisors to our global virtual teams. These efforts demonstrate the power of constructing learning situations wherein there are cross-national, diverse teams linked through the Internet tackling the major issues facing the world.

Finally, there continue to be those in academe who do not recognize either the need for such learning situations nor their power. The research methods dimension provides empirical data to support those who recognize the need for change in how we teach and learn not just in the US but also around the world. Further, there are many students who do not yet have access to higher education in their own countries. The research described here has implications for how they could learn in the future. Most of all, this paper illustrates vividly the ways in which students, faculty and administrators can learn new roles and new ways of learning that actually match the complexity and future professional needs in our increasingly interconnected world. Yes, the research reported here involves a classroom subject matter of globalization and the information society. But the learning modes demonstrated in this paper can apply to almost any field in higher education and we believe can be learned by almost any instructor. This is where there is a special opportunity for future research.

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