

Virtual Term Abroad: An Assessment of the Technology

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Abstract

Campus internationalization is becoming increasingly important at universities across the globe. In this paper we discuss our assessment of virtual meeting tools as a way to create a virtual term abroad (VTA) (virtual collaborations between a classroom in the US and abroad). Analysis of data indicates the following attributes have a positive impact on engagement and community: 1) the ability to see everyone's video simultaneously, 2) a chat area to allow for questions and discussion, 3) tools should be accessible from mobile devices and 4) always have a Plan B.

Introduction

Only a small percentage of students participate in study abroad programs and many groups are underrepresented. There is little diversity in race, gender and ethnicity nor access for non-traditional, lower socioeconomic groups, those with disabilities and first generation college students (Fischer, 2012). Campus internationalization is becoming increasingly important at universities across the globe. In this paper we assess virtual meeting tools as a way to create a virtual term abroad (VTA).

State University of New York (SUNY) Empire State College's (ESC) programs in Latin America are designed using blended learning model. Students attend mandatory week long

residencies during the first and last week of the semester and work online in between the residencies. In the Dominican Republic (DR) and Honduras, there weren't enough students to merit sending instructors to conduct residencies. As a solution, the college looked to using virtual tools to have DR and Honduran students synchronously participate in the Panama residencies. Feedback from end of term student surveys indicated the experience had been positive but improvements were needed to make the experience more meaningful.

In 2012 SUNY announced the opportunity to apply for an Innovative Instructional Technologies Grant (IITG). The initial collaborations between the DR, Honduras and Panama directly supported SUNY goals of “creating globally competent students... providing international exposure throughout all courses and degrees... and using social and emerging technologies to network students and faculty throughout the world” (State University of New York, 2009, pp. 18-19). A proposal for a Tier 2, \$20,000 grant was successfully submitted enabling a pilot study of the use of technology and benefits of a “Virtual Term Abroad.”

In this paper we discuss our assessment of virtual meeting tools as a way to create a virtual term abroad (VTA) (virtual collaborations between a classroom in the US and abroad). Our goals were to resolve some of the initial technical issues and challenges and analyze the success of the tools for promoting learner engagement and cross cultural and/or international interaction, eventually facilitating the successful participation of students in a “Virtual Term Abroad.”

Implementation of a “Virtual Term Abroad” that provides a meaningful experience for students attending remotely required testing a range of technological tools while connecting students in New York state with students abroad. ESC's program in Panama was appropriate for this pilot project because the students move through the program as a cohort allowing us to evaluate difficulties and develop solutions over a 14 month period. During the study we worked

with a cohort of students who had already experienced two terms of academic work without the improved tools, and completed another three academic terms during the trial period. This allowed them to give us valuable feedback on the changes.

Setting

Empire State College (ESC) started a marketing degree program with the Quality Leadership School in Panama in February 2009. It also had small programs in the Dominican Republic and Honduras. Typically the courses would start with a face-to-face residency, followed by 6 – 9 weeks of work online and then a closing residency. Through the years, the programs were continuously evaluated with the goal of improving the quality of instruction. A primary issue was lack of engagement during the online portion of the course. We started incorporating a variety of cloud computing and virtual meeting tools which both greatly improved student engagement and helped them better stay on schedule.

With the success of the cloud computing and virtual meeting tools, we started combining the small numbers of students in the Dominican Republic (D.R.) and Honduras with our students in Panama. The small numbers in those other countries did not support face-to-face residencies like we had in Panama, but we wanted to try to still replicate the experience of the face-to-face residencies for those students. The experiences with virtual residencies, and the student satisfaction with sharing their learning with students in other countries, gave birth to the idea of a virtual term abroad.

Our goal with the virtual term abroad was to connect students in the United States with our students in the Panama, allowing the U.S. students to share some of the same benefits the students in the Latin American region had encountered. To test the idea of a virtual term abroad,

collaborations took place with students at SUNY ESC, the College of Westchester, SUNY Cortland and the University of Economics in Bratislava in Slovakia.

Participants

The cohort participating in this study included students from the US, Panama, Honduras and the Dominican Republic (DR) with an age range of 19 – 50. Ninety percent of the participants were equally distributed across the 20s, 30s and 40s. This age group is representative of the large majority of students unable to participate in a traditional study abroad experience. Overall, 60% of the participating students were female, although the Latin American students were primarily male.

Across the cohort students had high levels of “connectivity.” Almost all of the participating students (over 93%) reported having high speed internet connections at home. Almost 70% had unlimited data plans for their phones. Over a third had an air card or modem, providing them with “anywhere” internet access, and 20.6 % of the tablet owners had data plans for their tablet devices, while the rest of the tablet owners used wireless internet connections.

A 2011 survey of Panama students showed none of the students had used virtual meeting tools prior to their experience with ESC, but at the time of this study (only two years later), 42.9% of the students reported previously using virtual meeting tools. The majority of the students also reported at least occasional course related use of a variety of virtual collaboration tools, ranging from Blackboard Collaborate (86.8%), Google Docs (81.9%) and Skype (81.1%) to Voice Thread (10%). 50 – 70% of the students reported at least occasional course related use of collaborative tools like blogs, wikis, Facebook and What’s App. This high familiarity with virtual collaboration tools is favorable for virtual term abroad experiences.

Both students and faculty overwhelmingly prefer using their computers (desktop or laptop) for all course related activities, but mobile devices, especially phones, provided important accessibility. 38.1% of students reported preferring their phones to connect with classmates, and 23.8% said phones were their preferred device to communicate with instructors (emails or text messages) and to look things up during class. Phones and tablets were reported to be used equally (9.5% each) for both participating in online discussions and taking notes during class. Phones were also used more than tablets for watching course related videos, doing research and 4.8% of the students even reported using their phones to write assignments. After computers, students only reported tablet devices as preferred for course related reading.

Instructors with varying levels of comfort with technology volunteered to test these tools and adapt their course materials accordingly. 63.6% of the instructors responding to the initial survey had taught blended or online courses ten or more times while 22.7% had experienced this four or fewer times. Correspondingly, 52.4% of the faculty considered themselves to have a fair amount of experience with technology and only 4.8% to have little experience. A much higher percentage of faculty (42.9%) than students (16.7%) considered themselves to have substantial or extensive experience with technology. Faculty tended to own more devices, but students had more facility to connect “anywhere, anytime” with students having better internet service at home, more unlimited data plans for their phones and more frequently had data plans for their tablet devices. (See Table 1.)

TABLE 1.

STUDENT AND FACULTY FACILITY TO CONNECT		
	STUDENTS	FACULTY
Have high speed internet at home	92.7	85.7
Have high speed internet at work	65.7	95.2
Have unlimited data plan for phone	68.4	47.4
Have air card or internet modem	34.4	38
Have a data plan for tablet (when applicable)	20.6	11.1
Use both a desktop and laptop computer	33	77.3
Have an ipad or other tablet	33.3	40.9
Have an iphone or other smartphone	61.9	68.2
Have an ipod or similar listening device	21.4	30
Have an e-reader	4.8	100

Source: Student and Faculty Pre-Collaboration Surveys, 2013.

Course Collaborations

For the project, course collaborations were organized between instructors in the SUNY ESC-Panama program and instructors at other NY based universities, in addition to one university in Slovakia. All students enrolled in the courses participated in the course collaboration activities, but participation in the study, by completing pre and post collaboration surveys, was voluntary and anonymous. We used the data from four of the Panama-NY collaborations, representing 42 students and 7 instructors. Instructors also completed pre- and post-collaboration surveys, as well as participating in a follow-up focus group.

Six 3 to 4 week course collaborations were organized between courses in Panama and partner courses in New York. The collaborations consisted of asynchronous discussions (typically a blog due to problems of access to the same LMS); synchronous virtual meetings between the students; cross-team assignment. A variety of tools and devices were tested during the virtual sessions to see which provided the most reliable technical connections; engagement of students and interaction between students.

Both faculty and students were surveyed both before and after the course collaborations to determine: (this should be in data collection)

- their previous experience and level of comfort with technology
- their previous knowledge and experience using specific tools
- the type of internet and other data services they had to support the use of virtual tools
- their perceptions of which tools worked the best and were easiest to use
- what devices they most frequently used to participate in the collaborations
- their perceptions on which tools best encouraged international interaction and student engagement

Virtual sessions were observed by the investigators as well as technical support staff in each location. The technical support staff set up the sessions, solved problems as they arose, kept a log of the problems encountered and how they were resolved, and provided a final technical evaluation of the virtual meeting tools.

Prior to these collaborations, faculty reported experience using a variety of tools for their courses. Blackboard Collaborate and Skype were the most commonly used tools outside of the learning platform. 31.6% and 28.6% respectively reported using these tools very frequently for course related activities compared to only 5.3% who had never used Collaborate and 23.8 who had never used Skype for their courses. We expected Blackboard Collaborate to be a commonly used tool because that is the tool provided by the College for virtual faculty meetings with students. Despite the frequent use of Blackboard Collaborate, only 52.4% of the faculty felt proficient in its' use, compared to 72.8% for Skype and 60% each for Google Docs (used very frequently by 21.1% of the instructors) and Facebook (used very frequently by only 16.7% of the instructors.) Even

though Google Chat/Hangout was used very frequently for course related activities by only 5.6% of the instructors, 55% felt very proficient in its use. This discrepancy may speak to the ease of use and intuitiveness of the latter tools compared to Blackboard Collaborate. It may also be a result of greater familiarity with the other tools outside of their academic work.

Prior to each collaborative session, we allocated 20 to 30 minutes lead-time, to make initial connections and ensure connectivity. Prep time to properly arrange our classroom tables and chairs was done to provide optimal viewing for our participants and viewable by our collaborative counterparts. Using a projector provided ample viewing of our counter-parts by all students on our side. Connecting a stereo grade speaker(s) provided clear audio. The setup time for the equipment varied, based upon the configuration(s) below:

TABLE 2.

Course Collaboration Descriptions

Collaboration	Countries	Universities	Virtual Sessions	Blog	Team Project
1	Panama-US	ESC-College of Westchester	Zoom-guided discussion	Yes	paired interview
2	Panama-US	ESC-College of Westchester	Zoom-case study discussions	Yes	paired interview
3	Panama-	ESC-College	Blackboard		

	US	of Westchester	Collaborate	Yes	
4	Panama-Slovakia	ESC-University of Economics in Bratislava	Zoom-guest speakers	Yes	design and development of a website
5	Panama-US	ESC ESC	No	Yes	
6	Panama-US-Turkey	ESC SUNY Cortland-Anadolu University	Blackboard Collaborate, Skype - guest speaker	No	

Technology

The first two tools we used for synchronous discussions were Skype and Blackboard Collaborate (Elluminate at the time). These tools were initially chosen based only on accessibility and convenience. SUNY ESC currently supports the use of two tools: Blackboard Collaborate for student use and Cisco Jabber for faculty/staff only use. In response to student request for more personal interactions during the online period some faculty began using Skype for office hours and

individual meetings. Skype was one of the first tools of its kind and was commonly used by students and some faculty.

The use of these tools had shown promising results for increased learner engagement and interaction between students in different countries. In a survey of Panama students (2011), almost 70% said that Collaborate sessions helped them stay more engaged and on schedule with their coursework, and over 50% said they felt courses with Collaborate sessions contributed more to their learning than courses without Collaborate. Despite these favorable results, the Collaborate sessions and other tools, resulted in frustrations, generally related to technological limitations. These limitations were discussed with faculty, IT staff and vendors at several conferences. The tools tested in this study are based on these recommendations.

The following purchases were made:

- Video conferencing equipment that included microphones to capture all the voices in the room and included echo cancelling tools
- A supply of headsets, simple webcams with microphones and other presentation devices to facilitate virtual communication

The following tests were performed:

- Tested the virtual tools using a variety of laptop computers and mobile devices (multiple brands to replicate the BYOD experience with students).
- Tested Blackboard Collaborate (already provided by the college)
- Tested other virtual meeting tools using free trial options ([Bluejeans](#), [Zoom](#)), eventually purchasing subscriptions to the tool we found to be most beneficial.

The tools used were all low cost, making the project easily replicable in other locations.

The classroom in Westchester, NY tested both the Aver video conferencing equipment and a Logitech webcam that was simply connected to a PC. Sean Caposella, Director of IT Operations at the College of Westchester, provided the following observations with respect to connecting with the Aver camera via Bluejeans provided the following advantages:

- allowed students to connect via any device (smart phone, tablet, dial in)
- allowed students to connect via multiple tools (Skype, Google, Jabber, etc.)
- didn't require them to download anything or set up an account,
- Movement of camera controlled remotely (pan, tilt and zoom)
- Voice and video clear
- Built in microphone receptive anywhere in classroom

Connecting with Aver provided the following disadvantages:

- Bluejeans was the only virtual tool that worked with the Aver camera since it was an IP video conferencing tool.
- When connecting Aver to Aver firewall ports had to be opened in order to connect

Connecting with the webcam (Logitech BCC950) provided the following advantages:

- allowed us to use any tool (Bluejeans, Skype, Google Hangout, Blackboard Collaborate, Zoom)

Limitations of the webcam:

- Students needed to come to the front of the class to speak into the microphone
- Limited view (no pan or zoom)

An advantage of Zoom and Google Hangout was the viewing of multiple video at the same time. During initial use of Collaborate there was a lot of discussion going on in the chat area but students refrained from using their microphone to speak during the session. During the testing of

Zoom an unexpected result was that the students started using their microphones to speak. This may be attributed to student's being able to see one another and it feeling more like a face to face conversation. More research comparing the use of tools with and without video is warranted.

An advantage of Zoom and Bluejeans was that they didn't require students to set up an account or download anything. The need to set up multiple accounts and track multiple passwords is a barrier to students using technology in their classes.

From a technology standpoint there were many challenges, although most were overcome so that the session could still be held. During the very first collaboration between ESC Panama and the College of Westchester there was a complete blackout in Panama. Students at the College of Westchester sat eagerly awaiting their Panama counterparts, and just as class was starting the power came back on. About half of the students in Panama were able to connect. During the final session in Panama there was a water shortage that resulted in the closing of all universities. The teachers packed up all the equipment and set up a classroom in the hotel. On the Westchester, side, one session there was no Wi-Fi in the classroom and the students connected individually on their tablets and smart phones.

Understanding how the Aver device operated was one of the first challenges as it only works peer-to-peer or through an IP Cloud hosting service which can be quite costly. Working with Aver engineering we were able to configure the device and appropriately test. During continued use of Aver within the Westchester College private network, we lost the device IP address and were unable to connect to outside entities. The Aver device needed to be setup with a reserved IP address so a new IP is not generated each time we attempt to connect.

Although we had tested the equipment prior to our first session there were times when we had sound but no video (and vice versa). We were lucky to have IT support during our sessions and there to help us troubleshoot problems.

TABLE 3.

COMPARISON OF VIRTUAL MEETING TOOLS

	Video	Audio	Connectivity	More than 4 Users	Internet consumption	PROS	CONS
Blackboard Collaborate	**	***	***	****	**	All of the information on one screen (whiteboard, participants, chat); can handle a large number of participants	The user log in is more complicated; the camera image of the speaker is very small.
Aver Video conferencing system	****	****	****	**	***	Especially designed for video conferences, the audio and video quality are very stable	It requires a public IP address and special programs to connect participants when they are not viewing from a location with similar equipment.
Zoom	***	***	***	***	**	Multiple ways to connect; simple log-in; compatible with various devices	Audio and video not as stable as with Aver equipment.

BlueJeans	***	**	***	****	**	Can connect using a variety of programs (skype, google hangout, etc.)	numerous connections made communication very slow, but that could be because we were using a demo version; very expensive for only occasional use
Skype	***	***	***	**	***	It works on every device; it is stable and reliable.	the free version doesn't allow more than two people to connect.
KEY:	* = POOR	** = AVG	*** = GOOD	**** = EXCELL ENT			

SOURCE: R. Ball, tech support Panama

Results

Student survey results were viewed globally, not by country or by course. Analysis of the data showed no significant difference in the responses based on age or gender.

Feeling connected and perceptions of tools

Since the primary purpose of this project was to find ways to facilitate a “Virtual Term Abroad” experience, it was important to know which tools helped the students and faculty feel more of a sense of community and personal connection with one another. The majority of the students reported almost all of the tools they used helped them feel more connected to the other students and faculty. Among the students who used them, the tools that stood out as contributing the most to feeling connected were the very easily accessible Facebook (75.4%), Google Docs and Google Chat/Hangout (75% each). These were followed by the blogs and wikis (72.6% and 71.4%

respectively), Twitter (71.2%), Blackboard Collaborate (68.1%), Skype (66.6%) and other virtual meeting tools (62.5%). (See Table 4.)

In addition to learning from the course collaboration activities, one student commented: “*I like the fact that I was introduced to new tools of communication.*” (Student post-collaboration survey, 2013).

Another student added:

In international business you can't always be face-to-face with the person you are communicating with. Technology has really helped to shorten the gap and make communication easier. I feel like in the classes we were constantly having problems with technology: a microphone wouldn't work, the video wouldn't stream, or the internet connection was not stable. But that is the way it is. While doing my internship at XX, I had to communicate with other countries every day and I would have the same problems. I have learned that I need to be patient and deal with the occasional flaw in technology because it is key to communicating with other countries. (Panama student, 2013.)

TABLE 4.

STUDENT PERCEPTIONS OF TOOLS					
% used		Easy to use		Helped feel connected	
Blackboard Collaborate	81.5	Google Chat/Hangout	85.8	Facebook	75.4
Blogs	75.9	Facebook	84.6	Google Chat/Hangout	75
Skype	66.7	Google Docs	84.3	Google Docs	75
Google Docs	64	Skype	82.2	Blogs	72.6
Wikis	56	Twitter	75.6	Wikis	71.4
Facebook	48.1	Wikis	75.1	Twitter	71.2
Google Chat/Hangout	48	Blogs	62.1	Blackboard Collaborate	68.1
Other Virtual Meeting Tools	33.3	Other Virtual Meeting Tools	58.3	Skype	66.6
Twitter	29.2	Blackboard Collaborate	49.9	Other Virtual Meeting Tools	62.5
Diigo	25	Voice Thread	-52.2	Voice Thread	50
Voice Thread	25	Diigo	-66.7	Diigo	33.6
NOTES:					
mid-point					
"Easy to use" and "Helped feel connected" are calculated as a % of students who reported using that tool. Voice Thread and Diigo are negative because more students reported them as being difficult to use than easy.					

Source: Student post-collaboration surveys, 2013.

When we compare the tools faculty reported using in the collaborations, and the tools students reported using, there are some discrepancies. For example, 100% of the collaborations had blogs, but almost 25% of the students reported never using a blog. We did not have 100% student participation in the blog discussions, which may explain this discrepancy. Another difference was that none of the instructors used Twitter, Diigo or Voice Thread for these collaborations, yet students reported on these tools. We believe they were expressing opinions from use of these tools at other times. Many students also did not acknowledge the use of any virtual meeting tools other than Blackboard Collaborate, even though instructors used other tools more frequently. Apparently students were not always aware of the tool being used for the virtual meetings. The fact that they so easily adapted to the different formats is a positive result encouraging the use of virtual meeting tools.

In general, faculty found the chosen tools to be very easy to use. The tools that they felt made the biggest contribution to student learning were those that offered visual contact between the students. (See Table 5.)

TABLE 5.

FACULTY PERCEPTION OF TOOLS		
TOOLS USED IN ORDER OF FREQUENCY OF USE	EASE OF USE	CONTRIBUTION TO STUDENT LEARNING
Blogs	Very easy, intuitive - 100%	Very helpful 80%; somewhat helpful 20%
Other Virtual Meeting Tools	Very easy, intuitive - 50%; Easy once learned - 50%	Very helpful 50%; did not hurt nor help 50%
Google Docs	Very easy, intuitive - 50%; Easy once learned - 50%	Somewhat helpful 100%
Skype	Very easy, intuitive - 100%	Very helpful 100%
Google Chat/ Hangout	Very easy, intuitive - 100%	Very helpful 100%
Facebook	Very easy, intuitive - 100%	Did not hurt nor help 100%
Wikis	Very easy, intuitive - 100%	Somewhat helpful 100%
Blackboard Collaborate	Very easy, intuitive - 66.7%; Easy once learned - 33.3%	Very helpful 100%

NOTE: Percentages calculated over number who used each tool

SOURCE: Faculty post-collaboration surveys

In addition to contributing to student learning, faculty also reported that virtual meetings helped them feel substantially more connected to their students than when only teaching online between face-to-face meetings (vs. 28.6 who felt there was no difference). Compared to courses in

which they have not held virtual meetings, instructors felt the virtual meetings helped student engagement with their coursework, with 66.7% indicating substantial increase in engagement, 16.7% expressing somewhat more engagement, and only 16.7% not noting any difference in student engagement. (See Table 6.) One instructor commented “*the level and substance of student engagement made this an invaluable project.*” (Faculty post-collaboration survey, 2013).

TABLE 6.

FACULTY VIEWS ON THE IMPORTANCE OF VIRTUAL MEETINGS	
Contribute to the student learning experience	100%
Increase student engagement with coursework	83.4%
Help instructors feel substantially more connected to the students	71.4%
Greater instructor satisfaction with courses including virtual meetings	83.3%

SOURCE: Faculty post-collaboration survey, 2013

Overall, 83.3% of the instructors were more satisfied with their courses using virtual meeting tools compared to other courses they teach, vs. only 16.7% who said their satisfaction was about the same as with other courses.

Faculty found the greatest difficulties with the virtual meetings were scheduling (57.1%) and technical problems (42.9%). 28.6% cited issues with their own ability to use the tools effectively while 14.3% indicated some concern over student behavior during the virtual sessions. One instructor noted “*Everyone not being comfortable with the technology and/or operating at different experience levels made the task more difficult.*” (Post collaboration faculty survey, 2013)

Course Collaboration use of tools and devices

During the course collaborations, 25.8% of the students reported using mobile devices to attend virtual sessions, and we observed students using phones and tablets to connect to almost every virtual meeting during the project. An equal number used their mobile devices to participate in the blogs. Students most frequently used their phones during the collaborations for direct communication with classmates: 32.3 % to send messages to classmates in the same course, 22.6% to send messages to students in other countries, and 22.6% to interact with other students during the virtual sessions (for example, messages in the chat box). Mobile devices were also used during the collaboration to access the online course (19.4%), to access course related pages in Facebook (16.1%), and to tweet about something related to the collaboration (3.2%).

Overall, 46.7% of the students used their phones at some time for collaboration related activities, 20% almost every day or multiple times daily. 24.1% used their tablets for collaboration related activities, almost half of those using their tablet almost every day or multiple times daily. 60% of the students who used mobile devices said they felt the ability to access collaboration activities via mobile devices increased the time they spent on the course (representing 29.1% of all student participants). During virtual sessions we observed when there were internet or firewall problems interfering with connections for the session, students successfully used their phones to connect to the sessions, salvaging the scheduled activity. Between 3.4 and 10.3% of students reported using mobile devices to connect to each virtual session.

Contrary to the students, after computers, faculty most often used tablets for collaboration related activities instead of phones. 42.9% reported using a tablet vs. 28.6% using phones. Faculty also used a wider variety of devices, reporting using e-readers and iPod or similar listening devices

for collaboration activities (14.3% each). The greater use of tablets may be in part because we provided faculty in the Panama program with tablet devices for them to test with the different tools. Faculty used mobile devices most frequently to check student activity (71.5%), to email students (57.2%), to take notes during class (57.2%) and equally (42.9% each) to watch videos, do research and do reading. In all cases the use of tablets predominated, except for email, which was equally done on phones and tablets. While all instructors used a computer to conduct the virtual sessions for which they were responsible, 14.3% attended virtual sessions as participants using a tablet. Overall, 100% of the faculty reported at least a slight increase in their use of mobile devices during the collaboration period, probably because we had encouraged their experimentation by providing tablets.

Recommendations

Best practices

Throughout this study we encountered numerous technology related challenges, ranging from a complete power outage in Panama, to the electricity being turned off due to a water shortage, through the Wi-Fi and equipment not working properly in NY. We strongly recommend testing all equipment prior to your session and having a backup plan. If you are doing a classroom to classroom session we suggest doing a test run of your classroom layout to ensure participants can view the monitor and be seen by those at a distance. The point of testing cannot be overstated here. It is also important to plan ahead and consider differences in holiday and school schedules as well as time zones.

There are so many factors that influence the audio and visual experience. Largely the best connection was a direct IP connection to Panama, since there was not a dependency on a

hosting service (facilitating the session) and the equipment is higher grade than our Logitech Web cam.

It is important to consider the Wi-Fi capacity of the classroom you are using. Hard wire is the most reliable. If students are in the classroom together and logging in via their own devices so they can backchannel, consideration of the Wi-Fi is critical. In Panama, because of broadband issues, virtual sessions were more successful when students participated from home rather than a shared classroom.

The number of people connecting to the session varied, anywhere from 5 to 12 individual connections. The clarity of each individual's connection varied based upon the quality of their webcam with an integrated microphone. Lower end pixel counts on the endpoint would lower the clarity of the video feed. Also at times the video and audio were not synchronous. Although noticeable, this did not appear to be a big issue during our sessions.

If at all possible, it is best to try to agree on the use of a single method of communication such as Zoom, SKYPE, Blue Jeans, etc. This simplifies the setup and reduces the dependency on IT support. (But always have a second compatible method as a Plan B.)

We found [Zoom](#) to be the most complete and user friendly virtual meeting tool. Connecting was not an issue for participants joining the meetings. Once the meeting was launched, invited participants were able to connect through e-mail links (invitations). We found that if the endpoint participant's web cam was not operational, they still could participate with audio only. It was also possible for the participant to call in using a phone number provided for each meeting. There is a chat box function for back channeling or to communicate about connection issues.

Zoom displays HD video, can provide IP Hosted solutions for selected teleconferencing equipment (PENDING see above) and also offers voice conferencing services scaled to the video

services, as part of their packaged solution. There can be up to 25 connections, which serves most of our class groups. Another useful function provided by Zoom is the ability to record sessions – having intelligence built into the software to display the active vocal party at all times, automatically. By default the recordings are placed on the local drive or designated network drive of the host after it has been packaged. Consideration should be given to using a jump or flash drive to house the recording. Screen sharing is very simple.

Another recommendation, from one of the participating faculty, is to do more initial screening of the participants and before the course or collaboration activities begin, provide training or assistance to those who have difficulties understanding how to use the tools.

Recommendation for starting with a low budget

With the initial one-time investment facilitated by the tech grant, improved learning experiences for SUNY/ESC students attending virtual residencies in the Panama program will endure until equipment needs to be replaced. Since the project builds upon technology and equipment already existing at most SUNY campuses, there would be little further investment needed to replicate and expand this project. Other national and international locations could replicate the experience with a small investment, creating an attractive network for international interaction.

With our experience to date we can recommend that organizations or individuals who wish to replicate our experience on a low budget should consider:

1. A reasonably priced web cam with an integrated microphone \$ 250.00
(Logitech BCC950 conference cam)
2. Utilizing Zoom's free service (limited to 25 participants and 40 minutes).

The paid service allows for unlimited meeting time and currently costs only \$100/year.

3. A PC equipped with a reasonably priced speaker
4. The use of an overhead projector connected to a Personal computer

establishing the connection.

Conclusions and future research

Our research demonstrates the importance of making sure any tools used are accessible from mobile devices. While both student and faculty participants used laptop or desktop computers for most of the course and collaboration related activities, mobile devices were an important alternative and provided access to course activities when other alternatives failed. The majority of students who used mobile devices to access course activities acknowledged that they spent more time in coursework because of this access.

Virtual meeting tools allowing participants to see and hear one another are the most important element for a successful virtual term abroad. Instructors felt they increased student engagement, contributed to student learning, helped instructors feel more connected to their students and added to overall satisfaction with the course. Being able to see and hear one another was the element students most appreciated. When students couldn't readily see and hear one another, they tended to limit their communication. The use of virtual meeting tools could similarly enhance any otherwise online course.

All of the participating faculty indicated they would like to repeat the experience.

"I would like to expand the experience to include faculty/students from other regions. I've found that my students have gained learning insights that they would not otherwise have experienced." (Faculty post-collaboration survey, 2013)

“It was a wonderful experience for myself and the students. I think it gave another dimension to the class. Online classes can become boring and I think this added interest to the course.” (Faculty post-collaboration survey, 2013)

Future research in this area could follow up on questions such as:

- What is the ideal length and number of virtual sessions during a virtual term abroad?
- More research on the comparison of student participation using audio-visual, voice only and text only tools.
- A larger research sample to validate the results with a larger group
- Optimal course design or best practices to take better advantage of the virtual tools and improve the student learning experience.
- How can we overcome the difficulties of synchronous meeting times and still contribute to student communication and integration between the two countries?

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