

Kubi vs. Google Hangouts

A TECHNICAL & PRESENCE COMPARISON

Introduction

The hallowed halls of academia have traditionally been the bastion of higher education for many but can those far away also participate in these great resources? The ideals of distance education have been with us for quite a while. One of the earliest attempts was a correspondence course to teach a new method of ‘Short Hand’ in which Caleb Philipps would send weekly mailed lessons to his students (Holmberg, 2005). As this type of lesson delivery continued to grow, eventually the Phonographic Correspondence Society (located in the United Kingdom) was found to more formalize this teaching method (Moore & Kearsley, 2005). One of the first examples of distance education here in the United States was Anna Eliot Ticknor (known as the ‘the mother of American correspondence study’), daughter of a Harvard University professor, who founded and ran the Boston-based Society to Encourage Study at Home from 1873 until her death in 1897. The idea of exchanging letters between teacher and student originated with her and monthly correspondence with guided readings and frequent tests formed a vital part of the organization’s personalized instruction (Mathieson, 1971). Modern forms of distance education have taken root largely due to the easy exchange of information over the internet. Distance learners can ‘tap’ into the audio & video feeds for a variety of classroom experiences that are described as hybrid, blended, or Massive open online courses (MOOCs). It is the goal of this paper to examine two forms and compare/contrast the effectiveness of ‘Classroom Presence’ and examine the technical aspects of each. The first of which will be the

Kubi Telepresence Robot

(<https://www.revolverobotics.com>) by revolve Robots (which is basically using the audio/camera capabilities of an iPad that is attached to a user controlled ‘neck’ that has two axis of mobility) that is used in combination with a presentation software such as WebEx to better show the teacher’s presentation/black-board. The

second system is a basic computer (or tablet or phone which are capable of running the software and have the hardware needed for two-way communication) running Google’s Hangout (<https://hangouts.google.com>). It is assumed that the reader is fairly familiar with both platforms and can research additional information about the base functionality of each (which it outside the scope of this paper).



1 KUBI - Low-Cost Telepresence System for Tablets

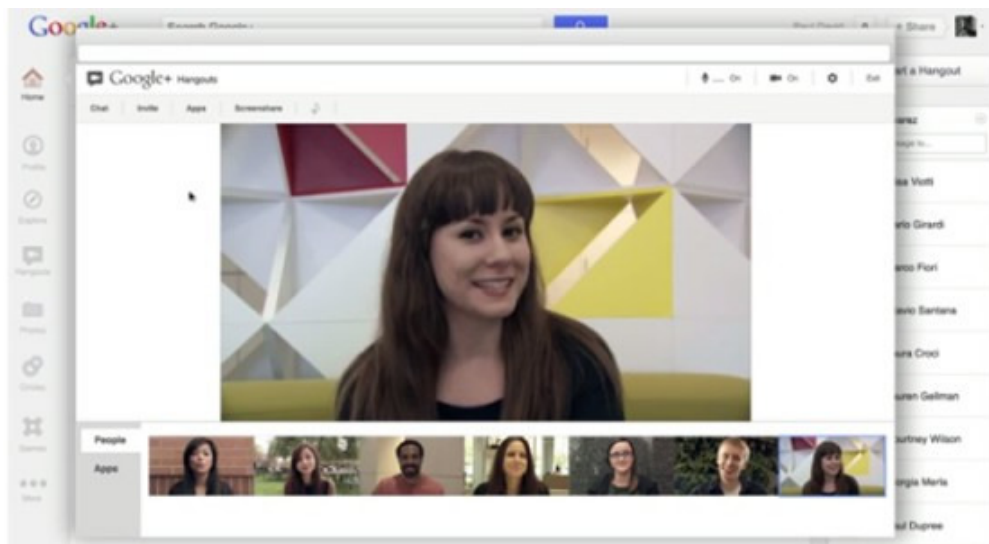
Classroom Presence

An important aspect of cognitive learning, is the ability to create a safe/nurturing rapport between the teacher and the student. The power of interaction between teacher and student heavily impacts student success and has shown to have even a larger effect on satisfaction and perceived learning than interaction with peers (Swan, 2001). While this has a tendency to be naturally developed by those with a proactive stance, when interacting with a ‘virtual’ person, questions of the student’s ability to learn or “How will I know they are learning?” or “How will I establish an academic relationship with my students if I can’t see them?” are common. It can be extremely easy

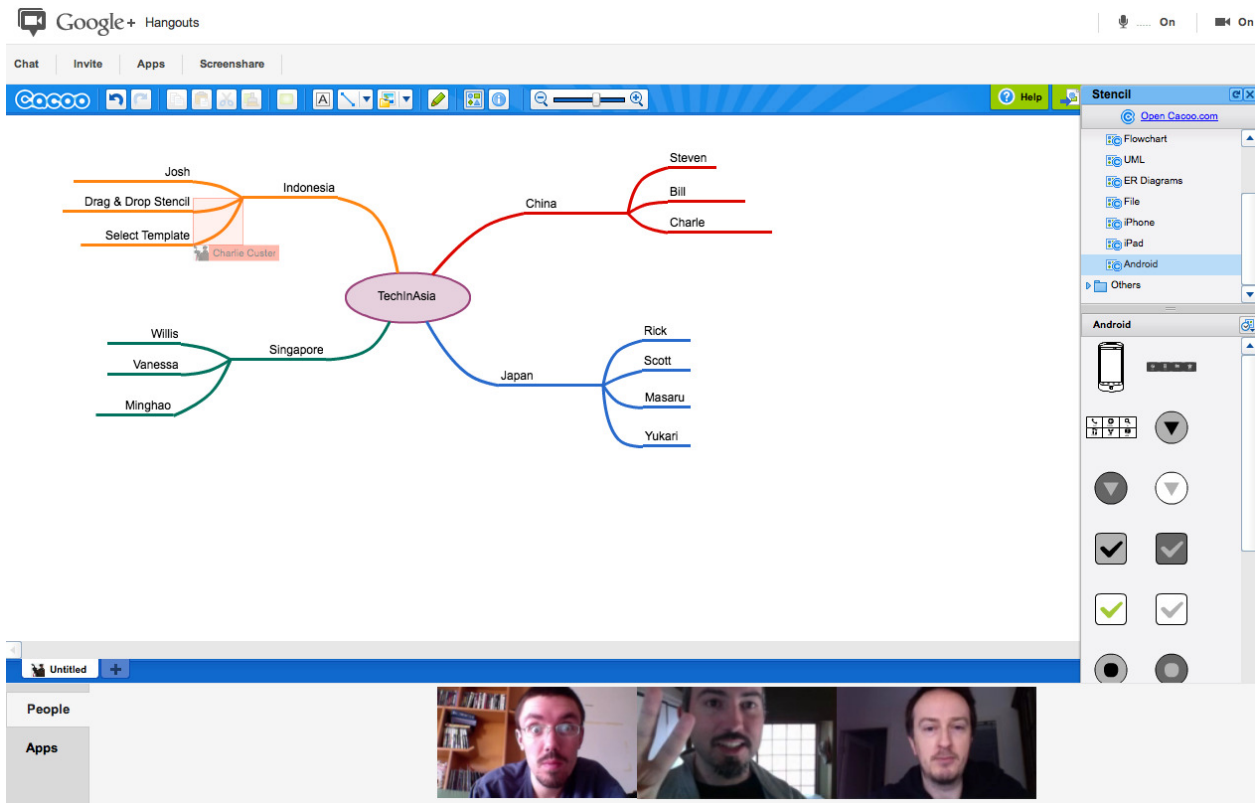
to 'overlook' the remote student whom is tied to the class through the 'small screen'. The experience can also be 'tainted' when during a class of 'live' students the instructor has to pause and 'fiddle' with the computer/table/electronics due to some technical issue – easily building resentment in the live students toward the virtual one. The example of a Kubi class/instruction can be seen in the photographs below:



Due to the images being a 'copy of a copy' in which the camera is recording an image projected on a tiny screen; the resolution of the student's faces is diminished. This is unfortunate as the whole purpose is to capture/experience the small nuanced communication occurring in facial gestures & body language to build rapport. When compared with Google's Hangouts, the primary speaker is shown large while the other attendees are shown in smaller windows:



Because the images are only a 'single generation' (and not a copy-of-a-copy) the quality and ability to view the nuances of facial gestures and body language are vastly improved. In addition, the presenter can share an application window (not necessarily the whole screen – which then blocks the visuals of the other students with the Kubi/WebEx approach) of their presentation or White Board area with the class and still see the feedback from the students (as shown below):



Technical Comparison

When dealing with this type of virtual classroom presence, it is desired that the technical aspects be reduced/minimized such that the experience is 'seamless'. Serious limitations can occur due to the hardware limitations of the iPads (such that the cameras can't zoom in and the microphone/speaker arrangement is not optimized for this application without additional equipment). Due to the variety of higher-end equipment (cameras, speakers, microphones) that can be connected to the teacher's computer and the reduced need for multiple windows/apps, some of the limitations can be overcome with Google Hangouts.

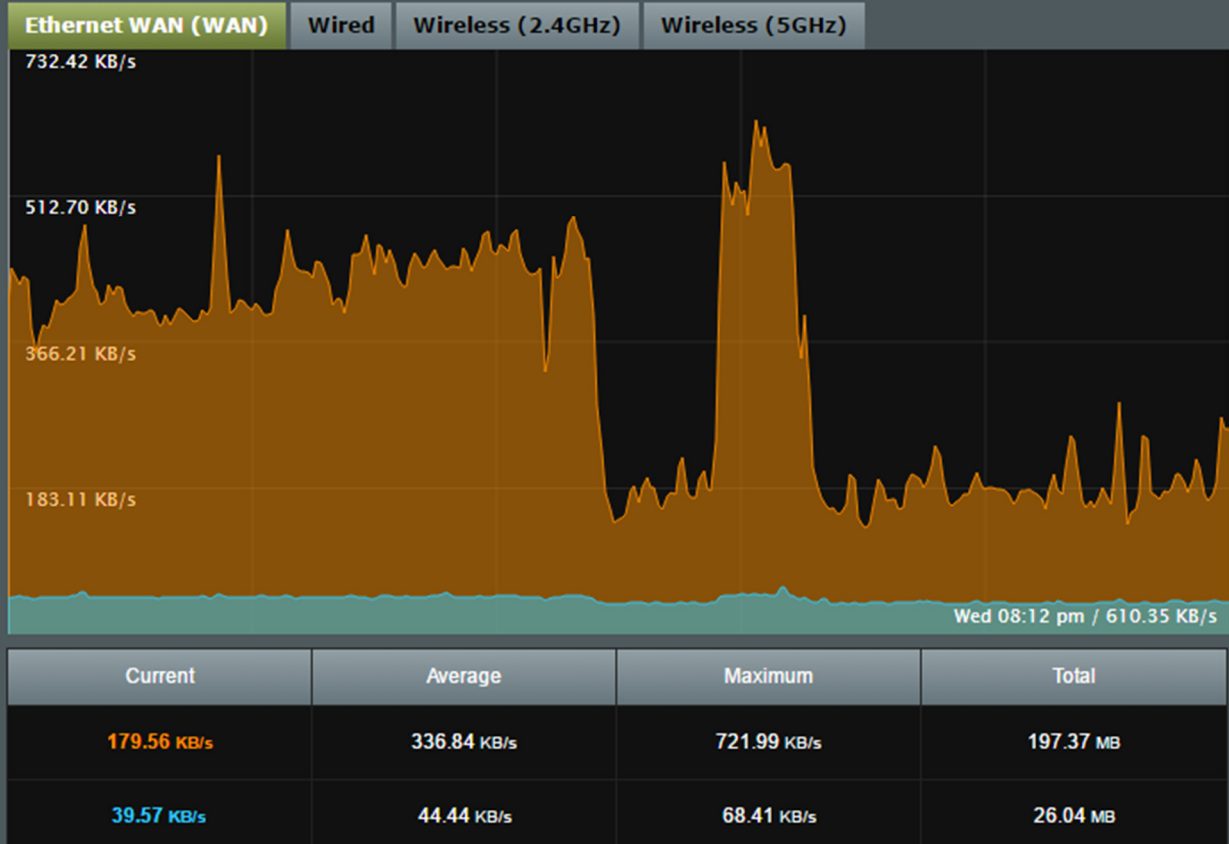
Another consideration that has a dramatic impact on the overall experience is the amount of bandwidth necessary for connectivity to the classroom experience. If high internet bandwidth is needed – the overall experience might be greatly reduced if the students are connected via WiFi (which is quite typical) with the only improvement necessitating a 'hard-wired' connection. Conferences were held with both a Kubi/WebEx multi-screened session (which averaged an incoming requirement of 450 KB/s when quality was smooth and 200 KB/s when quality of choppy/sporadic) and a typical Google Hangouts session (which averaged around a 175 KB/s incoming/outgoing bandwidth in which the session was continually smooth but video quality fluctuated between "8-bit-blockish" and very clean images) and the bandwidth of each shown below:

	Internet	Wired	Wireless
Reception	Incoming Internet packets	Incoming packets from wired network	Incoming packets from wireless network
Transmission	Outgoing Internet packets	Outgoing packets to wired network	Outgoing packets to wireless network

NOTE: Packets from the Internet are evenly transmitted to the wired and wireless devices.

Note: When NAT Acceleration is enabled, the wired network traffic bypasses the CPU, which may affect the accuracy of Traffic Monitor. Click [HERE](#) to disable NAT Acceleration.

[Traffic Monitor FAQ](#)



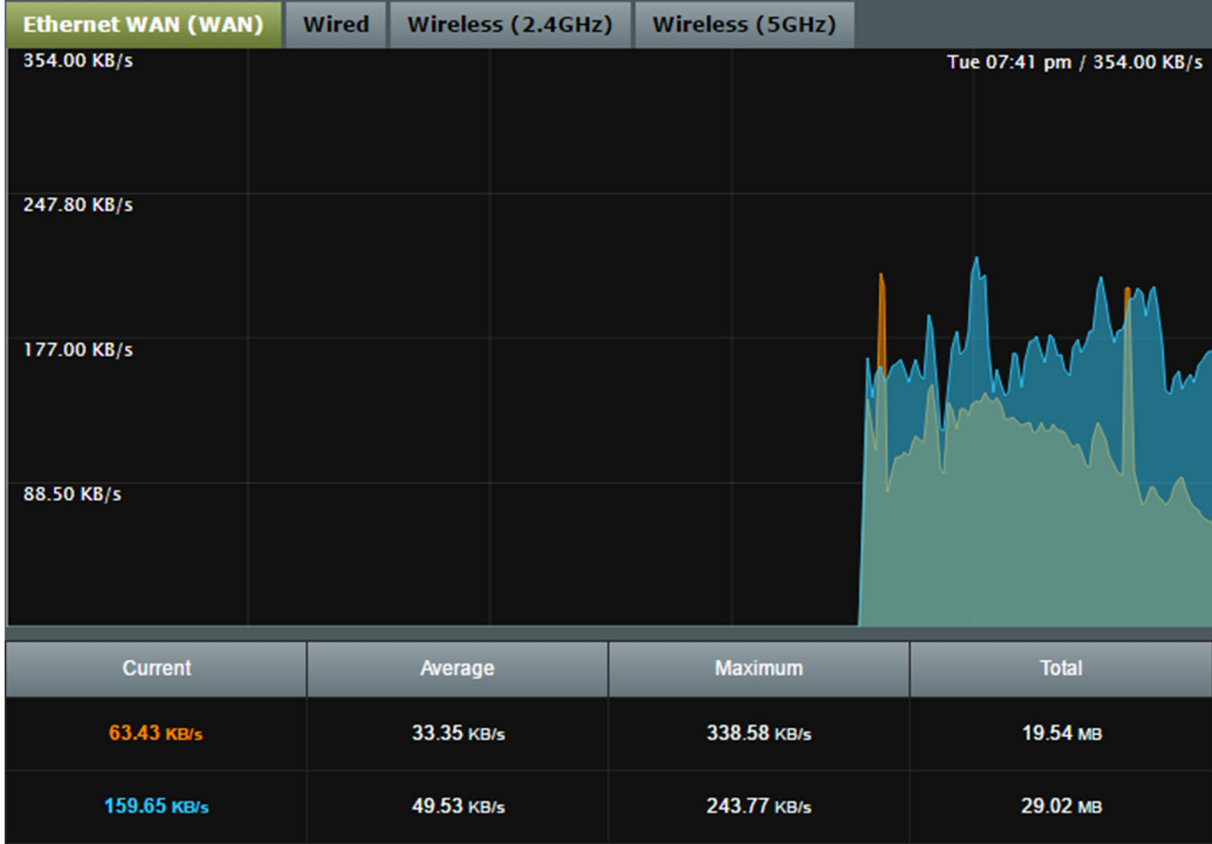
2 Bandwidth during a Kubi/WebEx Session

	Internet	Wired	Wireless
Reception	Incoming Internet packets	Incoming packets from wired network	Incoming packets from wireless network
Transmission	Outgoing Internet packets	Outgoing packets to wired network	Outgoing packets to wireless network

NOTE: Packets from the Internet are evenly transmitted to the wired and wireless devices.

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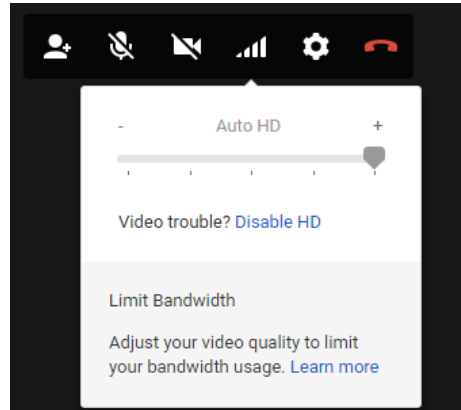


3 Bandwidth during a Google Hangouts Session

Conclusion

When introducing the idea of 'virtual students' into a learning environment, it is essential for the instructor to create a presence of themselves and champion the presence of the virtual student (that can easily be overlooked). It is also very desirable to utilize equipment & technology that require minimal setup, teacher interaction, and technological resources (especially Wi-Fi bandwidth). From the above listed aspects, it appears that Google's Hangouts application holds a superior position due to:

- Single Window/App showing both the visual/faces of the teachers/students consistently and the presentation/black-board
- Reduced internet band-width required (along with the specialized 'Bandwidth Adjust Controls' located with the Google's Hangouts application)
- The ability to much better visually see the other attendee's facial expressions, ticks, and body language (due to the lack of 'copy-of-a-copy' video).



4 Google Hangouts - Bandwidth Adjust controls

I believe that both systems can be greatly improved if all of the students utilize over-the-ear headsets with microphones that are close to their mouths (like that of an old-style phone operator).

From a 'total number of participants' standpoint – while it would appear that you could have an unlimited number of Kubi attendee's, the physical spacing requirements necessary (and the sheer expense) to have a large number of Kubi Telepresence robots is greatly overshadowed by the free cost of the Google Hangouts platform (which is currently limited to 9 attendees that can interact with each other but with a large audience watching) per session (since just about everyone has a smartphone capable of running the Hangout app). While it has probably been superseded, Google hosted their Summer 2014 Admin Training week in which more than 10,000 administrators expected to join in nine sessions (and touted as the 'Largest-ever Hangout on Air event') (Admin, 2014).

Works Cited:

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