DIGITAL TOOLS TO IMPROVE INTERNATIONAL COLLABORATION AND DISTANT EDUCATION

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ABSTRACT

The advent of rapid technological change within Sub-Saharan Africa's changing socio-economic setting is driving the need to utilize elements of technology to make progress within the sectors left behind. Education is one of these sectors. With a literacy rate among individuals 15 years and older at 64% (UNESCO, 2015), change is needed. This paper explores some of these technologies and the role they can play in curbing challenges faced in education in Africa. At this time, demand for education outweighs supply of qualified personnel and facilities available. Distant learning and collaborative technologies present the opportunity to accommodate this disparity and reach a greater number of students while delivering the educational experience they lack. This paper reviews the extant literature on education and distant technologies while congruently considering a case study on an on-going collaborative design project between students at Ashesi University, Ghana and Brown University, USA. It also employs views from key stakeholders in the educational space on opportunities the aforementioned technologies can provide for educational institutions on the continent. Analysis of these findings revealed, among other insights, the immense benefit technology plays in the facilitation of cross-cultural communication, sharing ideas across disciplines and ultimately dissolving physical barriers in learning. This paper explores some of the technologies that make this possible and makes recommendations for implementation.

Keywords: Education Technologies, Distant Learning, Cross Cultural Communication

1. Introduction

Technological advancement has played a disruptive role in many industries and sectors in the world today, changing century-long ways of doing things (Fridman, 2016). Education is one of these sectors technology is rapidly revolutionizing (Bloomberg, 2016). It has eliminated the need for movement, made information accessible from any part of the globe and ushered in an era of collaboration and transparency, ultimately promoting community through education. Technology will continue to disrupt and change the way stakeholders in education perform their duties and interact with each other. However, for a long time Africa has fallen behind in the technology race (Njoroge, 2014). Lack of infrastructure and low literacy levels have made it difficult for the disruption of technology in this well-endowed continent. Nevertheless, as we approach the end of the second decade of the 21st century, this problem is beginning to evaporate. Leaps in development in infrastructure, thriving economic growth and increasing literacy levels are telling the story of a new Africa.

Technology is quickly finding its feet on the continent and sectors such as banking and commerce are already feeling the effects of the disruption of technology. The old African education model is undergoing changes brought about by the presence of technology and this various digital tools must be fully harnessed in order to enable technological disruption in the African educational sector. A disruption that would see more collaboration and sharing of ideas to develop more capable Africans ready to tackle even the most intractable problems.
2. Research objectives
The aim of this research is to:
- Identify key digital tools that can be used in educational institutions to improve quality of education as well as examine how they could be used.
- Highlight a case study of cross-border collaboration between educational institutions in different countries with key lessons learned from this endeavor.
- Lay the groundwork for further research into the implementation of the aforementioned digital tools to play a role in the new African education model.

The above key aims serve as the guide for this research and highlights the key areas this paper will explore.

3. Statement of the Problem
They main problem this research seeks to address is the lack of innovation and cross-border collaboration in the traditional African education model. As Kevin Watkins mentions in his article, the traditional African education model consists of learning that encourages rote memorization and a focus on individual rather than collective success (Watkins, 2013). Curriculums that reward the aforementioned memorization and individuality, stifle the expansion of ideas in the minds of learners. For some, external collaboration between institutions is almost nonexistent. All these contribute to the inadequate innovation in the traditional African education system and affect the ability of our educational institutions to produce creative and well-rounded individuals armed with critical thinking and analytical skills to tackle some of Africa’s most intricate problems. This brings to notice the earlier stated problem of a lack of innovation and cross border collaboration in the traditional African education model.

4. Literature Review
A review of the literature on the subject uncovered digital tools that can be used in the educational setting and the many benefits they provide for learning. It also brought to notice the growth in the mobile economy in Sub-Saharan Africa which supports the use of digital tools in educational institutions. The following provides key enablers of the use of digital tools in sub-Saharan Africa:

1.1 The growth of the mobile economy in Sub-Saharan Africa
The growth of the mobile economy and internet use in Africa is one of the key enablers of the use of digital tools in educational institutions in Africa. 4G is gaining traction in several early-adopter markets particularly Angola, Mauritius, Namibia and South Africa. 4G adoption for the region as a whole will rise to account for 6% of connections in 2020. (Intelligence, 2016)
As can be seen from Fig 1.1 4G and 3G connections are on the rise in Sub Saharan Africa, with the latter projected to represent 51% of connections by 2020. The growth of 3G connections in Sub-Saharan Africa largely reflects the rising smartphone adoption rate, which has doubled in the last two years to 20% of total connections. In comparison, the global average is just over 40%. The adoption rate, which is set to accelerate further to one-third of connections by 2017 and more than half by the end of the decade, is benefitting from the increasing availability of low-cost devices (Intelligence, 2016). In addition to the growth of 4G and 3G connections and smartphones, there is growing investment in infrastructure by mobile operators to expand network connectivity across the region. Mobile operators in the region invested $9 billion in network infrastructure development in 2014, equivalent to 21% of revenues. This was a 16% increase on the amount invested in 2013. In recent years, capex growth has been driven by mobile broadband network deployments (Intelligence, 2016).
Operators across the region continue to invest heavily to expand network coverage and deploy mobile broadband networks. With quality network covering greater areas, individuals previously excluded from the digital revolution brought about by the internet would now have an opportunity to play an active role.

The combination of all the above lay significant groundwork for the use of technology in the educational sector as a greater number of individuals would have access to it. This is a signal of the ongoing technological change in Africa and the opportunity to redesign our educational models to incorporate elements of technology to foster innovation and cross border collaboration.

2.1 Digital tools available and their potential significance in a new African education model.

This subsection will look at 5 digital tools; Google Docs, Google Hangouts, Dropbox, Trello and Slack, their usefulness in the educational setting.

**Google Docs**

Google Docs is a free Web-based application in which documents and spreadsheets can be created, edited and stored online. Files can be accessed from any computer with an Internet connection and a full-featured Web browser. Users can control who sees their work. Google Docs lends itself to collaborative projects in which multiple authors work together in real time from geographically diverse locations. All participants can see who made specific document changes and when those alterations were done. Because documents are stored online and can also be stored on users' computers, there is no risk of total data loss as a result of a localized catastrophe. Google Docs can be used by teachers to share documents with students and have them work real time on the document collaboratively such that at the end of the activity, everyone can clearly see progress made as a class thereby promoting teamwork and collectivism.

**Google Hangouts**

Google Hangouts is a unified communications service that allows members to initiate and participate in text, voice or video chats, either one-on-one or in a group. Video conferencing is a great way for remote stakeholders in education to engage each other and share ideas, thereby nullifying the distance barrier. It is low cost as it can be run simply with a phone and an internet connection. With Hangouts, students are able to interact with other students in other institutions to collaborate on projects and share ideas to aid the respective parties develop better ways of looking at concepts and ideas. Video conferencing using Google Hangouts could represent a new means of collaboration in the new African education model.

**Dropbox**

Dropbox cloud-based service that offers users, an online backup service, free file syncing, and the ability to share files with others. Changes to files are backed up online, and can be accessed from any computer with internet access. The whole process is automated. Dropbox provides many benefits in the new African education model offering teachers and students up to 2 gigabytes free storage to sync and store files. It can be a life saver especially when the computer crashes and work is lost. Students can use Dropbox to submit assignments and store e-portfolios. They simply share the file with the instructor who then reads the file, comments and annotates areas for the student to take note. The student can always refer to these corrections any time they need to. Google Drive is also a very similar cloud storage service that can be used.

**Trello**

Trello is a collaboration tool that organizes your projects into boards. In one glance, Trello tells you what's being worked on, who's working on what, and where something is in a process.
Trello would be a very valuable tool in planning and managing academic projects between students and faculty. It is a free service that can be used across a wide range of devices from laptops to tablets and even smartphones. The simplicity of the software’s interface allows one to see project progress at a glance thereby making it user friendly and ideal for projects at an educational level.

**Slack**

Slack is an instant messaging and collaboration system that helps individuals in an organization keep track of their communication by categorizing them in ‘channels.’ Originally created to help streamline business communications, the application offers a lot of usefulness in an educational setting. Teachers at the University Of Ontario Institute Of Technology used Slack as an alternative communication method to post notes from lectures, assignments and project documents. The use of slack proved very useful as it increased student participation to levels higher than when in class discussions and emails were primarily used (Software Quality Research Lab Blog, 2015).

### 3.1 Impact of the use of digital tools in educational models

The socially-based tools and technologies of the Web 2.0 movement are capable of supporting informal conversation, reflexive dialogue and collaborative content generation, enabling access to a wide raft of ideas and representations. Used appropriately, these tools can shift control to the learner, through promoting learner agency, autonomy and engagement in social networks that straddle multiple real and virtual learning spaces independent of physical, geographic, institutional and organizational boundaries (McLoughlin, 2010). As web based multimedia production and distribution tools incorporating text (blogs, wikis, Twitter), audio (podcasting, Skype), photo (Flickr) and video (vodcasting, YouTube) capabilities continue to grow, tertiary education institutions are faced with ever expanding opportunities to integrate social media and technologies into teaching, learning and assessment (McLoughlin, 2010). Many social software tools afford greater agency to the learner by allowing autonomy and engagement in global communities where ideas are exchanged and knowledge is created as students assume active roles (Lee, McLoughlin & Chan, 2008; Ashton & Newman, 2006).

The learning experiences that are made possible by social software tools are active, process based, anchored in and driven by learners’ interests, and therefore have the potential to cultivate self-regulated, independent learning (McLoughlin, 2010). Though web based learning environments lend themselves to self-regulated learning approaches (e.g. inquiry based learning, problem based learning), new tasks and concepts impose numerous demands on learners (Narciss, Proske & Koerndle, 2007). As a counterbalance, personalized, learner centred design offers a dynamic perspective that incorporates pedagogical scaffolds to support novice learners to learn and apply previously unknown thinking strategies, skills and practices (Aleven, Stahl, Schworm, Fischer & Wallace, 2003).

Internationally, there are a growing number of designs for tasks and learning environments that seek to achieve a balance between self-regulated and personalized learning and scaffolding support, while integrating Web 2.0 tools as well as the production, sharing and use of student-generated content. Table 1 in Appendix A provides a number of examples, drawn from the exemplary practices of teachers at tertiary institutions across the globe (McLoughlin, 2010).

While the international examples in Table 1 provide good working models of self-regulated and personalized learning, educators need to be equipped with principles and guidelines that can be applied in diverse contexts. How can the ‘ideal’ balance between scaffold and learner-directed learning activities and tasks be achieved? What role should technologies, including but not limited to the ever-expanding and evolving raft of Web 2.0 and social computing tools, play in this process?
Jonassen (1994) maintains that the real challenge facing educational technologists is to consider instructional goals in a particular context, then to adjust the strategies, models and tactics as necessary to attune the nature of the task to the perspective of the student.

5. Design/Methodology/approach

Having conducted sufficient secondary research around the topic, this section seeks to analyze case study involving the use of the aforementioned digital tools for international collaboration in a design project at Ashesi University College. The project enabled students to control their own learning by creating an open ended discovery environment and the absence of instructional support. Students had to manage their own self direction, knowledge construction and independence by making available options and choice while supplying the essential structure and framework.

Ashesi Design Lab Deep Dives Project

Project Introduction

The Ashesi Deep Dives Project is a social innovation project in collaboration with Burro Brand and Brown University, USA that seeks to identify opportunities for product development in emerging markets. This particular period of the research focused on rural communities specifically the Berekuso village close to Ashesi University.

Brief Background of Research Space - Berekuso

The town of Berekuso is located in the Eastern Region, next to the Ashesi Campus. It is a farming community with pineapple and maize some of the main products of this endeavour. Businesses in Berekuso include a block maker, ‘convenience stores’ that sell household provisions, reprographics store, hair salons and a solar kiosk that sells solar products and small provisions. Farming is a source of income for some inhabitants of Berekuso who sell their harvest to local market personnel out of the town some from Agbogbloshie and Kaneshie market. There is a school in the town that takes students from the basic level to the junior high school level. A health center can also be located in the town and deals with relatively minor issues like childbirth, vaccinations and malaria treatment.

Selecting specific problem area

Having identified a number of problems in the rural community, we decided to narrow down on one particular problem we wanted to explore and solve with an opportunity for product development. We did this together with the engineers from Brown University and Patchi Dranoff of Burro as we needed to agree on a problem area that would be good to start with, considering the constraints. We settled on improving the way individuals carry items around the village, looking closely at water transportation. “How can we develop a product to make domestic transportation easier and more convenient?” is the question we sought to answer. The ultimate impact we were looking for was an easier, more secure system/product to carry more.

The Project made use of collaborative technology such as Google Docs and Google Hangout to facilitate interactions between the Ashesi Design Lab Team in Ghana, Brown University Engineers in the USA and Burro Brands’ product design fellow also in the USA. The team had weekly calls schedule using Google Calendar and the actual calls taking place using Google Hangouts. Google Docs was significant in the sharing of research findings and idles between the three parties and for keeping track of the project going forward.
Project outcomes as of end of April
As of the end of April, the project yielded an analysis of the transportation value chain in Berekuso, one physical prototype of a carrier device developed by both Ashesi and Brown University students on the team. The team also obtained data on the different person as that can be found in Berekuso and their thoughts on samples of carrier designs displayed to them. This enabled Burro to better understand what a carrier device in rural areas such as Berekuso could look like as well as the different costs and gains in the value chain associated with domestic transportation within Berekuso. A document was produced and shared with Burro personnel containing all details and findings obtained from the research. That document, shared on Google Docs was the starting point for further research to be carried out by another design team.

6. Final Analysis and Discussion
The project was very successful in that the students involved were able to get through a significant measure of the design process over the time period. This was helped greatly by the collaboration with the students from Brown University to share ideas. One key concept in design thinking is that of mental models, the explanation of one’s thought process. The mental models of the engineering students from Brown University and the design students from Ashesi University helped represent new ideas when thinking through the project and looking for solutions. The Brown University engineers engaged in rapid prototyping while the Ashesi Design Lab students performed more ethnographic research to better understand the problem and offer a helping hand in finding solutions.

This enabled the project to move smoothly as the team was able to test ideas as they moved forward. Digitals tools of Web 2.0 made this cross border communication easier and more effective and ultimately allowed both of students to engage in their own controlled learning with next to no direct instructions from faculty. Students in both teams were able to grow personally as they gained new ideas and ways to look at it from interacting with individuals with a different cultures and thought process on a local problem without having to physically be in the same location. Table 2 in Appendix B makes use of the model used in Table 1 above to outline the digital tools used and the specific ways in which they aided the team in successfully completing the project.

The questions, “How can the ‘ideal’ balance between scaffolded and learner-directed learning activities and tasks be achieved?” and, “What role should technologies, including but not limited to the ever-expanding and evolving raft of Web 2.0 and social computing tools, play in this process?” came up earlier in the literature review. Driver, Asoko, Leach, Mortimer and Scott (1994) are in concurrence with the view of Jonassen (1994), adding that teachers have two roles: Firstly, a supportive role in introducing new ideas, or cultural tools and supporting students in making sense of these for themselves, and secondly, a diagnostic role in continually examining students’ interpretations of activities in order to help determine an appropriate direction for subsequent steps.

Thus a major role of the teacher is arguably to facilitate this dynamic learning process, assisting learners in drawing their own links between their learning world and the ‘real world’; other roles may be that of ‘consultant’, ‘guide’ and ‘resource provider’ (Markel, 1999). Much like how the Ashesi and Brown University students had adequate comprehension of the design process before commencing the project, moving towards the personalization of learning environments also entails aiding learners in developing the fundamental skills that enable them to manage their own learning (McLoughlin, 2010).
Despite the abundance of good practice examples there continue to be significant gaps in teachers’ espoused and enacted learner-centered pedagogies (McLoughlin, 2010). In the Web 2.0 era, the need to close these gaps to achieve truly student centered learning is paramount, as learners, more so than ever before, desire and demand high degrees of autonomy, connectivity and socio-experiential learning (McLoughlin & Lee, 2008). Fortunately, Web 2.0 gives educators access to a variety of services and applications to tackle the aforementioned challenges by giving the learner the opportunity to determine how best to set learning goals and to create adequate environments to support them. This would help improve creativity, innovation and collaboration in our educational institutions and develop individuals well equipped with skills to solve problems.

7. Conclusions and recommendations

In this article, it has been argued that digital tools and technologies should be implemented into current educational models in Africa. These technologies help foster creativity and innovation through cross border collaborations and a personalized approach to learning. As online or Internet based learning is now the mode of learning for many students globally, there is an often an expectation that students commence university study with reasonably high levels of digital skills to enable them to negotiate, interact and access resources independently (Lorenzo & Dziuban, 2006; Katz & Macklin, 2007).

Also, as noted in many recent reports, the dispositions developed through engagement with Web 2.0 and social software technologies – i.e. communication skills, participation, networking, sharing – overlap with what are viewed as essential 21st-century learning and employability skills (Punie, Cabrera, Bogdanowicz, Zinnbauer & Navajas, 2006; Jenkins, 2007; CLEX, 2009). It is therefore very important that technology becomes a pillar in the design of our educational models as they offer more opportunity to develop a highly capable African workforce, when implemented properly.

Universities and colleges are being advised to implement both the infrastructure and the curriculum changes to maximize the potential of the new tools to support learning by capitalizing on the competencies and skills students bring into the classroom, while at the same time helping them obtain the attributes and capabilities to prepare them for work and life in the digital economy and networked society (see Brown & Adler, 2008; Kennedy et al. 2009).

The challenges for educators are complex and multifaceted, and include the provision of personalized learning experiences using suitable technologies that cultivate independent learning skills, while also scaffolding learner reflection and the development of generic competencies. The pedagogical change that is required involves not only the espousal of appropriate teaching approaches, but also awareness of the learner experience, and the importance of valuing learners’ pre-existing skills and capitalizing on them, while exploring and integrating social media in ways that pave the way for participation, community connections, social interaction and global networking (McLoughlin, 2010).

They must also be very aware of privacy issues which is existent with using online technologies as well as a potential reluctance of students to allow them into their social network space and community.

Nonetheless, the need to rethink our educational models cannot be overstated as, pointed out in this article, there exist tremendous potential to significantly increase results of efforts to educate young Africans by the introduction of technology and software to foster innovation and collaboration both within and out of institutions.
8. Suggestions for future research
Future research will focus on measuring the ‘before’ and ‘after’ of the state of the players so as to properly document the changes in their online/media habits or expertise at the end of the project. Further, carrying out more educational projects using technologies as a pillar would greatly help the topic being discussed as it would illustrate another instance of the use of technologies to personalise learning and share ideas thereby shedding more light on the benefits and potential pitfalls of implementation. This would go a long way to identify the best way to usher new technology into our educational spaces and cause the disruption that needed to have happened years ago.

9. References


## Appendices

### Appendix A - Table 1

<table>
<thead>
<tr>
<th>Institution and Location</th>
<th>Reference</th>
<th>Context</th>
<th>Self-regulated learning and scaffolding/ support</th>
<th>Personalization</th>
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<tbody>
<tr>
<td>Fashion Institute of Technology, USA</td>
<td>Harris (2007a, 2007b)</td>
<td>Students studying an art history class visit the Metropolitan Museum of Art in New York City, where they take photos of exhibits using mobile phones, upload them to Flickr, and use the site’s tools to tag, annotate and write descriptions and comments about the photos.</td>
<td>Students engage in learning tasks with a high degree of autonomy and freedom, as they mix and match content and create games and challenges for one another. Task scaffolding is provided by the instructor by using technology to enable expression of multiple perspectives and by mediating peer interaction.</td>
<td>Personalization and customization of tasks ensures that students remain motivated, i.e. they have a personal voice in making commentaries and in choosing descriptors to tag the photos. Peer to peer content sharing adds a collaborative dimension while still allowing individual reflection and achievement.</td>
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<td>Victoria University of Wellington, New Zealand</td>
<td>Elgort, Smith &amp; Toland (2008)</td>
<td>A mixture of on campus and distance education students enrolled in a Master of Library and Information Studies (MLIS) program work in groups to collaboratively produce web based information resource guides using a wiki.</td>
<td>The groups work autonomously to produce three deliverables based on instructor supplied guidelines: the resource guide (a web site providing links to / evaluations of information resources); presentation of the completed guide to the class; and an online journal in which students document their work processes and reflect on their personal contributions.</td>
<td>Each group of students chooses a topic that is personally meaningful, relevant and/or interesting to its members. The students also have flexibility in terms of their ability to personalize the content and the way it is presented using a range of digital media types.</td>
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<td>Bentley College (now Bentley University), USA</td>
<td>Frydenberg (2006)</td>
<td>Students studying an information technology (IT) fundamentals course purchase Pocket PCs instead of textbooks, which they use to explore IT concepts in a hands on, learner centred approach. They form pairs or groups and work</td>
<td>Each pair group has to work largely independently, with each member managing and regulating his/her own learning while also contributing to the overall management/ coordination and direction of the group. The instructor makes available a number of sample assignments for the students to choose from.</td>
<td>In addition to being able to select topics of personal interest and/or significance for presentation to their peers, the students can consume the content at times and places of their choosing, using a range of devices (including mobile/portable devices) that incorporate vodcast playback capabilities.</td>
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<td>Institution</td>
<td>Authors</td>
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<td>The Open University of Hong Kong, China</td>
<td>Lui, Choy, Cheung &amp; Li (2006)</td>
<td>Students studying a year-long Software Engineering and Project Management course are required to write reflective blog entries in response to stimulus questions. The blog sites are used both as knowledge sharing and personal work/information spaces.</td>
<td>Students work at their own pace and express ideas in their own style through blogs and wikis. The creation of eportfolios also documents each student’s personal learning achievement and thereby supports personalization.</td>
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<td>University of Leicester, UK</td>
<td>Edirisingha, Salmon &amp; Forthergill (2006, 2007)</td>
<td>Second- and third year undergraduate engineering students make use of ‘profcasts’, i.e. material designed to support learning distinct from that which is facilitated through structured on-campus or elearning processes alone.</td>
<td>Students learn independently by choosing profcasts that are relevant to their needs. Scaffolds include resources created by the instructor, and contexts where students can apply new knowledge. Weekly profcasts are released to supplement online teaching through updated information and guidance on the assigned activities for the week, and to motivate students through the incorporation of relevant news items, anecdotes and jokes. A framework based on Salmon’s (2002) activities model is used to foster active learning.</td>
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### Appendix B - Table 2

<table>
<thead>
<tr>
<th>Digital Tool</th>
<th>Purpose</th>
<th>Self-regulated learning</th>
<th>Personalization</th>
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<tr>
<td><strong>Google Docs</strong></td>
<td>Brown University and Ashesi Design Lab students used the application to facilitate sharing of documents and reports for every member of the team to see</td>
<td>The team frequently shares findings and concept designs using the application and this enabled each party to access the information to be used anywhere. On one occasion the Ashesi Design Lab students were able to access the document while out in the field doing field research</td>
<td>Each team chose the information they wanted to share as they saw suitable and as agreed with the other team to achieve progress in the project. Ashesi Design Lab students could collect findings and place it directly into a document to be shared. Team members could share findings and information as they saw fit</td>
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<td><strong>Google Calendar</strong></td>
<td>Meeting times were scheduled using Google Calendar</td>
<td>Self-directed learning is encouraged by students agreeing on and setting the appropriate meeting times to be shared with all other members of the team. The application helped coordinate meeting times considering difference in time zones between the U.S and Ghana</td>
<td>Team mates could attach personalize notes to calendar invites and events that helped other members be aware of relevant information to be discussed at the meeting. Students could also easily be made aware of meeting times and fit it in with their personal schedules</td>
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<td><strong>Google Hangouts</strong></td>
<td>The application was used to facilitate meetings between the Ashesi team in Ghana and the Brown University team and the Burro Brand personnel in the U.S</td>
<td>Student team members where wholly responsible for attending meeting times as previously set using Google calendar. Support was given by the Burro Brand personnel to ensure key information is passed unto both teams from Burro Brand. These virtual meetings proved very essential to the success of the project and as such students made it a point to be present even though there were no sanctions on being absent</td>
<td>Students could attend meetings from anywhere with an internet connection using a device of their choice. They could raise up issues they felt were important during the call and freely and confidently offer views and perspectives on issues raised during meeting. They could also offer to be made responsible for key deliverables at the next meeting</td>
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<td><strong>Google Drive</strong></td>
<td>The application served as the central location for the storage of all files related to the project including media (pictures and videos) and documents</td>
<td>Team members were responsible for updating project drive with documents relevant to the project. The Drive was created and managed by team members.</td>
<td>As with Google meetings, team members could access the drive to obtain files on any device and form anywhere with a working internet connection.</td>
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## Tools that could have been used to enhance the project

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<thead>
<tr>
<th>Tool</th>
<th>Description</th>
<th>Benefits</th>
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<tr>
<td><strong>Trello</strong></td>
<td>This application could have been used to manage the all facets of the project and serve as a central location for planning project steps and direction.</td>
<td>Once again team members would be responsible for setting up the Trello management account and keeping the project moving forward by setting next steps for the team. Team members are able to create tasks to be undertaken and can approve it a task is completed. Other team members can also create and post comments on tasks. The application can be accessed on PC, tablet and smartphone from anywhere with an internet connection. Team members could personalize their accounts and visual design of project overview interface.</td>
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<tr>
<td><strong>Slack</strong></td>
<td>This could have helped organize team communications into channels to help keep track of relevant conversations by categorizing them. It could also serve as a good form of communication outside of virtual meetings via Google Hangouts.</td>
<td>Team members would be ultimately responsible for the success of communication via Slack by responding to messages from and contacting other team members to share ideas or obtain clarification on an issue. Team members could also choose which members they wanted to directly contact using the application. Team members could use slack on any device with an internet connection and could personalize the channels within which the communication takes place to help them keep track of key information.</td>
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