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Using Cloud Collaboration for Writing Assignments by Students with Disabilities: A Case Study Using Action Research

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Abstract

Though separated by geographical distance, a student with disabilities, his advisor, and his writing coach consorted in the Cloud using Google applications to achieve a writing goal. Our scenario demonstrates how emerging technologies can bridge transactional distance and "virtually" supplant face-to-face conferencing around a college writing assignment. Individual levels of technical acumen with digital technology evolved to bridge the psychological and communication space between the student and his instructors. As a result, the telecollaborators developed an efficient coaching process adaptable for all students who need assistance in revising college writing assignments at a distance. Action research frames our discussion of the Cloud collaboration and provides a scaffold for student autonomy. The advantages as well and disadvantages of Cloud collaboration are outlined with reference to the National Institute of Standards of Technology definition of Cloud Computing and the Seven Principles of Universal Course Design.

Keywords: transactional distance; cloud collaboration; telecollaboration; students with disabilities; college writing; action research

Introduction

The use of Cloud technology in higher education continues to grow. Cloud Computing is defined as "a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011, p. 2). The use of this often free technology to facilitate student-faculty communication and improve writing skills at the college level continues to be explored. The active involvement of all telecollaborators, including a student with disabilities, his advisor, and his writing coach, in our exchange prompted an identification of our methodology as participatory action research because the effort evolved as co-research contributed by and for those who are helping and being helped (Wadsworth, 1998). Views of the process will be shared by Keane (advisor) and Russell (writing coach) in a framework of action research developed by Lewin (1946). Lewin viewed action research as spiral of steps, "each of which is composed of a circle of planning, action and fact-finding about the result of the action" (p. 38). Step-by-step, the triad progressed toward their goal of helping a student with disabilities write an individualized degree planning essay.

Cloud-based technology can bring students and faculty together in a personalized and motivating learning environment: an ambitious, but attainable goal. To this end, we sought answers to the following questions: Are there particular ways in which neurologically impaired students may benefit from instruction delivered via the Cloud? Is there potential for Cloud-based technology to bridge the transactional distance gap with students without disabilities?

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Limitations particular to any disability impact telecollaboration processes with students who have disabilities. In this study, the student's limitations stemmed from cerebral palsy, a condition that affects him physically. He received assistance from Empire State College's Office of Disability Services in identifying technologies that would fit his specific communication needs. However, the student also worked independently, through trial and error, to find free or low cost applications to assist with his schoolwork.

All students at Empire State College design an individualized degree plan with their advisor, typically as part of a two-credit semester-long course called Planning and Finalizing the Degree. Students must complete a major essay in accompaniment with the individualized degree plan, and segments of the essay are broken down into module assignments. Once the student with disabilities had begun his Planning and Finalizing the Degree course, his mentor and writing coach joined him in moving forward to find telecollaboration options to assist him. Ultimately, the student settled on the Google suite to aid his communication as well as his writing. Through his instigation, the student's advisor and writing coach became familiar with Google Cloud capabilities. Technical challenges were faced and surmounted during the learning process that evolved to build early metaliteracy skills for the triad. As Mackey and Jacobson (2011) redefine metaliteracy, "it places a particular emphasis on producing and sharing information in participatory digital environments" (p. 63).

Embrace the Cloud

This promising practice reviews our telecollaboration process, along with the technical challenges and learning that resulted from the effort. It is important to note that the particular writing assignment in our case provided an exceptional opportunity to explore the Cloud. Because the essay content was dependent upon the student's course preferences and career goals, only minimal grading and judgment occurred; there were no wrong answers. Also of note, there was an ongoing observation of a significant reduction in transactional distance between telecollaborators (Moore, 2007). In addition, the virtual exchange evolved into a new and more productive realm by the student himself despite, or perhaps because of, his disabilities.

As presented in Smith (2007), Lewin's 1946 Action Research chart provided a step-by-step process used to help the student with disabilities reach his writing goal. As the triad continued their collaboration, the following steps emerged to illuminate the case history:

I. Identifying an Initial Problem

The student with disabilities, who had been working with his advisor on conceptualizing and revising a major essay assignment, requested additional help from the College's writing coach. Not unlike many of today's students, he conducts most of his communication outside of a classroom, untethered by a computer. Although it was necessary to use his computer to read content and submit assignments, he routinely dictated assignments on his mobile phone using a speech to text program. For this student, recording content verbally was a standard practice, as he is disabled with spastic cerebral palsy, a neurological handicap that affects his speech intelligibility and slows his typing speed considerably. Despite his technology use, he continually requested phone conferences with both his advisor and writing coach in order to gain reassurance and direction.

II. Fact Finding

Most modern students who are learning at a distance will submit drafts of essays or papers attached to emails or posted in online courses to later be downloaded by the instructor who writes and saves

comments, and returns the document for revision. The student then downloads the revised attachment and makes required changes independently. The student may decide whether to return the document for additional review, or submit the paper for final evaluation and grading.

After identifying the limitations of the student's disability in our case, the triad searched for appropriate technology to telecollaborate more efficiently. Land-line and cell phone communication at a distance was essential in the beginning, both to establish rapport and to plan computer-based collaboration. An improved mode of communication was sought to discuss the student's essay, working to identify the best technology that would enable him to create and revise text. Neither the mentor nor the writing coach personally edited the student's essay, but served to facilitate the student's understanding of what changes were needed, thereby promoting his ability to make editing decisions and overall autonomy.

III. Planning

Without any formal training in the workings of the Cloud, the triad applied action research to determine the best mode of collaboration to assist the student in revising his essay. Synchronous conferencing using Google Voice was preferred over previous land-line conference calls because the audio fidelity provided through computer speakers, headphones, microphones made the student's speech more intelligible. As a result, there was a noticeable reduction in the number of times he was asked to repeat his questions and answers.

IV. First Action Step

The student's role was essential in determining what technology would work within the limits of his disability. Following his lead, the triad downloaded the Voice feature of the Google suite to accompany the review of a draft document shared by the student in Google Drive. After an initial review, the advisor began the process of providing feedback on content and helping the student to clarify his argument. The writing coach joined the process by annotating the document with inserted comments that focused on the writing mechanics. The triad began to communicate asynchronously as well as synchronously. Attention focused on one document in Google Drive, which could be updated at any time by any member of the triad. Google Voice provided a way to discuss the essay when viewed by all parties in real-time, emulating face-to-face conferencing.

V. Evaluate

Working with the document in Google Drive while also utilizing Voice allowed each participant to view revisions, make comments and edits while also providing real-time audio clarification. In addition to the advantages of immediate feedback on details of composition, communication on the Cloud allowed personalities to emerge along with expectations and preferences.

The student was challenged to examine and revise his work more thoroughly through the use of the combined technologies. During the synchronous conferences, the student easily identified correct spellings and sentence structure errors that were highlighted by the advisor and writing coach. However, since his typing was labor-intensive and notably slowed by his handicap, the writing coach would occasionally assist by recording his dictated narrative changes. Consequently, they discovered that the student was an able creator of more advanced level writing that was previously masked by his typing errors. Transactional distance (Moore, 2007) had been breached to the extent that he would transfer his words to the page quickly through another's typing. This practice promoted Mezirow's idea that "insistence upon reciprocity and equality often represents positive movement toward greater autonomy and self determination" (1981, p. 3). In addition, the

Voice tool allowed the participants to establish a caring tone that promoted greater acceptance of the student's emerging capabilities, allowing the participants to establish a "feeling of trust and caring in the affective domain" and forestalling attention fatigue (Kuh *et al*., 2006; Russell, 2012, p. 23; Zull, 2004).

VI. Amended Plan

To increase the strength of the essay and bearing in mind the role of the advisor and coach as the "guide on the side" vs. "the sage on the stage," the student's autonomy was consistently encouraged (Knowles, 1984). Facilitative dialogue, in the Moore (2007) spirit, allowed the student to decide which courses matched his learning goals within the guidelines for his degree. In addition, the writing errors were addressed collegially. Instead of the didactic observations like, "wrong tense," and "fix this," the writing coach highlighted writing weaknesses, prompting facilitative questions such as "where would you like to start today?" why is this highlighted?" and "which comments can we resolve?" Together, the triad decided when the document was complete and satisfactory for final submission.

VII. Second Action Step

Taking earlier problem solving experiences into account and applying a heuristic approach, the triad identified three gears that worked together to enable smooth Cloud conferencing. First, the technical features had to be accessible to the participants. Google accounts were an obvious necessity; including team participants in one another's Google contact list was also required. While it was easy to download Google Voice and place a call, all Voice and Chat settings had to be in place prior to conferencing. If headsets were used, they needed to be plugged in properly and turned on. It was essential to locate and check related computer settings frequently. Despite user preparation, the Google technology itself wasn't always reliably cooperative. The triad occasionally resorted to three-way phone conversations using cellular devices and land-lines. In spite of these challenges, the triad became enthusiastic advocates of using of the Cloud to close the transactional distance gap.

Second, and equally important, was the student role as the focus of the revision efforts. The triad became metaliterate learners together as the following process was established to ensure that the goal was reached:

1. student submitted the document to be revised and edited;
2. advisor and writing coach placed proactive comments on document and returned to the student to make changes;
3. student made appropriate edits and notified the coach when the document was ready for another review;
4. a synchronous conference was scheduled where the student took the lead, guided by facilitative questioning and immediate feedback from the writing coach and advisor.

Lastly, the quality of the dialog present in the interactions, whether by voice or asynchronous comments, had to be conducted collegially with attention to the affective domain (Aragon, 2003; Ghosh, 2011; Oliver & Herrington, 2003; Pickett, 2001; Rovai, 2007). Although most would agree to the premise, avoiding negatives took more consideration than generally assumed. For example, the writing coach could initially highlight and insert a comment such as: "comma needed after introductory phrase." However, for most punctuation and writing style errors, merely highlighting the error was sufficient for the student to recognize the lapse in self-editing, allowing him to make the revision

autonomously. Persistent errors could be analyzed in later Voice conferences to determine if the error occurred due to a lack of knowledge or if it was merely a typo. Generally, the writing coach used comments and questioning, never personally editing the document, but functioning as a facilitator of the student's learning.

Discussion

Despite challenges, study participants enthusiastically advocate use of the Cloud to close the transactional distance gap. While Gorsky and Caspi (2005) examined Moore's (1991) theory and found it tautologically lacking in both reliability and construct validity, Moore's view of transactional dialog continued to develop and remains valid as scaffolding support for learning in Cloud conferencing. Covili (2012) observed, "Collaboration involves much more than simply working together on a project with others. Collaborative activities ask students and teachers to engage with one another, learn from one another, and rely on one another as an integral part of their education" (p. 7). When students and instructors are able to gain a foothold in the appropriate Cloud application, the advantages overcome transactional distance to the point where Cloud conferencing becomes preferable to face-to-face conferencing in achieving individual student goals. Sonwalkar (2008) described a lack of harmony between overall course structure in higher education and the capabilities of technology. Course design had not yet evolved to the point where it could maximize the many instructional uses for technology. Severance, Hardin and White (2008) also supported Sonwalkar's claim in their finding that virtual learning environments (VLEs) failed to individualize learning to the extent possible. Adaptive learning, which aims to meet the needs and interests of individual learners, offers a system in which course design and technology coexist. The writing task accomplished in our action research offers an ideal modern example of adaptive learning in an online environment.

The advantages of our telecollaboration experience clearly meet the Seven Principles of Universal Design (see Table 1), a set of standards developed by researchers at NC State University to increase usability for the disabled and generally benefit all individuals by making environments, products, and communications more accessible (Burgstahler, 2001; The Center for Universal Design, 2008).

The Student View

An ethnographic interview examined the student's experience through questions created by the writing coach. The student was pleased to share his successful experience with a larger community of learners. The results of the interview revealed that the student would use either his smartphone or Google Voice on the computer to collaborate during our synchronous collaborations. To compose text, he dictated his written assignments to his smartphone either by voice or typing. At times, he favored typing because "sometimes it's difficult for me to be understood" in his speech to text program. In addition, he prefers the prediction feature of his smartphone because it "gives instantaneous corrections as a function of the keyboard settings." After reviewing his written work via Google Drive on his smartphone screen, he can review the text on his computer to see "if the wording is correct." In order to self-edit, he would either email himself a written paragraph or cut and paste it into a document, a function supported by Holmes and Silvestri (2012).

He stated,

> *At first I copied and pasted an email to myself, but I started using Google Docs around the time we started collaborating, leading to the second way to use Google Drive app on the phone. This app sends the text directly to Google Docs. Google is now my first choice.*

Table 1: Seven Principles of Universal Design Applied to Telecollaboration Case

Principle One: Equitable Use	The Google suite allows for privacy and avoids segregating users. The same means of access is provided for all without charge.
Principle Two: Flexibility	Cloud conferencing allows mobile devices to extend beyond the access site. Adaptations are flexible enough to adapt to alternative learning styles and preferences as well as distance (Dugger & Allen, 2012). Intrinsically, the application appeals to all learning styles, including auditory, (Google Voice), kinesthetic (cursor text manipulation); verbal (opportunity for read-alouds, making alternate composition and vocabulary choices); visual (all the visuals from Word: highlighting, bold, strikethrough, etc.) and social learners can read each other's facial expressions (camera and Hangouts)
Principle Three: Simple and Intuitive Use	With some guidance by a user, Google Apps are flexible in adapting to individual needs. Google Drive is accessible through simple and intuitive access with a Gmail/Google account, regardless of a user's experience. A wide range of literacy and language skills is accommodated.
Principle Four: Perceptible Information	Commenting on documents provides a clear link through a cursor click on highlighted writing issues, causing the comment to move and brighten in color. The addition of Google Voice in synchronous conferencing adds another layer of perception.
Principle Five: Tolerance for Error	All document versions are saved automatically; changes are saved within seconds. Previous versions of the document are readily available through the File menu.
Principle Six: Low Physical Effort	Using a keyboard and/or cursor allows for a minimum of attention fatigue and a maximum of comfort. Physical effort may easily be assuaged by taking breaks from asynchronous tasks.
Principle Seven: Size and Space for Approach and Use	Using ordinary Internet capabilities, no effort is needed to access the document, or to confer with instructors.

Because the student's seemingly basic errors previously masked his true abilities, his stronger writing skills were not revealed until he connected visually and verbally in Google Cloud space with his writing coach and advisor.

> *Thanks to Google talk it has been easier to communicate with others. I first noticed this while working on the rational essay with Dr. Russell. She mentioned to me the level of clarity in my speech was much higher, than me speaking on the phone. This process allowed me to work independently and use Dr. Russell's skills when I felt like I needed them.*
>
> *Google technologies have made it easier for me to communicate with my advisor outside of the Planning and Finalizing course, as well as on assignments in other subject areas. I worked on a final essay for a Human Services course (again with Dr. Russell) using the technology and plan to use it again in my future classes. My Human Services instructor and I connected with Google for other assignments as well.*

For educators who are most comfortable with traditional keyboard functioning, it may be discomforting to imagine students composing their work orally. While there may always be a need for print editing, an approach using voice dictation worked best for the student in our case with neurological impairments.

Going forward, I feel Google talk will help others a lot. Especially students who have similar difficulties as I did. If Google docs and Google talk can become as successful for others like it was for me, it will be great for disabled students. The biggest problem has been that many instructors aren't as open to the idea as perhaps they should be. I've asked instructors to join me in using the technology and have been refused. They often only want to stick with the way that they are doing things now and not try something new. One of my professors doesn't even realize that when I call him on his phone, I'm using Google chat to talk with him. He's already involved with the technology that way.

Conclusion

Emerging Cloud technology in our case provided a vehicle for a student with disabilities to gain writing skills, achieve more confidence and autonomy, and develop a strong relationship with his advisor and writing coach. Such technology may provide faculty members with a new window into the capabilities and writing processes of students with disabilities. We also support the use of Cloud computing as a saver of documents, not only because it automatically saves and tracks each change every few seconds, but for the accessibility it offers to individuals and groups of people anytime and anywhere the Internet is available.

The question remains: What elements are missing in a Cloud conference that requires essay revision and editing compared with face-to-face? While physical presence is missing, Google tools attaches photos to correspondence, providing a consistent image presence. In addition, distractions present in side-by-side conferencing are eliminated because the participants have total control over their own environment. Kaplan and Berman (2010) noted "the environment must not interfere with whatever purposes brought one to the setting" (p. 49). This non-adaptive technology is quickly emerging as an effective practice in personalizing instructor feedback for all online students. Ice *et al.* (2007) found that additional auditory feedback enhances "teaching presence and a student's sense of community" in distance education (p. 3). Students in online courses indicated their preference for audio feedback along with an increased ability to understand previously lost nuances, improved retention, and awareness that the instructor cared for the student's success (Ice *et al*. 2007). The significant increase observed in speech intelligibility using Google Voice compared with cell or land-line phone communications noted in this study should direct future research inquiries.

The use of Google Apps during the six-month period of our study with a student with disabilities broadened the scope of our practice. The potential exists to facilitate the building of writing skills more efficiently than they would be otherwise (Denton, 2012). However, further comparison studies of similar Cloud tools are needed to continue to establish validity. Google Hangouts, now available for small groups for planning and document creation, provide synchronous collaborative opportunities (Covili, 2012; Greene & Ruane, 2011). In addition, the use of Voice Comments attached to text comments inserted in writing documents serves to personalize feedback. As Cloud telecollaboration continues to benefit individual students, users can expect to find more positive results for teaching and advising, along with expanded applications for collaboration with colleagues and faculty.

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