5-2011

Writing with Others: The Rhetoric of Cloud Technologies in the Workplace

Sarah Garmon
Clemson University, cgarmonr@gmail.com

Follow this and additional works at: https://tigerprints.clemson.edu/all_theses

Part of the Communication Commons

Recommended Citation
https://tigerprints.clemson.edu/all_theses/1067

This Thesis is brought to you for free and open access by the Theses at TigerPrints. It has been accepted for inclusion in All Theses by an authorized administrator of TigerPrints. For more information, please contact kokeefe@clemson.edu.
WRITING WITH OTHERS: THE RHETORIC OF CLOUD TECHNOLOGIES IN THE WORKPLACE

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
Professional Communication

by
Sarah Caroline Garmon
May 2011

Accepted by:
Dr. Jan R. Holmevik, Committee Chair
Dr. Huiling Ding
Dr. Steven B. Katz
Communication scholars need to know more about how collaborative technology could change the workplace. Understanding the rhetorical situation of workplace communication helps explain the paradigm shift in the making between old technologies (e.g. Microsoft Office and PCs) and new technologies (e.g. Google docs and tablets). The study of two workplaces, Dr. Apparao Rao’s physics lab at Clemson University and my freshman composition classroom, indicates that conventional forms of communication such as email, instant messaging, and voicemail may cause a gap in workplace communication. Cloud-based solutions may fill that gap in communication as well as the gap between Carolyn Miller’s dichotomy of academia and the workplace and “praxis” versus “techne.” With cloud computing, people can access applications and data anywhere in the world on demand. Traditionally, when individuals save content or run software on their hard drive, it is as if they can “see” where they store files or run the application. On the other hand, the “cloud” metaphorically describes what people cannot see while using the Internet. The Internet is illustrated in network diagrams as a cloud, and the cloud represents “all that other stuff” or “etc.” that keeps the network running. The cloud also represents a space that is another person’s responsibility to maintain. Cloud computing may include various types of services which include Software as a Service (e.g. Google Docs), Platform as a Service (e.g. Google App Engine), Hardware as a Service (e.g. Amazon’s S3), and Database as a Service (e.g. Apple’s MobileMe and Microsoft’s Live Mesh). Cloud technologies are far away from stabilizing in the workplace. Currently, Microsoft Office and email promote serial collaboration. Cloud-
based technologies have several implications for teachers, students and researchers. Teachers could use cloud-based technologies to instruct writing as a process over time rather than writing in one sitting. In order for cloud computing to stabilize, a paradigm shift in workplace communication would have to take place.
DEDICATION

I dedicate my thesis to my parents, Powers and Judy Garmon and my grandfather, Hanks Jones. Thank you for your love and support as I achieve my educational aspirations.
ACKNOWLEDGEMENTS

I would like to thank Dr. Holmevik for his dedication, guidance, and persistence throughout this journey. I learned about cloud-based technologies for the first time in his Proposal Writing class, and he motivated me to learn more about the cloud paradigm. Without his advisement, this would have been an impossible undertaking. I appreciate my other committee members, Dr. Ding and Dr. Katz, for broadening my thinking and for their ideas to further develop my thesis.

I am also grateful for all of the students, post docs and professors who work in Dr. Rao’s lab. Their enthusiasm willingness to participate helped me get to know their workplace.

Finally, I would like to thank my husband, Jason, for his patience, encouragement, and support throughout this long process.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE PAGE .................................................................</td>
</tr>
<tr>
<td>ABSTRACT .............................................................................</td>
</tr>
<tr>
<td>DEDICATION .........................................................................</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS ................................................................</td>
</tr>
<tr>
<td>LIST OF TABLES ....................................................................</td>
</tr>
<tr>
<td>LIST OF FIGURES ...................................................................</td>
</tr>
</tbody>
</table>

## CHAPTER

1. INTRODUCTION, LITERATURE REVIEW, METHODOLOGY, AND OVERVIEW ............................................................................. 1
   - Gaps in Communication ...................................................... 4
   - Relevant Theories from Professional Communication ............. 8
   - Methodology ...................................................................... 10
   - Overview .......................................................................... 12

2. THEORIES OF WORKPLACE COMMUNICATION .......................... 15
   - The Construction of Facts in Laboratory Life ....................... 16
   - Workplace Communication ............................................ 19
   - International Communication ........................................ 24
   - The Ethnicity of Physics .................................................. 27
   - Apprenticeship System ................................................... 28
   - Findings ......................................................................... 31

3. TWO STUDIES OF WORKPLACE COMMUNICATION .................. 34
   - Case Study ...................................................................... 34
   - Serial Collaboration in the Lab ....................................... 36
   - Collaboration with Other Labs ....................................... 41
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loosing Data</td>
<td>43</td>
</tr>
<tr>
<td>Cloud-Based Technology in the Lab</td>
<td>47</td>
</tr>
<tr>
<td>Composition in the Cloud</td>
<td>54</td>
</tr>
<tr>
<td>Google Docs</td>
<td>55</td>
</tr>
<tr>
<td>Prezi</td>
<td>61</td>
</tr>
<tr>
<td><strong>4. OPPORTUNITIES AND LIMITATIONS OF CLOUD COMPUTING</strong></td>
<td>64</td>
</tr>
<tr>
<td>What is Cloud Computing?</td>
<td>64</td>
</tr>
<tr>
<td>Cloud Computing: A History</td>
<td>69</td>
</tr>
<tr>
<td>What are Paradigms?</td>
<td>72</td>
</tr>
<tr>
<td>Examples Signaling the Cloud Paradigm</td>
<td>74</td>
</tr>
<tr>
<td>What This Means for Collaboration</td>
<td>76</td>
</tr>
<tr>
<td>Limitations</td>
<td>77</td>
</tr>
<tr>
<td>Google’s Terms and Policies</td>
<td>78</td>
</tr>
<tr>
<td>Opportunities</td>
<td>80</td>
</tr>
<tr>
<td><strong>5. ANALYSIS OF CLOUD TECHNOLOGIES FOR THE WORKPLACE</strong></td>
<td>84</td>
</tr>
<tr>
<td>Cloud Technologies for the Lab</td>
<td>86</td>
</tr>
<tr>
<td>Composition Classrooms</td>
<td>88</td>
</tr>
<tr>
<td>Dark Clouds</td>
<td>89</td>
</tr>
<tr>
<td>Conferencing</td>
<td>90</td>
</tr>
<tr>
<td>Prewriting for Individual Projects</td>
<td>90</td>
</tr>
<tr>
<td>Collaborative Writing</td>
<td>90</td>
</tr>
<tr>
<td>Blogging</td>
<td>91</td>
</tr>
<tr>
<td>Implications</td>
<td>92</td>
</tr>
<tr>
<td><strong>WORKS CITED</strong></td>
<td>98</td>
</tr>
</tbody>
</table>
LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>94</td>
</tr>
</tbody>
</table>

Adaptation of Spinuzzi and Zachry’s Genre Ecologies for Cloud Computing
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Latour and Woolgar’s Cycle of Credibility</td>
<td>18</td>
</tr>
<tr>
<td>2.2</td>
<td>Former members of Dr. Rao’s lab in Spring 2007 (left), two former PhD students working in the lab (right)</td>
<td>29</td>
</tr>
<tr>
<td>3.1</td>
<td>Keqin Yang (upper left), Apparao Rao (upper right), Jason Reppert (bottom) working in the lab</td>
<td>35</td>
</tr>
<tr>
<td>3.2</td>
<td>Example of ENGL 103 student’s Prezi</td>
<td>62</td>
</tr>
<tr>
<td>4.1</td>
<td>Network diagram where “The Cloud” is a metaphor for the Internet (Velte 4)</td>
<td>66</td>
</tr>
<tr>
<td>4.2</td>
<td>Software as a Service (SaaS) (Velte 12)</td>
<td>67</td>
</tr>
<tr>
<td>4.3</td>
<td>Hardware as a Service (HaaS) (Velte 15)</td>
<td>68</td>
</tr>
<tr>
<td>4.4</td>
<td>Platform as a Service (Paas) (Velte 14)</td>
<td>69</td>
</tr>
<tr>
<td>4.5</td>
<td>Student-teacher conference</td>
<td>82</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION, LITERATURE REVIEW, METHODOLOGY, AND OVERVIEW

In *Internet Invention: From Literacy to Electracy*, Gregory Ulmer states electracy “is to digital media what literacy is to print” (xii). Ulmer identifies just as individuals may be literate or illiterate, individuals may also be electrate or anelectrate (Ulmer 171). Ulmer indicates electracy is more than a shift from print to digital, but electracy is actually a shift in the way we think about the composing process in a document. Similar to how writing classrooms are at a crossroads with the introduction of the Internet as a composing space, we are at the intersection of old technologies and new cloud-based technologies. The way writers author documents is changing. The transformation may be more complicated than the location in which an author saves documents – whether he saves on a hard drive or in the “cloud.” Cloud computing is not merely saving documents in the cloud rather than a hard drive – this possible paradigm is actually changing the way users think about master documents and co-authorship.

The ethical implications of the word “user” are part of an ongoing discussion on Latour’s Actor-network theory in which humans and objects alike have agency¹. For example, the person using software, such as Adobe Dreamweaver, is not the sole user - the technology is also using them. The result is that the human being becomes something in between. The “user” of Adobe Dreamweaver has to take unnecessary steps to complete

---

¹ In *Reassembling the Social: An Introduction to Actor-Network Theory*, Bruno Latour examines Actor-network theory, a social theory pertaining to the material and semiotic network between humans and objects.
the simple task of making spry widgets work offline within the program’s interface as well as on a live web site. When you “use” cloud-based technologies such as Google Docs, you are counting on the servers, which exist where you cannot see them, to save your work. An ongoing process takes place whereby people “use” the word processor in Google Docs, and the software auto saves the user’s document every fifteen seconds.

The way we collaborate on documents did not change with the introduction of the desktop computer into mainstream society. With the old technology of internal and external hard drives, authors save documents on a hard drive, and when it comes to collaborating on a document, the author emails a copy an attachment to a co-author or editor. In this scenario, serial collaboration is taking place because the author sends a copy of the master document rather than the master document itself, which is not much different from exchanging hard copies. During the revision process, collaborators obtain multiple drafts, and the proliferation of copies may cause confusion. For instance, the authors may lose track of what draft is most up-to-date. Anyone who collaborates on projects and communicates with colleagues and clients may be subject to these problems with serial collaboration. With new cloud-based technologies, authors share, edit, and save documents or presentations in the cloud because the users save their work on servers in a remote location rather than individual hard drives. Now, changes to the document take place in the composing space of the master document in real time, and as a result, collaborators in the workplace will think about co-authoring documents in new ways. Rather than serial collaboration taking place, writers experience collaboration in real time.

Traditional methods of workplace communication and serial collaboration such as email, instant messaging, and PowerPoint pose problems in sharing information. For
example, the mass volume of emails in an inbox may cause information to become buried, and unread messages may become lost as threads are updated. Carolyn Miller identifies a problem with the dichotomy of the workplace and academia. Academia has a conflict with how scholars define the “workplace” – some think the classroom only prepares students for the workforce. Miller observes this contradiction between vocational preparation and cultural awareness. Technical writing textbooks argue academics know something that can help improve nonacademic or professional practices while survey results show the kind of writing that takes place in the nonacademic sphere and can inform how teachers teach communication skills to their students (Miller 16). A workplace for this study is not a divide between academic and nonacademic; however, I define the workplace as a shared space where work occurs in which two or more people mediate information.

Miller advocates for a change in how we perceive technical communication from the “low” sense of the word to the “high” sense. Low, or “praxis,” is practical, goal-oriented and effective, and it functions as work without theory. On the other hand, high, or “techne” is the craft of writing that promotes the value to the community and working in harmony with corporate and academic discourses. This is contradictory - we say that nonacademic rhetorical practices are inadequate and need improvement through instruction, yet they serve as authoritative modes and therefore define goals for instruction. For example, academic instruction improves new a graduate’s performance in the workplace, but professors also need to understand the profession in order to instruct their students. Cloud technologies can help break down the dichotomy of the ivory tower versus the marketplace and bring both praxis and techne together in the two
environments I studied. Specifically, Google Docs can alleviate some of the problems I have found with composition in the two workplaces. First, I examined Dr. Apparao Rao’s research group, which specializes in the study of nanotechnology in the Department of Physics and Astronomy at Clemson University. Although a scientist in a lab must perform individual work to advance his or her own career, scientists must communicate with their peers. Work in a scientific lab hinges on the ability for a group to collaborate as they conduct experiments and write papers for scientific journals to move forward in their professional careers. Second, I recorded my experience teaching English 103, Accelerated Composition, with Google Docs in a journal. Students must learn to work as co-authors in order to excel in the collaborative assignments. Two of the major essays are individual efforts; yet, each requires a peer review session of the students’ first drafts. On the other hand, the last paper is a group project with three to four authors per group.

**Gaps in Communication**

Studies in workplace communication examine how conventional forms of communication, such as email, changed the traditional workplace by “weakening status barriers between users, thereby flattening the workplace hierarchy, improving employee performance and satisfaction, and promoting equal participation by all members of work groups” (Kudsi-Zadeh 1). On the other hand, researchers found results revealing employees’ negative opinions about email and other methods of communication (Snodgrass, Yates, and Cameron).

First, a study at Leeds Metropolitan University explored how people view email as a form of workplace communication, and the researchers determined advantages and
disadvantages of email, telephone, handwritten, and face-to-face communication based off surveys (Snodgrass 106-107). Overall, Snodgrass determined email is less disruptive than a telephone call and face-to-face, saves people time from playing “telephone tag,” and provides a record of the conversation (114-115). However, email limits non-verbal cues, which may lead to a misrepresentation of an individual’s attitude towards the email exchange. The discussion of confidential information may not be secure, and Snodgrass identifies email as “information overload” (115).

Yates, et al. explored how the PowerPoint genre “has emerged as a powerful and complex communicative structure that reflects and shapes organizational practices while also enabling and constraining a range of social actions and outcomes” (87). Yates cites Tufte and Norvig who point out PowerPoint’s constraints, which include “limited, fragmented, and flattened content appearing in bulleted form,” and the genre has also resulted in “limited comprehension, information overload, lack of reflection, idea fragmentation and reductionism” (87). Based on her empirical research, Yates et al. concludes despite those weaknesses, PowerPoint still encourages collaboration among team members because it allows individuals to brainstorm ideas and forces brevity in presentations (87). She views the linearity of slides as an advantage; however, she recognizes after the fact, its linearity may pose negative consequences in the end. The document may be confusing when individuals “repurpose” the presentation by looking back at PowerPoint handouts and the speaker is no longer there (88).

Companies adopted new forms of media that fosters “collaboration at a distance,” such as instant messaging (IM), and Cameron conducted a case study on instant messaging in workplace settings by interviewing employees at various organizations. She
found instant messaging (IM) is so successful in workplaces because it is an informal mode of communication; however, IM is not as efficient as face-to-face communication (10). Her survey results also reveal employees use IM as a supplement to other forms of workplace communication. While IM allow employees to multitask, respondents noted the form of media is disruptive in the workplace (1).

As these conventional modes of communication pose gaps in sharing information, teachers studied how to implement new collaborative technologies in classroom settings (Richardson, Bold, Walsh, Carr, Lundin, and Morris). For example, teachers implemented software packages that offer some form of a “Shared Workspace,” enabling students to edit and share each other’s documents. Browsers such as Firefox and operating systems like Linux also promote collaboration of texts (Richardson 125). Researchers also studied how students can use wikis for online learning, client-based projects, and collaborative writing. First, Bold studied how students in online course used wikis as they collaborated on group projects (5). In the course evaluation, the students commented, “The convenience of anytime, anywhere courses made up for lack of contact with instructor and peers” (11). Although wikis cannot replace the richness of the interaction between teachers and students in a traditional classroom setting, Bold concludes teachers can implement wikis in other distance learning programs to “reduce feelings of isolation or alienation” (11).

Next, Walsh studied four client-based projects in a technical communication classroom in which students collaborated with clients by using wikis (1). The results of her study confirmed “wikis improve collaboration, help develop student expertise, and enact a ‘writing community’ service-learning paradigm” (1). She also found wikis did not
cause the students to lose their focus in the classroom, and she recommends instructors set the standards for the wiki uses in the classroom and to encourage wiki participation (1). Finally, Carr studied the implementation of a class wiki for collaborative writing projects in an undergraduate political science course, and she concluded, “Wikis may be seen as communicative tools that have the potential to support group interaction, but their uptake depends on the context of their use” (267).

When it comes to implementing collaborative technologies in the classroom and the workplace, we have to break down the idea that an individual controls the text. Winsor examined how co-workers crafted texts in a collaborative workplace setting when she studied how one set of employees drafted a Request for Quote (RFQ) and how another group communally drafted a labor contract. She found her participants “used rhetorical and social resources to try to shape regulatory regimes to serve their own interests. And while some of these resources were more available to some people than to others, they all participated in the generation of power to the extent that they could participate in the writing” (18). She found when groups consist of individuals with opposing viewpoints; these “diverging interests” disrupt any agreement the group reached. Winsor concludes this is a good thing, and “skilled rhetorical action” will make it possible for groups to agree on changing a text (18).

**Relevant Theories from Professional Communication**

In this study, I will use the theories of Michel Foucault and Lloyd Bitzer. First, the Rhetorical Situation plays a complex role in understanding the current situation for workplace communication, and Bitzer defines the Rhetorical Situation as “a natural
context of persons, events, objects, relations, and an exigence which strongly invites utterance; this invited utterance participates naturally in the situation; is in many instances necessary to the completion of situational activity, and by means of its participation with situation its rhetorical character” ( ). Overall, a rhetorical situation requires exigence, audience, and constraints (6).

The exigence, or “imperfection marked by urgency; a defect, an obstacle, something waiting to be done,” consists of the problems from the old ways of communicating in the workplace (6). The urgency in this situation stems from a possible paradigm shift between old and new technologies in the workplace, and our society is not as far along as we think. For example, today we use digital technology just as we use the old technologies. Email in the workplace is not much different from the traditional memo – an email attachment moves from one place to another just like a letter. In Microsoft Word, users save documents to a hard drive and email copies to multiple recipients. The PC itself perpetuates the state of sole ownership of documents while new technologies, such as the iPad, signal a change since it relies on a smaller hard drive. In other words, we are in an interim stage in which we move materials into a future world where we do work with copies, but we work with the original document. Additionally, the constraints include the technology available and people’s inclination to change how communication takes place in workplace settings, and third, the audience, or “positive mediators of change,” of this rhetorical situation include Dr. Rao’s lab, my freshman composition classroom, and other workplace situations where collaborative technologies apply to the situation.
Second, Foucault claims in every society, the production of discourse is “controlled, selected, organized and redistributed according to a certain number of procedures whose role is to avert its powers and dangers” (216). Foucault wishes language could be fluid and dynamic, but institutions force discourse to become the opposite (215). He defines discourse as written or spoken communication that provides a language for talking about a topic at a historic moment, and this applies to the discourse of cloud technology (Hall 44). For thousands of years, serial collaboration has been “in the true,” and as a result, institutions promote sole authorship. The institution controls knowledge production and reinforces the notion of serial collaboration as the norm.

Additionally, Foucault identifies prohibition, one of the external rules of exclusion, which is relevant to understanding the possible resistance to cloud-based technologies. For example, students of English composition may resist collaborative writing assignments in class because their previous instructors may have taught co-authorship is a form of plagiarism. The instructors may have considered this “cheating,” and the stigma remains. Students may also oppose real time collaboration with applications such as Google Docs because it may be uncomfortable for their peers to judge their document while the work is still in progress. Foucault also discusses the ritual of discourse (215-237). Within the traditional ritual of writing, the author asserts control and ownership over the document. The sole author stores the file on a hard drive, and he controls who reads it. On the other hand, a new collaborative writing ritual would allow writers to share the same status whether they are the author, first reader, second reader, etc.; whereas before, the author of the document asserted more control of a document.
Methodology

I performed a case study on Dr. Rao’s group in the Physics Department at Clemson University in Spring 2010 for a workplace communication course. I chose this site because I have been associated with the lab for the past three years. My husband, Dr. Jason Reppert, worked in the laboratory for almost five years, and he worked as a post-doc in the lab during the case study. I have an advantage as an observer for this pilot study because the employees are accustomed to my visits in the lab on a daily basis; thus, I was able to blend in with the environment. My father graduated from Clemson University’s Physics program in 1976, and he worked for the Physics Department in Kinard Hall. One of his professors, Dr. Skove, still works in the lab.

Researcher bias exists in my study of the lab, just like any study. In my case, I have been indirectly associated with the lab for almost three years because my husband works there. In order to prevent researcher bias as I conducted my study, I did not discuss any of the interviews or observations with Jason; in fact, I saved his interview for last. I interviewed Rama first because he is the most talkative and outgoing in the group, so if he seemed confused by a question, I would be able to rephrase the question before I asked the nine other people in the group.

My goal was to determine how each of these aspects of daily communication played a role within the lab’s hierarchy:

- What is the most effective means of communication within this group? Does communication need improvement between the ranks of the hierarchy?
- How do cultural differences influence communication in the structure of lab?
• How does the turnover rate (Physics Ph.D. program is 4-5 years long) affect the efficiency/dynamics among the members of the lab?

To answer these questions, I observed the workers in the lab for four eight-hour sessions, in which I recorded notes and wrote reflections in a journal on the events and meetings I attended with the group. I conducted interviews with every member of the group except one undergraduate student who did not respond to me about arranging an interview time. My primary source of data was through the interviews with the group: Dr. Apparao Rao, Dr. Malcolm Skove, Dr. Jason Reppert, Dr. Keqin Yang, Ramakrishna Podila, Ted Dickel, Kiran Lingam, Mehmet Karakaya, Deepika Saini, and John Spear for a total of ten interviews. I asked each of them the same questions so I could triangulate the data. In addition to my observation hours and interview sessions, I immersed myself in the culture as much I could by attending a seminar with the group as well as two potluck lunches followed by group meetings. Finally, since I was closely tied to the group before this study, I was able to retrieve email documentation of conversations within the group as well as copies of journal articles Rao expects his group to read, and these documents were able to set the context for the study. I used the observation notes and emails to set the context for my analysis. Then, I triangulated my interview transcription data, so I could answer the research questions.

Later, during the second part of the case studying in Spring 2011, I wanted to find out more about the lab’s current situation when it came to day-to-day communication, so I performed informal interviews with the seven remaining lab members. This time, I focused on how serial collaboration affects communication in the lab, I asked about and their experience with cloud technologies, such as Google Docs.
I also kept a journal of my experience with using Google Docs in my Accelerated Composition classrooms, two sections of nineteen students each, as the students completed various individual and collaborative assignments. I conducted research on the history of cloud computing and studied what defines cloud computing. Through my study of the rhetorical situation Dr. Rao’s lab and my composition classes, I intended to answer questions: What is the future of cloud computing? What does it do with perception that no one is the master but that there is a group who owns a piece of writing if the writing is not on an individual’s hard drive? What is the function of live chat for collaboration in real time, and how will this affect writing in various workplace settings, especially in student writing?

Overview

To expand on communication and the cloud computing in the workplace, I detail the current situations of two workplaces – Dr. Rao’s lab and my English 103 classroom, present a brief history of cloud computing, provide a rhetorical analysis of cloud-based technologies, and offer recommendations to the workplace based on my findings. The purpose of this thesis is to gain a better understanding of cloud computing and to prescribe solutions for workplaces challenged by serial collaboration.

After this introductory chapter, in Chapter 2, I will identify and describe current practices and problems with communication in Dr. Apparao Rao’s research group based off my findings from a case study beginning in Spring 2010. I will expand upon my workplace communication study with several examples and theories from professional communication literature.
Then, in Chapter 3, I will present the current situation of two workplaces: Dr. Apparao Rao’s lab in Kinard Hall at Clemson University and my English 103 classroom. I will present the findings from my interview study from Spring 2011 with each of the lab members and illustrate the current situation of my freshman composition classroom based on notes I took while introducing Google Docs into the classroom from Fall 2010 to Spring 2011.

Next, in Chapter 4: Opportunities and Limitations, I will provide a brief history of cloud computing, discuss Thomas Kuhn’s theory of paradigm shifts, and address the indications of a paradigm shift. Then, I will show examples of cloud-based solutions – I will describe both open-source and free for educational use (e.g. Google Docs and Prezi) technologies as well as programs that require users to pay a subscription (e.g. Amazon and Microsoft). I will also discuss some of the opportunities and limitations of cloud computing in the workplace.

Lastly, in Chapter 5: Recommendations and Conclusions, I will propose solutions based on my research on cloud computing in the workplace and my findings from Rao’s lab and my English 103 sections. I will suggest how users may implement cloud-based technologies to improve communication in workplaces where collaborative writing takes place. This will tie the chapters together by detailing how cloud-technologies have been and will continue to change the way we think about authorship.
Bruno Latour and Steve Woolgar conducted an ethnographic study of a scientific lab, and their research includes thick description of observations in the field, formal interviews of the lab’s employed scientists as well as scientists related to the work, letters, drafts of articles data sheets all written by the scientists, and a study of the lab’s archives. The focus of the study was to see how work scientists carried out their daily work, as Latour and Woolgar kept busy “monitoring scientists in one place and focusing on the work done by a scientist located firmly at his laboratory bench” (27). More specifically, the ethnographers’ account “concerns the social construction of scientific facts” or how scientific order is produced from nebulosity, the methods in which scientists develop, organize, and present their research in a logical way (32). The authors point out the irony of social scientists delving into remote forests to study people and not into laboratories nearby (17). Latour and Woolgar claim the inner workings of laboratory life are still mysterious even though in more recent years researchers studied the “macroconcerns” of science – the authors argue these efforts have still further isolated science from the general public (17). The authors argue the specialized approaches demonstrated by other social scientists only reflect on the end product, not necessarily how scientists arrived at the product (18). Thus, Latour and Woolgar state the purpose of research is to demystify science by studying the day-to-day interactions and processes of the scientists (18).

Latour and Woolgar argue the best way to examine scientists is while the scientists carry out their daily activities in the lab, and the authors observe how scientists construct facts within their microprocesses. The ethnographers state, “We want to
demonstrate the idiosyncratic, local, heterogeneous, contextual, and multifaceted character of scientific processes,” and they express how one of the major obstacles in this study is the lack of written records for this process (152). The observers say they want to see how the differences between the logic of scientific and non-scientific practices hold up in the laboratory (152). Overall, Latour and Woolgar present how facts can be created or destroyed in conversation, how exchanges become ideas or thoughtful processes, how facts are socially constructed, and how we can account for non-indexical statements (154).

**The Construction of Facts in Laboratory Life**

Latour and Woolgar reflect on the similarities between the kinds of conversational exchanges in the laboratory and those that take place outside of work (158). The first kind of exchange between scientists is “known facts,” and these kinds of dialogues help spread information so the scientists can grow on each other’s knowledge (160). Second, evaluative statements rely on a specific method comprise of many conversations, and they negotiate the importance of what part of an experiment is a priority (157). Then, the third type of exchange centered on theoretical matters in which “there was no obvious reference to the past state of knowledge to the relative efficacy of different techniques” (162). Lastly, the fourth highlighted the discussions about fellow scientists, and sometimes they dwelled on past experiments while other times they judged the scientists for their merits (163). Latour and Woolgar argue conversations are a good source of data for understanding scientific processes because documented conversations display how broad scientists’ interests and concerns are; the ethnographer’s evidence indicates the challenge identifying purely descriptive technical or theological discussion; the
mysterious thought process of scientists in the lab does not significantly contrast with everyday dialogue.

Latour and Woolgar present the etymology of the word fact, which is derived from the root “facere” and “factum” to make or do. They define fact as an “objectively independent entity, which by reason of its “out-there-ness” cannot be modified at will and is not susceptible to change under any circumstances” – this has been a source of tension for philosophers and sociologists (174-175). Latour and Woolgar claim during the construction of facts, a statement becomes a “split entity” because it is both a set of words representing an object and the object takes a life of its own (176). There are challenges in defining what “out there-ness” really means because of how objects fit within reality – unknowns will still exist (178). The scientists vaguely refer to objects (178). A “reality” cannot explain why a statement becomes a fact because it is after the statement has been accepted as a fact that individuals attain a reality (180). Latour and Woolgar state they “do not wish to say that facts do not exist nor that there is no such thing as reality;” in other words, their position is not relativist. Overall, they argue the idea of “out there-ness” is a result of scientific work rather than its cause (180).

Latour and Woolgar also demystify the scientific laboratory by discussing the important role economics place in that setting. Latour and Woolgar emphasize the priorities of the individual scientist instead of focusing on the group or laboratory (191). A driving factor for scientists is the norms placed on them during their training, yet norms are not the only factors that motivate scientists (193). Scientists, when questioned, said their interests in certain fields were based on curves of interest and development and credit is only secondary (193). Scientists have to earn credibility in their field to be
considered a good investment for future projects. Thus, Latour and Woolgar put forth the cycle of credibility.

Figure 2.1: Latour and Woolgar’s Cycle of Credibility

Scientists constantly have to think of their investors, so they will continue to reinvest in their laboratory in the future (197). The scientists also have to show they are using the investor’s wisely and that exciting new results are constantly coming out of the lab (229). Norms are not necessarily what guide the scientist to recognition; “economic forces tie down the researcher both as an independent capitalist and as an employee” (230).
Workplace Communication

Stanley Deetz approaches communication within organizations by thinking of ways to describe and explain organizations. He states, “Each discourse provides an orientation to organizations, a way of comprising people and events within them, and a way of reporting on them” (16). His filters allow us to see different things in a company – the filters can be ways of structuring an organization, but they are really orientations to understanding how people construct and systematize organizations. For example, if something is dissensus, it focuses on foregrounding difference, tension, and suspicion; if elite or a priori, the organization assumes difference always existed (critical) (14). If it is local and dissensus, it focuses on difference but assumes difference grows from people making choices (dialogic) (14). The local or emergent view is anti-foundational and situational (11). This dissensus/consensus continuum helps us determine the degree to which the organization values creating an employee consensus or whether the organization tends to rely on dissention and tension for the organization to grow. Deetz’s theory contains four quadrants: normative, interpretive, dialogic, and critical. Normative takes a functionalist, top-down approach, privileging the language of the research community over the local community; it values rationality, allows consistency, emphasizes the importance of economics and facts, and does not see emotion or consensus (19-23). Interpretive values the social and communal as well as the quality of work life, but does not see emotion (23-25). The critical is characterized by the struggle of power-relations and a strict hierarchy (25-26). Lastly, the dialogic is very dynamic, situational, and diverse, and it encourages creative conflict; the dialogic allows, for
example, the CEO to hear the voices of the management and entry-level employees equally (30).

Often, the productivity of a workplace is contingent on how individuals share information. In scientific lab setting, the individuals depend on collaboration to get work done – scientists must work together on experiments and write papers in order to advance in their field. Stephen Doheny-Farina examines how usability experts must develop relationships with users (168). Even though he is discussing the relationship between writers and technologists, the same concepts of collaboration is applicable to my case study. He states, “Relying solely on such information acquisition means placing one’s faith in the myth of information transfer. What is more important is for designers to develop relationships with users so that they can work together in some shared space” (168). The way to overcome barriers that may intrude upon this “shared space” is true collaboration – collaboration is not just collective awareness of individual actions; rather, collaboration is working together in a shared space and sharing work and not just information.

Doheny-Farina defines collaboration as “a process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have come to on their own” (169). Above all, collaboration is contingent on “social bonding” or “mutual trust” (169). By this definition, collaboration cannot take place if individuals to not share a similar skill set and if they do not share a mutual trust in one another. Doheny-Farina also identifies two types of collaboration: conceptual and technical (170). Conceptual collaboration occurs when a group creates “concepts, ideas, themes, metaphors, and analogies” (170). On the
other hand, technical collaboration involves “adapting the concepts to specific applied tasks,” in which an expert in the particular field is required (170).

Doheny-Farina presents two case studies. First, ABC Company has two writers, Corrie and Walter, who collaborated with the technologists. The two writers would collaborate with the engineers for many hours a day, and then Corrie and Walter would part ways and work in their individual offices. On the other hand, XYZ Corporation used “co-location” so writers could become apprentices of the technology experts. Both the writers and the technologists would not only collaborate conceptually, they would also occupy the same office space at all times, unlike Corrie and Walter. Overall, collaboration can break down the organizational hierarchy, which Deetz describes in the critical and interpretive orientations, if individuals collaborate willingly and if collaboration is for the good of the workplace. Doheny-Farina also concludes organizations resist change (172).

Rao’s lab contains a hierarchy of professors, post docs, graduate students, and undergraduate students, and I sought to find if power dynamics in the organizational hierarchy affected communication. Overall, eight out of the ten people in the lab say face-to-face interaction is the best method of communication. Skove, who has been working in the lab since he was a student in 1954, asserts the best ways to communicate included talking one-on-one, but he also indicates using lots of graphs, a white board, and email are good methods of communication. When looking the Deetz’s orientations for organizations, we can see one-on-one communication between professors and students is dialogic and interpretive, since communication through group meetings and emails does not reinforce a hierarchy and allows for the voices of all employees to be heard.
Dickel, like a few of the other students says group members can be inefficient with responding to email or voicemail, and he states, “Scientists have their own way of looking at things, and it kind of takes a while for them to communicate ideas” (Interview). Contrary to the majority, Rao states the most efficient form of communication is email followed by a personal meeting. He also sends emails to the whole group if he foresees they may encounter similar problems and so they are up to date with what is happening in the lab. He states, “I send a general email to the whole group and follow it up with an email to the subgroup, and that’s been working really well” (Interview). Even though Rao states the most efficient form of communication is email, Reppert says email is not the best way to get in touch with the busy professor because “he gets so many emails that your email might get lost,” indicating a gap in communication (Interview).

Graduate student Lingam claims group meetings are the best form of communication, and these meetings occur every other week. Rao’s rationale for the group meetings every other week is too often, and once a month is not often enough. Yang, Podila, and Spear identified the group meetings as an alternate form of communication but not as the best method. Yang and Podila both agree the group meetings allow everyone to be on the same page, and the meetings allow them to know of everyone else’s projects. Spear says he was in favor of the group meetings because it allows him to see Rao and all of the members of the lab in person in order to ask them questions. Overall, the scientist’s outlook on the best method of communication is not constant throughout the group.

During each interview, I asked about the best methods of communication first, and then followed that question up with asking a harder question, if the communication in
the lab needed to improve due to gaps in communication. Three out of the ten group members (all new graduate students) indicate communication does not need to improve at all. Half of the scientists ranging from professors to graduate students say administrative skills need improvement. For example, he says despite all of his efforts to promote good communication, things “fall through the cracks” (Interview). Rao traced the communication gap to the reality that students are working in the lab. He indicates students forget to reorder supplies that are running low and states, “Being a student myself at some point in time, students mostly want to get their things done and move on” (Rao Interview). Graduate students and post docs who say the gaps in communication are more administrative issues describe how group meetings may start later than planned and that so many people have projects going on at once, it is hard to keep track of what everyone is working on.

Spear said it is hard to catch Rao when his is not busy. In addition, since finances are a major constraint for the group, Rao does not spend as much time working in the lab as he used to, and this affects how often the students are able to access him for help. Reppert noted Rao used to spend more time in the lab while he was a graduate student, but now the professor has to spend more time applying for grants and traveling to try to obtain more funding. Rao states, “Funding dictates whether if I can keep somebody or not. It’s very difficult. Funding times go up and down.” Lastly, Karakaya said he does not perceive a rigid hierarchy, but he said he asks the post docs a question before he goes to Rao with a question.
**International Communication**

Barnum and Li argue technical communicators in western cultures need to gain insight into cultural biases for Chinese writing strategies to write better for a Chinese audience (143). In other words, western cultures need to have a better idea of the rhetorical situation or terministic screens, a device that filters what we see and how we interpret the world around us, they are working with when it comes to writing for a Chinese audience (143). Rather than just relying on translating documents alone, authors need to localize documents, or put them in the appropriate cultural context (145). The article discusses Edward T. Hall’s theory of high and low context cultures to explain how authors place a document in the proper cultural context (144). For example, Chinese writings may follow a high-context and inductive order (from specific details to general topic or a spiral order in which you wait until the end to get to the main point). On the other hand, documents from the United States may follow a low-context and deductive pattern (the main idea stated first, supported by points, with each new point introduced in the first sentence of a paragraph) (152-153). In addition, Barnum and Li emphasize people who work on international writing teams need to understand the differences in communication styles, or high versus low context cultures, to improve communication effectiveness. Barnum and Li claim international business focuses less on the contrasts between cultures but instead view “the middle ground of collaboration as the solution to doing business in the Information Age” (164).

Maitra and Goswami further explore this idea of high versus low context cultures in their case study involving a Japanese company’s annual report, and the authors define culture as “a shared way of being, evaluating, and doing what is passed from one
generation to the next” (197). Maitra and Goswami hypothesized when American readers and document designers approached a translated business document in which the page layout had not been changed, they will use their knowledge of western document design to interpret the text (197). Thus, the American audience would have a difficult time reading the document since conventional western documents are simplistic in design and are linear. Maitra and Goswami’s hypothesis was confirmed with the results, and they call for extensive collaborative research to analyze and focus on the individual instead of a group as a whole (201-202).

Perkins argues for new metaphors that reflect changes toward a borderless, yet multi-cultural professional communication. She, like Barnum and Li and Maitra and Goswami, argues we should focus on the individual rather than the group; however, she claims if we keep reinforcing the boundary metaphor (such as high versus low context cultures), then we will keep reinforcing stereotypes (19). Perkins states that when professional communicators and teachers think about international communication, they think of it as an accommodation between language users, bridging gaps and overcoming obstacles (29). The author argues this is not the only way of thinking – borders do not always exist but when they do, they are constantly in flux (19). She states, “I argue for an understanding of cultural as fluid, layered, overlapping – distinguishable not by boundaries of inclusion and exclusion but by prototypical features” (19). Perkins advocates against a reductionist view of culture, and says we need ethnographic studies of these global workplaces. She details her ethnography of VisionCorps, a company that was born global, and the employees spoke in a unifying language, Technical English (29). She argues students need to be aware of the significance of global communication, and
they should interview professional communicators or work through scenarios involving global communication (34).

Rao’s group is nationally and ethnically diverse, consisting of four Indian scientists (Rao, Podila, Lingam, and Saini), four Americans (Skove, Reppert, Dickel, and Spear), one Chinese (Yang), and one Turkish group member (Karakaya) at the time of my case study. Therefore, six of the members are from a high-context culture, and four of the group members are from a low-context culture. However, according to the interviews, those who believed cultures influence communication only ascribed that language influenced communication in the group. Rao states the presence of different cultures in the lab helps them to develop patience and tolerance towards the people who are new to the United States. He states, “The people for whom English is not their native language to learn from others in the group. It’s like a two way street. Both benefit. It is sort of a humbling experience because if I was to go to France and give a lecture in French, I would be dead in the water” (Interview). In the same vein, Reppert and Spear indicate the different cultures affect communication in the lab because it takes a brief period to understand the international students, especially if they are from a country that does not commonly teach the English language.

On the other hand, Skove claims different cultures in a group do not have an impact on communication in the lab because “physics does not have an ethnicity” (Interview). Both Yang and Saini agree with Skove by saying culture does not affect communication in the lab because culture does not affect the study of science. Yet, Yang, Saini, as well as Dickel, say the international students are challenged by learning etiquette, which may confuse the overall communication in the lab. Saini recalls she was
bombarded with slang when she came to the United States; Dickel claims courses on American etiquette for foreign students are lacking – the courses often misrepresent the etiquette and make it more of a challenge for international students to adjust. For example, international students in the lab have a preconceived idea about the proper way to address an email to American students, but it makes the email message confusing to the American student.

The Ethnicity of Physics

Yang, Saini and Skove’s belief that culture does not effect science is part of a very old and ongoing debate in the humanities versus the sciences and positivism versus relativism. Sprat argues in order to arrive at “Truth,” the scientists in the Royal Society of London have “separated the knowledge of Nature from the colors of Rhetorick [sic] the devices of Fancy or the delightful deceit of Fables” (62). He claims the scientists have nobly secured communication between hand and brain (62). In other words, Sprat believes rhetoric, ornamental language, and figures of speech would prevent scientists from arriving at the truth, so the scientists are able to speak in a neutral language and can record exactly what they see without bias – their hands have not corrupted their scientific work. They have developed a “natural way” to speak their language is as close the mathematical plainness as it can, preferring the language of tradesmen before “Wits” and “Scholars” (113). He concludes by questioning where science would be now if their predecessors had been “benefactors” rather than “tyrans over reason,” who communicated “more of their works and less of their wit” (116).
On the other hand, Bacon states, “For the mind of man is far from the nature of a clear and equal glass, wherein the beams of things should reflect according to their true incidence; nay it is rather like an enchanted glass, full of superstition and imposture, if it be not delivered and reduced” (136). He further illustrates this idea with the metaphor of Plato’s cave, claiming our spirits have their own caves consisting of “our own complexions and customs, which minister unto us infinite errors and vain opinions” (137). In other words, our terministic screen is largely affected by our own persuasions and bias, particularly culture. Bacon says although we believe to possess control over our words, words are like “Tartar’s bow, do shoot back upon the understanding of the wisest, and mightily entangle and pervert their judgment” (138). Bacon then challenges us to be like mathematicians and identify our terms and define them, but no mater what, we cannot divorce ourselves from the fallacies of language (138). Finally, Bacon argues Plato was wrong to think of rhetoric as a “voluptuary art, resembling it to cookery” because speech does more good than it does evil (150). He praises Aristotle for placing rhetoric between logic on one side and moral or civil knowledge on the other (151).

Apprenticeship System

For the last section of my report, I wanted to learn how students who graduate played a role in the lab’s hierarchy. At Clemson University, the Ph.D. students in Physics obtain their degrees in four to five years; thus, I wanted to interview the scientists to find out how the cycle of students graduating within the group have directly affected them. Last semester, two of the graduate students received their PhDs, and I wanted to find out how the other members in the group perceived the transition from graduate student to
post doc. I also wanted to learn how the hierarchy affects day-to-day interaction in this workplace setting.

![Image](image.jpg)

Figure 2.2: Former members of Dr. Rao’s lab in Spring 2007 (left), two former PhD students working in the lab (right).

Rao has two strategies for easing the transition when students graduate. First, he tries to keep somebody who has a broad enough base in terms of experience, so they can contribute to several different projects and manage their own project at the same time. He says Reppert and Yang are examples of such people. Rao states, “As students graduate or are close to their graduation or are even halfway through, I make it a point they know that they have to groom a junior student because that helps them with their career down the road. Someday the present students in my group may go out and become a faculty member somewhere, so they need to learn how to manage people – managing people in a nice way. It has to come not by force. It cannot be like a Hitler, so you’ve got to learn how to do that” (Interview). Reppert agrees with Rao – the older students should teach the younger students to prevent a long transitional period. According to Reppert, the group underwent a transformation when three of its members left within a few months of
each other in mid 2007, and the older students teaching the younger students played a vital role in making that a smooth transition. Dr. Yang said the process of training students is “like a river” in which the veteran students mentor the new students.

On the other hand, Lingam and Spear say they have not noticed the graduating of students affecting communication within the lab, but they have only been in the lab for two years. In the same vein, Karakaya has not been in the lab for more than a year, so he has not seen a turnover in the group but says it was challenging for him as a newcomer – it was hard for him to manage lab work and his courses. Saini, who has also been in the lab for less than a year, had a similar response but expresses, “Since I am a girl they helped me” (Interview). When I asked her if she feels like she is treated differently than the men in the lab, she noted they just help her “carry heavy boxes and that sort of thing” (Interview)

Skove has seen five decades of students coming and going and has even been in charge of his own research group in the Physics Department. He is the anomaly within the hierarchy because he has officially been retired since 1989, yet he still comes to work every day. Although Rao is in charge of the research group, Skove also ranks at the top of the hierarchy because of his years of experience. During his interview, he illustrated his understanding of the process of students graduating with an anecdote. He said students start their careers by learning from the professors and end their careers as students when the professor is learning from the student. Skove illustrated this point when he said a student made dials for an instrument for the professor to use. The dials were not connected to anything – it was just for the professor to feel useful. The student was worried the professor was going to mess up the experiment, so he made the false dials.
Findings

Overall, six out of the eight students said they did not perceive a hierarchy within the lab for communication – they can easily interact with Rao whenever they want; thus, this workplace exhibits characteristics of the dialogic and interpretive terministic screen. Dr. Yang described Rao and Skove as brothers, and Lingam said Rao is like a friend to the students in the group. I also found this lab is mostly like a family, especially since they are trying to build a sense of identity as a group by not just working in the lab alone. The lab could not operate without teamwork, especially since the journal articles they write are co-authored among members of the group. In addition, two members of the group, Saini and Rao, say they are motivated by the teamwork and success of the group as a whole. They spend time with one another outside of work – Reppert plans to arrange different functions outside of work featuring each different culture represented in the lab. For example, Indian night would feature curry dishes and a game of cricket and American night would consist of grilling hotdogs and playing softball. In addition, the potluck lunches flatten the hierarchy by breaking up cliques among the professors, senior students, and younger students.

Each of the students and post docs identified themselves as a collaborative member of the group able to freely communicate with everyone. The students said they go to Skove with questions all the time. Skove will talk to anyone no matter what rank, but he will talk to the more experienced students at a higher level. In addition, the graduate students do not identify themselves below the post docs or above the undergraduates – they all work together, and as Podila said, the post docs have just received their PhDs and do not seem any different after the fact. Rao has been able to
acquire five labs in ten years and has acquired a three million dollar grant from the Air Force Office of Scientific Research award in 2009, which demonstrates Rao elicits good business strategies.

Communication within an organization can never be perfect. While there is certainly room for improvement in some areas, Rao’s group members communicate freely across the ranks. This research group is contrary to an example Dickel described during his interview. He attended Cal Tech for undergraduate, and the lab there enforces a strict hierarchy in which the low ranking students have little to no interactions with the professors. Since the lab at Cal Tech was much bigger than the one at Clemson – the hierarchy was necessary to keep order. Similar to Dickel’s experience, Podila recalls the communication in his undergraduate lab in India involved the lower ranking students going through the post docs like a “filter” to get through to the professors. Finally, one of the elements or “rhythms” Rao applies to the group to maintain order within the organization is the senior students training the new students. Within this apprenticeship system, both students in the scenario are “subjected, used, transformed, and improved” – the older students learns to manage scientists and the younger students are trained to fit into the lab’s environment and to maximize the productivity in the lab (Rao Interview).

The first part of my case study illustrates the many variables involved with communication in a lab setting of ten scientists. Although each student works individually to earn their degree, they must be able to collaborate with each other to complete experiments and publish papers in notable scholarly journals. Currently, email, one-on-one interactions, and group meetings ranked as the most reliable form of communication in the lab; yet each one of these cause gaps in communication. Each of
the current forms of communication in Rao’s lab, such as email, instant messaging, and PowerPoint, pose problems in sharing information. This study called for more research on new technologies that could change the way the group communicates.
CHAPTER 3

TWO STUDIES OF WORKPLACE COMMUNICATION

To learn more about the lab’s current situation, I performed interviews each of the lab members in Rao’s lab, and these interviews establish the lab’s current rhetorical situation of their workplace, as the group members communicate within the lab and collaborate with other labs on and off campus. I chose the interview method, so I could ask open-ended questions about their current situation for communication and receive a broad range of responses. Interviews may only emulate “familiar tales, or reveal the particular form of discourse” (Tretheway 96). Tretheway does not view this as a limitation; however, the interview method should be viewed “as an opportunity to fully explore the contours of a particular discourses [...] in all of its normalizing effects” (96).

In addition, I studied my English 103 classroom, and as a teacher researcher, I kept a journal to study the rhetorical situation of implementing a cloud-based technologies to alleviate the problems caused by serial collaboration.

Case Study

Although I did not complete an extensive ethnography like Latour and Woolgar in order to find out about the current situation for communication in the workplace, I conducted a two-part case study in a scientific lab. I studied Dr. Apparao Rao’s lab in Kinard Hall at Clemson University; the first part of the case study took place in Spring 2010, and the second part of the case study took place in Spring 2011. Rao’s group is
comprised of undergraduate students, graduate students, post-docs, and a professor emeritus. When I initially performed the study, I interviewed one undergraduate, John Spear, five graduate students, Ramakrishna Podila, Ted Dickel, Deepika Saini, Mehmet Karakaya, and Kiran Lingam, two post-docs, Dr. Jason Reppert and Dr. Keqin Yang, and professor emeritus, Dr. Malcolm Skove. During the second part of the case study, Reppert and Yang had left the group for new jobs, and the group had two new members, Luciana Oliveira and Martin Egblewogbe.

Figure 3.1: Keqin Yang (upper left), Apparao Rao (upper right), Jason Reppert (bottom) working in the lab.

My first study in Spring 2010 explored different aspects of workplace culture, and my goal was to study how the ten scientists in the group communicated. First, I wanted to learn if communication was achieved across the rankings of the hierarchy. Second, I wanted to learn if the different cultures in the lab influenced communication in the lab, and finally, I wanted to observe how the workplace’s hierarchy copes with students entering and leaving the program within a period of four to five years. I found how three
elements: communication, culture, and graduating students, interacted within the organizational hierarchy so the members of the lab could learn ways to improve their overall communication. The second part of the study in Spring 2011 focused on how the group communicates with old and new technologies.

**Serial Collaboration**

When asked if email causes a breakdown in communication, Dickel says it could when a group of people tries troubleshooting through a problem. He states, “I have had to work with someone in the group and they weren’t around, and yes, you have these breakdowns because you cannot convey information accurately or extensively enough through email for more technical things like making a certain device or duplicating some kind of experiment” (Interview). Dickel also recalls instances where email has hampered communication as the group works together on a paper. For example, two people would work separately on a draft revision, and then a third party would put all of the changes together. He states, “It works, but it doesn’t necessarily work well. So a lot of times, it ends up being done serially. It goes, but it goes really slow. The first person has it, then the next person, and the next person...it can take a very long time” (Interview).

Then, I interviewed Oliveira who has worked in Rao’s lab for less than a year, so she was not a member of the lab when I performed the first part of the case study. When asked if she has ever had trouble with communicating via email, she could not think of a specific instance at first, but then she could remember a time when she sent an email to everyone explaining the new waste procedure. She recalls, “I guess people received it, but I am not sure everybody read it. And if they read, it they will forget it after a while.
Even though I sent everything I needed to, I can remember even Jason said to resend the email to everyone again, so I guess people just forget or they don’t actually care” (Interview). Oliveira believes it depends on how disciplined people are to keep in touch, so any time communication fails, it is more of a problem with an individual’s organizational skills.

Next, Saini asserts the best way give instructions are to send them over email because “it doesn’t look like you are the boss” (Interview). She states, “You can give some instructions pertaining to your work, room, or lab or whatever responsibility. I think it would be better send that information via mail rather than going to the person. In case we need something or in case we need to get work done, it’s best to go there – it’s much clearer and it puts it straight about what you want and what you don’t want” (Interview). Saini thinks there can be problems with communication when it comes to giving instructions over email. She describes sometimes when you give instructions over email, people may perceive you are “acting bossy” or taking a bossy tone. She says you just have to “frame your emails very smartly,” so you are just “saying it” and not ordering people around (Interview). For example, when one of the office administrators wrote “don’t do this, and don’t do this – but when you go meet her she is so sweet, and you know exactly why she is saying it. She is busy and has work, and she is working for you. I think that’s where email miscommunicates [sic] what you really want to say” (Interview).

Podila thinks the best way to share files is over email and explained how senior group members and new members take on different roles when collaborating on a paper over email. For example, when he joined, Reppert was a senior group member, and
Podila was following the senior member’s lead. When they would get results on an experiment, it would be Podila’s duty to perform “ninety percent” of the analysis (Interview). Then, to push the project forward, the group members involved would meet together and decide to do more experiments or modify the procedure, and then, Podila would go back to doing more experiments. Whoever the first author or “leading man” on the project was would write up the paper and send it to the whole group (Interview). Then, each member would give his or her feedback, and then all the feedback would be collected into a document. The document would go back and forth at least three or four times. Then, when the document was finished, Rao would take one last look at it, and then send out the final version to the group. He says the feedback takes place mostly over email – except Skove will make edits on a hard copy “because he probably prefers that” (Podila Interview). He has not had any trouble keeping track of who comments what because the comments in word include the user’s name. The only major problem is with formatting since some members use Macs and the others use PCs, which alters the justification of the document.

Spear is the only undergraduate working in the lab, and he has been a member of the group for two years. As an undergraduate, Spear does not collaborate with group members on papers, and he does not work with other labs. He says he mostly just does experiments in the lab, and he has not worked much with publishing papers yet. However, he has edited Podila’s papers before to make sure it is clearly written. He states, “Mostly, I just make sure that it makes sense. If I think anything needs to be explained more, I will just tell him where to go into more detail. A lot times I don’t really know everything about his experiments, so I can’t tell him what’s right or wrong, but some of [the editing
is] grammatical” (Spear Interview). According to Spear, Podila usually prints out a hard copy, and Spear will write notes all over the hardcopy or make edits over email.

Skove has seen many generations of graduate students coming through the lab, and he can remember when the lab drafted all of the equations by hand. They would use a Leroy Lettering Set to ensure they used the proper font and made the work readable. Skove maintains contact with NSF, and he talks to professors in other departments at Clemson – he stays in touch with the ones who have been here before he retired and others who were his students. When working with other labs on projects, he lets Rao take care of it. Skove states, “As most physicists are interpersonal relationships are not our forte, and if he [Rao] takes care of it, that is fine” (Interview). Since his retirement, Skove has not worked on papers with other groups outside his lab – Rao usually takes care of it. Sometimes, Skove will go over a draft for English or “for smoothness and for grammatical errors” (Interview). He will provide feedback one of two ways. He edits an electronic copy and sends it over email, so it is clear who made comments or changes on the draft, or he will leave his feedback on a hard copy. Skove remarks students may believe he prefers a hard copy, and he said that is not necessarily true. The professor also said the group sometimes meets around a table and talks about particular parts of a paper that need rephrasing. Skove could not recall a time when email hampered communication; however, he occasionally forgets what version of a document with which he needs to work.

Skove also says things are less collaborative than they were fifty years ago. There was less competition, more cooperation, and less arguing. He said there were not many women students then, and the students’ wives were usually typists. The students normally
gave their papers to the typists, and the students would usually go through four or five iterations before it was finished. Skove states, “I don’t remember ever having any distasteful things happen but there is a little more of it now” (Interview). He said everybody got tenure — “that you just walked in and you got tenure. These days, you have to have a stack of papers this big, and maybe half the people don't get tenure” (Interview). He added it is a higher level of science now, and it has gotten even more competitive. In the past, “everybody” had a Ph.D. — people preferred the title “professor” because not everyone was a professor. Now, it is the other way around (Interview). Today, everyone has a doctorate but not everyone is a professor.

According to Rao, the fastest way to get in touch with group members is through email, but the best way is to conduct group meetings every two weeks where he “can look them in the face and in their eye and let them know what's expected” (Interview). When Rao assigns students to work on project requiring a “dedicated amount of time,” he works with them on a Saturday (Interview). He states, “because the projects are of such a nature that you cannot do them in bits and pieces because you need to have continuity of the storyline, and it's often very difficult to do it on weekdays. So every time I have a new student, I sit down with them an entire Saturday and go through the whole paper with them so they know what is expected and how to put their next paper together. As they get more expedience, then I don't have to do the Saturday thing with them” (Interview).

When it comes to writing papers, Rao says most of the burden rests on the first and second author. Then, a post doc or a professor also collaborates on the document, and Rao receives the final cut. Rao states, “It's like a top down structure, or if you want to call
it bottom up, it reaches me at the last stage then that way the reason I do it not because I want to speak from a high pedestal or anything. It’s just that there is everybody’s input there, and then I can sort of paint the big picture and tell the storyline correctly” (Interview). Once a student does the Saturday training session, then the student shares the paper with all the co-authors and asks them for their input. Rao indicates the group often has collaborators who are not at Clemson, so they wait for the input from Austria, Yale, and India. After they receive feedback from the other group or groups, then the student sends it to the whole group over email, and then before it is submitted, Rao take one last look at it. Rao could not recall a time where he lost track of what draft of a paper he was working on because his group keeps track of the document by adding a suffix with the date. Very seldom do they have two versions in the same day, so it does not cause much of a problem.

**Collaboration with Other Labs**

During the pilot study, the group explained how they communicated with each other, and these follow up interviews during the second part of the case study provide more detail about how they communicate other groups. Lingam and Egblewogbe do not recall a time where time and distance caused a problem when communicating with another lab. Lingam says there will always be an issue with time to get experiments done, but it has never caused work to go unfinished. Egblewogbe says the most difficult thing about working with other groups is considering the time difference. For example, Ghana, where he is from, is five hours ahead. If you send a message in the evening, you probably have to wait another twenty-four hours because of the time lapse.
According to Dickel, the two most common ways to collaborate with groups outside the lab are email and conference calls. The most common way is through email “so you can get updates and sort of let each other know what each other is working on and what you’ve found” (Interview). Conference calls are for anytime there is a discussion about a specific question or an issue with an experiment, but as far as day-to-day communication, the lab depends on email to communicate with other labs. Dickel recalls he recently collaborated with a group from Georgia Tech, and Dickel’s group needed directions about how to activate a device developed by a group from Georgia Tech. He said trying to communicate with the other group over a conference call was “particularly difficult” because the group from Georgia Tech was familiar with their own device, and Dickel and his colleagues were not. Dickel states, “They were saying do this and this, and we were sitting there trying to understand it...and you hope when it arrives that you know what to do. But at the time, you aren’t if it’s going to happen” (Interview).

Podila expresses it is “a whole different ball game” when working with another group (Interview). Within their own group, the process is very fast because they are in the same lab, but with different groups, there can be friction because you can only explain so much over email and it is hard to schedule a time for a call. In his experience, Podila has found it takes a lot longer to write a paper with collaborators who work outside the lab. He says if group members are away, they will have Skype calls, and they use that technology when collaborating with labs outside of Clemson. He notes they use a webcam to video chat. For example, he worked on his first project with professors from Brazil, India, and Ashville, NC. Therefore, he would set up a common time, so it could work with all the time zones, and they would share information through video chat.
Podila clarifies his group has used video chat on a number of other occasions throughout his four years here.

Rao says there have been instances of lacking clarity in communication when it came to communicating with other labs. For example, he sent samples to Japan for some measurements, and they started working on the backup samples rather than the more important samples Rao with which he wanted to work. Rao said sometimes the language barrier causes a problem, and he is not sure rather it its a communication problem between Clemson and the professor there or between the professor and his students. Rao states, “It's like two funnels back to back. All the students in my group come to me, and I communicate to Japan lets say. Then, it goes through the inverted funnel in Japan to the professor there, and it has to go through him to get to his group. Somewhere down the line things get messed up. But most of the time – I would say 95 percent of the time – we are right on track. So it has happened. To err is human” (Interview).

**Loosing Data**

Dickel states he has never had any terrible hard drive failures where he has lost everything, but he recalls a specific instance when he lost some data. Last July, the weekend before the Carbon conference at Clemson, he was working on a PowerPoint, and the program crashed before he could save it, causing him to lose two hours worth of work. He has not considered backing up work in the cloud because it is not a frequent issue for him in the short term. Although, he says he can think of a couple of people who have had severe hard drive failures. He states, “It’s only when you are working on something like a dissertation or thesis when you have the terrible hard drive failures. It’s
not during the other five years you’ve had your computer before...and then it will burst into flames for no reason” (Interview).

Lingam has not considered uploading his work to the web either, but he says, “It would be a safe way to do that because you would never lose your data” (Interview). Luckily, the only time his motherboard failed, the data he lost for good was not important. Egblewogbe says he has lost data before because of a hard drive fail, but says he feel a little uneasy about his files existing somewhere out of his reach. He states, “It doesn’t seem to me that they are mine if they are living somewhere else. When they are in your computer’s hard drive, you can see them” (Interview). In addition, he indicates he would not want to store documents in the cloud because at home in Ghana “you do not have the best Internet connection” (Interview).

Oliveira recalls she has lost data before but it was nothing “catastrophic” (Interview). She says sometimes the computer may restart on its own after installing updates of somebody may think the computer is off, press the on button, and turn off the machine before your data can be saved. She said she would consider storing her data on the cloud, but expressed some concerns about the servers in the cloud. She questioned, “What happens if you lose your data because the server crashes and you don’t have another back up?” (Oliveira Interview). She illustrated this idea when she explained she had been to the student infirmary earlier that day and noticed the health center’s office had new computers, and she made a comment to the nurse about the new hardware. The nurse replied all of the patient files are being uploaded to the computers and that the paper copies are being destroyed. She then asked the nurse what they would do if the
system went down, and the nurse replied all the data would be lost, except for any recent patient information.

Saini remembers losing data when she reformatted her computer and forgot to save her data somewhere else. She notes luckily the files were not critical, but nonetheless, she could never get them back. She notes she would use the cloud to store data, but she has concerns about privacy. She states, “I don’t want somebody hacking my stuff all the time. We have private data over there. We don’t want a paper or data to get out – like if we were going to publish a paper and somebody else has it already. You never know who is looking at it” (Saini Interview). Saini notes she trusts Google, but in the back of her mind, she would worry if her documents were safe. She says that, for example, she feels uneasy about the advertisements showing up repeatedly when you Google certain words. She concludes she would use Google Docs only for things that are not very sensitive. If the paper’s published it’s okay, but she would not feel comfortable saving her personal data in the cloud because she is not “ensured privacy” (Saini Interview). Spear claims he has never lost any data on his hard drive, but would consider using cloud computing if he knew more about it. He says, “Privacy concerns might be the only thing [issue]”, just as Saini indicated, but as far as reliability, he would not have any concerns (Interview).

Podila said the only problem with his PC is its operating system. He states, “Most of the time, the problems I faced was my operating system. I did not have those problems with Linux or Unix, but Windows keeps failing” (Interview). He has never had a recurring problem with losing data, so he has never considered using Google Docs as a back up for all of his data. He said files, if they are large, take too long to load, even if
your Internet connection is fast. Podila noted he works with many high-resolution .tiff files in the lab, and most of his work is done on a plotting program, Igor, which requires a lot of RAM. In order to keep his files safe, he backs it up on thumb drives and emails it to himself.

Skove recalls his wife typed his dissertation, and it was original in five carbons and “that was all there was so you had to watch that very carefully” (Interview). In recent times, Skove has never lost data before because “you keep that very precious,” but he has lost documents before (Interview). For example, he recently lost an article when he was half finished and had to start over. Skove said would back up documents in the cloud, but he would not back up data there. He keeps track of his data on a thumb drive and saves it in other places. He would rather keep the data safe in his freezer than in the cloud because data is just too precious. He states, “That may be a bit of Luddism in that probably the cloud is safer than my freezer. But a freezer I can kick, and I can open up and see its there. What if all the sudden they had an accident at Google?” (Interview).

Rao said he has lost data “big time” (Interview). For example, he teaches an optics course almost every semester, and when he had a big computer crash, all of his files for the course were lost. He states, “I usually back up my laptop once a month, and it just so happens that it wasn’t backed up, I lost a lot of material, including some very important talks I had given in Sweden. All that is gone” (Interview). Rao would consider storing his files in the cloud as long as it is secure. He keeps a 500-gigabyte hard drive, which is accessible to his group members within the lab.
Cloud-Based Technology in the Lab

Dickel is familiar with cloud technologies, for example, Google Docs. The Physics Department has done a couple of things with it, but he has not used it much on his own. Every semester, the Graduate Student Evaluation Committee (GSEC) makes sure the students are on track by meeting with them one-on-one. For example, they ask students when they plan to graduate. To set it up they use Google Docs, GSEC uses Google Docs to organize the scheduling. He also used Google Docs to plan “Senior Skip Day,” with his classmates when he was an undergrad at Cal Tech. But besides those few instances, he has not used Google Docs at work, and he notes Rao’s group is still “a little old-fashioned” because they email copies of documents to each other. Dickel says something like Google Docs would be “easy enough to implement,” but changing the way the lab communicates is not something they have looked into, and he says, “It’s probably just an inertia of here is what we’ve been doing – it seems to be working well enough” (Interview). Doheny-Farina makes a similar observation – organizations are resistant to change.

On the other hand, Lingam says although he has never tried Google Docs for himself, the lab uses Google Docs to keep track of the chemical and supplies inventory. He says they started using it two or three months ago and everyone who is a member of the lab has access to it. He says, “As long as people actually go into the document and enter in the information, it’s a much better way than physically having to go to that lab and enter all the data” (Interview). Egblewogbe has some familiarity with Google Docs – he works with a group of people to keep track of a cache of documents, and he keeps track of an email list with Spreadsheet.
Oliveira started using Google Docs when she was a teaching assistant, which was before she became member of Rao’s lab. She would input the grades of her own students, and the other TA would input his grades, so the professor they were working for could access the grades of everybody working the class in one place. Since she has been a member of Rao’s group, she has used Google Docs with the rest of the members to keep track of inventory and to schedule times to use the CVD (Chemical Vapor Deposition) furnace. When asked how the system is working, she says as soon as she orders something; she puts it in the Google Doc, and then notifies everyone by email. She states:

I am very disciplined. I have always been like that, so for me it’s easy to keep track of everything. But some people are just not. They are disorganized – they just don’t have the routine of doing it – it’s hard unless you reinforce it. In a university setting, it might be more difficult to reinforce these things. I don’t know if it’s a man problem or a woman problem because men are more disorganized by nature than women in general. (Oliveira Interview)

Oliveira was not familiar with how the word processor in Google Docs worked because she had only been exposed to the spreadsheet interface. After a brief explanation, she said it sounds like something useful since everything would be in one document online – you could work on your portion while a collaborator could work on a separate portion. She said it sounds like it would be easier than email because it is just one document rather than working on a document remotely and then exchanging it and having somebody else is in charge of making it sound like it is coming from the same person, but she has never used it for herself. She said it would also be better than how she currently writes because you would not have duplicates.
Saini says Google Docs has been a good solution for keeping track of chemical inventory, “so that it’s shared with everyone, and everyone knows” (Interview). She personally uses it to keep a track of whatever orders she is placing. She also likes it because she does not have to download something every time she wants to edit it – she can just see it and share it with anyone in an instant. She has only used Google Docs to keep track of the inventory.

Podila uses Google Docs for the inventory and to keep track of the Chemical Vapor Deposition as well, although he notes he is unsure if people use the CVD document. He also uses it to keep his own online lab notebook. He states, “I have it just in case I lose it, or for when I leave Clemson. I just write all of the parameters when I do an experiment – I write them down in a spreadsheet on Google Docs” (Podila Interview). He has shared the lab notebook with Egblewogbe, and Podila notes it was easy to share it with him, rather than sending multiple entries in the form of email attachments. Podila said he could potentially write scientific papers in Google Docs – it should work “because Google Docs is just like email because all of them [group members] can access it at one place” (Interview). He is unsure if the professors he works with are “tech savvy” enough, and they may be unaware of cloud computing (Interview). Yet, he said cloud computing “would be nice because that way all the documents and all the comments are on the same document” (Interview). Though, Podila had one major reservation about Google Docs for writing papers; he said he might not be a good thing if a person does not want others to see what they are saying about another lab member. He illustrated this concept by stating:
If I sent a document to four people, you might want to put a comment on there you did not want me to see. Say you do not want me to see it since I am just a grad student. If two professors start taking and they do not want me to see what they are talking about, they would just prefer to send an email rather than do it in Google Docs because it is public. And if you take the person off [the document] the person would know it. Sometimes you don’t want the other person to be hurt. (Interview)

In regards to privacy, Podila just said he would like for the setting for Blogger and Google Docs to be deactivated to show up on the search engines. He uses Blogger, Gmail, Docs, and Orkut, a popular social networking site in Europe and India. He has manually set his privacy settings, so people cannot search for him on Google. Podila said Google Docs is also appealing for him because it has the translator. He says the only drawback is that he has had trouble saving it in Google Docs, so he has to save a translated document as a Word file. He noted this feature would be good for collaborating with people in South America or China.

When asked if he has used Google Docs before, Skove said he has heard of the inventory sheet but avoids things like that if he can. He said Google Docs sounds like a good way to do things, but on the other hand he actually prefers to write in something called Scientific Word, which is a LaTeX. LaTeX is a printing language, and allows the author to put code equations and arrange them neatly, but you need Scientific Word to use LaTeX. When asked if Google Docs would be good for keeping track of parameters or writing about the results of an experiment, Skove stated, “Call me an old fogey, but I would say no. I say each investigator should keep a notebook” (Interview). He said
scientists have to be able to draw graphs in the notebook, and they have to keep a record of what time it is during the experiment. He states, “The notebook that you take experimentally is yours and maybe only you have to know what this is here and what has happened every four seconds” (Interview). He said a lot of that is recorded on computers now, but the lab notebook is still in a form convenient for the author. He said Google Docs may be good for the members of the lab to use after the experiment is complete. He said Google Docs may be a good for writing up reports but said it may be a problem if the student has gotten the data but the professor may have a deeper knowledge of the subject. He said he did not mean there would be a dispute over authorship in this situation. Skove said he has not seen many arguments over whose name goes first, second, or third on a paper. Occasionally, people dispute over the priority. So, it may prove difficult to balance their abilities in a shared document, and he said, “It's different picture trying to keep that all together, but I don't know. I could be convinced otherwise” (Interview).

Rao has been using Skype to conduct meetings with other labs for three years. When they meet with labs in the U.S. they use video chat. On the other hand, when they meet with labs outside the country, such as India, the Internet may be slow, so they just perform an audio chat. They can be on their cell phones and not necessarily in front of their laptop. Although he has heard of Google Docs, Rao was not sure how to know which document is latest version and who modified it. He may consider using something like Google docs down the road, but right now, there are people like Skove who like to work with a hard copy. Rao also indicates the hardcopy still has its advantages. He says he can look at a figure and a text by putting those pages next to one another, which he cannot really do with a laptop. Rao said his computer monitor is a widescreen; he could
have one window fifty percent and the other at fifty percent, but he would need to have two documents open. He states, “I still think there are some hurdles in the sense that the hard copy is much easier to maintain the continuity of the storyline. It’s easy to switch back and forth, but on the other hand the electronic copy is very handy. It's on your lap top anytime you can just pull it up” (Interview).

Overall, Rao’s lab collaborates, yet in the humanities, particularly in English class, we do not have that kind of collaboration. Dr. Rao could not simply carry out the everyday tasks in the lab himself – he depends on a staff of graduate students and post docs to keep things running. Collaboration cannot take place if individuals do not share a similar skill set or if they do not share a “mutual trust” with one another (Doheny-Farina 196). Users who have a mutual trust with fellow collaborators may be able to improve how they edit documents in real time from different locations.

Our education system does not promote real collaboration. From the moment a child enters institution, he or she is taught to complete work individually. Collaborative assignments may receive less merit than individual assignments, for example. Some teachers may prohibit group work because they view it as cheating. Thus, some students may be resistant to collaborative writing assignments in class because they may be taught co-authorship is a form of plagiarism. Students may also be uncomfortable with sharing their drafts with their peers because they may feel like their peers are judging their unfinished work. The old ways of communication, such as email, reinforced this idea of serial collaboration, in which students could complete assignment with lengthy threads of email attachments documenting the process. Today, cloud technologies give us the chance to interact in real collaboration as student writers compose documents together in
real time. The easiest part will be learning how to use the technology. The hardest part will be breaking from our tradition and learning how to truly collaborate. Unless we can learn true collaboration, the cloud technologies out there will not improve the way we learn, and a major gap between the workplace of the classroom and the workplace beyond academia will still exist.

The workforce demands true collaboration; yet, we are trapped in a closed system that promotes serial collaboration and the ideals of old technologies such as word processors, hard drives, and email attachments, which proliferate copies of a document for collaboration. Serial collaboration has been “in the true” for hundreds, if not thousands of years, and as a result, we have been trained to be sole authors. The institution controls knowledge production and has thus reinforced the notion of serial collaboration as the norm for communication. The rhetorical situation can also help us understand cloud technologies and how they fit in with workplace communication. First, the exigency of this situation is that various types of “advanced technologies” are really slowing us down. Messages are easily buried in email inboxes – by the time users get to responding to an email, it may be too late. People do not always check the voicemails and respond right away. Documents are composed on an individual’s personal computer and sent for revision over email, sometimes causing confusion on where it falls in the sequence of multiple drafts. PowerPoint forces a linear thought process and makes little sense when the presenter is not there to explain it. Second, the audience is anyone who depends on reliable collaboration and sound communication in the workplace. This could be anyone who is currently relying on email, instant messenger, memos, telephone, and meetings and individuals who have already adopted cloud-based technologies but has to
find a balance with the old ways to communicate to be productive. The major constraint is that Internet access is not ubiquitous. Without an Internet connection, collaborative technologies are rendered useless. Also, cloud-technologies change the way we look at the authorship of documents. It may be uncomfortable to change to a new way of doing things. As Doheny-Farina indicates, “Organizational systems seem to have momentum that is often resistant to change” (172), so one of challenge is that organizations often have a “momentum” that resists change (172).

Although our education system has enforced us to work individually from the time we became a part of the institution, the workforce demands real collaboration and team players. Google Docs, a cloud technology, is suited to bring praxis into collaboration and conflate the dichotomy of composition in the “workplace” versus the “classroom.”

**Composition Classroom**

One of the major challenges I faced as a new teacher of Accelerated Composition at Clemson University was not only planning lessons, speaking in front of a class full of unpredictable students, and grading assignments fairly, but I also struggled with the online writing lab included with the textbook. The program was great in theory because it kept track of all of the student’s writing assignments, contained an online version of the book, and had an assortment of diagnostic tests; however, the program was known for crashing, running slow even when connected to the Internet through an Ethernet cable, and for altering a document’s formatting. After about a month of tirelessly troubleshooting through issues caused by the faulty program, I decided to change over to
something else when I graded a student’s first draft of a six-page essay, and it did not save any of my comments.

Google Docs

I decided to use Google Docs as a long-term solution. At this point, I only used Google Docs to write my thesis proposal, and I used it for my oral exam study materials. Each member of my study group wrote possible exam questions, and anyone shared in the document responded to them between group meetings.

Only one of my forty said they had ever heard of cloud computing and could explain what it meant in his own words. During the first day with Google Docs in the classroom, I explained what cloud computing is based on my understanding from my thesis proposal, and then my students created their own Gmail accounts because regular Gmail accounts (@gmail) did not work with Clemson Gmail (@g.clemson). For instance, if my students tried to share a document with their Clemson Gmail account, I could not edit the document with my Gmail account. Thus, I required all of my students to create a Gmail account they could use after graduating from the university, so they needed to create a professional persona. This provided a good opportunity to talk about personas with my students. My students had just completed an autobiography assignment in which they wrote one personal and one professional persona. The purpose of the assignment was to think of the audience in mind while writing the autobiography. Even deciding of a username for an email address is a rhetorical choice, and their username is a representation of who they are. Nonetheless, I had a few usernames that were not a
Introducing a cloud-based technology provided me with an opportunity to talk about the privacy policies of the cloud. When I told them they would be turning in their assignments over Google Docs, I asked them if they had any concerns about using it for the class. I was met with blank stares, and I paused for a couple of beats. I told them my concern is Google Docs could make you feel like your teacher is looking over your shoulder. The teacher and student hierarchy creates and regulates the gaze. In Discipline and Punish, the Panopticon structure causes an inmate to experience “a state of conscious and permanent visibility that assures the automatic functioning of power.” The inmate will always see a central tower that houses the guards, but he will never know if he is being watched at any moment (Foucault 201). In a classroom using Google Docs, this concept of the Panopticon is applicable to the teacher-student interaction. As soon as a student shares their document with the teacher, the student may not know exactly when they are the object of the teacher’s gaze. The teacher could have one of their student’s documents open, and as long as they do not close the tab, the teacher is “viewing” the document in Google Docs even if they are looking at something else in another tab. Until the collaborator closes the tab containing the document or closes their browser, the student may feel like someone is watching them. In addition, students who share a master copy with other collaborators for a group project may have the same feeling. Students do not know exactly what their peers are reading in their document, especially if they are meeting remotely as a group in Google Docs.
I state a disclaimer: I am not there to spy on the students in my class. I want to be there to help them, and Google Docs enables me to meet with the students in their document if they need my help. I discussed Google’s Privacy Policy and encouraged them to look into the privacy policies of social media sites they use every day, such as Facebook, which already store their personal information.

One of the exigencies of Google Docs in the classroom was that students would share the documents with me after they were due. Some would turn it in minutes after class had started, and I never had this problem with the textbook’s writing lab or email. Google Docs is infinite – the students could keep editing the document even after they had shared it with me; whereas before, the writing lab would not allow them to modify the document after they had turned it in to me. I also think that trying to pass of the assignment as “on time” would not have passed with email because it has a visible time stamp, and once a student emails an assignment to me, it is out of their hands. I had to address this issue right away. I reminded my students that Google Docs automatically saves about every five seconds, and the revision history shows me exactly when they composed their essay. This situation provided a teachable moment to discuss their ethos as students. If a student is emailing me in class, then they are telling me they are not paying attention in class, which harms their ethos as a student.

In addition, students had a hard time learning the word processor in Google Docs. I may have given them too much credit for being Millennials and expected them to be able to use it with ease. Even though I gave them a tutorial of Google Docs in class, many of my students would share documents formatted 11 pt. font Arial single spaced, the default, rather 12 pt. font Times New Roman double-spaced, the MLA format I require
on all assignments. I considered this issue in my second semester, and I made sure everyone understood how to use the word processor by requiring them to complete an in-class assignment with Google Docs. However, some students continued to struggle with inserting images, wrapping text around the images, and formatting the hanging indent in their Works Cited page.

I encourage my students to use Clemson’s Writing Center, and I assure them that it is okay to have someone proofread assignments for grammar. Little did I know this disclaimer would cause an issue with Google Docs I had never imagined. During the second semester, a student met with me during student conferences to go over her first paper. I noticed the student was not the first author on the document. This occurred early in the semester, and I assumed it was her partner from the peer review. I thought it was odd she was not the owner, so I asked her about it. She had shared a copy of her rough draft with her father, and her father was the owner of the document. I thought it was a little “high school” to have parents reading over the essay. We only had ten minutes to meet about her paper during instructor conferences, so I did not look into it any further at the time.

Later, I brought up the revision history and saw her father had spent nearly two hours editing the essay for grammar. The student may not have been in the document for the duration of the editing session because her username did not show up in the revision history. I talked with the student one-on-one about how these were her ideas, but she went about editing her paper in the wrong way – she needed to be present in the document, and her father could leave comments that she could choose to ignore or accept.
Her father could also explain the grammatical corrections she needed to make with the chat function.

I found email became a burden, especially during my second time teaching. Students would ask me questions over email we went over in class – they could have gone to their classmates for clarification before coming to me. I set ground rules for email at the beginning of each semester. I said they should email me if they anticipate an absence, want to schedule a time to meet with me outside of my office hours, or need clarification on directions. I would not respond to emails asking about things we went over in class.

During the second semester, I used Google Docs as a conferencing space for the first time. My first student conference using this method took place just as easily as meeting in person. The student was sick with the flu and had to miss the mandatory instructor conferences for the first essay. We met in her document and communicated with the chat and comment functions. She had followed the directions for her paper and had a complete draft, so it was relatively easy to conference over Google Docs. On the other hand, not all conferences were that simple. During another conference over Google Docs, a student did not come prepared with any questions. She asked if I could just read over her paper and leave comments before it was due. I thought we were meeting because she indicated she had questions about her proposal over email. Finally, after a long moment of silence (which seems even longer in Google Docs), she asked me a question about the current situation in her proposal, which initiated the conference. Then, after I was able to give her feedback on that section, she told me that she had a math exam to go to and asked if I could just look over the rest for her and leave her comments. My next
conference that followed was even worse; the student showed up nearly ten minutes late, claiming that he could not find his battery charger. He also did not have a draft, which made the conference a waste of time. I regret meeting with the student because I taught him it is okay to show up late.

I have never experienced a Google doc failure. One time, during the second semester, the time on Google Docs was off by a couple of hours, but it did not affect my students’ work. In the event Google Docs crashes, I have a clause in my thesis that students must turn their work on time, so students would need to turn in a hard copy in the event of this ever happening.

Google Docs was useful for peer review, and during the first semester, the peer review for the second paper was the first collaborative assignment. My students were amazed they could be in the same document as their classmates, and everyone could write at the same time. During the peer review session, they traded papers with at least two classmates. Then, I asked them about the peer review sessions two days later in the conferences, and this indicated who participated in the peer review. Google Docs is also useful for group projects. In fact, some of my students from the first semester used Google Docs in conjunction with Skype to communicate with group members as they wrote a reflection essay over Thanksgiving Break. When my second semester students completed the first collaborative writing assignment, they asked me how they should do it. I really was not expecting that question and responded they should do it in whatever way they can. They just need to follow the directions of the assignment and turn it in to Google Docs. I was met with blank stares and then said they could each take turns writing, assign one person to type while others share their ideas, or split up the writing
assignment – there are many possibilities. If I was faced with this question again, I would say these cloud technologies are so new; we are trying to find out the best way to use them in composition classrooms.

In order to keep both my sections organized, I created folders for each of my classes and color-coded them to keep track of both sections. Under each class folder, I created a folder for each assignment. Then, I provided the name of the assignment and the due date. With this system, I did not have trouble finding a student’s assignment, but I could also easily find documents from my first semester to use as examples for my second semester students.

I grade my students’ assignments in Google Docs – I provide my feedback with the commenting tool, and then I put the grade at the bottom in a different color text. This way, the student is updated on their progress. Then I immediately record the grade in my grade book, so I can keep a record of their grades. I only post the grade on Blackboard rather than Google Docs if the student has shared the assignment with another collaborator in the class (otherwise, the confidentiality of their grade would be at risk). I also kept a record of my lesson plans in Google Docs from first semester, so I could use them for the second semester. I created a document for each day as needed and kept a record of what worked and what I would modify for the next semester.

**Prezi**

I recall the introduction to Prezi as one of the most fun days for both the first and second semesters. First, I gave them an overview of what you can do with the technology by showing some of the video tutorials on Prezi’s “Learn” page. Then, the students
signed up for a free account, and we worked through how to use the program together. After I went over important things to remember about the program (such as saving as you go or using a mouse if you have one because I find it easier), the students completed a brainstorming assignment for their research paper. Some of the students amazed me with their level of creativity, and for some reason, this technology seemed a lot easier for them to pick up than Google Docs [INSERT SCREENSHOT OF STUDENT PREZIS]. I have also found it useful from an organizational standpoint because when I open a student’s Prezi, it automatically saves in my Prezi account. I do not have to go searching for it in my email inbox – it is easy to find my students’ Prezis on the homepage of my Prezi account.

![Prezi Student Example](image)

Figure 3.2: Example of ENGL 103 student’s Prezi.

For the first semester, my students just used Prezi as a mind-mapping resource. However, this semester, I used it as a brainstorming and presenter tool, so students can...
see the process of their research argument assignment. They initially use it as a brainstorming tool because it allows them to compose without the constraints of linear thinking. Then, they use it as an outlining tool before turning in a conventional formal outline. Since I implemented the presentation assignment, more is at stake because they will not only share their research argument and their findings with me but also their peers.
What is Cloud Computing?

Before we can begin to understand what cloud computing is, we must understand what cloud computing is not. The terms grid and cloud seem to be used interchangeably or “mentioned all in the same breath;” on the other hand, they are not synonymous (Chee 22). Grid computing is comprised of multiple computers working through one problem at the same time (Chee 22). The grid must be individual computers that “take directions from a central controller that breaks the problem into single-computer-sized packages, parcels the individual pieces out to members of the grid, then accepts results and assembles them into answers” and are not limited to physically exist in the same geographic location (Chee 22-23). With grid computing, it does not matter where the computers are housed – they could be located in different countries or in the same room.

The concept of grid computing was introduced in the 1990s, allowing clients to plug into a service that mimicked a “metered” electricity supply (Rittinghouse 21). Clustering combines many computers together to form a supercomputer in order to increase processing power and allows the computers to “talk to one another” (20). This method divided all of the work among multiple processors, and the end user could not tell which CPU actually performed the process (21). According to Rittinghouse, grid computing “expands on the techniques used in clustered computing models, where multiple independent clusters appear to act like a grid simply because they are not all located within the same domain” (21).
Grid computing is cost effective because it allows users to share resources when they demand considerable amounts of computer power. One example of a grid computing application is the Search for Extraterrestrial Intelligence @Home (SETI) project in which computers all over the world apportion the unused cycles of their computers to analyze thousands of hours of radio data for evidence of extraterrestrial life (Velte 8). With grid computing, many computers divide the load and allocate those resources among each computer. Cloud computing, on the other hand allows “multiple smaller applications to run at the same time” (8).

Unlike existing paradigms such as Grid, Peer-to-Peer (P2P), Services computing, and Market-oriented computing, cloud computing is an approach in which users may access applications and data anywhere in the world on demand (Buyya, et al. 602). Leonard Kleinrock of Advanced Research Projects Agency Network states, “As of now, computer networks are still in their infancy, but as they grow up and become sophisticated, we will probably see the spread of ‘computer utilities’ which, like the present electric and telephone utilities, will service individual homes and offices across the country” (Buyya, et al. 602). In other words, people are beginning to demand software in new ways – there is a demand for software developers to create software for millions of users to employ as a service instead of running programs that individuals store on their hard drives (Buyya, et al. 601).
When individuals save content or run software on their hard drive, it is as if they can “see” where they have stored the files or run the application. On the other hand, the “cloud” metaphorically describes what the user cannot see while using the Internet. The Internet is illustrated in network diagrams as a cloud, and the cloud represents “all that other stuff” or “etc.” that keeps the whole network running; the cloud also signifies a space that is someone else’s problem to run or maintain (Velte 4). Cloud computing may include various types of services, which include Software as a Service (SaaS), Platform as a Service (PaaS), Hardware as a Service (HaaS), and Database as a Service (DaaS).

First, SaaS is an emerging trend by which vendors offer and maintain services on the Internet (Rittinghouse 50). This method of hosting services in a network is the opposite of the traditional business model, Software-as-a-Product, because software is not purchased, installed, or updated on a personal computer’s hard drive (50). Instead, SaaS

Figure 4.1: Network diagram where “The Cloud” is a metaphor for the Internet (Velte 4).
Second, Platform as a Service (PaaS) enables users to build their own applications, and the service supplies all the resources required to build applications and services in the cloud. Before, a user would have had to download and install software to their computer’s hard drive and oftentimes only pay for what they use, which is similar to the SaaS model (14). Anyone with an Internet connection may benefit from PaaS services which include “application design, development, testing, deployment, and hosting [...] team collaboration, web service integration, database integration, security, scalability, storage state management, and versioning” for custom web-based applications (Velte 14).
Next, Hardware as a Service (HaaS) allows customers to pay in order to use infrastructure such as software and server equipment and are billed like they are using a utility – they are only billed for resources they use in a month (Rittinghouse 35). Many customers can also use the hardware at the same time since the hardware in the datacenter exists is outsourced in a remote location (Velte 16).

![Figure 4.3: Hardware as a Service (HaaS) (Velte 15).](image)

Finally, Database as a Service (DaaS) allows users to store their information in a database that the service maintains such as Amazon’s Simple DB, Apple’s Mobile Me, and Microsoft’s Live Mesh (Velte 17). With this service, the data appears to be stored in one place on a server that exists in the cloud, and the users do not have to worry about losing the data if their hard drive crashes or they lose their computer (Velte 17).
Cloud Computing: A History

This “new” way of thinking about the cloud is not so new – what is emerging is the “second coming” of cloud computing (Hayes). To understand cloud computing, we must understand the history of modern computing. World War II created a need for faster and more efficient computing. A Turing device was developed in 1941 by a British mathematician named Alan Turing, which is considered one of the first fully operational computers – it used both floating point and binary arithmetic (Holmevik, Rittinghouse 2). Turing devices consisted of tape sectioned off into squares and were either marked with a symbol or unmarked and a scanner “capable of writing and erasing symbols while moving left and right along the tape” (Holmevik). What made this machine so significant is the binary digits could be read by multiple machines (Holmevik). During World War
II, computer prototypes were developed based on the Turing device, so the U.S. Army could decode secret messages from the Germans (Rittinghouse 2).

A monumental development took place at the University of Pennsylvania’s Moore School of Electrical Engineering where J. Presper Eckert and John W. Mauchly developed the ENIAC to calculate the trajectory of field artillery in 1943 (Holmevik). This innovative calculator made with electronic vacuum tubes was almost 500 times faster than other processing machines of its time, and “its combination of speed and accuracy opened a whole new set of perspective on the notion of high-speed computing” (Holmevik). Another example of an early computer dating back to the World War II era includes the Colossus, which was developed by British mathematicians at Bletchley Park; this computer was constructed with vacuum tubes and hard-wired circuits and data was stored by using paper punch cards (Holmevik, Rittinghouse 3). The Colossus was a powerful machine for its time, and it started intercepting secret German messages in 1943 (Holmevik).

In 1944, Eckert and Mauchly worked with John von Neumann, a physicist and mathematician from Princeton University, to design a computing device that would store data inside the machine (Holmevik). This new “stored-program concept” meant a computer could “configure the machine for the specified problem and guide it step by step through the solution of that problem” because now programs could be loaded into the memory rather than feeding punched cards through the external machine (Holmevik).

Then, in the 1950s, transistorized computers were invented, replacing the valves with transistors – these computers were far too bulky and costly for the public, so they were mainly used by university or government labs (Rittinghouse 5). Then, Jack St.
Claire Kilby developed the first integrated circuit in the fall of 1958, and microchips were used in computers starting in 1963. This new technology made computers available to businesses because the integrated circuit made it possible to build minicomputers (Rittinghouse 6).

The push to introduce cloud computing has roots dating back to the 1960s. About five decades ago, all of the computing took place at a central site, and users would communicate through terminals over telephone lines; users who did not have a mainframe for their computers were able to access service bureaus and “time-sharing systems” that provided hardware and machinery for computing (Hayes). In 1971, Intel released the first commercial microprocessor called the Intel 4004 (Rittinghouse 6). By 1974, personal computers were both small and cheap enough to be affordable to the public, and the first commercially available computer was the MITS Altair 8800 (Rittinghouse 6). Soon after the release of the first personal computer followed products by Apple, Commodore PET, and the IBM PC in the 1980s. Personal computers seemed to “liberate” individuals from having to use a central data centers housing all of the programs – now users had the freedom to modify software to fit their demands and exert more “control” over their own computing environment (Hayes).

This new model “offered a central repository for shared data while personal computers and workstations replaced terminals, allowing individuals to run programs locally” (Hayes). However, the newly founded way of doing things promoted isolation rather than collaboration. Personal computers allowed users to store their files on a hard drive, and the only way to co-author or collaborate on documents was a serial form of collaboration whereby users shared only copies of their documents with collaborators.
In the 1990s, the idea of clustering and grid computing was promoted, so users could purchase computing power from a third party as if it was a utility (Rittinghouse 21). Then, Globus Toolkit was released as an open source application for creating grid systems, and with this tool, users could share computing power, instruments, and databases “without sacrificing local autonomy” (22). Programs like Globus Toolkit and Amazon’s S3 are examples that have paved the way for the cloud model, which may be appealing to users who need to store data but who do not want to worry about the maintenance (22).

Now, many companies such as Google, Amazon, Apple, and Microsoft offer DaaS, PaaS, SaaS, and HaaS on the Internet, signaling a possible change or paradigm shift in the way people compute – as users migrate their data to the cloud and choose services rather than software as product.

**What are Paradigms?**

Physicist Thomas Kuhn wrote about paradigm shifts and scientific revolutions, which are the “extraordinary episodes in which that shift of professional commitments occurs” (6). They are the “tradition-shattering” events that occur in the “tradition-bound activity” of science and forever alter the scientific imagination (6). Kuhn is critical of historians for viewing scientific revolutions as a isolated instances that one can reduce to studying as if they were or a totem pole (7). He argues the vocabulary historians must use impede them from explaining scientific revolutions because their vocabulary limits them to talk about revolutions as a single isolated event or “piecemeal” (7). A newly found theory “is not just an increment to what is already known – its assimilation requires the
reconstruction of prior theory and the re-evaluation of prior fact, an intrinsically revolutionary process that is seldom completed by a single man and never overnight” (7).

According to Kuhn the study of paradigms is what prepares a student for the initiation into the scientific community, and scientists have a shared consensus about the paradigm in order to continue the research tradition of normal science (11). A new theory must be better than its contender’s theory in order to be received as a paradigm, but the new paradigm will never be able to explain everything (17). Anomalies are what signal the change in a paradigm, and Kuhn indicates it must be more than just a single anomaly to “evoke crisis” in the existing paradigm; the scientist who scrutinizes every anomaly would be unproductive (82). However, when the anomalies persist and interfere with the current way of thinking about things, the evolution “to crisis and to extraordinary science has begun – it comes to be more recognized by the field” (82). Indications of a paradigm’s acceptance include new specialized journals, societies, and a new place in the curriculum; anyone who does not accommodate the new paradigm will be left to conduct their studies in isolation, as if they were forced into an asylum (19).

In order to achieve paradigm status, a theory is considered invalid only if another theory may fittingly take its place; in other words, accepted paradigms replace existing paradigms (77). When scientists in a particular field reject a paradigm they must “simultaneously” accept a new paradigm (77). To remain a scientist, an individual must not reject paradigms without substituting it with another paradigm or the individual reject science itself and become “the carpenter who blames his tools” (79). A paradigm shift is similar to a change in visual Gestalt – it is as if someone drew a picture of a bird on a piece of paper and now the paradigm shift would cause one to see a rabbit instead (85).
However, the scientist may not switch back and forth between seeing the bird or the rabbit – they must see only one, and Kuhn states, “Scientists do not see something as something else; instead they simple see it” (85).

**Examples Signaling the Cloud Paradigm**

A number of services may be examples or “anomalies” of a possible paradigm shift in how the world computes. Some of the major contenders in new technologies include Google, Amazon, and Apple. First, Google Docs provides an intuitive SaaS that is similar to Microsoft Office since it contains a minimalistic version of a word processor, spreadsheet, and presentation program. With the free-to-use Google Docs, collaborators can share documents and work in real time from different locations. Another service, Google App Engine is an example of PaaS, allowing users to write their own applications for at a graduated fee. This platform allows developers to write code, balance the load when sites increase traffic, and integrate custom-designed applications with other Google services (Velte 42).

Second, Prezi is a collaborative technology, which is free for educational use and by subscription for other uses and allows users to create and store non-linear, interactive presentations in the cloud. Users may brainstorm with Prezi, taking advantage of the collaborative during the beginning stages of a project, and users may replace PowerPoint with Prezi for interactive presentations. The service also allows users to collaborate in real time for editing or showing presentations. Prezi allows the user to choose from a number of themes and upload video files and image files to personalize the presentation.
Third, Google Sketch Up lets a designer “model anything you can imagine” – from redecorating a bedroom to modeling a skyscraper – for free. Users can model their city for Google Earth and use Google Images to furnish rooms. Google Sketch Up provides intuitive tools that allow users to create original models or leverage what people have made on the Google 3D Warehouse. Users can easily go from 2D to 3D with their patented “Push/Pull” tool, and every measurement used in Sketch Up is precise. They provide numerous online video tutorials and an extensive help center.

Apple provides a service called MobileMe that synchronizes a customer’s laptop, mobile device, and notepad through Apple’s cloud servers, ensuring contacts, photos, emails, and documents are streamlined on each device. Additionally, MobileMe offers ad-free web apps that simulate a “desktop-like” experience through a browser (Velte 148). MobileMe “pushes” new email messages to an individual’s iPhone, so the user does not have to manually check their email or search for downloads. The service also pushes these emails to the owner’s other devices (Velte 148).

Next, Amazon’s Simple Storage Service (S3), which is the “best-known” cloud storage service that allows customers to store and retrieve an unlimited amount of data (Velte 142). Users are able to upload objects from one byte to five gigabytes of data each and write, read, and delete them at any time (Velte 142). Amazon assigns each file a unique developer-designed key, and users have the options to share files publicly or store them privately. Overall, Amazon’s aim is to promote “scalability, high availability, and low latency at commodity costs” (Velte 144).

Microsoft is “a little late to the party” but offers Azure, the basis for Microsoft’s cloud offerings, for developers to write applications in the cloud that will run off remote
servers (Velte 218). Developers can use Azure to build custom applications to run in the cloud or may improve existing applications with cloud-based technologies. The dynamic structure of Azure allows software developers to build web applications, applications for connected devices, PCs, servers, and developers can create hybrid applications offering the best online and “on premises” experience (Velte 219).

In addition to the examples of SaaS, PaaS, and DaaS, hardware that does not rely on clunky hard drives to store information or run programs have recently emerged as product offerings in the marketplace. Tablets that do not have USB connect or large amounts of memory, such as the iPad, Sony Dash, or Samsung Galaxy, are signaling a change. In addition, Netbooks “strip down” a laptop to the essentials and are thus less expensive and lightweight (Chee 254). Laptops such as Apple’s MacBook Air, which runs off flash memory, are also designed to operate with cloud-based technologies.

What This Means for Collaboration

Time and distance are major constraints of companies whose branches are isolated from one another, and with the rise of globalization, there has been an increasing demand to allow people to easily connect with one another. Email and voicemail attempted to close the gap, but these technologies are not solutions for communicating in real time. Distance and time slow down decision-making and have the adverse effect of impeding innovation. Existing models for workplace communication “are failing to keep up” because the demands for workplace communication are changing (Rittinghouse 62-63). The Internet allowed for people to connect from one machine to the other “dramatically changed the economics of communications, making corporate globalization
financially feasible” (63). Real collaboration through a combination of video, text, and voice could play a role in the solution to closing the gap between distance and time.

**Limitations**

Not all companies may benefit from the collaborative features offered by cloud technologies. For example, companies that handle sensitive data such as financial information or medical history may not be able to store information in the cloud because the data is confidential. Compliance with the Health Insurance Portability and Accountability Act (HIPPAA) would become much more complicated if it was offered as SaaS (Rittinghouse 161). The owner of the data is still responsible for keeping confidentiality, and users have the misconception that cloud computing “removes data compliance” (Rittinghouse 160).

The ethical implications of the cloud are also uncertain. Data may be leaked or breached at any moment since a third party stores an individual’s data (Velte 93). Cloud-based service providers may even elect to share personal information with a marketing firm, so reading the Terms of Service is important (Velte 32). The FBI may subpoena your files that exist in the cloud. The service that you subscribe to may be willing to turn over your documents and may not go to court on your behalf. Before, the FBI would need probable cause and a search warrant to gain access to the files on your hard drive (Velte 31). When it comes to surveillance, a government could enable filters looking for keywords, for example, “al-Qaida,” and “terrorist attack.” This may be problematic; for example, an unassuming student could write a paper about the War in Iraq, and because of his keywords, the filters could take the paper out of context and signal a red flag. As a
result, the government could place the student on a no-fly list. If the student had saved the paper on his hard drive, the government would not have found his paper, and the student would not appear on the no-fly list.

Since the host is in charge of updating and managing the application in the “cloud,” one of the drawbacks of SaaS is the vendor may decide to modify how the application works at any time or even discontinue it (Velte 11). In addition, an inherent issue with SaaS is vendors may “lock-in” their customers and make it impossible or very expensive to migrate their data to a new vendor (Velte 13). Issues with PaaS are similar to SaaS – the provider may decide to change the platform’s specification at any time, and if the provider goes out of business, the customer may pay a high price to move data to another host (Velte 14). Examples of companies that provide the infrastructure to run these kinds of applications in the cloud are Amazon.com, eBay, Google, iTunes, and YouTube (Rittinghouse 49).

Google’s Terms and Policies

Google has an extensive Privacy Policy in which they detail when users sign up for an account, Google has the right to combine your information with other Google Services or third parties “to provide a better experience,” and you can opt out of these services at any time in Google Dashboard (Privacy Policy). Google also indicates they send one or more cookies (a small file that consists of a string of characters that is sent to your computer or device when you visit a site in order for the site to recognize your browser) to “improve the quality of their service,” track user trends and keep track of ad selections (Privacy Policy). Google also monitors what you are doing from the moment
you visit one of their sites, which may seem invasive to people who believe the Internet is an anonymous space. They keep a server log of the things you do while you visit one of their sites. Google also keeps track of all the emails that users send them, and Google keeps record of users’ email addresses to send them information about Google (Privacy Policy). Additionally, Google may receive information regarding your geographical location if you elect to use Google Maps or Latitude (Privacy Policy).

Google will share your information and content when they send it to their subsidiaries for processing, and when they have “good faith belief” in which access to your content and information should go to government or law enforcement (Privacy Policy). In other words, Google would have the right to hand over a document deemed “questionable,” which resonates with the example of the student and the War in Iraq essay. The term “good faith belief” may seem vague to users; in other words, it is up to Google discretion to release your content if they see fit. If a user decides to delete his/her information, “residual copies may take a period of time before they are deleted from [their] servers and may remain in [their] backup systems (Privacy Policy). In other words, your content is never really “deleted” even if you go through the process of cancelling your account.

Google ensures the only people who have access and view the user content are Google “employees, contractors, and agents” who process it, and they are bound by confidentiality and face termination or criminal prosecution if they violate their obligations (Privacy Policy). In the event that Google merges with another company or is bought out by another corporation, they ensure confidentiality of the user’s information and will provide a notice to all users if they change their privacy policy (Privacy Policy).
With Google Docs, users retain the copyright when you “submit, share, upload, post or display on or through the service” (Additional Terms of Service). Google does hold the right to distribute your content “to various public networks and in various media,” and users may not have content that violates copyright laws or trade secrets without permission (Additional Terms of Service). Google observes the right to remove user content if it violates copyright laws or contains inappropriate content not limited to “pornography, obscene or defamatory material, or excessive length,” which most would agree this policy is a good thing (Additional Terms of Service). If a user creates content and submits it to the Content Gallery, the creator maintains the copyright, and Google Docs users must use the Content Gallery at their own risk – Google is not responsible for any viruses or bugs (Additional Terms of Service).

Opportunities

First, cloud technologies allow the user to work from anywhere. Individuals will not need to be constrained by their geography – if they want use programs that require a large amount of memory they could use a cloud-based HaaS as a solution, for example. Thus, the concept of a computer lab may be something of the past because the user would have the capabilities of a computer lab from any location with an internet connection. With cloud computing, industry could start making the shift towards service provision rather than product delivery. For example, Adobe could sell one of their Design Suite programs such as Photoshop or Dreamweaver on a subscription basis, and the user would save their design projects in the cloud. Instead of writing a manual and selling it with the software product, Adobe could sell on-demand support and webinars explaining how to
use their design services. Additionally, with cloud computing, the user does not have to worry about memory, updating software, and backing up data. Now, instead of focusing on those responsibilities, customers of SaaS can just focus on their work.

The cost of new laptops or notepads that rely solely on cloud technology would be much more economical than traditional computers – there would be no need for a bulky hard drive or fans to cool down the computer. Thus, the cloud-computing model is more environmentally friendly than the traditional way of computing. Rather than buying expensive new equipment, cloud computing can help individuals stay on top of their computing needs without investing in costly computers (Velte 30). The cloud-computing model could particularly aid start-up business, small to medium enterprises, and non-profit organizations. Also, the “titans” of cloud computing, such as Amazon, Google, Microsoft, IBM, and Yahoo!, have a good record and provide reliable and secure services (30).

Cloud technologies are ideal for the workspace of the classroom because students can work together in real time on collaborative writing assignments – no one is the sole owner of a document because the document is shared. Information that students post and share is also less likely to be confidential or “trade secret.” Students may also use Google Docs for individual writing assignments and collaborate with ease for a peer review session for major assignments. Students can also benefit from the revision history function because they can recover ideas they may have deleted and can watch the evolution of their own writing process. Teachers also benefit from being able to view their students’ writing process by looking at the revision history. Although cloud technologies may not replace one-on-one interactions that take place in class or
conferencing sessions, Google Docs, for example, may be a solution if class is cancelled or if students are unable to attend a student-teacher conference.

Figure 4.5: Student-teacher conference.

While Google Docs is a technology students can use to compose individual essays and various collaborative writing assignments, Prezi is a cloud-based technology that can help students throughout the stages of the writing process – from the invention of ideas to the delivery of a final product. Students may use Prezi for mind mapping, and they may share their Prezis with classmates and their teacher for feedback. This interface allows students to think non-linearly as they consider topics for a research paper, for example. Students can add on to their brainstorming mind map as they complete research and think critically about their project in order to form an non-linear outline students may use to help guide them as they write. Finally, they could use their outline as a presenting tool as
they share their findings with classmates. Prezi would be used as an alternative to other presentation technologies, such as PowerPoint and Google Presenter.
ANALYSIS OF CLOUD TECHNOLOGIES FOR THE WORKPLACE

Electracy, a shift from making meaning of literary to electronic texts, is a new skill set that is required to master composing and writing digital texts. Ulmer’s theory of electracy “depends on mood in order to sustain a narrative” and proposes a way to make writing more entertaining, encouraging teachers and students to think about writing not as drudgery but as a fun, unpredictable experience (Rice 281). Many individuals already spend many hours a day composing on social networking sites such as Facebook and Twitter and may spend their spare time following blogs. In the social networking space, students find this kind of interaction to be a form of play. With Facebook and Twitter, individuals adopt a persona they want their friends to see, and part of the game is writing on friends’ walls and posting updates that reflect their persona.

With cloud-based technologies such as Google Docs and Prezi, people in the workplace could make writing a social experience. For example, rather than composing an document in Microsoft Word and turning it into the teacher, students would have a broader network to share ideas if their peers were co-authors of the essay. Students could also share notes from lectures in a Google Doc and use Prezi as a studying tool to jointly create a mind map connecting the information from class lectures. If students and professionals can develop a mutual trust in one another in their workplace, then collaborative writing could enrich the learning experience in composition classroom and in other workplaces.
Ulmer asserts the music tradition of Funk coincides with electracy and rhetoric, proposing that it sets the proper mood for electrate writing (Rice 282). Ulmer states, “A crucial moment in the invention of literacy was Aristotle’s formulation of the ‘thing’ in the practice of definition. Now the thang is similarly important for electracy” (Ulmer 316). Rice expands on Ulmer’s assertion about the importance of the “thang” in electronic rhetoric as being as equally important for invention in rhetoric, as Aristotle asserted. Rice quotes Rickey Vincent who states, “Funk is the extremes of everything...Funk is a way out, and a way in. Funk all over the place” (282). Funk is a collaborative process and consists of “non-traditional popular music rhythm sounds” where everyone participates and the rhythm belongs to everybody, and it unifies everybody “together grooving as one” (281). Funkcomp, according to Rice, challenges students “to construct and adopt the alter ego as motive to defamiliarize the commonplace. Instead of being a student, the Funkcompositionist adopts a funky identity” (291).

Google Docs has the potential to be “funky,” allowing students to riff about the topics with which they want to write. They can also keep track of the riffs with the revision history. Students shared in a document can conduct an improvisation similar to jazz or acting when they take up a persona and each riff in a document they have shared with each other. Google Docs can be a technology that promotes the thang rather than the thing. The thing as the topic sentence in composition and the topic sentence is a clear and concise idea that has been an essential element of writing pedagogy (282). Rice says this creates Engfish, cliché and unimaginative writing that students believe their teachers
want them to reproduce (286). Rice proposes the Web as the “funkiest of all new media forms” for Funkcomp (283).

The ideals of Funkcomp do not have to be limited to composition classrooms. Riffing off one another in various workplace settings could not only be productive but also be a form of play and enjoyment. After interviewing people from a real workplace setting and after keeping a record of my experience with Google Docs in the classroom, I propose solutions based on my findings. Although this study details two workplaces, my findings may be applied to many other types of workplaces that depend on collaboration.

Cloud Technologies for the Lab

Rao’s research group relies on a combination of the old ways of communicating, such as email, face-to-face interactions, group meetings, and the new way of communicating, Skype and Google Docs. The group has already set up a Google Doc to keep track of inventory and the CVD sign up sheet; now, it is just a matter of keeping each other accountable for updating these lists. Podila keeps a lab notebook in Google Docs, so sharing notes with other group members is an easy task. The group also uses Skype for meetings with people from other research groups located as far away as India.

I recommend the lab uses Google Docs to write papers. Rather than having two people write their portion and have a third author combine it all together, the group members could use Google Docs to find new ways to write collaboratively. With this system, emails containing attachments of drafts would significantly decrease, and people would not lose track of what draft to work on. Also, Rao could stay in touch with his students through an ongoing log as a way to move away from email, as one of his
students remarked, “Dr. Rao gets so many emails that your email might get lost.” In addition, rather than sending document attachments through email, the documents can be shared with him and organized in folders within Google Docs so files do not get buried in his inbox. The group could use Google Docs to keep an agenda of a meeting. Each person could be shared in the meeting agenda before the meeting and add notes about what they want to talk about in the meeting. Then, during the bi-weekly meetings, they could add notes to the agenda as needed. Afterwards, each group member would retain access to the document, and this will minimize emails sent to each group member’s mailbox.

Like Podila, students could keep lab notebooks in the cloud, so it is easy to share information. Not only will this back up their notes in case they lose the hard copy, but it will also allow students to have access to the files after they leave Clemson. Rao’s lab could also use Skype for meetings that take place with other labs close by, and not just with collaborators who live thousands of miles away. For instance, Dickel’s situation with Georgia Tech could have been completely avoided if they had corresponded face to face over Skype rather than just relying on a teleconference. I also suggest the younger more “tech-savvy” members train the veteran members of the lab on how to use cloud-based technologies. I recommend, based on Podila’s feedback, that people in the workplace become more proactive about learning the privacy policy of cloud-based services. After the veil is removed between the user and the cloud, more people in the group could be inclined to collaborate on journal articles conference papers, posters, and various other kinds of scientific documents.
Cloud Technologies for Composition Classrooms

From the very moment teachers introduce the new technologies in the classroom, I recommend teachers hold students accountable for learning the new technology. Throughout life, students will need to depend on themselves to learn how to use new technologies. Spend the first day learning how to use Google Docs – explain the features in full and then assign them a short essay in Google Docs in class so they can practice “sharing” the document. During the past two semesters, there has always been a student or two from each class who does not turn in this initial assignment, and it is considered late because they had the chance to ask for clarification in class. Even non-traditional students need to be held accountable, and should be encouraged to consult the help page before coming to the teacher for a one-on-one tutorial. I would be doing my students a disservice if I hold their hand all the way, since the world we live in is constantly changing.

Additionally, I recommend teachers enforce personal responsibility, especially with freshmen. Students should not blame the technology; for instance, students may say, “Google Docs was down,” or “I could not get on the internet.” On the first day of class, teach strategies for backing up documents, so students may turn in the assignment in some form (e.g. an email attachment or hard copy). I also recommend that teachers require students to turn in hard copies of their major assignments because MLA formatting, which is a requirement for freshman composition, makes the most sense for print rather than digital (for example, page numbers and headers).

If composition teachers find email to be cumbersome, they could consider setting up a Google Doc for each student entitled “Student-Teacher Conference.” Teachers of
writing classes could also use Google Docs as an alternative to Blackboard to let students keep track of their grades. Also, rather than emailing back and forth about issues, teachers could set up a time each week to meet in the Google Docs for a conference as needed. This document would also keep track of each students’ grades so they are aware of it (I keep the master grade book in Google Spreadsheet and make sure the document it is private and unsearchable). This could also be a space to address issues such as falling asleep in class, excessive tardies or absences, or late work. The students would be required to check it before class meets in order to stay informed. I would still maintain a policy or chain of command for getting in touch with the instructor. For example, if students have issues and need to contact me – the best way would be to come by my office hours (to go over specific questions about papers or readings) and email is the last resort.

Dark Clouds

One of the “darkest” elements of teaching composition is the possibility that students could plagiarize their assignments. If teachers suspect plagiarism, I recommend they take full advantage of the revision history by reviewing the student’s process over time. Then, if the teacher still is inclined to believe a student cheated, they could confront the student about their writing process, which is traceable through the revision history. In addition, instructors should consult the revision history if they are unsure about students adding to the assignment after the due date.
Conferencing

If teachers cannot meet one-on-one because of inclement weather or due to a student’s illness, conferencing in Google Docs can at least save a class day from being lost. I recommend teachers clearly communicate ground rules for conferencing in Google Docs. For instance, students should be required to attend a conference in Google Docs with a completed draft and questions. Through the chat function and commenting, teachers are able to give feedback, and students can ask for clarification. In addition, teachers could use Google Docs for conferencing in conjunction with Skype to mimic face-to-face interaction.

Prewriting for Individual Projects

Students may use Prezi for brainstorming, and it can liberate students from thinking linearly; students may share their Prezis with other students and their instructor in the cloud. Teachers can also instruct their students to use Google Docs as a way to keep track of a research log for a research paper. With Google Docs, students can keep track of where they found their sources and write annotations in the log to remind themselves how each source fits in with their argument.

Collaborative Writing

I recommend teachers give the students a short collaborative writing assignment in class to practice writing as a group, but make it a long enough assignment that students will have to work on it outside of class. Then, during the next class, talk about how the group collaborated both in and outside of class. This will help practice and think about
how to collaborate on a long-term, more intensive project. In addition, initiate a
discussion about privacy and Google Docs and talk about concerns. For example, it may
feel like the professor is looking over their shoulder. Demystify Google Docs by talking
about its privacy policy with students. Composition teachers can also use Google Docs as
a teaching moment to talk about authorship. Discuss what resources are appropriate for
them to use (e.g. the university’s writing center and in-class peer review) and what
sources are not appropriate for use.

I also recommend discussing how to use Google Docs for collaborative writing
outside of English class after they have used Google Docs for some time. They might
have found a way to use it than they had never thought of before.

**Blogging**

Implementing a Blogger site in the classroom could accompany what the students
are working on in Google Docs, and they could access each application through their
Gmail account. The site would contain important administrative things such as a
calendar detailing the reading and writing assignments. Rather than printing out a
syllabus or posting supplemental readings on Blackboard, I would post it all on the blog;
instead of using Blackboard for some things and Google Docs for the other, the students
could access both things, Blogger and Google Docs, in one place under the same account.
I think to remedy the unfamiliarity of Google Docs among my students, I would create a
link to the Google Docs help page within the blog. I would require them to check the blog
before each class for updates, and I would post information such as a notice cancelling
class or directions to bring supplies to class for the day’s activity. This would replace the
need for email for many situations, and students would simply visit the web site like visiting the blogs they visit in their free time. In addition, each of my students would be an author of the blog, so they could provide a summary and application for one reading assignment during the semester. The blog would also be a multimodal space to not only share their feedback on the readings but also share video/pictures they find relevant to the class. For example, I would post videos/images we talk about in class for them to have later, even after the class if they need them. The problem with online learning tools such as Blackboard is the course documents and all of the work disappears when the course is over. I would keep the blog up, so after the semester is over, students may access the information even after they graduate from Clemson.

**Implications**

Spinuzzi and Zachary identify the dichotomy of closed and open systems (170-171). Individuals work within a closed system when they rely only on the documentation included with the product; on the other hand, individuals who work within an open system reach out to documentation outside of the manual packaged with a product. This phenomena is identified as genre ecologies, when “the dynamic and unpredictable clusters” include “an interrelated group of genres (artifact types and the interpretive habits that have developed around them) used to jointly mediate the activities that allow people to accomplish complex objectives” (172).

Spinuzzi and Zachary argue “the closed-system assumption limits in important ways how we as software documenters plan, develop, design, write, test, and understand documentation,” and that software should resemble an open system (170). Old computing
technologies that constitute a closed system promote the ideals of the old technology (e.g. word processors, hard drives, and email attachments). These old technologies perpetuate copies of a document rather than working with a master document. On the other hand, an open system promotes new technologies that enable users to collaborate in real time within a master document. Spinuzzi and Zachary assert, “Configuring such spaces [i.e. the Windows tool tray] presents technical communicators with a productive way of disrupting current user-support strategies” (178). Cloud technologies provide the opportunity to disrupt the way students traditionally turn in assignments and collaborate on documents in their workplace, and cloud technologies could disrupt how Rao’s group communicates. Spinuzzi and Zachary’s terminology for the theoretical framework of genre ecologies: contingency, decentralization, and stability can lend itself to cloud technologies and can help us understand the implications of cloud technologies for workplace communication.
When it comes to contingency, the members of Rao’s lab currently use serial forms of collaboration to work on experiments, work with other groups, and collaborate on papers. They mostly rely on email because of its expediency to get things...
accomplished. The group also communicates through bi-weekly group meetings and depends on teleconferencing with Skype to meet with other labs. They have free access to free cloud-based technologies, such as Google Docs, which could change the way they keep their lab notebooks and how they share the responsibility of editing each other’s papers. In my freshman composition classroom, I still use some of the old technologies part of a closed system. I use email to communicate with my students outside of class, and I use Blackboard to post supplemental readings and to post their grades.

Based on my interviews, members of Rao’s group have indicated shortcomings, or decentralization, of serial collaboration with email. Dickel explained the process of revising papers in a serial manner takes a long time, and meeting with other labs through a teleconference can result in misinterpreting information. In addition, Saini indicated the constraints of email have set the wrong tone when an authority figure is giving directions through an email message. Oliveira also indicated she has had to resend emails in the past because she is unsure if people read her email messages – it is possible her emails are just buried among other emails within her group members’ inboxes. Members of Rao’s lab supplement the old ways of communicating with new, cloud-based technologies. Already, the group uses Google Spreadsheet to keep track of inventory and to schedule the use of equipment. One graduate student, Podila, already has used Google Docs to keep track of his lab notebook and has shared his notebook with another group member who needed his information. In my classroom, I have found it is cumbersome to keep track of emails and hard copies for every assignment. Instead of having my students email me assignments, I have adopted Google Docs as a solution for my students to turn in individual assignments, peer review each others’ papers, and collaborate on group assignments.
Cloud technologies are far away from stabilizing and from being “officially sanctioned and promulgated” in the workplace (177). Currently, Microsoft Office and email promote serial collaboration, and they are examples of expedient forms of computing in the workplace. These new technologies have several implications for teachers, students and researchers in the workplace. Teachers could use cloud-based technologies to instruct writing as a process over time rather than writing in one sitting. Cloud-based technologies have the potential to be “funky,” allowing students to interact with peers and the instructor on the Internet as well as experience conventional interactions in class discussions. For example, a student who struggles with organizing their ideas in a linear fashion could use Prezi for brainstorming a research paper, and they can receive feedback on their brainstorm by sharing their Prezi with their peers and instructor. Additionally, cloud technologies such as Google Docs and Prezi are intuitive and accessible for students who may not consider themselves “tech-savvy.” Students can also take what they have learned about the technology beyond the composition classroom and apply Google Docs or Prezi to other coursework to better their learning experience.

In order for cloud computing to stabilize, a paradigm shift in workplace communication would have to take place. Software as a Service, such as Google Docs, has simply not caught on yet. Future studies on cloud technologies in the workplace could focus on other workplace cultures – from a high-profile multinational corporation to even a small non-profit organization. An ethnographic study involving the implementation of cloud-based technologies in a workplace for a trial period would provide the opportunity to learn how the new technologies could change a work environment. Researchers of workplace communication should continue to explore the
rhetorical situation of the workplace because of the dynamic nature of the workplace, and researchers should critically study the boundaries and implications of authorship with cloud-based technologies.
WORKS CITED


