PERSONAL-LEVEL FACTORS AND GOOGLE DOCS USE IN MONMOUTH COUNTY
MIDDLE SCHOOLS

By

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Technology has become an essential part of the world, both in people’s personal and professional lives. Digital assessments such as those being implemented in New Jersey as part of the Partnership for Assessment of Readiness for College and Careers (PARCC) will soon be instituted on a large scale; these require students to be able to utilize computer technology in order to be able to complete the assessment. Therefore, it is imperative that administrators know the most effective ways to successfully diffuse and have teachers implement technology across their classrooms. This study examined how the technological innovation Google Docs has diffused through schools/districts in Monmouth County, NJ and determined that there are significant relationships between the frequency and complexity of professional use of Google Docs and personal-professional characteristics of middle school classroom teachers.

Through the use of an online survey, quantitative data about teachers’ personal-professional characteristics and the frequency and complexity of respondents’ uses of Google Docs was collected from 35 out of the 53 schools in Monmouth County; roughly 45% of the surveyed population provided viable responses. Linear regression was used to determine which independent variables had a statistically significant correlation with the dependent variable “Google Docs Usage Score” (GDUS), a measure of the frequency and complexity of Google Docs use. The independent variables culled from the literature that were included for consideration were decision method (optional, collective, or authority); innovator type (innovator, early adopter, early majority, late majority, laggard); and the following personal characteristics: years of teaching experience; subject area taught; grade levels taught; number of types of technology used personally; number of types of technology used professionally; and technological, pedagogical, and content knowledge (TPACK) score (Mishra & Koehler, 2003).
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Using quantitative methods, this study determined that there was a statistically significant association between the frequency and complexity of teachers’ use of Google Docs and the following variables: optional decision method; innovator, early adopter, and early majority innovator types; the subject areas Mathematics and Visual and/or Performing Arts; the number of types of technology used professionally; and TPACK score. These findings provide administrators with several concrete variables to consider when attempting to encourage the diffusion of a technological innovation such as Google Docs into a school. Additionally, when combined with research by Wisnicki (2014), it was found that personal factors have a larger impact on Google Docs implementation than do environmental factors. Limitations of the study might include sample size and the formulation of the Google Docs usage questions on the survey.

This study is significant because it builds on the diffusion work of Rogers (2003) and the Concerns-Based Adoption Model of Hall, Wallace, & Dosset (1973), and adds clarity to the literature on diffusion of educational technology within schools. This study also provides a new theoretical construct for examining the levels of use of Google Docs, which could potentially be expanded to include a measurement for other types of educational technology.
Dedication

This dissertation is dedicated to my family, with special thanks to the following members:

George Edward Tetreault, who laid the bedrock of excellent values;
Robert and Vivian Tetreault, who provided unflagging support and a sturdy foundation;
Amy Rene Land Tetreault, who helped me see the light at the end of the tunnel and kept the home fires burning;
and Jacob, Beth, Zack, Ryan, and Mason, who will build on our successes and see farther than us all.
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Introduction

For decades, the use of computer technology in schools has been a subject of intense study, going back as far as the 1960’s (Finn, 1960; Flannagan and Others, 1962; Silberman, 1961; etc.). The historical roots of the wider push for greater integration of computers into the classroom can be traced back to the 1980’s. The scathing *A Nation At Risk* report (1983) jump-started an educational reform effort - an effort that continues to this day - that roughly coincided with the arrival of the relatively inexpensive “personal computer” or “PC”. Schools began to invest in computer technology, both as an administrative tool to make the operation of the school more efficient, and as an educational tool. In more recent decades, the evolution and proliferation of the personal computer has led to a revolution in how computer technology has been used in business and personal lives, which in turn led to a strong push to incorporate more computers into schools. This, too, was heavily studied (Allen & Thompson, 1994; Bruce & Rubin, 1993; Goodson et al., 1991; Herr, 1994; Kitao, 1994; Ollila et al., 1993) and debated (Benyon & Mackay, 1993; Cuban, 1986, 2001, 2003, 2008; Tyack & Cuban, 1995). Now the widespread use of networked technologies, the emergence of social networking software, and, most recently, the increasing use of cloud computing technologies are once again causing disruption in schools, often in unexpected ways.

The belief that more technology needs to be integrated into classroom education is considered axiomatic in modern education. This can be seen at the national level via the United States Department of Education’s National Educational Technology Plan 2010 - titled “Transforming American Education: Learning Powered by Technology” - and the current (2006) National Educational Technology Standards (NETS) of the International Society for Technology in Education (ISTE); it can be seen at the state level, specifically in the Common Core State
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Standards (CCSS) (2011), which are being adopted by many states, including New Jersey; and it can be seen at the local level in school policies and student handbooks that are being rewritten to include Acceptable Use Policies (AUPs).

Review of these various documents reveals that the word “technology” actually refers to the “technology cluster” (Rogers, 2003) of computer, Internet connectivity, and software for productivity, communication, and collaboration. This “technology” is being recommended for integration into schools. While this cluster requires many components, both physical and intangible, the end result is a mechanism that allows teachers and students to find information easily and collaborate and communicate globally. It is easy to understand why policy makers at all levels feel it is imperative for students to learn the skills necessary to take part in an increasingly technologically-driven and globally-oriented society. Technology has become ubiquitous. It is extensively used in people's personal lives: televisions now come with wireless internet connectivity, many people in “third world” countries have leap-frogged from having no method of distance communication to having cellular “smart” phones, and the newest devices (such as those created by Apple) often have lines blocks long on their release dates. Even among economically-challenged families, the Internet is rather readily available; the Pew Internet & American Life Project found that in 2012, 89% of teens in families making $30,000 per year or less had internet access (Pew 2012).

Beyond the personal world, technology has become a lynch-pin in our economy. There is hardly a business today that functions without some kind of technology - even the cash registers at McDonald's are touch-screen terminals. The cover story of the April 22, 2013, Time magazine is about the importance of technology education for the growing American manufacturing sector (Foroohar & Saporito, 2013). One of the first lessons taught in Rutgers education classes is that it
is the mission of schools to prepare students to be productive members of a democratic society. In the modern world, that means schools need to educate students in the use of technology for purposes of communication and commerce.

Many teachers claim to use technology in their instruction. This often refers to how the teacher displays information via a SMART board or overhead projector hooked up to a computer. According to the Nation Center for Educational Statistics (2010-I), "Teachers reported having the following technology devices either available as needed or in the classroom every day: projectors (36 and 48 percent, respectively), interactive whiteboards (28 and 23 percent, respectively), and digital cameras (64 and 14 percent, respectively). Of the teachers with the device available, the percentage that used it sometimes or often for instruction was 72 percent for LCD or DLP projectors, 57 percent for interactive whiteboards, and 49 percent for digital cameras." Unfortunately, such devices are essentially light-up black boards and do not much impact teachers’ professional practices.

Even among those reporting computer use in classrooms, the statistics are not very encouraging; again, according to the NCES (2010-I), "Teachers reported that they or their students used computers in the classroom during instructional time often (40 percent) or sometimes (29 percent). Teachers reported that they or their students used computers in other locations in the school during instructional time often (29 percent) or sometimes (43 percent)." In other words, about 65% of the instruction has a teacher OR a student using computers for some parts of instruction.

However, there is increasing pressure for teachers to have students actually interacting with technology. In addition to the previously-mentioned report from the U.S. Department of Education, there are also the Common Core State Standards (2011), adopted by New Jersey and
other states, which explicitly require students to utilize multimedia technologies. Unfortunately, compliance with the state standards is often fitful and begrudging. For better or for worse, New Jersey teachers are going to be pulled, possibly kicking and screaming, into this world of the interactive-technology classroom with the arrival of the PARCC assessment in the 2014-2015 school year. The Partnership for Assessment of Readiness for College and Careers (PARCC), a multi-state initiative of which New Jersey is a governing state, will require schools in all participating states to do their standardized testing online in the 2014-2015 school year (PARCC 2012) and will require students to utilize basic computer skills such as cutting and pasting, typing, and clicking-and-dragging to enter their answers on the test. Thus, these skills need to become part of the daily practice within classrooms.

Requirements such as those for the PARCC assessment should not be unexpected. The National Center for Educational Statistics (2010-II) reported that in 2009 an estimated 97 percent of public school classrooms across the nation had one or more computers with Internet access, and that 91 percent of public school computers were used for instructional purposes. The estimated annual national expenditures on educational technology in grades K-12 is roughly $20 billion, or approximately $400 per student (Johnson, 2012). With such massive investments of capital in school technology, it only makes sense that there is a desire and expectation to see that these investments are being deployed efficiently and effectively. But as the pace of technological change continues to increase, administrators need to be cognizant of the best ways to integrate technology into their existing systems, with minimum disruption and maximum impact.

**Research Problem**

Despite the massive amount of resources being focused on increasing the integration of technology into classrooms, there is currently a dearth of research focused on how technology
diffuses into classrooms and is implemented by teachers. In order to address this gap in the literature, this study examined the factors that affect the diffusion and implementation of technology in schools. Specifically, this study focused on the teacher-level factors that affect the frequency and complexity of the professional use of Google Docs.

Offered by Google, the online search company, Google Docs is part of a suite of free applications. It can be accessed either by individual users via free Google Drive accounts, or it can be accessed by districts for free as part of the Google Apps for Education initiative. Google Docs has been available since 2006, when it was offered for free to anyone who wished to sign up for an account to use the program. It is increasingly being used in educational settings across the country and is popular for use in schools for a host of reasons predicted by the theoretical frameworks on diffusion and adoption of innovations. As one example, the relative cost to the user is negligible - as previously stated, the financial cost is zero, but also, the mental effort required to learn how to use the basic functions of Google Docs is extremely low, as the menus and functions closely mirror those of one of the world’s most popular productivity suites, Microsoft Office.

There are additional reasons Google Docs is worth studying. It was the first widely adopted software to encourage collaboration along with productivity, combining social networking features with productivity software. It has been leading the pack in this area, to the point that Microsoft, usually a major player in productivity software, is chasing after Google to try to offer the same features (except that, at this time, Google's product is demonstrably superior). Google Docs is free, and is available to individuals on an as-needed basis, or to districts who wish to sign up; this potentially represents a huge cost savings to schools, since they could, theoretically, switch over to Google Docs and abandon Microsoft's Office,
SharePoint, and Outlook, all of which have up-front costs as well as licensing fees. As a cloud-based program, Google Docs is platform agnostic – it can be used on any computer, with pretty much any operating system. Also, being cloud-based makes Google Docs very “portable” – as long as a user has an Internet connection, the user can access Google Docs; there is also an offline version that allows continued productivity even if a network connection is not available. All of these features have led to Google Docs being increasingly adopted across the United States, in both the public and private sector, and in both school districts (see Hillsborough's recent deal with Google that converted the entire district to Google Docs and netted the K-3 program 3,000 free Google tablet devices for educational research-testing purposes) and colleges (as with Rutgers' recent adoption of the Google Apps for Education suite). Additionally, Google Docs is a model of where technology is going – it represents the convergence of productivity software and social media, thanks to both the collaboration tools built in to Google Docs and the integration of audio and video chat into Google’s Gmail software, which is part of the Google Apps for Education suite. Finally, the upcoming PARCC assessment is going to require students to be able to input their answers using copy-and-paste, drag-and-drop, point-and-click, and other cross-platform computer skills, all of which are components of using Google Docs, even more so than in other productivity suites, a fact which might encourage more schools to use Google Docs to help better prepare their students.

Although there is a wealth of literature at the system level on diffusion and adoption of innovation, there is almost no literature that examines these concepts from the individual level. Earlier research focused on how to institutionalize innovation (e.g., Miles, 1983) with authority decisions (Hord, et al., 1987). In the past, innovations required investment in physical equipment and focus on a particular innovation due to limited financial resources. Decisions about resource
investment and institutional focus were, essentially, the sole purview of the administrators of the institution.

However, this model needs careful consideration, as it would seem there is a shift occurring in how and at what level adoption decisions are being made. While technology, both hardware and software, is being purchased at an ever-increasing rate, the physical resources needed to implement technology innovations have largely already been purchased and are available to both classroom teachers and students. Training relies less on institutional-representative experts who are only available at certain times and in certain locations, and instead is frequently available online to individuals who are learning about readily-available options and making choices to adopt technology by sharing knowledge asynchronously via websites and streaming videos without concern for geography. Thus, the decision to adopt technology in schools has come to include a mix of institutional and individual adoptions, which is unusual in education. Google Docs is a way to examine the spread of an innovation that can be adopted either on an institutional level, on an individual level, or through some combination of both. Therefore, this study focused on the decision methods, innovator types, and personal-level factors that impact the diffusion and implementation of Google Docs.

Google Docs was chosen as the focus for this study because it was a good stand-in for current and future technologies. The cloud-based Google Docs software simplifies content creation, collaboration, and communication into a single package. It melds “traditional” and “modern” technology elements. The creation elements are heavily based on word processing, spreadsheet, slide show, and drawing software with which most adult users, and many student users, are already familiar. The collaboration and communication features, which allow asynchronous, ageographic (unbounded by locational or geographical constraints), and
instantaneous sharing of information and ideas, takes elements from both modern social networking software (the incorporation of immediate feedback via instant-message/text message style chat and live editing and commenting) and more traditional email and distribution software (the asynchronous, ageographic abilities of the editing, revision history, and commenting features). Additionally, Docs fulfills many of the criteria for an innovation that will quickly diffuse and be adopted, as outlined in a variety of literature.

**Significance of the Study**

Technology evolves extremely quickly, and, while formal social structures do not vary greatly, technology allows new types of interactions between and among social structures; thus, many of the available sources of information on the diffusion of technology may be dated and may not present a clear understanding of modern technology diffusion within schools. This study examined whether the literature accurately reflects the current state of affairs.

Additionally, there has not been a study to date that has focused on the diffusion of a specific innovation (here, Google Docs) within middle schools and personal factors associated with users who adopt the innovation for professional use. As such, this study provides insight into the factors which lead to the diffusion and adoption of a technological innovation. Knowledge that can lead to greater integration and smoother adoption of technology in schools is valuable to both researchers and administrators.

Finally, this study helps identify patterns of Google Docs use that emerge. This can help in the planning of future technological innovation deployments, as it helps identify typologies and levels of use of Google Docs that could apply to similar innovations.
Research Questions

The objective of this quantitative study was to examine the implementation of Google Docs in Monmouth County, New Jersey, middle schools to determine what personal factors influence the diffusion and adoption of this technology for professional use. The questions guiding this study were as follows:

- How does the level of innovativeness of teacher-users affect the frequency and complexity of professional use of Google Docs? Research suggested that more innovative users will have higher degrees of professional implementation of Google Docs.
- How does the innovation decision method of users affect the frequency and complexity of professional use of Google Docs? Research suggested that optional and collective decision types will result in a higher degree of professional implementation of Google Docs.
- How do teacher-users’ personal (non-professional technology use) and individual-occupational factors (number of years of experience; subject area; grade levels taught; professional technology use; and technological, pedagogical, and content knowledge) affect the frequency and complexity of professional use of Google Docs? Research suggested a positive association between personal and individual-occupational factors and frequency and complexity of professional Google Docs use.

Conceptual Framework (Literature Review)

This study focused on the personal-level factors that impact the diffusion and implementation of Google Docs (see Figure 1), as opposed to environmental factors, which were covered in research by Wisnicki (2014). Three main areas of the literature were investigated to
provide the framework for this study: the process of the diffusion and adoption of an innovation; patterns in innovation use; and personal characteristics of innovators.

**Figure 1: Hypothesized interaction of independent and dependent variables**

**Diffusion & Adoption**

**Diffusion.** The process of adopting an innovation has been studied from many perspectives and at the heart of all this work is the theory of diffusion of innovation. Pioneered by Ryan and Gross (1943), examined in detail by Rogers (1962, 1995, 2003) and verified by subsequent research (Berger, 2010; Collins, 2000; Gunn and Panko, 1998; Liao, 2005; Lynch, 2002; Mintrom, 1997; Nichols, 2008; Salmon, 2005; Zhao & Borman, 2004; etc.), the theoretical underpinnings of the diffusion of an innovation attempt to explain how a new idea (an innovation) is conveyed via communication channels from the originator (the innovator) through a population; the members of the population then make decisions to either adopt or reject the innovation.

Adoption decisions are divided into three distinct types - authority decisions are those made by a high-ranking member of a hierarchy, with which lower level members of the hierarchy are required to comply; collaborative decisions are those reached by mutual agreement
among members of an organization; and *optional decisions* are those made by an individual, independent of consideration of the decisions of others. The central tenet of diffusion theory is that in organizations, authority decisions lead to the fastest adoption of an innovation (Hord, et al., 1987; Rogers, 2003). However, some research suggests that the adoption of innovations in educational institutions is more likely when change is collaborative, rather than authority-driven (Hall, Wallace, & Dosset, 1973; Nichols, 2008; Salmon, 2005). Thanks to the massive changes in communication and information technologies now widely available to teachers, it seemed plausible that optional decisions are driving the adoption of the Google Docs innovation in schools.

The diffusion literature suggests that there are two sets of factors which heavily influence the adoption of an innovation: *environmental*, or systems-based, and *personal*, or those that originate with the individual. Although an understanding of the influence of factors at both levels is important, a complete examination of the interaction between system factors and personal factors is beyond the scope of this study; therefore, the study focused on the personal factors and leaves specific considerations of the environmental factors to other researchers (Wisnicki, 2014).

**Adoption.** Rogers (2003) posits that adoption conforms to an S-shaped curve over time (see Figure 2). To the left are the creators of the innovation; as one moves to the right, the number of adopters increases. Rogers breaks the adopters into several distinct categories.

The first 50% of adopters (“earlier adopters”) are innovators (2.5%), early adopters (13.5%), and the early majority (34%); the second 50% of adopters (“later adopters”) are the late majority (34%) and laggards (16%). Thus, one might consider the level of innovativeness of a user of an innovation as a personal characteristic, as all of these adoption decisions rely on the choices of users at an individual level.
Additionally, "The percentage of teachers that reported that the following activities prepared them (to a moderate or major extent) to make effective use of educational technology for instruction are 61 percent for professional development activities, 61 percent for training provided by school staff responsible for technology support and/or integration, and 78 percent for independent learning. " (NCES, 2010-II). That is, teachers reported that the best way to prepare to use technology is via independent learning, which involves optional decisions. This suggests that both optional adoption decisions and informal communication channels are an important factor in the adoption of educational technology (See Wisnicki, 2014, for further discussion of the impact of communication channels on Google Docs use).

Thus, the elements of institutional change identified by former research (e.g., Fullan, 1993; Fullan & Stiegelbauer, 1991; Hargreaves & Fullan, 2009, etc.) may be less relevant to the study of the diffusion of technology within an educational institution than a consideration of how

Figure 2: S-shaped diffusion curve (Rogers, 2003)
those elements map to individual users’ adoption processes, which is reflected in the tenets of the Concerns-Based Adoption Model (CBAM).

**Concerns-based adoption model (CBAM).** Whereas diffusion theory was a general concept whose precepts had been applied to education, the CBAM was specifically designed to consider the adoption of innovations by schools. In 1973, Hall, Wallace, and Dossett stated that the adoption of any innovation could be directly linked to two central concepts: the Stages of Concern (SoC) and the Levels of Use (LoU) of the new users. The SoC relate to the mental state of the adopter as the adopter considers whether or how to use the innovation; as such, it is completely internal. The LoU relate to the types of interactions between the adopter and the innovation, which is an external relationship. The basic argument of the CBAM was that users in an earlier stage of adoption of an innovation would feel greater amounts of concern based on their lack of familiarity with the innovation; in turn, this would be reflected in the quantity and quality of engagement with the innovation (the LoU). Thus, the CBAM implies a direct, causal relationship between the individual and adoption of the innovation: *greater mental comfort leads to greater use*. Because the individuals in question are teachers, the CBAM supposes there is a further relationship between adoption by a school and adoption by teachers at that school. This early CBAM work was built on the work of Fuller (1969), and has been reviewed extensively (Anderson, 1997; Cheung & Yip, 2004; Christou, Eliophotou-Menon, & Phillippou, 2004; Hall, 1979; Hall & George, 2000; Hall & Loucks, 1978; Hord & Hall, 1986; Schotsberger & Crawford, 1996; etc.), until it has become part of the bedrock of innovation literature.

Below is a comparison of Hall’s (2010) definitions of the SoC and LoU (see Table 1); in essence, the LoU reflect the operationalization of the SoC. This study wishes to focus attention on the importance of the LoU in the diffusion and adoption of an innovation by examining the patterns
of use of Google Docs among middle school teacher-users, in alignment with suggestions by Straub (2009) that the LoU concept, often overlooked in diffusion and implementation research, deserves greater consideration as an integral part of the study of the implementation of an innovation.

Table 1

<table>
<thead>
<tr>
<th>Stage / Level</th>
<th>Stage of Concern (SoC)</th>
<th>Definition</th>
<th>Level of Use (LoU)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 / 0</td>
<td>Unconcerned</td>
<td>Little concern about or consideration of the innovation is indicated</td>
<td>Non-use</td>
<td>No action is being taken with respect to the innovation</td>
</tr>
<tr>
<td>1 / I</td>
<td>Informational</td>
<td>A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems unworried about himself/herself in relation to the innovation. She/he is interested in substantive aspects of the innovation, such as general characteristics, effects, and requirement for use, in a selfless manner</td>
<td>Orientation</td>
<td>The person is seeking out information about the innovation, but is not actively engaged in using the innovation</td>
</tr>
<tr>
<td>N/A / II</td>
<td></td>
<td></td>
<td>Preparation</td>
<td>The person is preparing to use the innovation for the first time</td>
</tr>
<tr>
<td>2 / III</td>
<td>Personal</td>
<td>Individual is uncertain about the demands of the innovation, his/her inadequacy to meet those demands, and his/her role with this innovation. This indicates analysis of his/her role in relation to the reward structure of the organization, decision making, and consideration of potential conflicts with existing structures or personal commitment. Financial or status implication of the program for self and colleagues may also be reflected.</td>
<td>Mechanical</td>
<td>The user is using the innovation in a poorly coordinated manner and is making user-oriented changes</td>
</tr>
<tr>
<td>3 / IV-A</td>
<td>Management</td>
<td>Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.</td>
<td>Routine</td>
<td>The user is making few or no changes and has established a pattern of use</td>
</tr>
<tr>
<td>4 / IV-B</td>
<td>Consequence</td>
<td>Attention focuses on impact of the innovation on students in his/her immediate sphere of influence.</td>
<td>Refinement</td>
<td>The user is making changes to increase outcomes</td>
</tr>
<tr>
<td>5 / V</td>
<td>Collaboration</td>
<td>The focus is on coordination and cooperation with other regarding the use of the innovation.</td>
<td>Integration</td>
<td>The user is making deliberate efforts to coordinate with other in using the innovation</td>
</tr>
<tr>
<td>6 / VI</td>
<td>Refocusing</td>
<td>The focus is on the exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternative to the proposed or existing form of the innovation.</td>
<td>Renewal</td>
<td>The user is seeking more effective alternatives to the established use of the innovation</td>
</tr>
</tbody>
</table>
The correlations in the CBAM paradigm between the SoC and the LoU suggests that, when considering how an innovation has already diffused through an organization, an inventory of the SoC may not be relevant; how users feel about an innovation that is already in effect would seem to reveal less about how the innovation is diffusing that an actual poll of how intricate the adopters’ uses are. In fact, the reliability of the SoC has been called into question by some research (Bitan-Friedlander et al., 2004; Christou et al., 2004; Straub, 2009). Vaughan (2002) suggests that monitoring LoU would be a better measure of implementation than consideration of SoC, as some past studies have suggested. Therefore, this study did not attempt to capture the SoC of users; rather, it focused on the patterns and typologies of use as a reflection of the implementation of the innovation. Straub (2009) concluded that “[d]iffusion theory takes a macroperspective on the spread of an innovation across time”, while the CBAM provides “a microperspective on change, focusing not on the whole but rather on the pieces that make up the whole” (626). Yet the CBAM is intended as a method of considering organizational adoption as an authority decision facilitated by a change agent (Hall, Wallace, & Dossett, 1973; Hord, et all, 1987; Straub, 2009); it does not consider the role of the individual in the adoption of an innovation within an organization. This study considered whether the changes in the educational landscape over the past four decades, which incorporate changes in communication systems, educational-organizational philosophies, and technologies, have impacted adoption decisions, shifting these decisions from strictly authority (as posited by the CBAM and other theories) to allow for a greater role for optional adoption decisions. This seemed plausible, especially for a technologically-focused innovation that is easily communicated via an increasingly connected educational landscape.
Patterns of Use & Typologies

A review of the CBAM framework implies that the LoU observed among Monmouth County middle school teachers breaks down into eight basic categories, which map to certain implementations of Google Docs:

1. Non-use (LoU 0) - Teacher is not using Google Docs.
2. Orientation (LoU I) - Teacher is learning about the existence of Google Docs.
3. Preparation (LoU II) - Teacher is considering how one might use Google Docs.
4. Mechanical (LoU III) - Teacher is starting to utilize basic features of Google Docs to become familiarized with the system as a precursor to classroom implementation.
5. Routine (LoU IV-A) - Teacher is starting to utilize Google Docs as a classroom tool in a basic fashion; use of Google Docs’ basic features has become routine for the teacher, but use within the classroom is an exception to normal classroom practice at this point as teacher considers how the use of Google Docs fits within content and pedagogy.
6. Refinement (LoU IV-B) - Teacher regularly utilizes Google Docs within the classroom as part of normal instruction, and is determining how to best refine the use of Google Docs to match the goals of instruction.
7. Integration (LoU V) - Teacher is looking for new ways to utilize Google Docs; teacher is taking advantage of the collaborative features both to communicate with colleagues and to encourage students to communicate and collaborate with each other.
8. Renewal (LoU VI) - Having explored all the options available via Google Docs, teacher is considering whether Docs is the best tool to help increase student outcomes.

Innovation configuration mapping. These implementation predictions were confirmed when Docs users were asked to create an innovation configuration map. An innovation
configuration map (ICM) is another theoretical construct of the CBAM framework. It is a chart that lays out the theoretical progression from “least use of an innovation” to “best practices with an innovation”. An ICM of Google Docs use was created using the guidelines provided by Hall and George (2000). The ICM was created by assembling a group of Google Docs-using teachers from several districts, each of whom self-identified as being toward the upper LoU for Google Docs. These teachers were asked to contribute examples of Google Docs use, then to place those examples on a scale from most-involved use to least-involved use. The resulting table was then reviewed, discussed, and revised until all members of the group felt it was an accurate representation of the expected patterns of Google Docs use based on their personal experiences and observations (see Table 2). The model considers not only the functional uses, but also who, besides the user, might be involved in each “transaction” with Google Docs.

The arrangement of the user-generated ICM is predicated on the idea that each column assumes mastery of most or all of the skills listed in the columns located to the right. That is, the A column, which represents the practices of a high-level user of Docs, is assumed to incorporate most or all of the skills and uses identified in columns B through G. Similarly, column B’s uses and skills are predicated on the understanding and/or mastery of those skills and uses listed in columns C through G. Thus, column G represents the “least use” of Google Docs.
### Table 2

**Google Docs Implementation Configuration Map**

<table>
<thead>
<tr>
<th>A.  (Best Practices)</th>
<th>B.</th>
<th>C.</th>
<th>D.</th>
<th>E.</th>
<th>F.</th>
<th>G.  (Least Use)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher and Student:</strong></td>
<td>Teacher and Student:</td>
<td>Teacher and Student:</td>
<td>Teacher and Student:</td>
<td>Teacher and Student:</td>
<td>Teacher and Student:</td>
<td>Individual:</td>
</tr>
<tr>
<td>Teacher uses auto-grading forms to assess students and auto-email student responses</td>
<td>Students utilize collaborative features of G. Docs to work on projects.</td>
<td>Teacher participates in dialogue with students about class work via G. Docs.</td>
<td>Students are encouraged to share work with each other to get and provide peer feedback.</td>
<td>Teacher collects assignments via G. Docs.</td>
<td>Teacher shares class notes, other files with students</td>
<td>Teacher chooses to use productivity software in G. Docs.</td>
</tr>
<tr>
<td>Students utilize teacher provided G. Form to reflect and self-assess on work done at the end of a project.</td>
<td>Teacher and Admin:</td>
<td>Teacher and Teacher:</td>
<td>Teacher and Admin:</td>
<td>Teacher and Teacher:</td>
<td>Teacher and Admin:</td>
<td>Individual:</td>
</tr>
<tr>
<td>Teacher and Admin:</td>
<td>Teachers utilize collaborative features of G. Docs with colleagues in other schools and/or districts to create resources</td>
<td>Teachers utilize collaborative features of G. Docs with colleagues.</td>
<td>Teachers utilize collab. features of G. Docs with building colleagues to share resources</td>
<td>Teacher shares notes, other files with colleagues</td>
<td>Department meeting notes, memos shared</td>
<td>Teacher uses G. Docs to access files from various locations.</td>
</tr>
<tr>
<td><strong>Teacher and Teacher:</strong></td>
<td>Teacher and Teacher:</td>
<td>Teacher and Teacher:</td>
<td>Teacher and Teacher:</td>
<td>Teacher and Teacher:</td>
<td>Teacher and Admin:</td>
<td>Teacher and Other:</td>
</tr>
<tr>
<td>Teachers utilize collaborative features of G. Docs with building colleagues to review and amend curriculum</td>
<td>Teacher shares information from students via G. Forms</td>
<td>Teacher gathers information from students via G. Forms</td>
<td>Teacher gathers information from students via G. Forms</td>
<td>Teacher and Teacher:</td>
<td>Teacher and Admin:</td>
<td>Teacher views a file or document shared by someone else via G. Docs (“Forced” interaction with G. Docs)</td>
</tr>
<tr>
<td><strong>Teacher and Admin:</strong></td>
<td>Teacher and Admin:</td>
<td>Teacher and Admin:</td>
<td>Teacher and Admin:</td>
<td>Teacher and Admin:</td>
<td>Teacher and Admin:</td>
<td>Teacher and Other:</td>
</tr>
<tr>
<td>Teachers utilize collab. features of G. Docs with building colleagues to review and amend curriculum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Teacher views a file or document shared by someone else via G. Docs (“Forced” interaction with G. Docs)</td>
</tr>
</tbody>
</table>
Although the innovation configuration map for Google Docs was created without any discussion of educational, psychological, or organizational theory, the patterns of Docs uses identified in the ICM roughly align with the Levels of Use (LoU) of the implementation of an innovation, as identified by George, Hall, & Stiegelbauer (2006) and Hall & Hord (2011), which, in turn, reflects the predicted stages of concern of new users of an innovation (see Table 3).

Table 3

<table>
<thead>
<tr>
<th>Docs ICM Patterns of Use Correspondence to CBAM Levels of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ICM Section</strong></td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>G</td>
</tr>
</tbody>
</table>

**Typologies of Google Docs use.** Further consideration of the ICM leads to the identification of three main patterns in the uses of Google Docs, in addition to Non-use (LoU 0):

- **Personal Productivity** - Utilizing Docs as a storage tool (F, G). Users create and/or curate a collection of materials for themselves. This type of use requires no interaction between users and is essentially a *simple substitution of computer*.
technology for physical artifacts such as photocopies and word processors, or paper and pencils.

- **Basic Interactions** - Utilizing Docs to increase productivity (C, D, E). Users are starting to interact with a collection of materials and other local users. This type of use begins to take advantage of computing technology by encouraging interaction between users, but does not require it, and tends to focus on *activities that could be reproduced relatively easily with a combination of other technologies*, such as pencils and paper with phone or email, with minimal change in the speed or structure of the communication.

- **Advanced Interactions** - Utilizing Docs to transcend physical and chronological bounds (A, B). Users are moving beyond the confines generally imposed by the structure and style of the school system. This type of use requires interaction between users in order to extend learning beyond the bounds of the classroom, furthering users’ understanding and education. The qualities of these interactions *are not easily reproducible with other technologies*, as these interactions combine aspects of a variety of technologies.

It is important to realize that the typologies of Google Docs use are cumulative; the skills needed to achieve a higher level of use require users to understand the skills of the previous level of use. That is, in order for a Google Docs user to be able to reach the Basic Interactions type of use, she must have the ability to complete tasks at the Personal Productivity level; similarly, the tasks at the Advanced Interactions level are more difficult than those of the Personal Productivity level and require a greater knowledge of and comfort with the features and uses of Google Docs. This is consistent with the cumulative qualities of both the SoC and the LoU of the CBAM.
model; one must achieve a certain degree of comfort and/or skill at the lower level before one is able to achieve the next level.

This tripartite division of patterns of use for Google Docs seems to mirror the tripartite divisions of the SoC as identified by Vaughan (2002): “Self-concerns” (SoC 0, 1, 2) are concerns wherein the user is most concerned with figuring out the innovation’s impacts on herself. “Task concerns” (SoC 3) are concerns wherein the user attempts to determine how to utilize the innovation within her own practice. “Impact concerns” (SoC 4, 5, 6) are concerns wherein the user considers how the innovation impacts others. These patterns of Google Docs use were utilized to examine the level of professional use of Google Docs by Monmouth County middle school teachers.

**Teacher-User Characteristics**

While much of the current work on diffusion research focuses on environmental factors and barriers to implementation, it is important that researchers also focus on the personal characteristics of innovation adopters. In fact, personal characteristics may be an essential component of understanding the diffusion of technology within schools; this belief is reflected in the CBAM’s focus on the perceptions of the individual adopters via the SoC. Repeatedly in the literature, the importance of user perception of the innovation is noted (Berger, 2010; Goolsbee & Klenow, 2002; Hall 2010; Liao, 2005; Nash & Hopper, 2012; Nichols, 2008; Straub, 2009; Tabata & Johnsrud, 2008; Vaughan, 2002). It would seem that individual adopters are one of the most important determinants of successful innovation adoption and diffusion. This suggests that users’ personal characteristics should be examined to determine if there is a relationship between particular individual-level characteristics and increased adoption of the innovation. One aspect of
the literature that focuses on personal characteristics of technology users in schools is the TPACK model.

**Technological, pedagogical, and content knowledge (TPACK).** Technological, Pedagogical, and Content Knowledge (TPACK) is a theoretical framework created by Mishra and Koehler (2003) as a way to conceptualize the complex interplay that exists between teachers’ knowledge about three fundamental elements of modern education. This framework grew out of the work of Shulman (1986, 1987), who argued that any understanding of the teaching process must first start with the recognition that the activity of successful teaching requires practitioners to have strong mastery of two unique fields. First, teachers need subject area content knowledge (CK) – a teacher must understand the topic to be addressed in the classroom. Second, teachers need pedagogical knowledge (PK), an understanding of how to teach. Shulman (1986) posited that it was possible for teachers to have knowledge in one area or the other without necessarily having proficiency in both. He went on to suggest that a successful teacher need not only have CK and PK, but must be able to integrate those two areas of knowledge together to create a third construct, Pedagogical Content Knowledge (PCK). So, for a teacher to be successful in the classroom, she must not only understand the content to be taught, and the process of teaching, but also how the content affects the process of teaching, and how to best deliver specific content to a group of students.

Mishra and Koehler (2006) found value in this construct, but realized that it did not account for a major component of modern education: technology. Therefore, they conducted design experiments with other researchers (Ferdig, Mishra, & Zhao, 2004; Koehler & Mishra 2005; Koehler, Mishra, Hershey, & Peruski, 2004; Koehler, Mishra, Yahya, & Yadva, 2004; Mishra, Zhao, & Tan, 1999; Vyas & Mishra, 2002) which led them to conclude that it was
necessary to extend the concept from PCK to TPCK (later TPACK). Under this model, the successful teacher requires knowledge of not only content and pedagogy, but also technology. Further, the successful teacher must be able to reconcile the effects of one area upon another (how certain types of technology limit or expand the content; how the use of certain technology impacts the application of particular pedagogical practices; how to best implement certain content within the classroom). Additionally, the successful teacher must be able to combine knowledge of all three areas – technology, pedagogy, and content area - into a unified classroom practice (see Figure 3).

![Figure 3: Technological, Pedagogical, and Content Knowledge (TPACK) concept map (AACTE, 2008)](image)

The TPACK framework has been upheld by research that has found that the more teachers utilize technology for personal use (outside of their professional practice), the greater the likelihood that they will utilize technology as part of their professional practice (Beveridge & Rudell, 1988; Kagima & Hausafus, 2000; Liao, 2005; Ma, Anderson, & Streith, 2005; Tabata & Johnsrud 2008). In other words, teachers who utilize and are comfortable with technology in
their personal lives are more likely to be able to consider technology a vital part of everyday life, and to be able to incorporate their experiences with technology into instructional practice.

Theoretically, TPACK forms the basis for any successful teacher implementation of technology; if teachers do not have TPACK, they are less able to implement technology in an effective manner within their respective disciplines. In this way, the TPACK framework correlates with the CBAM concept - as one progresses through the SoC and one’s comfort with the innovation increases, one’s LoU also increases. Therefore, based on the SoC and the LoU of the CBAM, as well as the TPACK theoretical framework, one could conclude that teachers with high levels of personal technological familiarity and pedagogical and content area efficacy are more likely to effectively implement technology such as Google Docs. This study therefore attempted to determine whether there is a relationship between the types and amounts of technology used personally by teachers and the frequency and complexity of the teachers’ professional use of Google Docs.

**Personal technology use.** Adoption decisions are based on a consideration of the balance between the benefits of adopting an innovation versus the costs of implementation (Rogers, 2003), which include not only money, but also the time required to learn how to use the innovation (knowledge and training) and the time that is consumed by use of the innovation (the efficiency of the innovation). Potential-user perception also affects the decision to adopt or reject the innovation: if the potential users think the technology in question is important to doing their jobs, or to improving their job performance, then they are more likely to adopt the innovation (Tabata & Johnsrud 2008). In other words, the investment of time and effort (the cost) is partially offset by the value added to the teacher-user’s practice. When making classroom technology adoption decisions, teachers who are already users of similar technologies would be more likely
to see a low cost of implementation, and more likely to see the value-add. They would therefore seem more likely to adopt, rather than reject, the innovation. This fits with the CBAM (Hall, Wallace, & Dossett, 1973) concepts of the Stages of Concern (SoC) and Levels of Use (LoU).

In the case of Google Docs, the costs are very low. The monetary cost is nothing, as the program is free for all users. The knowledge and training necessary to use the functions of Google Docs is very low, as Google Docs closely mimics other software that is in common use - specifically, the functions and menus are similar to the Microsoft Office suite of productivity software. The efficiency of the innovation is equal to or greater than that of other widely-used software, and can exceed the efficiency of using materials such as paper, pens, or photocopies. Similarly, the value-add in job performance and student outcomes is at least equivalent to that of productivity programs already in use, such as Microsoft’s Office suite. Additionally, Google Docs combines the value-adds of productivity software with social networking software and cloud storage software. Thus, one would predict that educators who are aware of a variety of types of educational technology are likely to perceive Google Docs as providing high value for low costs, and are therefore likely to use Google Docs.

**Pedagogical and content knowledge.** It is reasonable to assume some degree of content efficacy for certified middle school teachers. Under current New Jersey state rules (NJ Department of Education, 2011), all teachers must be able to document that they are “Highly Qualified” to teach the subject area for which they are mainly responsible. In schools with departmentalized settings, such as middle schools, this means that subject area teachers must have completed at least one of the following qualifiers, any one of which would require a minimum basic command of the content area:

- Pass the Praxis II Middle Content Test or K-12 Content Test; or
● Have an undergraduate major in the content area; or
● Have 30 credits equivalent to a major (at least 12 credits at the upper division or graduate levels) in the content area; or
● Have a graduate degree in the content area; or
● Hold National Board certification in the content area.

Likewise, it is reasonable to assume some degree of pedagogical efficacy for certified middle school teachers. Since 1998, the state has required practicing teachers to complete 100 hours of professional development every five years; all of the approved professional development opportunities that qualify to meet this requirement are related to the improvement of professional practice (NJ Department of Education 2011, 2012-II). Teachers new to practice are arriving with a foundation in pedagogical theory, and they are required to create a professional development plan (PDP) within the first 60 days of service within a district, in accordance with the aforementioned professional development program outlined by the state (NJAC 6A:9, 2011). These requirements, in addition to mandated observations by administrators and supervisors, suggest that most teachers beyond their first few years of experience have demonstrated at least minimal pedagogical and content area efficacy to a degree that would allow them to add a consideration of potentially useful technologies to their contemplation of pure subject matter and pedagogical concerns.

**Years of experience.** Research has found a link between years of experience and increased likelihood of technology adoption (Liao, 2005; Palacio-Cayetano et al, 2002; Straub, 2009; Tabata & Johnsrud, 2008). This might be based in part on the fact that teachers with greater years of experience have decreased levels of concern about their practice (Fuller, et al., 1974). This implies that teachers with greater years of experience are more likely to be highly
placed on the SoC measures of the CBAM, and therefore more likely to be at a higher LoU of innovations.

Thus, a link between years of experience and increased adoption of technology makes sense; a teacher with greater years of experience might find that her longer term of service provides a stronger command of subject area materials and pedagogy, in addition to practical experience with classroom management and administration, allowing the teacher to focus less on the day-to-day running of a class and more on how to expand her practice. If this is coupled with personal technology use, the likelihood of a teacher having TPACK, and therefore being willing and able to successfully implement technology within a classroom, is subsequently increased. This study therefore examined respondents’ years of service to determine if there was a relationship between longevity in the profession and increased use of Google Docs.

The findings linking greater number of years of experience to increased likelihood of technology adoption might have a basis in earlier diffusion research. Rogers (2003) assigned the values of compatibility (how well the innovation performs within the context of its use) and complexity (how difficult the innovation is to use) to the innovation; again, these values are based on the perceptions of the potential user, and are not necessarily inherent in the innovation itself. Therefore, it is possible that teacher-users with greater years of experience are more readily able to see the compatibility of certain types of technology with their practice. Likewise, integrating that technology into practice might seem to have a lesser degree of complexity to an experienced teacher.

To carry this idea of compatibility and complexity further, teachers in different subject areas or different grade levels may have different conceptions of compatibility and complexity; however, these perceptions have not been explored across subject areas or grade levels.
previously. This study attempted to provide some guidance in this area, as it provided data on the adoption rates of Google Docs across different subject areas and multiple grade levels.

**Methods**

This study sought to provide quantitative evidence of the relationships between implementation of Google Docs for professional use and teachers’ personal factors as a way to provide administrators with concrete concepts of how to best encourage the adoption of technology across a school (see Figure 1). As the factors examined are personal influences on the implementation of Google Docs, self-reported data was used; the demographic and objective types of data gathered were not reliant on direct observation by the researcher. The anonymous nature of the surveys insulated respondents from feelings of peer pressure or conformity, and should have provided an accurate array of data.

**Sample and Setting**

The target population for this study was all the middle school teachers in Monmouth County, New Jersey. Monmouth County was chosen both because there are schools and teachers who have adopted Google Docs, and because it represents a wide array of demographics, including geophysical locations, ages of facilities and faculties, student diversity, and Google Docs adoption decision types, and a variety of socioeconomic statuses (SES), as demonstrated by district factor groupings (DFGs) and free and reduced lunch program participation.

Monmouth County contains 43 school districts with 53 schools that service students in grades 6th, 7th and 8th grades, including one charter school. The student population of Monmouth County is composed of various ethnicities: 72% White, 11.9% Hispanic, 9.1% Black, 5.7% Asian, 9% “Two or More Races”, .2% Hawaiian Native, and .1% Native American,
Similarly, Monmouth County’s schools service a wide range of socioeconomic demographics. DFGs give an approximation of a district’s socioeconomic status; DFG - A represents the neediest districts, and DFG - J represents the wealthiest. Districts in Monmouth County are classified by DFGs as follows: 4% A, 4% B, 14% CD, 8% DE, 14% FG, 28% GH, 20% I, 6% J (NJDOE 2004). In addition, 16.5% of the students participate in the free lunch program, 21.2% participate in the reduced lunch program, 2.8% are LEP (Limited English Proficiency), and .02% of the students are considered migrant (NJDOE 2012-I).

The target population included all faculty members in grades six through eight at each middle school, allowing for data collection across grade level, subject area, years of experience, technological knowledge, and implementations of Google Docs, regardless of subject area, gender, age, or ethnicity. Schools were selected by comparing two lists: one that lists schools with middle school grades, provided by the Monmouth Country Superintendent; and a second obtained from the NJ State Department of Education web site that lists all schools in the state, along with their official classifications (NJDOE 2012-I). Discrepancies were then rectified by searching individual school websites or contacting schools via phone or email to determine if schools contained 6th, 7th and/or 8th grade teachers. As there is a wide array of school configurations, the superintendents of districts with any school confirmed to include middle school grades (grades 6, 7, and/or 8) were contacted and asked to take part in the survey, regardless of configuration or official designation by the state. For example, in K-8 districts, teachers in grades 6-8 were invited to participate in the survey.

**Instrumentation & Measures**

Both this researcher and Wisnicki (2014) were interested in the same dependent variable (professional use of Google Docs), but each researcher examined that dependent variable from
the perspective of different independent variables; this study considered the effects of personal-level variables on teachers’ professional use of Google Docs in middle schools, while Wisnicki examined the effects of environmental variables. A survey was co-created with Wisnicki in an effort to take best advantage of a single survey of Monmouth County middle school teachers. Thus, only some of the questions in the survey related to the independent variables of the research questions of this study: innovativeness, decision type, and personal-level factors (years of experience, subject area taught, grade(s) taught, individual’s use of various technologies, and TPACK level). Other data collection methods were considered - such as archival records, case studies, and field experiments - but were discarded in favor of surveying, as surveys are an efficient means to gather large quantities of timely data from a target population; thus, the survey lends itself to the study of diffusion-in-progress. To help maintain respondent confidentiality, respondents were not asked to provide information that would make them easily identifiable. Researchers decided that digital distribution of the survey was the most efficient method for collecting data; Qualtrics web-based software was used to create, and distribute a link to, the survey. This was supplemented by a paper version of the survey for districts with low electronic response rates (See Appendix F for the paper copy of the survey; and Appendix G for an annotated version of the survey that indicates which questions mapped to which variables.)

**Relationship of variables to survey questions.** Innovativeness was determined by Question 13; respondents were asked to categorize themselves based on five descriptions. Each choice corresponded to an innovator type, as identified by Rogers (2003): innovator, early adopter, early majority, late majority, or laggard (see Figure 2).

Decision method was determined by Question 11; respondents were asked to identify how they came to the professional decision to utilize Google Docs; the four choices available
corresponded to the four decision methods identified by Rogers (2003): Non-use, Optional, Collective, and Authority. This variable straddles the realms of personal and environmental because optional decisions are personal choices by the users; collective decisions require both personal decision and environmental interaction; and authority decisions are outside the realm of personal decision and are, instead, a function of the users’ environment.

The personal-level independent variables had multiple components, each of which was targeted by a separate question.

Years of experience was determined by Question 3, which asked respondents to indicate how many years they had been teaching. Choices ranged from zero full years through 30, with an additional option of “More than 30 years”.

Subject area was determined by Question 4. Respondents were asked to identify one or more subject areas they taught. Response choices included the four core subject areas (Language Arts, Social Studies, Science, Math), as well as World Language, Physical Education/Health, Technology, Visual and Performing Arts, and Special Education. There was also an “Other” option, with a write-in area for teachers to identify what the “other” subject area was.

Grade level was determined by Question 5, which asked respondents to select one or more of the grade level choices; 6th, 7th, and/or 8th grade.

Respondents were asked about their individual use of various technologies in Questions 6 and 7. Question 6 was composed of eight sub-items each focused on a different, specific technology that related to comparable functions and/or features of Google Docs; respondents were asked to indicate via checkmarks if they used each type of technology for personal use, professional use, or both. Question 7 provided respondents with a write-in option to identify the
names of specific technologies other than Google Docs the respondents used as part of their professional practice.

TPACK level was determined by Question 8, which had seven sub-items. All sub-items were taken from the “Survey of Preservice Teachers’ Knowledge of Teaching and Technology” (Schmidt, et al., 2009), which had been previously tested for reliability. Each sub-item provided a description that identified a particular type of TPACK knowledge and asked respondents to rate how accurately each description applied to him-or herself on a five point scale, from “Strongly Disagree” to “Strongly Agree”.

Question 14, the final question on the survey, related to the dependent variable, the frequency and complexity of teachers’ professional use of Google Docs, which was of interest to both researchers. As previously mentioned, the researchers determined that the four basic typologies of Google Docs use are, in order of complexity for the user, Non-Use, Personal Productivity, Basic Interactions, and Advanced Interactions. There were 11 sub-items in question fourteen, each of which captured two measures of professional Google Docs use— the type of use (organized by the degree of difficulty of the use), and the frequency of that type of use. Questions regarding the complexity of use were based directly on the activities reported by Google Docs-using teachers in the ICM (see Table 2), which resulted in the creation of three sub-items to measure Personal Productivity, four sub-items to measure Basic Interactions, and four sub-items to measure Advanced Interactions. Frequency of these uses was measured based on a scale with five possible responses: “Never”, “Rarely (1-2 times per year)”, “Sometimes (once a month)”, “Regularly (once a week)”, and “Frequently (daily)”.

**Piloting the survey.** Two pilots were run to assess respondents’ abilities to comprehend the questions and answers and to insure the correct operation of the digital form of the survey in
Qualtrics. The researchers were available before, during, and after the pilots to answer respondents’ questions or concerns. Each of the pilot groups was specifically chosen because its members fell outside the target population of the study.

The first pilot took place on February 27, 2013, at the Indian Hill grade school in Holmdel. Fourteen teachers in grades three through five participated in this pilot; these grade levels were outside the target population. The group included a mix of teachers with various years of experience, a variety of subject areas, and various levels of comfort and experience with Google Docs, from those who had “never heard of it” through those who used Docs daily. Each member of this pilot group took the survey online in one of the school’s computer labs.

Respondents were timed. The following results were observed:

- Shortest response time: 2 minutes, 38 seconds
- Longest response time: 11 minutes, 52 seconds
- Average response time: 5 minutes, 30 seconds

No difficulties were witnessed or reported before, during, or after the digital administration of the survey. After respondents took the survey digitally, they were provided with paper copies of the survey and asked to review the questions and responses one more time for any issues in wording or comprehension that stood out to them or caused them any difficulties. All respondents answered that they had no issues and easily comprehended all the questions and answer options.

The second pilot took place on March 6, 2013 at the Eisenhower Middle School in Wyckoff, New Jersey. This school is not in Monmouth County, and is therefore outside the target population. Nine teachers in grades six through eight participated. The participants had a variety of years of teaching experience, subject areas, and levels of use of Google Docs. The
teachers met with researchers in the library with their laptops and took the survey online.

Respondents were timed and the following data was collected:

- Shortest response time: 4 minutes, 59 seconds
- Longest response time: 7 minutes, 35 seconds
- Average response time: 6 minutes, 26 seconds

After the survey was completed online, survey respondents were given a paper copy of the survey and asked to provide the researchers with any feedback about questions that were difficult to understand as well as any issues they had with the digital administration of the survey. One respondent asked if the question “How did you come to the decision to use Google Docs?” referred to using Google Docs personally or professionally. Researchers added “professionally” to the survey question to clarify. No other difficulties were witnessed by the researchers or reported by the respondents.

During the proposal review, a committee member requested two changes: that question #6, asking about which technologies respondents used on a regular basis for personal use, have an additional “professional use” answer field added; and that a text write-in field be added after that question to allow respondents to write in any types of software other than Google Docs that respondents might use for professional use to do some or all of the functions available via Google Docs. These modifications were made after the pilot tests and before distribution of the survey.

**Recruitment Procedures**

All eligible schools were contacted via phone to confirm contact information and to get an estimated number of faculty members across grades six through eight to provide researchers with an approximation of the total possible teacher population to be surveyed.
At the Monmouth County Feb. 22, 2013 Superintendents’ Meeting, the county superintendent handed out “Permission to survey within your district” forms to all attending county superintendents (see Appendix A); researchers followed up with superintendents who did not sign the permission form at that meeting by phone, email, and in person.

Once superintendent permissions were obtained, researchers contacted principals within those districts via mail to provide both an introductory overview of the study and a minor incentive ($5 gift card for Dunkin’ Donuts) in the hopes of increasing awareness of the study, receptivity to the forthcoming online survey, and response rates. A further incentive was outlined in the mailing – the first 30% of responding schools that achieved a survey response rate of 75% or higher would receive a check for $100 (financed by the researchers); this was later expanded to include all schools that achieved a 75% response rate.

On May 5, 2013, after committee review of the proposal and IRB approval of the survey (See Appendix D), principals were contacted via email and provided with a link to the online survey (See Appendix E); principals were asked to distribute this link via email to their faculty members and to encourage faculty members to respond. All teachers in grades 6, 7, and/or 8 were invited to respond to the survey, regardless of age, race, ethnicity, gender, and/or subject area. Survey participation was voluntary, and to provide insulation from negative repercussions and encourage truthfulness in responses, no personal information was requested as part of the survey to help maintain respondents’ anonymity.

Principals in schools with response rates of less than 75% were contacted via phone, email, and in person multiple times and reminded of the $100 incentive in an effort to encourage the greatest possible participation. In early June, principals in schools with low response rates were asked if they thought whether providing a paper copy of the survey to faculty members
would help increase response rates. Three schools felt this might be helpful. Paper copies of the surveys were printed and brought to the schools. The researchers returned to collect the paper surveys during the final days of the school year and found that only one school had distributed the paper surveys.

The last completed online response was collected on June 26, 2013; the online survey was closed on June 28, 2013. At this point, all Monmouth County schools had completed their regular school years.

Responses

25 out of 43 Monmouth County superintendents provided permission to survey within their districts (see Appendix B for copies of the signed permission forms); these 25 districts contained 35 out of the 53 schools within Monmouth County, and contained representatives of all eight DFGs. Between May 5 and June 28, ten schools earned the $100 reward when they met or exceeded the 75% response rate. When the online survey was closed out, there were 987 total responses to the survey – 965 electronic, 22 paper – out of a population of approximately 1790, an estimate based on faculty numbers provided by principals and secretaries during the researchers’ confirmation of contact information.

The Qualtrics data was imported into an Excel spreadsheet and each response was numbered; the responses from the paper surveys were added to the spreadsheet and numbered. The results were then sorted and analyzed for consistency and completeness. Qualtrics counts a “response” as any time a unique computer follows the link to the survey; it then differentiates between “finished” responses - those where the respondent clicked through all of the questions - and “unfinished” responses - those where the respondent did not click through all of the questions.
Based on data from Qualtrics, the average time for a finished response was approximately 31 minutes; this would seem to include respondents who began the survey, then stepped away for a while before continuing and completing their responses, as there are 32 response times of over an hour, including four between 25 and 51 hours, and one over 118 hours. If one ignores response times of less than a minute and more than an hour, the average response time for 793 completed responses was approximately 7 minutes, which was in line with the average response times seen during the survey pilot.

Data Exclusion. The purpose of this study was to determine what, if any, relationship exists between personal-level characteristics of teachers and the frequency and complexity of professional use of Google Docs. Review of the data revealed responses that were not usable for this purpose. Based on researcher review, responses were excluded for the following reasons:

- 6 clicked the link to the survey but did not answer any questions.
- 2 disagreed with conditions of survey and were exited from the survey before they could provide any responses.
- 134 agreed to conditions of survey but did not complete survey by clicking through all of the questions.
- 5 paper copies had suspicious similarities to results gathered via Qualtrics suggesting respondents had completed both the paper and the online survey; the “overlapping” paper responses were therefore excluded.
- 2 paper copies made multiple answer selections for single-choice question items, making analysis impossible, and were therefore excluded.
- 1 response from a district that was not approved by the superintendent
- 34 responses were missing data (years of experience) because the question on the online survey was mistakenly not set to require a response.
2 paper responses indicated that they did not use Google Docs professionally, which means they should not have answered any more questions; but they indicated choices for Question 14 anyway.

In total, 186 responses were excluded for the above-stated reasons.

The combination of online and paper surveys produced a pool of 801 completed, non-overlapping responses; this represents approximately 44.8% of the surveyed population. The final data pool was made up of three main sub-groups that affected responses and data analysis: respondents who had not heard of Google Docs (122), respondents who chose not to use Google Docs professionally (267), and respondents who chose to use Google Docs professionally (412).

**Regression Methods**

A variety of statistical methods were examined to determine an appropriate method to analyze the data and determine answers to the research questions. Since the study design gathered quantitative data that included one dependent variable and multiple independent variables, all of which were either numerical or could be “dummy” coded for analysis, regression analysis was chosen (Kleinbaum, et. al., 1998; Kutner, et. al., 2005; Mertler and Vannatta, 2013; Sweet & Grace-Martin, 2002). Three sets of regressions were run utilizing the data collected from the survey.

*Logistical regression.* A significant portion of survey respondents indicated non-use of Google Docs; therefore, a set of regressions was run to determine if there were increased probabilities of use or non-use of Google Docs based on the personal-level demographic information gathered by the survey – specifically, years of teaching experience, subject area taught, number of grade levels taught, number of types of technology used personally, number of types of technology used professionally, and TPACK score. Logistical regression was performed
to see if any of the collected variables seemed to be a significant factor in predicting use versus non-use of Google Docs. Logistical regression was used for this portion of the analysis because the dependent variable was binary: use or non-use of Google Docs (Mertler & Vennatta, 2013; Sweet & Grace-Martín, 2002; Kleinbaum, et. al., 1998). This regression utilized all of the completed responses to the survey, which resulted in a data pool with N=801.

*Multiple regression.* This study focused on the factors that affect the frequency and complexity of professional use of Google Docs. Multiple regression analysis was used to analyze the data provided by respondents who indicated that they had used Google Docs professionally; any valid responses in which respondents indicated a professional use of Google Docs and a Google Docs Usage Score (GDUS) greater than zero were included, resulting in an N=412. Linear regression was chosen as an appropriate analysis technique because there are multiple independent variables being examined, and the dependent variable, GDUS, can take on many different values (Kleinbaum, et. al., 1998; Kutner, et. al., 2005; Mertler and Vannatta, 2013; Sweet & Grace-Martín, 2002). Stepwise multiple regression was a good choice for this analysis because this study is exploratory in nature, featuring multiple predictors; as Mertler and Vennatta (2013) point out, a stepwise method of regression can help to “determine which specific IV’s [independent variables] make meaningful contributions to the overall prediction” (168).

The dependent variable in these regressions was the Google Docs Usage Score (GDUS), which measures the frequency and complexity of Google Docs usage by teachers within their professional capacity, and the personal-level factors served as the independent variables.

A final set of stepwise regressions was run that took the personal-level independent variables that reached the level of significance from this study and combined them with the environmental factors identified by Wisnicki (2014) as significantly correlated with the GDUS to
determine what factors, if any, were especially significant from across these studies. As both researchers had independently arrived at a sample that utilized the same respondents and a sample size of $N=412$, and both researchers selected stepwise regression for their individual analyses; this method was also used on the combined model.

**Google Docs Usage Score (GDUS)**

Before regression analysis of the data pool could begin, researchers needed to determine how to interpret the survey results regarding the dependent variable. This required further consideration of the current data pool.

The purpose of this study was to determine which personal-level factors, if any, are associated with an increased frequency and complexity of use by teachers using Google Docs professionally. Question 14 of the survey was designed to gather information about the frequency and complexity of respondents’ professional use of Google Docs. The question was divided into 11 sub-items, each focused on a different aspect of Google Docs use, arranged in order of complexity from least-complex to most-complex. To determine which components of Questions 14 were relevant for further study, factor analysis was run on all valid responses that answered Question 14. As previously noted, there were several sub-groups within the main response set who were identified as “Non-users of Google Docs”; these responses were not useful in determining which components of Question 14 were valid, as they did not answer any of the items on Question 14. This resulted in a data pool for factor analysis with an $N=412$.

Factor analysis revealed that each sub-item of Question 14 was necessary for consideration within the statistical analysis – all components loaded high (greater than .5) (see Table 4).
Because all 11 sub-items were found to be important in determining respondents’ degree of professional Google Docs use, researchers created a simplified method of incorporating the data from all sub-items on Question 14 into a single, continuous measure of professional Google Docs usage.

Based on the response choices available in Question 14, researchers determined that the best way to analyze the data was to create a single score that accounted for both frequency of use and complexity of use. As previously mentioned, it is important to understand that the typologies of Google Docs use are cumulative; the skills needed to achieve a higher level of use require users to understand the skills of the previous level of use. That is, in order for a Google Docs user to be able to reach the Basic Interactions type of use, she must have the ability to complete tasks at the Personal Productivity level; similarly, the tasks at the Advanced Interactions level are more difficult than those of the Personal Productivity level, and require a greater knowledge of
and comfort with the features and uses of Google Docs. The Google Docs Usage Score (GDUS) was determined via the following method:

a. Each frequency response was assigned a value from 0 to 4, with “Never” = 0 and “Frequently” = 4.

b. The sub-questions for each type of use were separated; there were three sub-items for Personal Productivity (14a, 14b, 14c); and four sub-items each for Basic Interactions (14d, 14e, 14f, 14g) and Advanced Interactions (14h, 14i, 14j, 14k).

c. To account for the different number of questions regarding each typology, the frequency scores for each type of use were averaged to create a combined frequency-typology score out of four.

d. To account for the cumulative nature of the typologies of Google Docs, the researchers weighted the averaged typology scores - Personal Productivity scores were multiplied by 1; Basic Interactions scores were multiplied by 2; and Advanced Interaction scores were multiplied by 3. This was done to create a numerical score that more accurately reflects the degree of difficulty of each type of use; for example, although a respondent might be utilizing fewer features of Google Docs less frequently, if those uses are at the Advanced Interaction level, that respondent needed to invest a greater amount of time, energy, and thought into that use than did another respondent who is utilizing more features more frequently at the Personal Productivity level.

e. Each respondent’s weighted scores were summed to create a Google Docs Usage Score (GDUS) out of 24 points.
Thus, the equation for determining a respondent’s professional Google Docs usage score is as follows:

\[
GDUS = (\text{Average Personal Productivity score} \times 1) + (\text{Average Basic Interactions score} \times 2) + (\text{Average Advanced Interactions score} \times 3)
\]

This score mathematically quantifies each respondent’s mastery of Google Docs across both their typology and frequency of use; higher GDUS suggests both greater frequency of use and more advanced typologies of use. Figure 4 provides an example of how GDUS was calculated.

### Data Analysis

As previously mentioned, this survey produced 801 completed and valid responses and there were three main sub-groups within the completed response pool: “Google Docs users” (those who use Google Docs as part of their professional practice), user who “Chose not to use Google Docs”, and users who “Haven’t heard of Google Docs”. These responses were examined in a variety of ways.

### Descriptive Statistics

An examination of the percentages of district factor groupings across the three sub-groups reveals that, compared to the total data pool of all completed responses (“All responses”), all of the groups’ percentages are relatively consistent (see Table 5). However, for lower socio-economic status districts, the percentages with responses of “Haven’t heard of Google Docs” are...
two to five times as large as the percentages for those respondents in the “Google Docs users” sub-group; this might suggest that teachers in lower-SES districts are not as aware of educationally usefully technologies like Google Docs.

Table 5

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</thead>
<tbody>
<tr>
<td>A</td>
<td>7.10%</td>
<td>4.08%</td>
<td>9.49%</td>
<td>4.37%</td>
<td>11.24%</td>
<td>22.95%</td>
</tr>
<tr>
<td>B</td>
<td>12.20%</td>
<td>4.08%</td>
<td>2.62%</td>
<td>3.40%</td>
<td>2.62%</td>
<td>0%</td>
</tr>
<tr>
<td>CD</td>
<td>12.20%</td>
<td>14.29%</td>
<td>8.36%</td>
<td>6.31%</td>
<td>9.74%</td>
<td>12.3%</td>
</tr>
<tr>
<td>DE</td>
<td>15.12%</td>
<td>8.16%</td>
<td>8.49%</td>
<td>4.85%</td>
<td>13.11%</td>
<td>10.66%</td>
</tr>
<tr>
<td>FG</td>
<td>16.21%</td>
<td>14.29%</td>
<td>13.98%</td>
<td>8.50%</td>
<td>19.48%</td>
<td>20.49%</td>
</tr>
<tr>
<td>GH</td>
<td>13.84%</td>
<td>28.57%</td>
<td>31.59%</td>
<td>35.92%</td>
<td>25.84%</td>
<td>29.51%</td>
</tr>
<tr>
<td>I</td>
<td>18.76%</td>
<td>20.41%</td>
<td>23.60%</td>
<td>33.98%</td>
<td>16.85%</td>
<td>3.28%</td>
</tr>
<tr>
<td>J</td>
<td>4.55%</td>
<td>6.12%</td>
<td>1.87%</td>
<td>2.67%</td>
<td>1.12%</td>
<td>0.82%</td>
</tr>
</tbody>
</table>

*NJDOE (2004)
“Haven’t heard” groups had marginally higher average years’ of experience, it’s possible that if respondents had more options to choose from when answering the question, then there would be a more pronounced difference in the average years of experience for the two non-use sub-groups.

Table 6

<table>
<thead>
<tr>
<th>Individual Factors - Averages by Respondent Group</th>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Note: All percentages are based on responses</td>
</tr>
<tr>
<td>(N=801) Google Docs users (N=412) Chose not</td>
</tr>
<tr>
<td>to use G.D. (N=267) Haven't heard of G.D.</td>
</tr>
<tr>
<td>(N=122)</td>
</tr>
</tbody>
</table>

| Years of teaching experience (out of 31) | 13.94 | 13.59 | 14.17 | 14.61 |
| Number of grade levels taught (out of 3) | 1.76  | 1.87  | 1.66  | 1.61  |
| Types of technology used (Personal) (out of 8) | 5.59  | 5.83  | 5.49  | 4.98  |
| Types of technology used (Professional) (out of 8) | 3.78  | 4.17  | 3.43  | 3.25  |
| TPACK score (out of 35)                     | 27.67 | 28.29 | 27.61 | 25.74 |

Table 6 also shows that Google Docs users tended to teach more grade levels than teachers in the other sub-groups; this might suggest that Google Docs is seen as a good tool for teachers to help keep organized and provide an efficient work flow within their classrooms. Additionally, Google Docs users on average use a greater number of different types of technology, both personally and professionally, than respondents in the other sub-groups, an outcome implied by a review of literature on diffusion of innovations. Finally, Google Docs users exhibit a slightly higher than average TPACK score than the other sub-groups, as predicted; this suggests that teachers who use Google Docs professionally feel more comfortable integrating technology into their practice.

Across the three sub-groups, the percentage of teachers responding from each subject area was relatively consistent (see Table 7). The one exception is that Technology teachers were
more heavily represented in the sub-group Google Docs users and much less represented in the “Haven’t heard” sub-group than they were in the “Chose not to use” group, which comes as no surprise; technology teachers should be expected to have heard of Google Docs and similar technologies. Across the entire data set, there were 92 respondents who selected “Other” for one or more of their subject areas, 61 of whom only selected “Other” for their subject area. There were 13 “Other” responses that did not write in further information, 9 of which only chose “Other” for their subject area. A complete chart of the 79 text write-ins for “Other” can be viewed in Appendix H.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>English / Language Arts</td>
<td>29.84%</td>
<td>30.1%</td>
<td>27.72%</td>
<td>33.61%</td>
</tr>
<tr>
<td>History / Social Studies</td>
<td>18.23%</td>
<td>17.72%</td>
<td>19.85%</td>
<td>16.39%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>24.34%</td>
<td>22.09%</td>
<td>26.22%</td>
<td>27.87%</td>
</tr>
<tr>
<td>Science</td>
<td>18.73%</td>
<td>17.23%</td>
<td>20.22%</td>
<td>20.49%</td>
</tr>
<tr>
<td>Visual / Performing Arts</td>
<td>6.62%</td>
<td>8.25%</td>
<td>4.49%</td>
<td>5.74%</td>
</tr>
<tr>
<td>Technology</td>
<td>4.74%</td>
<td>6.31%</td>
<td>3.75%</td>
<td>1.64%</td>
</tr>
<tr>
<td>Special Education</td>
<td>21.47%</td>
<td>19.17%</td>
<td>22.47%</td>
<td>27.05%</td>
</tr>
<tr>
<td>Health / Phys. Ed.</td>
<td>4.00%</td>
<td>3.88%</td>
<td>4.12%</td>
<td>4.10%</td>
</tr>
<tr>
<td>World Language</td>
<td>5.24%</td>
<td>5.58%</td>
<td>5.24%</td>
<td>4.10%</td>
</tr>
<tr>
<td>Other</td>
<td>11.49%</td>
<td>11.89%</td>
<td>11.61%</td>
<td>9.84%</td>
</tr>
</tbody>
</table>

Respondents could select more than one subject area, so respondent groups may add to more than 100%

Interestingly, compared to the total data pool and the other sub-groups, Google Docs users tended to be more heavily represented among Grade 7 teachers, and to a lesser extent among Grade 8 teachers (see Table 8). There are many possible explanations for why the two higher middle school grades might feature greater professional use of Google Docs – it could be related to the pedagogical appropriateness and/or maturity level of students at the lower versus
higher grades; it could be an organizational issues, based on how grade levels are distributed among buildings within a district; or it could be related to personal factors of teachers at those grade levels. These percentages might also suggest that teachers dealing with students of different ability levels and/or curricula that are thematically unrelated find technology like Google Docs conducive to organization and/or professional practice.

Table 8

<table>
<thead>
<tr>
<th>Grade Levels Taught - Percentage by Respondent Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sixth Grade</td>
</tr>
<tr>
<td>Seventh Grade</td>
</tr>
<tr>
<td>Eighth Grade</td>
</tr>
</tbody>
</table>

Respondents could select more than one grade level, so respondent groups may add to more than 100%

Table 9 provides information about what types of technologies teachers are using in their personal lives, and how heavily represented each personal use is within the data sub-groups. Google Docs users tend to use more types of technology than their counterparts in the other sub-groups, and are much more likely to use more “up-to-date” technologies (such as video conferencing), which is as predicted. However, there are two interesting exceptions to this trend. Google Docs users are slightly less likely to use email and social media in their personal lives than are teachers who chose not to use Google Docs for professional use. These two types of technologies are generally used in personal lives for relatively quick and informal communication with others. This might suggest that Google Docs users utilize other types of technology (such as video conferencing) for quick and informal communication and rely less on asynchronous communication via typed text.
When one examines the types of technology used as part of professional practice, the Google Docs users sub-group carries over its heavy representation in each category of technology as compared to the other sub-groups (see Table 10). Interestingly, the email exception seen in personal use also carries over to professional use; but social media use among Google Docs users is significantly higher than among the other sub-groups. This might suggest that Google Docs users are also more likely to use other kinds of technology within their professional practice, and at a greater rate than their colleagues who are not using Google Docs. It should be noted that while the percentage of Google Docs users using cloud-based storage is staggering compared to the other sub-groups, this data may be misleading; respondents might be including their use of Google Docs, which would heavily weight the data for this type of technology.
Among respondents who indicated that they use Google Docs professionally, an interesting phenomenon was noted in the decision method that led to their use of Google Docs.

While many use decisions were driven by authority decision methods (41.75%), a significant number of decisions were made independently by teachers (35.68%) or in collaboration with colleagues (22.57%) (see Table 11). This suggests that, as predicted, teachers’ adoption of technology into their practice is affected by individually-based decisions, either individually (optional decision method) or in league with peers (collective decision method).

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While many use decisions were driven by authority decision methods (41.75%), a significant number of decisions were made independently by teachers (35.68%) or in collaboration with colleagues (22.57%) (see Table 11). This suggests that, as predicted, teachers’ adoption of technology into their practice is affected by individually-based decisions, either individually (optional decision method) or in league with peers (collective decision method).
innovation is diffusing (see Figure 2). This suggests that the respondent pool is a good match for a general population implementing an innovation.

Table 12

<table>
<thead>
<tr>
<th>Innovator Type of Google Docs Users</th>
<th>Total (N)</th>
<th>Innovator</th>
<th>Early Adopter</th>
<th>Early Majority</th>
<th>Late Majority</th>
<th>Laggard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>412</td>
<td>6</td>
<td>72</td>
<td>151</td>
<td>124</td>
<td>59</td>
</tr>
<tr>
<td>Percentage</td>
<td>100%</td>
<td>1.46%</td>
<td>17.48%</td>
<td>36.65%</td>
<td>30.10%</td>
<td>14.32%</td>
</tr>
</tbody>
</table>

While the descriptive statistics on the respondent data suggests some interesting trends and relationships, such cursory analysis is not sufficient when trying to determine the relationship between the independent and dependent variables or when trying to predict the values of the dependent variable from the values of the independent variables. Therefore, regression analyses were run on the collected data.

Regression Set 1: Use v. Non-use

The first set of analyses focused on the use or non-use of Google Docs for professional purposes. Survey respondents were classified as “non-users” according to one of three schemas: Users could select “I have not heard of Google Docs” in Question 9; and users could select “I do not use Google Docs professionally” in Question 11 or users could indicate a GDUS of zero by selecting “Never” for all sub-items in Question 14. All of these responses indicate that respondents are not using Google Docs in a professional capacity. Across these three types, there were 389 non-users. All remaining survey responses fell into the “use” category (N=412).

The independent variables that were examined in this phase were limited to those six variables that were relevant to the non-use response – years of teaching experience, subject area
taught, number of grade levels taught, number of types of technology used personally, number of types of technology used professionally, and TPACK score; since decision method and innovator type are specifically related to a use scenario, survey respondents who were non-users did not provide any information regarding these variables, so they could not be included in the use v. non-use analysis.

For regression purposes, the dependent variable was coded as “Uses Google Docs professionally” (1) or “Does not use Google Docs professionally (0). Data for the independent variables was coded using the following schemata:

- “Years of teaching experience” was coded as a whole number between zero and 30, as indicated by respondent on a scale of 0-30, or “More than 30”. “More than 30” responses were coded as 31.
- “Subject area taught” was coded as “taught” (1) or “not taught” (0). “Other” was counted as a single subject for the purposes of this analysis (see Appendix H for the text entries by respondents for “Other”).
- “Grade levels taught” was coded as 1, 2, or 3 based on the total number of grade levels taught.
- “Types of technology used” was coded as “used” (1) or “not used” (0) for the first set of regressions, but no significance was found for any particular type of technology except “Cloud-based storage”; however, as previously noted, this particular category may not have been reliable, so this result was discarded and a new coding system was devised . “Types of technology used” was coded as a total for “Personal” use (0-8) and “Professional” use (0-8) (see Appendix I for a list of the text entries by respondents naming other technologies used as part of their professional practice).
“TPACK score” was coded as a total out of 35 points. Question 8, which dealt with the TPACK score, had seven sub-items, each of which asked respondents to rate their agreement with statements about their level of comfort with various examples and aspects of TPACK in the classroom. Possible responses ranged from “Strongly Disagree” (1) through “Strongly Agree” (5).

Logistic regression provides an odds ratio that can be converted to probability – the odds of success divided by the odds of failure (Mertler & Vannatta, 2013) or in this case, the odds of use divided by the odds of non-use. Because the independent variables are a mixture of categorical and continuous variables, and the dependent variable in this instance is binary (use versus non-use of Google Docs), logistic regression was an appropriate technique to apply (Mertler & Vannatta, 2013). Logistic regression attempts to model the probability of a “success” outcome using a linear function of the predictors, resulting in a linear probability model (Bickel, 2007; Mertler & Vannatta, 2010).

\[
\ln \left( \frac{P(Y_i = 1)}{P(Y_i = 0)} \right) = \beta_0 + \beta_1 X_i
\]

The results of the stepwise logistical regressions revealed that only two individual-level demographic factors gathered by this survey had a p-value < .05: the number of grade levels taught and the number of types of technology used professionally (see Table 13).
When stepwise logistic regression was run using only the variables that reached the level of significance, the final model was arrived at (see Table 14). The following is the equation for the final model for this set of regressions:

\[
\ln \left( \frac{P(Y_i = 1)}{P(Y_i = 0)} \right) = -2.399 + .560 X_1 + .208 X_2
\]

where \(X_1\) represents the “Number of types of technology used professionally” and \(X_2\) represents the “Number of grade levels taught”. This equation states that the probability of Google Docs use increases both with each additional type of technology used professionally, and with each additional grade level taught by the user. According to the logistic regression, teachers who teach
two grade levels are 1.23 times more likely to use Google Docs than teacher who teach 1 grade level; and teachers who teach three grade levels are 1.23 time more likely to use Google Docs than teachers who teach two grade levels (see Table 14). The logistic regression also revealed that teachers who use three different types of technology as part of their professional practice are 1.75 times more likely to use Google Docs than teachers who use two different types of technology as part of their professional practice (see Table 14).

Table 14

<table>
<thead>
<tr>
<th>Variables in the Logistic Regression Final Equation, N=801</th>
<th>B</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Grade Levels Taught</td>
<td>0.208</td>
<td>0.017</td>
<td>1.231</td>
</tr>
<tr>
<td>Step 1 a Number of Types of Technology Used Professionally</td>
<td>0.56</td>
<td>0.000</td>
<td>1.751</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.399</td>
<td>0.000</td>
<td>0.091</td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: NoGrLevelsTaught, NoTypesTechUseProf.

As the purpose of these logistic regressions was to determine if there was any relationship between the personal-factor demographic data collected and the decision to use or not use Google Docs, these results might have been affected by the inclusion of the data sub-group “Haven’t heard of Google Docs”. Therefore, logistical regression was also run with the “Haven’t heard of Google Docs” users removed, resulting in a data pool with N=679 (see Table 15). No significant differences were noted – the variables were found to have very similar levels of significance. The following is the equation for the final model of this set of regressions:

\[
\ln \left( \frac{P(Y_i = 1)}{P(Y_i = 0)} \right) = -1.855 + .510 X_1 + .206 X_2
\]

where \( X_1 \) represents the “Number of types of technology used professionally” and \( X_2 \) represents the “Number of grade levels taught” (see Table 15). According to the logistic regression on the data that only involved users who had heard of Google Docs, for every increase in grade levels
taught, the odds of a teacher using Google Docs is 1.23 times more than a teacher teaching one less grade level. For example, for a teacher teaching two grade levels, his or her odds of using Google docs is 1.23 times more than a teacher teaching only one grade level (see Table 15). And while the logistic regression on this data set had a slightly different outcome for number of types of technology used professionally, the numbers were similar - for every increase in number of types of technology used as part of professional practice, the odds of a teacher using Google Docs is 1.67 times more than a teacher using one fewer type of technology professionally. For example, for a teacher using four different types of technology, his or her odds of using Google Docs is 1.67 times more than a teacher using three different types of technology as part of his or her professional practice (see Table 15).

Table 15

<table>
<thead>
<tr>
<th>Variables in the Logistic Regression Final Equation, N=679</th>
<th>B</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Grade Levels Taught</td>
<td>0.206</td>
<td>0.031</td>
<td>1.229</td>
</tr>
<tr>
<td>Number of Types of Technology Used Professionally</td>
<td>0.510</td>
<td>0.000</td>
<td>1.666</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.855</td>
<td>0.000</td>
<td>0.157</td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: NoGrLevelsTaught, NoTypesTechUseProf.

Among the total survey population of 801 respondents, Google Docs-using teachers were slightly less likely to teach one grade level than their non-user peers (43.73% users versus 56.27% non-users), but were slightly more likely to teach three grade levels (56.9% users versus 43.1% non-users), and were much more likely to teach two grade levels (65.07% users v. 34.93% non-users) (see Table 16).
Table 16

<table>
<thead>
<tr>
<th>Number of Grade Levels Taught – Percentage by Respondent Group</th>
<th>Google Docs users (N=412)</th>
<th>Chose not to use G.D. (N=267)</th>
<th>Haven't heard of G.D. (N=122)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 grade level</td>
<td>43.73%</td>
<td>38.30%</td>
<td>17.97%</td>
</tr>
<tr>
<td>2 grade levels</td>
<td>65.07%</td>
<td>23.29%</td>
<td>11.64%</td>
</tr>
<tr>
<td>3 grade levels</td>
<td>56.90%</td>
<td>30.60%</td>
<td>12.50%</td>
</tr>
</tbody>
</table>

If one considers the average number of grade levels taught by respondents, teachers who include Google Docs use as part of their practice tend to teach more grade levels than teachers who do not use Google Docs, or teachers who have not heard of Google Docs (see Table 17). Google Docs users also tend to utilize more types of technology professionally than teacher who do not utilize Google Docs professionally (see Table 17).

Table 17

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of grade levels taught</td>
<td>1.87</td>
<td>1.66</td>
<td>1.61</td>
</tr>
<tr>
<td>Number of types of technology used professionally</td>
<td>4.17</td>
<td>3.43</td>
<td>3.25</td>
</tr>
</tbody>
</table>

A Hosmer and Lemeshow test was conducted to determine the validity of the use v. non-use models (see Table 18). A chi-square statistic is computed comparing the observed frequencies with those expected under the linear model. A non-significant chi-square (p-value > .10) indicates that the data fit the model well. The Hosmer and Lemeshow Test significance levels for these logistic regressions’ final models (p = .001 for N=801; p= .069 for N=679) suggests that there are other variables not accounted for in this logistic regression model that play a larger role in a user’s decisions to use or not use Google Docs professionally.
The Hosmer and Lemeshow Test checks the null hypothesis that there is a linear relationship between the predictor variables and the log odds of the criterion variable. Therefore, rejecting the null could mean several things possibly, e.g., log-linear modeling is not appropriate due to violations of the assumptions for logistic regression model. Or, there could be other variables not included in this study which can better explain the dataset. This is an area that warrants further investigation.

Table 18  

Hosmer & Lemeshow Tests - Significance of Final Model Regressions

<table>
<thead>
<tr>
<th></th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=801</td>
<td>0.001</td>
</tr>
<tr>
<td>N=679</td>
<td>0.069</td>
</tr>
</tbody>
</table>

*p > .10

Regression Set 2: Personal Factors v. Google Docs Usage Score

To determine what relationships exist between the independent variables of this study and the frequency and complexity of teachers’ professional use of Google Docs, linear regression was used (N=412). As previously mentioned, the dependent variable was the GDUS, which was coded as a score between 0 and 24. The coding for the independent variables for this series of regressions was essentially the same as that used for the logistic regressions, with the addition of two independent variables, which were coded according to the following schemata:

- “Decision Method” was dummy coded as a nominal variable.
  - “Optional” was coded as “1, 0”.
  - “Collective” was coded as “0, 1”.
  - “Authority” was coded as “0, 0”.
- “Innovator Type” was dummy coded as a nominal variable:
  - “Innovator” was coded as “1, 0, 0, 0”


Stepwise linear regression was run on the variables. Within the correlations between the dependent variable and the 21 independent variables, 12 were between 0 and ±0.099; 7 were between ±0.1 and ±0.199; and 2 were between ±0.2 and ±0.299 (see Table 19).

Table 19

<table>
<thead>
<tr>
<th>Correlations - Personal-Level Variables</th>
<th>GDUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google Docs Usage Score</td>
<td>1.000</td>
</tr>
<tr>
<td>Years of Teaching Experience</td>
<td>0.015</td>
</tr>
<tr>
<td>Subject: Language Arts</td>
<td>0.013</td>
</tr>
<tr>
<td>Subject: Social Studies/History</td>
<td>0.098*</td>
</tr>
<tr>
<td>Subject: Science</td>
<td>0.003</td>
</tr>
<tr>
<td>Subject: Mathematics</td>
<td>-0.189*</td>
</tr>
<tr>
<td>Subject: Visual or Performing Arts</td>
<td>-0.083*</td>
</tr>
<tr>
<td>Subject: Technology</td>
<td>0.137*</td>
</tr>
<tr>
<td>Subject: Special Education</td>
<td>-0.038</td>
</tr>
<tr>
<td>Subject: Others</td>
<td>-0.007</td>
</tr>
<tr>
<td>Subject: Physical Education/Health</td>
<td>-0.016</td>
</tr>
<tr>
<td>Subject: World Language</td>
<td>0.035</td>
</tr>
<tr>
<td>Number of Grade Levels Taught</td>
<td>0.075</td>
</tr>
<tr>
<td>Number of Types of Technology Used Personally</td>
<td>0.170*</td>
</tr>
<tr>
<td>Number of Types of Technology Used Professionally</td>
<td>0.266*</td>
</tr>
<tr>
<td>TPACK Score</td>
<td>0.272*</td>
</tr>
<tr>
<td>Dec. Method: Optional</td>
<td>-0.055</td>
</tr>
<tr>
<td>Dec. Method: Collective</td>
<td>0.106*</td>
</tr>
<tr>
<td>Innovator Type: Innovator</td>
<td>0.191*</td>
</tr>
<tr>
<td>Innovator Type: Early Adapter</td>
<td>0.124*</td>
</tr>
<tr>
<td>Innovator Type: Early Majority</td>
<td>0.000</td>
</tr>
<tr>
<td>Innovator Type: Late Majority</td>
<td>-0.162*</td>
</tr>
</tbody>
</table>

* \( p < .05 \)
Among the twenty-one independent variables examined in this study, nine were found to have coefficients that rose to the level of significance ($p < .05$) (see Table 20).

Table 20  

_Coefficents - Personal-Level Variables^a_  

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Sig.</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-3.018</td>
<td>0.057</td>
<td></td>
</tr>
<tr>
<td>Years of Teaching Experience</td>
<td>0.060</td>
<td>0.016*</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Language Arts</td>
<td>-0.091</td>
<td>0.851</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Social Studies/History</td>
<td>0.690</td>
<td>0.211</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Science</td>
<td>-0.420</td>
<td>0.459</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Mathematics</td>
<td>-1.829</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Visual or Performing Arts</td>
<td>-1.912</td>
<td>0.020*</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Technology</td>
<td>0.438</td>
<td>0.630</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Special Education</td>
<td>-0.276</td>
<td>0.622</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Others</td>
<td>-0.851</td>
<td>0.224</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: Physical Education/Health</td>
<td>-0.319</td>
<td>0.777</td>
<td></td>
</tr>
<tr>
<td>Subj. Taught: World Language</td>
<td>-0.140</td>
<td>0.885</td>
<td></td>
</tr>
<tr>
<td>Number of Grade Levels Taught</td>
<td>0.376</td>
<td>0.180</td>
<td></td>
</tr>
<tr>
<td>Number of Types of Tech. Used (Pers.)</td>
<td>0.145</td>
<td>0.288</td>
<td></td>
</tr>
<tr>
<td>Number of Types of Tech. Used (Prof.)</td>
<td>0.494</td>
<td>0.004*</td>
<td></td>
</tr>
<tr>
<td>TPACK Score</td>
<td>0.142</td>
<td>0.002*</td>
<td></td>
</tr>
<tr>
<td>Dec. Method: Optional</td>
<td>-1.655</td>
<td>0.002*</td>
<td></td>
</tr>
<tr>
<td>Dec. Method: Collective</td>
<td>-0.041</td>
<td>0.943</td>
<td></td>
</tr>
<tr>
<td>Innovator Type: Innovator</td>
<td>4.880</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>Innovator Type: Early Adapter</td>
<td>3.108</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>Innovator Type: Early Majority</td>
<td>2.433</td>
<td>0.002*</td>
<td></td>
</tr>
<tr>
<td>Innovator Type: Late Majority</td>
<td>0.968</td>
<td>0.256</td>
<td></td>
</tr>
</tbody>
</table>

\[ \Delta F = 5.749, \Delta F \text{ p-value} = .000^* \]

ANOVA regression p-value = .000*

\(^a\) Dependent Variable: Google Docs Usage Score (GDUS)

* $p < .05$

The significant independent variables were, in order of significance, Innovator Types Innovator, Early Adapter, and Early Majority; TPACK Score; Number of types of technology
used (Professionally); Decision Method: Optional; Subjects taught: Mathematics and Visual/Performing Arts; and Years of Teaching Experience.

Stepwise linear regression resulted in a final model with the following equation:

\[
GDUS = -1.733 + .160X_1 + 4.467X_2 + 2.597X_3 + 1.826X_4 + .549X_5 - 1.568X_6 - 1.846X_7 - 1.593X_8 + .053X_9
\]

- \( X_1 = \) TPACK Score
- \( X_2 = \) Innovator Type: Innovator
- \( X_3 = \) Innovator Type: Early Adopter
- \( X_4 = \) Innovator Type: Early Majority
- \( X_5 = \) Number of types of technology used (Professionally)
- \( X_6 = \) Decision Method: Optional
- \( X_7 = \) Subject taught: Mathematics
- \( X_8 = \) Subject taught: Visual or Performing Arts
- \( X_9 = \) Years of teaching experience

According to this model, nine independent variables representing six different types of personal-level factors are significantly associated with increased frequency and complexity of Google Docs use for professional purposes. This equation confirms some of the predictions made earlier in this research. An increase in TPACK score is linked to an increase in GDUS; this makes sense, as the TPACK score reflects how comfortable a respondent is using technology as part of their professional practice, and the more comfortable someone is using technology in a professional setting, the easier it should be for them to integrate a technology like Google Docs into their practice. Similarly, increased GDUS is correlated with an increase in the number of different technologies used professionally; this echoes the logic of the TPACK correlation, in
that teachers who use more types of technology are more likely to be able to incorporate Google Docs into their practice.

The subject area variables are interesting, in that they are negatively correlated with the GDUS. It was predicted that there might be a positive correlation between Google Docs use and writing-oriented subjects like English/Language Arts or History due to the fact that Google Docs provides not only a writing platform but also many additional, educationally-useful features. However, it is not surprising to find that Mathematics and Visual/Performing Arts both have a negative correlation with GDUS. There are many very specialized mathematics technologies that focus much more specifically on educational purposes than Google Docs’ spreadsheets – it makes sense that mathematics teachers would not be drawn to Google Docs. Similarly, Google Docs’ suite of programs does not have a component that readily lends itself to adoption by teachers of the arts.

The significant association between GDUS and the innovator types was also expected; people who are earlier adopters of innovations (innovators, early adopters, and early majority) are more likely to be aware of and take advantage of technological innovations such as Google Docs. Being an innovator is nearly twice as likely to influence the GDUS as being an early adopter; and is more than twice as likely to influence GDUS as being part of the early majority; however, it would seem that if a user generally sees herself as part of the first fifty percent of users, then she is more likely to have a higher GDUS than those users who see themselves as followers (innovation type: late majority), or users who are forced to use Google Docs (innovation type: laggard).
As predicted, optional decision method reached the level of statistical significance; however, it had a negative correlation with GDUS, though it had been predicted to have a positive correlation based on a review of the literature.

Finally, years of experience showed a positive correlation with GDUS, as predicted. This is a logical outcome – good teachers who have “learned the ropes” and are comfortable with their subjects and students would be likely to seek out ways to continue to evolve and improve their classroom practice, and technologies such as Google Docs are one way for those experienced teachers to expand their technological, pedagogical, and content knowledge.

The final model had an R Square of .221 (see Table 21), meaning this model explained 22.1% of the variance in the GDUS.

Table 21

<table>
<thead>
<tr>
<th>Model</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0.221</td>
</tr>
</tbody>
</table>


The final model had an ANOVA significance of .000 (see Table 22), suggesting that this model significantly predicts GDUS.

Table 22

<table>
<thead>
<tr>
<th>Model</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Regression</td>
<td>.000ª</td>
</tr>
</tbody>
</table>

ª. Dependent Variable: Google Docs Usage Score

Regression Set 3: Combined Models Factors v. Google Docs Usage Score

As previously mentioned, a final set of stepwise regressions was run that took the significant personal-level independent variables identified in this study and combined them with the environmental factors identified by Wisnicki (2014) as significantly correlated with GDUS. Wisnicki found two environmental variables to be significantly correlated with GDUS – the environmental barrier “Time” and the decisions type “Collective”. The coding schemata for these independent variables were as follows:

- “Time” was coded as a whole number between 0 and 4 based on respondents’ selections on a Likert scale sub-item in survey question 10 that asked respondents to rate the degree to which it was a barrier to increasing the respondents’ professional use of Google Docs.
- “Decision Method: Collective” was dummy coded as “0, 1”, in line with the coding for the related independent variable, “Decision Method: Optional”.

When stepwise regression was run on the combined models’ factors, the final model equation was identical to that determined via linear regression of the personal-level variables; the factors “Environmental Barrier: Time” and “Decision Method: Collective”, which were found to be the most significant of the environmental factors studied by Wisnicki (2014), did not reach the level of significance (p > .05) when examined in conjunction with the personal-level variables (See Table 23).
Table 23

*Personal and Environmental Factors Regressions*

<table>
<thead>
<tr>
<th>Model</th>
<th>$B$</th>
<th>Sig.</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-1.733</td>
<td>0.205</td>
</tr>
<tr>
<td></td>
<td>TPACK Score</td>
<td>0.160</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Inn. Type: Innovator</td>
<td>4.467</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Inn. Type: Early Adapter</td>
<td>2.597</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Inn. Type: Early Majority</td>
<td>1.826</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>No. of Types of Tech. Used (Prof.)</td>
<td>0.549</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Dec. Method: Optional</td>
<td>-1.568</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Subj. Taught: Mathematics</td>
<td>-1.846</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Subj. Taught: Visual or Perf. Arts</td>
<td>-1.593</td>
<td>0.032*</td>
</tr>
<tr>
<td></td>
<td>Years of Teaching Experience</td>
<td>0.053</td>
<td>0.028*</td>
</tr>
</tbody>
</table>

$\Delta F = 12.699, \Delta F \text{ p-value} = .000$
ANOVA Regression p-value = .000

<table>
<thead>
<tr>
<th>Model</th>
<th>$B$</th>
<th>Sig.</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>(Constant)</td>
<td>-0.803</td>
<td>0.586</td>
</tr>
<tr>
<td></td>
<td>TPACK Score</td>
<td>0.153</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Inn. Type: Innovator</td>
<td>4.429</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Inn. Type: Early Adapter</td>
<td>2.401</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Inn. Type: Early Majority</td>
<td>1.689</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>No. of Types of Tech. Used (Prof.)</td>
<td>0.514</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>Dec. Method: Optional</td>
<td>-1.524</td>
<td>0.003*</td>
</tr>
<tr>
<td></td>
<td>Subj. Taught: Mathematics</td>
<td>-1.782</td>
<td>0.000*</td>
</tr>
<tr>
<td></td>
<td>Subj. Taught: Visual or Perf. Arts</td>
<td>-1.633</td>
<td>0.028*</td>
</tr>
<tr>
<td></td>
<td>Years of Teaching Experience</td>
<td>0.056</td>
<td>0.021*</td>
</tr>
<tr>
<td></td>
<td>Environmental Barrier: Time</td>
<td>-0.285</td>
<td>0.068</td>
</tr>
<tr>
<td></td>
<td>Dec. Method: Collective</td>
<td>0.218</td>
<td>0.688</td>
</tr>
</tbody>
</table>

$\Delta F = 1.740, \Delta F \text{ p-value} = .177$
ANOVA Regression p-value = .000

---

*a. Dependent Variable: Google Docs Usage Score*

* $p < .05$

This shows that personal-level factors are more significant than environmental factors in the frequency and complexity of teachers’ professional use of Google Docs.
Conclusions

The purpose of this study was to examine the relationship between personal-level factors and the frequency and complexity of use of educational technology, specifically Google Docs. Environmental variables, addressed separately by Wisnicki (2014), were also considered as part of the final analysis of this study. By examining the variables that affect the frequency and complexity of use of Google Docs, this study hopes to provide greater understanding of how schools can harness pre-existing characteristics of the educational landscape to help expedite the successful diffusion of other, similar technologies and technology-based practices.

Understanding of the personal characteristics that influenced the diffusion of Google Docs could provide the beginnings of a template for educational technology diffusion that will help schools more readily align with the growing federal and local pressures to include more technology within education. This, in turn, should help schools better prepare students to be productive members of the global society in which they are coming of age. The findings of this study are discussed below.

Significance

Although the models arrived at were found to not take into account a significant number of relevant factors, the logistic regression run on the personal-level variables determined that there was a significant association between the number of types of technology used professionally and the decision to use Google Docs professionally. This regression also showed a significant association between the number of grade levels taught and the decision to use Google Docs professionally. These results make logical sense. If users are already using a variety of technologies, then they will probably find it easier to adopt a new, but similar, technology into their practice. And increasing the professional requirements of teachers might encourage greater
adoption of Google Docs as an efficiency measure on the parts of teachers; Google Docs would allow teachers with a variety of grade levels to easily create, access, and store materials, and would allow easy sharing of those files amongst colleagues - the latter of which is a likely candidate for why teaching more grades might lead to greater Google Docs adoption.

Review of the research questions of this study in light of the findings previously outlined provides the following answers:

- How does the level of innovativeness of teacher-users affect the frequency and complexity of professional use of Google Docs? Stepwise regression upheld the prediction that more innovative users (innovators, early adopters, early majority) have a positive correlation with Google Docs use. This prediction, based on both research and experience, makes logical sense, and the findings dovetail with Rogers’ (2003) framework of innovator types - Google Docs is a relatively new technology in the educational field, and is still in the process of diffusing through schools, so it is logical that those who are using it are the teachers who tend to try new things. This finding also seems to support the supposition that innovator types could be considered across the two broad categories “earlier adopters” - the first 50% of users to adopt an innovation - and “later adopters” - the latter 50% of users to adopt an innovation - as opposed to the five levels identified by Rogers (2003), as there was a significant association between the first three types of Rogers’ adopter categories and GDUS, but no association between GDUS and the last two innovator types.

- How does the innovation decision method of users affect the frequency and complexity of professional use of Google Docs? Stepwise regression found that there was a negative correlation between optional decision method and GDUS. In this regression, authority decision was coded as the reference group; findings concerning optional and collective decisions are in
reference to authority decisions. This suggests that, within the confines of this study, and in conjunction with the variables under consideration, authority decisions are more likely to result in increased GDUS. This aligns with the findings of previous researchers, who found that centralized authority decisions were important for institutional change (Fullan & Stiegelbauer, 1991; Hargreaves & Fullan, 2009) and tended to be the most effective in terms of adoption of an innovation (Hall, Hord, and Dosset, 1973; Rogers, 2003). However, it is important to note that while this negative relationship between GDUS and optional decision method is the opposite of what was predicted, it is difficult to extrapolate the precise relationship between the optional decision method and GDUS. Authority decisions were found by both this study and Wisnicki (2014) not to rise to the level of significance in relation to GDUS. Even if an authority decision was made that required educators to use Google Docs, increasing their frequency of use, it is difficult to force users to pursue more than a functional-level use of a technology, meaning the complexity of use is unlikely to climb very high. The negative correlation between optional decision method and GDUS might reflect the fact that teachers have not yet accepted the importance of including technology as part of professional practice, and are therefore simply choosing not to use technology at all within their classrooms; or it might reflect that teachers have an overwhelming number of technology choices available; or it could possibly reflect that many teachers are not able to discern which technologies are most relevant or appropriate to their professional practices. Further research into the interplay between optional decision method and independent variables like the number of types of technology used professionally could reveal a positive correlation with the dependent variable GDUS, which could suggest that teachers who are more conscious of the technology options available and who can choose which technology they will implement within their classrooms might be more likely to implement Google Docs.
How do teacher-users’ personal (non-professional technology use) and individual-occupational factors (number of years of experience; subject area; grade level; professional technology use; and technological, pedagogical, and content knowledge) affect the frequency and complexity of professional use of Google Docs? Stepwise regression upheld the direct relationship between GDUS and the personal-level factors “Years of teaching experience”, “TPACK score”, and “Number of types of technology used professionally”, and revealed a negative relationship between GDUS and the subject areas “Mathematics” and “Visual/Performing Arts”.

As predicted based on a review of the literature and personal experience, a teacher’s amount of experience is an important factor when considering whether an innovation will be adopted. It is possible that teachers with fewer years of experience may not have enough professional mental attention to juggle mastery of classroom management, mastery of content, administrative tasks, and the myriad of other variables that compete for teachers’ mental resources on a daily basis. Conversely, teachers with more years of experience may be able to relegate many of the competing attention-sinks to a more automatic response level within their practice, leaving them with “spare” mental attention to consider how to implement a new innovation, such as the adoption of Google Docs for professional purposes. The data in Table 6, which shows average years of experience for survey respondents by their user category (“Google Docs users,” “Chose not to use Google Docs,” “Haven’t heard of Google Docs”), coupled with the fact that years of experience rose to the level of significance in this model, suggests the possibility of a curvilinear relationship between years of teaching experience and GDUS; this might be an area for future study. Also, as was noted earlier, within the responses to the survey question regarding years of experience, the largest response group was “More than 30 years,.”
which was coded as 31 years; it’s possible a more distinct curvilinear relationship could be observed if the “years of experience” question had a greater range of choices at the top end.

This study’s prediction about the positive correlation between TPACK scores and GDUS were also confirmed. Teachers who are more conscious of how technology can intertwine with their content and pedagogy would logically be drawn to technologies that allow increased sharing of and collaboration on materials and resources, both with colleagues and with students.

While this researcher predicted a positive correlation between personal technology use and GDUS, the correlation between the number of types of technology used professionally and GDUS could be seen as an outgrowth of this concept. While it is surprising that there does not seem to be a statistically significant carry-over of personal technology use into professional practice, it comes as no surprise that those teachers who use many different types of technology are aware of Google Docs and are likely to adopt it into their practice, as Google Docs essentially rolls the functions of many different types of technology into a single system.

By the same token, while it is not one of the predictions posited earlier in this study, it is not surprising to find a negative correlation between mathematics and GDUS, or arts and GDUS, as Google Docs does not readily lend itself to use within these subject areas. Although the original prediction was that there might be a positive correlation between some subjects and Google Docs use, it may not be surprising to find that this is not the case – one might argue that Google Docs is equally useful in most subjects, with two obvious exceptions.

Examination of the combined personal and environmental factors revealed that personal-level factors have a stronger relationship to GDUS than do environmental factors. While collective decision method might have been significant among environmental factors, it was not surprising that it did not survive the combined data regressions, as it had already been found to
not meet the level of significance in the personal-level factors regressions. However, it was somewhat surprising to find that the “Environmental Barrier: Time” variable dropped out. Time is frequently identified in other studies as a barrier to the implementation of innovations (Bauer & Kenton, 2005; Clausen, 2007; Cuban, 2001; Goos & Bennison, 2008; Honan, 2010; Litrell et al., 2005; Wallace, 2004), and is an extremely valuable commodity among teachers, given the constraints of the school day schedule. However, other research has found that teacher-level factors are extremely important in the adoption of technology in school (Hu, Clark, & Ma, 2003; Zhao & Cziko, 2001); in fact, Veen (1993) found that “teacher factors far outweighed the institutional or school factors” (Mumtaz, 2006, p. 337) in the adoption of information and communication technology within schools. This study adds support to those findings.

**Implications**

The variables determined to be significantly associated with increased GDUS seem to be united by the concept of individual capacity – a complex of knowledge and beliefs that administrators might be able to harness to increase GDUS, and, theoretically, the implementation of other, similar technology innovations. Future studies might want to focus on determining if there are other areas that should be considered in this constellation of individual teacher capacity, and what specific effects individual capacity factors have on the implementation of technological innovations within schools.

As discussed earlier, technology is becoming an increasingly important part of daily life, and therefore should be seen as an increasingly important part of the educational landscape. Teachers need to move past the idea that using a projector or a SMART board counts as “using technology in the classroom.” Administrators can help make that happen if they take advantage of their teachers’ personal-level characteristics.
The theory that there are four main types of professional Google Docs use (Non-use, Personal Productivity, Basic Interactions, and Advanced Interactions), based on the literature and preliminary discussions and interviews, suggests that there is more to consider than “use” or “non-use” when examining the implementation of technology within a classroom; it also suggests that the 8-part LoU construct posited by Hall, Wallace, and Dosset (1973) might be simplified when examining new technologies’ implementations and be based not only on the type of the use by the teacher, but also on the functional equivalents of the technology, i.e., looking at different technologies that can perform similar tasks. Complexity and frequency of use of technologies within the classroom have implications for student outcomes as more high-stakes testing becomes electronically-based; thus, administrators should consider the cost-benefit analysis of technology implementation in more depth than whether or not the technology is used or not used, as some levels and amounts of use may justify expenditures needed for both hardware, software, and training, while more basic and/or infrequent uses may not. Future research might focus on the role of LoU in the diffusion and adoption of technology.

The findings of this study imply that administrators might increase the frequency and the complexity of professional use of Google Docs within their schools if they can convince a specific set of teacher-users that the technology is useful to their professional practice. Characteristics of the target population would include experienced teachers of more than one grade level who tend to be “earlier adopters” – those who are forward thinkers (innovators) or those who tend to jump on the band wagon early (early adopters, early majority). Also, those teachers who tend to get dragged along by the peer pressure or are forced to use Google Docs are less likely to have a higher GDUS than those who feel they are part of the early vanguard, so administrators might consider focusing more professional development on teachers who tend to
fall into these categories; this also suggests that administrators should be wary about “forcing” innovations on their faculty members.

While this study did not specifically focus on the correlation between environmental factors and the frequency and complexity of teachers’ professional use of Google Docs, the environmental barrier “Time” and the decision type “Collective” were both identified by Wisnicki (2014) as significant. While these two factors dropped out of stepwise regression when combined with the significant personal-level factors identified by this study, administrators should still be aware that these are relevant elements worth consideration. Time, in particular, is an element within the control of administrators, in that they can provide release time to teachers for professional development or practice with Google Docs (or other technologies).

There was some evidence to support the idea that administrators might also consider the impact of the number of technologies being used by faculty and the number of grade levels taught when attempting to influence teachers’ decision to use or not use Google Docs. Although these were essentially very basic and preliminary findings, they suggest that users who are familiar with and who use more types of technology as part of their professional practice are more likely to utilize Google Docs. This might suggest that if administrators want to encourage the use of a particular technology, they should help raise potential-users’ awareness of the technology; administrators might also want to provide access to and encourage the use of many types of technology. Also, administrators wishing to encourage increased Google Docs use might also change teachers’ assignments to include a greater number of grade levels being taught.

It is interesting to note that both the analysis of use versus non-use and the analysis of which factors are correlated with Google Docs use both found the number of types of technology being used professionally to be statistically significant. This might imply that getting teachers to
use *many* types of technology professionally might create a self-perpetuating cycle; perhaps teacher who use and are aware of many educational technologies are teachers who will regularly update their classroom practice with newer and better tools. This is an area that might be explored by future researchers.

Based on the descriptive data gathered in this survey, one might theorize that there is a curvilinear relationship between years of experience and classroom use of technology. Newer teachers might tend to focus more on correctly delivering content and dealing with student management, leaving fewer mental resources for the consideration of new applications of technology. On the other end of the spectrum, teachers approaching retirement may not want to spend time or effort on practices that may not work out; also, they may not see the value in spending time and effort to acquire skills that will get minimal use, as the teacher is nearing the completion of her educational practice. This might be an area for future research to consider.

As previously noted, question #7 of the survey provided respondents the chance to write in other types of technology they are using for professional purposes. While this resulted in a very long list of alternative technologies, several technologies were frequently mentioned: Dropbox (45 entries), Edmodo (40 entries), Office (38 entries), Word (36 entries), Skype (15 entries), Prezi (15 entries), PowerPoint (14 entries), Excel (12 entries). Interestingly, every one of these frequently-mentioned alternative technologies have functions that are essentially mimicked by Google Docs; and Dropbox, Edmodo, Skype, and Prezi are cloud-based programs, like Google Docs. This suggests an emerging area of educational technology that future researchers might examine.

As Google and their competitors continue to add features to their free software offerings, it is likely that future researchers studying the implementation and effects of technologies such as
Google Docs will have a larger response pool to draw on as more schools adopt it or similar services to enhance both professional file creation and transfer as well as sharing and collaboration among and between stakeholder groups such as administrators, teachers, and students.

While there are many educational technologies extant, administrators should consider the utility of Google Docs when deciding whether to pursue its implementation. As previously noted, there seems to be a utility to this software suite that is cross-disciplinary, though it should be noted that there may be more subject-appropriate technologies for certain areas, such as mathematics and arts. Administrators should also consider the importance of providing educators with many types of technology so that teachers can find and utilize those that are most appropriate to their classroom circumstances. It might also behoove administrators to consider using more experienced teachers as both testers of and evangelists for new technologies; more experienced teachers might be able to provide demonstrations of how key technologies can be utilized in the classroom and serve as models of how to incorporate technology within the sometimes-chaotic, often-attention-consuming daily routine for less-experienced teachers.

**Limitations**

One limitation of this study was the set-up of the survey; the digital copy of the survey did not have all questions set to require a response before allowing respondents to move on to the next question. This resulted in some questions being left blank, making the responses less useful than they would be if completed.

Also, the use of both electronic and paper survey in three schools proved somewhat problematic. If paper copies of the survey are provided as a supplement to a digital version of the
survey, future researchers need to consider how to discourage respondents from completing both versions of the survey to avoid multiple responses from the same respondents.

Analysis of the “Subject Area” variable proved to be problematic for several reasons. First, it was possible for there to be overlap in responses, as respondents could choose more than one subject area. Second, it was unclear whether the subject “Special Education” was a separate subject area, or whether it referred to an in-class support role or a replacement class that might overlap with another subject area. Additionally, the “Other” category captured few teaching roles and many support and administration roles.

Another limitation of this study was the population; surveys were only collected from approximately one third of the total teacher population of Monmouth County, New Jersey. Reproduction of this study in another geographic location, or with a larger proportion of Monmouth County’s teaching population, might further refine these results and help establish how generalizable the results are to a larger population.

The GDUS measure utilized in this study used weighted averages. However, based on the factor loading matrix, all items show similar strength of association with the first component, so an alternative calculation would be a simple sum. There are also additional possibilities for the consideration of Google Docs use, such as using psychometric models. Future research might consider alternative measures of Google Docs use to determine if there are other methods more suited to the measure of frequency and complexity of use of Google Docs.

Most importantly, this study focused only on the use of Google Docs, which was meant to be a stand-in for other educationally-useful technologies. It would be incredibly valuable for future researchers to determine whether the variables that are correlated with the frequency and complexity of professional use of Google Docs are also correlated with the frequency and
complexity of use of other educationally-useful technologies. Any overlap would suggest that the characteristics in question might be more widely generalizable to multiple educational technologies, which would provide an excellent focus for administrators hoping to encourage the diffusion and adoption of technology within their schools. It would also be beneficial to know if the use of other technologies can be sub-divided into categories along a continuum that reflects both frequency and complexity of use, as was done with the use of Google Docs was in this study. This could inform cost-benefit analyses when administrators are considering investment in various technologies.
References


Finn, J. D. (1960). Technology and the instructional process. *Phi Delta Kappan, June*


Meeting of the Society for Information Technology & Teacher Education, Atlanta, GA, Atlanta, GA.


Appendix A: Permission to Conduct Research form

Permission to Conduct Research

I (name)__________________________________________ Superintendent of Schools for the (school district)________________________________ School District grant permission for Stephanie Kraft Wisniki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisniki and Tetreault.

Signature of Superintendent _________________________  Today’s Date ________________

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant relationships between the patterns of use and any personal or environmental factors.

Figure 1. Conceptual framework for study variables

This study will examine the specific research questions listed below:

1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?
2) How does the innovation (Google Docs) diffuse through schools/districts in Monmouth County, New Jersey?
3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Appendix B: Signed Permission Forms from Monmouth County Superintendents

Permission to Conduct Research

Email to swisnicki@gmail.com OR fax to: 212-504-7905

I, [name], Superintendent of Schools for the [school district], hereby grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district. The survey will be administered electronically and will take approximately 15 minutes to complete. The survey is anonymous and the data collected will be used for research purposes only. I understand that the responses of teachers will be kept confidential. I will provide feedback to the researchers that will share findings from the survey but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses.

Signature of Superintendent

Today’s Date

Research Proposal Overview

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

Email to swisnicky@gmail.com OR fax to: 212-504-7905

I (name) Christopher Albright, Superintendent of Schools for the (school district) Monmouth School District grant permission for Stephanie Kraft Wisnicky and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers' responses from Wisnicky and Tetreault.

Christopher Albright 3 June 13

Signature of Superintendent  Today's Date

Research Proposal Overview

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Joseph C. Majka, J.D. Superintendent of Schools for the (school district) Bradley Beach School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

Today’s Date

Research Proposal Overview

The purpose of this study is to uncover the patterns of use of one specific technology (Google Docs). This study will examine how Google Docs, an innovation, has diffused through schools/districts and identify the important environmental and personal factors that have influenced that diffusion.

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Fredrik Oberkehr, Ed.D. Superintendent of Schools for the [school district] Colts Neck Township School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

Today’s Date

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Cheri Croll, Superintendent of Schools for the (school district), Granting permission for Stephanie Kraft Wisniki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisniki and Tetreault.

Signature of Superintendent: ____________________________
Today’s Date: ____________________________

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I, (name) Elizabeth O'Connell, Superintendent of Schools for the (school district) Freehold Borough School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an online and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent Elizabeth O'Connell  Today's Date Feb. 22, 2013

Research Proposal Overview

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Bernard F. Brage Jr. Superintendent of Schools for the (school district) Hazlet Twp. School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

[Signature] Bernad F. Brage Jr. 2/22/2013

Today’s Date

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I, William Chillo, principal of Highlands Elementary School, grant permission for Stephanie Kraft Wisniki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University, to distribute an online and/or paper survey to all elementary and special education teachers in my school, questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisniki and Tetreault.

Signature of Principal

Today’s Date: April 16, 2013

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

Figure 1. Conceptual framework for study variables

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<td>(traditional, interactive)</td>
<td>(funds, class size, computer access)</td>
<td>(morale, experience, previous use)</td>
</tr>
</tbody>
</table>

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4. What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Barbara Duncan, Superintendent of Schools for the (school district) Holmdel School District, grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers' responses from Wisnicki and Tetreault.

Signature of Superintendent: Barbara Duncan
Today's Date: 2/23/13

Research Proposal Overview

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Erid Golden, Superintendent of Schools for the (school district) Howell Township School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent 2/28/13

Research Proposal Overview

The purpose of this study is to uncover the patterns of use of one specific technology (Google Docs). This study will examine how Google Docs, an innovation, has diffused through schools/districts and identify the important environmental and personal factors that have influenced that diffusion.

Figure 1. Conceptual framework for study variables

This study will examine the specific research questions listed below:

1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?
2) How does the innovation (Google Docs) diffuse through schools/districts in Monmouth County, New Jersey?
3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Gerald North Superintendent of Schools for the (school district) Legislature School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

Today’s Date

Research Proposal Overview

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1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?
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3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Carolyn M. Kossack, Superintendent of Schools for the (school district) Little Silver School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent  Carolyn M. Kossack  Today’s Date 4/3/13

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) \textbf{John J. Marcouse Jr. Ph.D.} Superintendent of Schools for the (school district) \textbf{Monmouth-Essex Regional School District} grant permission for Stephanie Kraft Wisnici and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers' responses from Wisnici and Tetreault.

\begin{flushright}
Signature of Superintendent \hspace{1cm} Today's Date
\end{flushright}

\textbf{Research Proposal Overview}

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) DR. DAVID ABBOTT Superintendent of Schools for the (school district) MARLBORO School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

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3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

Email form to: swisnickl@gmail.com or fax to 212-504-7905

I (name), William O. Geore III, Ed. D., Superintendent of Schools for the (school district) Middletown, Public School District, School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent  

Today’s Date

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

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3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I, Scott Feder, Superintendent of Schools for the Millstone Township School District, grant permission for Stephanie Kraft, Wisnicky, and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University, to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers' responses from Wisnicky and Tetreault.

Signature of Superintendent

Today's Date

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

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This study will examine the specific research questions listed below:

1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?

2) How does the innovation (Google Docs) diffuse through schools/districts in Monmouth County, New Jersey?
3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?

4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) David A. Mooij, Superintendent of Schools for the Neptune Township School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in the district ascertaining how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

Today’s Date

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

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3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) John Lysko, Superintendent of Schools for the (school district) Ocean Twp. School District, under the direction of Dr. William Firestone, Rutgers University to distribute an online and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisniki and Tetreault.

[Signature]

April 17, 2013

Today’s Date

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

Figure 1. Conceptual framework for study variables

This study will examine the specific research questions listed below:

1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?
2) How does the innovation (Google Docs) diffuse through schools/districts in Monmouth County, New Jersey?
3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) Andrew J. Orefice Superintendent of Schools for the (school district) Oceanport School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

[Signature]

Today’s Date

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

Figure 1. Conceptual framework for study variables

This study will examine the specific research questions listed below:

1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?
Permission to Conduct Research

(name) Dr. David A. MacCormick Superintendent of Schools for the
(school district) Monmouth County School District

School District grant permission for
Stephanie Kraft Wisniski and Steve Tetreauit, under the direction of Dr. William Firestone,
Rutgers University to distribute an on-line and/or paper survey to all Middle School and High
School teachers in my district questioning how they use Google Docs for instruction.

Signature of Superintendent

Today's Date

Research Proposal Overview

The purpose of this study is to uncover the patterns of use of one specific technology
(Google Docs). This study will examine how Google Docs, an innovation, has diffused through
schools/districts and identify the important environmental and personal factors that have
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Figure 1. Conceptual framework for study variables

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3) What are the environmental factors that influence the diffusion of Google Docs in
   middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of
   Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) John F. Beaman Superintendent of Schools for the (school district), Spring Lake, School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

Today’s Date

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name) John Russo, Superintendent of Schools for the (school district) Tri-County School District grant permission for Stephanie Kraft Wisnicky and Steve Tetraault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction.

Signature of Superintendent: ____________________________

Today's Date: ____________________________

Research Proposal Overview

The purpose of this study is to uncover the patterns of use of one specific technology (Google Docs). This study will examine how Google Docs, an innovation, has diffused through schools/districts and identify the important environmental and personal factors that have influenced that diffusion.

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2) How does the innovation (Google Docs) diffuse through schools/districts in Monmouth County, New Jersey?
3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

Email to swisnicky@gmail.com OR fax to: 212-504-7905

I, Joseph J. Annibale, Superintendent of Schools for the Union Beach School District, hereby give my consent to Stephanie Kraft Wisnicky and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University, to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicky and Tetreault.

June 13, 2013

Signature of Superintendent

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

Email to gwisnicki@gmail.com OR fax to: 212-504-7905

I (name), Richard Fitzpatrick, Superintendent of Schools for the (school district) Upper Freehold Regional School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers' responses from Wisnicki and Tetreault.

Signature of Superintendent

Today's Date: June 12, 2013

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

Thomas Farrell

I (name) Thomas Farrell, Interim Superintendent of Schools for the (school district) West Long Branch School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers' responses from Wisnicki and Tetreault.

Signature of Superintendent [Signature]

Today's Date 4/22/13

Research Proposal Overview

This study will examine how an innovation (Google Docs) has diffused through schools/districts, and identify the important environmental and personal factors that have influenced that diffusion. The study will also attempt to uncover the patterns of use of Google Docs and attempt to determine if there are significant correlations between the patterns of use and any personal or environmental factors.

Figure 1: Conceptual framework for study variables

This study will examine the specific research questions listed below:

1) What are the patterns of use of Google Docs of the teachers in middle schools in Monmouth County, New Jersey?
2) How does the Innovation [Google Docs] diffuse through schools/districts in Monmouth County, New Jersey?
3) What are the environmental factors that influence the diffusion of Google Docs in middle schools in Monmouth County?
4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Permission to Conduct Research

I (name), Alexis C. Harris, Superintendent of Schools for the (school district) Hope Academy Charter School, School District grant permission for Stephanie Kraft Wisnicki and Steve Tetreault, under the direction of Dr. William Firestone, Rutgers University to distribute an on-line and/or paper survey to all Middle School and High School teachers in my district questioning how they use Google Docs for instruction. I understand that the responses of teachers will be kept confidential. I will receive a report from the researchers that will share findings from the study but that will only provide aggregate data. At no time will I receive information on individual teachers’ responses from Wisnicki and Tetreault.

Signature of Superintendent

Research Proposal Overview

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4) What are the personal characteristics of teachers that are associated with the use of Google Docs in middle schools in Monmouth County?
Appendix C: Mail to Monmouth County middle school principals

Steve Tetreault  
Principal, William R. Satz School  
24 Crawfords Corner Road  
Holmdel, NJ 07733

April 25, 2013

Dear Principal Tetreault,

**Win $100 for your school!**

We are doctoral students at Rutgers University studying the environmental and personal factors associated with the use of Google Docs. We hope you will encourage your teachers to participate in our VERY SHORT (10 minute) on-line survey about the use of Google Docs in Monmouth County Middle Schools. Our hope is to identify diffusion patterns to help administrators successfully diffuse new technologies through their schools.

We will be reaching out to you via email next week with a link to the survey. At that time it would be greatly appreciated if you could forward the link to all of your 6th, 7th, and/or 8th grade teachers and ask them to complete the survey. This includes teachers in all academic subject areas as well as in special subjects (are, music, gym, etc.). Again, the survey is VERY short and will take 5-10 minutes to complete. We are going to donate $100 to the first 30% of schools with a 75% or higher response rate.

We know you are very busy and so we really appreciate your kind assistance! Please enjoy a Dunkin Donuts treat on us.

Sincerely,

Stephanie Wisnicki < swisnicki@gmail.com > & Steve Tetreault < Stetreault600@gmail.com >
Appendix D: IRB Approval

Attachment 7

Sample of Survey Instrument

Diffusion of Google Docs in Monmouth County Middle Schools

This survey is part of a study by Rutgers doctoral students of the diffusion of Google Docs in Monmouth County, New Jersey schools. Your responses to this survey will help us to learn about the factors involved in the successful diffusion of technologies within schools, and may provide guidance to school administrators’ future plans regarding the implementation of new technologies.

With minor exceptions, this survey contains only quick-answer, multiple-choice responses. We estimate that you should be able to complete the survey in approximately 10 minutes. Your responses to this survey will be kept strictly confidential and will only be reported at the aggregate. The results will never be reported in any way that would permit any response to be associated with a specific individual.

After completing the survey, you will be assigned an identification number that will correspond to your responses so that your identity is not linked to your responses. Information gathered from the survey will be kept confidential and will be used only for the purpose of this project by the study authors. Because the information you provide in this study is strictly confidential, there will be essentially no risk from your participation. All study data will be kept for 7 years after the completion of the study and then will be destroyed.

The information you provide in this study will enhance our ability to understand the diffusion of technology through schools. Information learned will be shared with participating districts. This survey will be distributed to approximately 800 participants. All participants, regardless of gender, age, or ethnicity, are encouraged to respond. Your participation in this study is completely voluntary, and you may stop taking the survey at any point.

If you have any questions concerning this project, please feel free to contact the Principal Investigator, Dr. William Firestone, or the Rutgers University’s Institutional Review Board using the following contact information:

Dr. William Firestone, Principal Investigator
Rutgers University Graduate School of Education
10 Seminary Place, New Brunswick, NJ
Tel: 732-932-7496 x 8231
Email: william.firestone@gsse.rutgers.edu

Rutgers University Institutional Review Board for the Protection of Human Subjects
Office of Research & Sponsored Programs
3 Rutgers Plaza, New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

Approved

APR 4 2013
Approved by the
Rutgers IRB
Diffusion of Google Docs in Monmouth County Middle Schools

This survey is part of a study by Rutgers doctoral students of the diffusion of Google Docs in Monmouth County, New Jersey schools. Your responses to this survey will help us to learn about the factors involved in the successful diffusion of technologies within schools, and may provide guidance to school administrators’ future plans regarding the implementation of new technologies.

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Dr. William Firestone, Principal Investigator
Rutgers University Graduate School of Education
10 Seminary Place, New Brunswick, NJ
Tel: 732-932-7496 x 8231
Email: william.firestone@psue.rutgers.edu

Rutgers University Institutional Review Board for the Protection of Human Subjects
Office of Research & Sponsored Programs
3 Rutgers Plaza, New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

Thank you for your time and patience in completing this survey. Please read each question and the possible responses carefully, and then fill in the requested information or mark the appropriate check boxes.

APPROVED

APR 2 4 2013

Approved by the Rutgers IRB
MEMORANDUM

TO: Principal Investigator

FROM: IRB Administrators: Michelle Gibel; Margie Cooper

SUBJECT: IRB Policy Regarding the Use of Stamped Consent Forms

The Institutional Review Board for the Protection of Human Subjects (IRB) implemented a policy in April 2000 whereby investigators are required to have subjects sign consent forms which indicate the approval and expiration dates on the form. This procedure is recommended by the Office for Human Research Protections, the federal agency that oversees human subject protections compliance, and is mandated by the Rutgers University IRB.

Attached is the Notice of Approval for your research protocol, (Protocol and Title are referenced on the notice) and a copy of the current IRB-approved version of the informed consent document that must be used. The original should be retained for your files.

You are required to use only the current, IRB-approved consent form when obtaining informed consent. However, the IRB allows you to choose one of two methods to provide a “dated” copy of the consent form to subjects:

1) You may either copy the original of the stamped consent form, and use the copies, or

2) You may type the approval and expiration dates on the bottom of each page of an un-stamped version of the approved consent forms and use copies of those documents. If you choose to type the dates on an un-stamped copy, the following statement should be used: “This informed consent form was approved by the Rutgers University Institutional Review Board for the Protection of Human Subjects on (Date); approval of this form expires on (Expiration Date).”

If you have any questions regarding this policy, you may contact an IRB Administrator: 848-932-0150 (main line) or contact either: Michelle Gibel at 848-932-4058 or gibel@grants.rutgers.edu; Margie Cooper at 848-932-4018 or margaret.cooper@rutgers.edu.

Thank you for your continuing cooperation.
April 25, 2013

William A. Firestone  
Graduate School of Education  
10 Seminary Place  
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Exemption Date: 4/24/2013  Exempt Category: 1

This exemption is based on the following assumptions:

- **This Approval** - The research will be conducted according to the most recent version of the protocol that was submitted.
- **Reporting** – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications** — Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)** – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: None

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

[Signature]

Acting For—
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board
RUTGERS UNIVERSITY
Office of Research and Sponsored Programs
ASB III, 3 Rutgers Plaza, Cook Campus
New Brunswick, NJ 08901

May 7, 2013

William A. Firestone
Graduate School of Education
10 Seminary Place
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 5/07/2013 Exempt Category: 1

This exemption is based on the following assumptions:

- This Approval - The research will be conducted according to the most recent version of the protocol that was submitted.

- Reporting – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;

- Modifications – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;

- Consent Form(s) – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 5/07/2013 for Addition of Sites: Oceanport, West Long Branch

Failure to comply with these conditions will result in withdrawal of this approval.

The Federal wide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

[Signature]

Acting For—
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board
May 9, 2013

William A. Firestone
Graduate School of Education
10 Seminary Place
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 5/09/2013 Exempt Category: 1

This exemption is based on the following assumptions:

- **This Approval** - The research will be conducted according to the most recent version of the protocol that was submitted.
- **Reporting** – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications** – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)** – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 05/09/2013 for Addition of Stephanie Wisnicki as Study Coordinator

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

Acting For--
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board

cc: Stephanie Kraft Wisnicki
Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 5/24/2013  Exempt Category: 1

This exemption is based on the following assumptions:

- This Approval - The research will be conducted according to the most recent version of the protocol that was submitted.
- Reporting – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- Modifications – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- Consent Form(s) – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 5/24/2013 for Addition of Site: Middletown Township Public Schools

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

Michele Aidel

Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board

cc: Stephanie Kraft Wisnicki
RUTGERS UNIVERSITY
Office of Research and Sponsored Programs
ASB III, 3 Rutgers Plaza, Cook Campus
New Brunswick, NJ 08901

June 7, 2013

William A. Firestone
Graduate School of Education
10 Seminary Place
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: "Diffusion of Google Docs in Middle Schools"

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 6/4/2013 Exempt Category: 1

This exemption is based on the following assumptions:

• This Approval - The research will be conducted according to the most recent version of the protocol that was submitted.

• Reporting – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;

• Modifications – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;

• Consent Form(s) – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 6/4/2013 for Addition of Research Site: Avon School District;

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

[Signature]

Acting For--
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board

cc: Stephanie Kraft Wisnicki
June 10, 2013

William A. Firestone
Graduate School of Education
10 Seminary Place
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 6/6/2013 Exempt Category: 1

This exemption is based on the following assumptions:

- **This Approval** - The research will be conducted according to the most recent version of the protocol that was submitted.
- **Reporting** – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications** – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)** – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 6/6/2013 for Addition of Research Site: Millstone Township School District;

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

[Signature]

Acting For:
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board

cc: Stephanie Kraft Wisnicki
June 19, 2013

William A. Firestone
Graduate School of Education
10 Seminary Place
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 6/19/2013 Exempt Category: 1

This exemption is based on the following assumptions:

- This Approval - The research will be conducted according to the most recent version of the protocol that was submitted.
- Reporting – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- Modifications – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- Consent Form(s) – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 6/19/2013 for Addition of Research Site: Asbury Park School District;

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

[Signature]

 Acting For—
 Dr. Beverly Tepper, Ph.D.
 Professor
 Chair, Rutgers University Institutional Review Board

cc: Stephanie Kraft Wisnicki
June 19, 2013

William A. Firestone
Graduate School of Education
10 Seminary Place
College Avenue Campus

Dear William Firestone:

Notice of Exemption from IRB Review

Protocol Title: “Diffusion of Google Docs in Middle Schools”

The project identified above has been approved for exemption under one of the six categories noted in 45 CFR 46, and as noted below:

Amendment to Exemption Date: 6/17/2013

Exempt Category: 1

This exemption is based on the following assumptions:

▪ This Approval - The research will be conducted according to the most recent version of the protocol that was submitted.

▪ Reporting – ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;

▪ Modifications – Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;

▪ Consent Form(s) – Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;

Additional Notes: Administrative Amendment to Exemption Granted on 6/17/2013 for Addition of Research Site: Union Beach School District;

Failure to comply with these conditions will result in withdrawal of this approval.

The Federalwide Assurance (FWA) number for Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Sincerely yours,

[Signature]

Acting For—
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board

cc: Stephanie Kraft Wisnicki
Appendix E: Email to Monmouth County middle school principals

Dear Principal Tetreault,

It’s Stephanie & Steve again (doctoral students at Rutgers – Google Docs study) – we hope you enjoyed a tasty Dunkin’ Donuts treat! Now it’s time to **WIN $100 for your school!** Please forward the attached link to **ALL** your 6th, 7th or 8th grade teachers (including special education and special subjects) and encourage them to complete the survey today.

If you have any questions or problems, please email us or call us at:

Stephanie Wisnicki       swisnicki@gmail.com       732-567-2617
Steve Tetreault         STetreault600@gmail.com    908-692-8550

Remember, the first 30% of schools with a 75% or higher response rate for the survey will have $100 donate to them, so encourage those responses!

Have a great day!

Sincerely,

Stephanie & Steve

**Survey Link:** <https://rutgers.qualtrics.com/SE/?SID=SV_0Bs2cah3xADPjff>
Appendix F: Survey instrument sample

Diffusion of Google Docs in Monmouth County Middle Schools

This survey is part of a study by Rutgers doctoral students of the diffusion of Google Docs in Monmouth County, New Jersey schools. Your responses to this survey will help us to learn about the factors involved in the successful diffusion of technologies within schools, and may provide guidance to school administrators' future plans regarding the implementation of new technologies.

With minor exceptions, this survey contains only quick-answer, multiple-choice responses. We estimate that you should be able to complete the survey in approximately 10 minutes. Your responses to this survey will be kept strictly confidential and will only be reported at the aggregate. The results will never be reported in any way that would permit any response to be associated with a specific individual.

After completing the survey, you will be assigned an identification number that will correspond to your responses so that your identity is not linked to your responses. Information gathered from the survey will be kept confidential and will be used only for the purpose of this project by the study authors. Because the information you provide in this study is strictly confidential, there will be essentially no risk from your participation. All study data will be kept for 7 years after the completion of the study and then will be destroyed.

The information you provide in this study will enhance our ability to understand the diffusion of technology through schools. Information learned will be shared with participating districts. This survey will be distributed to approximately 800 participants. All participants, regardless of gender, age, or ethnicity, are encouraged to respond. Your participation in this study is completely voluntary, and you may stop taking the survey at any point.

If you have any questions concerning this project, please feel free to contact the Principal Investigator, Dr. William Firestone, or the Rutgers University's Institutional Review Board using the following contact information:

Dr. William Firestone, Principal Investigator
Rutgers University Graduate School of Education
10 Seminary Place, New Brunswick, NJ
Tel: 732-932-7496 x 8231
Email: william.firestone@gse.rutgers.edu

Rutgers University Institutional Review Board for the Protection of Human Subjects
Office of Research & Sponsored Programs
3 Rutgers Plaza, New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

Thank you for your time and patience in completing this survey. Please read each question and the possible responses carefully, and then fill in the requested information or mark the appropriate check boxes.
NOTE: Once the survey is begun, you cannot return to previous questions, so please be thoughtful with your responses.

By selecting “Agree,” you will be agreeing to the conditions of the survey. Once you have made your choice, click on the forward arrow located toward the lower-right of the screen.

☐ Agree
☐ Disagree

If Disagree Is Selected, Then Skip To End of Survey
1. Please choose the name of your school district.

- Asbury Park
- Atlantic Highlands
- Avon Borough
- Belmar Borough
- Colts Neck Township
- Deal Borough
- Eatontown Borough
- Fair Haven Borough
- Farmingdale Borough
- Freehold Borough
- Freehold Township
- Hazlet Township
- Henry Hudson Regional
- Holmdel Township
- Howell Township
- Keansburg Borough
- Keyport Borough
- Little Silver Borough
- Long Branch Borough
- Manalapan-Englishtown Regional
- Manasquan Borough
- Marlboro Township
- Middletown Township
- Matawan-Aberdeen Regional
- Millstone Township
- Monmouth Beach
- Neptune City
- Neptune Township
- Ocean Township
- Oceanport Borough
- Red Bank Borough
- Rumson Borough
- Sea Girt Borough
- Bradley Beach
- Shrewsbury Borough
- Spring Lake Borough
- Spring Lake Heights
- Tinton Falls
- Union Beach
- Upper Freehold Regional
PERSONAL-LEVEL FACTORS AND GOOGLE DOCS USE IN MONMOUTH COUNTY MIDDLE SCHOOLS

- Wall Township
- West Long Branch
- Academy Charter
- Hope Academy Charter

2. Please type the name of your school in the box below.
3. How many years have you been teaching? Please count year one as your first full (Sept. – June) year of teaching.

☐ 0
☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ 7
☐ 8
☐ 9
☐ 10
☐ 11
☐ 12
☐ 13
☐ 14
☐ 15
☐ 16
☐ 17
☐ 18
☐ 19
☐ 20
☐ 21
☐ 22
☐ 23
☐ 24
☐ 25
☐ 26
☐ 27
☐ 28
☐ 29
☐ 30
☐ More than 30 years
4. What subject area(s) do you teach? Please choose all that apply.
- Language Arts/English
- Social Studies/History
- Science
- Mathematics
- Visual and Performing Arts
- Technology
- Special Education
- Other ____________________
- Health and Physical Education
- World Language

5. Which grade(s) do you teach? Please choose all that apply.
- 6
- 7
- 8
6. Of the following technologies, which do you use on a regular basis for PERSONAL USE (that is, not counting your use for professional or school-related reasons) and/or for PROFESSIONAL USE (as part of your professional practice with colleagues or students)?

Please select all that apply.

<table>
<thead>
<tr>
<th>Productivity software (e.g., Microsoft Office [Word, PowerPoint, Excel, etc.], Open Office, Google Docs, etc.)</th>
<th>Personal Use</th>
<th>Professional Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Text messaging via cellular/smart phone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instant or text messaging online via computer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB storage device (e.g., portable hard drive or “thumb drive”, a.k.a.: memory stick, pen drive)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloud-based storage (e.g., Dropbox, Bitcasa, iCloud, Box, SkyDrive, Google Docs/Drive, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social media (e.g., Twitter, Facebook, Google+, etc.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online video chat/conferencing (e.g., Skype, Facetime, G+ Hangouts, etc.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Please enter the name of any software, other than Google Docs, that you use for PROFESSIONAL use (as part of your professional practice with colleagues or students) that allows you to do any or all of the following:

- cloud-based storage
- document creation
- document sharing
- social media
- online video/chat
8. Please choose the answer which best matches your reaction to each statement. (Items adapted from Survey of Preservice Teachers’ Knowledge of Teaching and Technology [Schmidt, et al., 2009].)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can learn technology easily.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I frequently play around with technology.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I know about technologies that I can use for understanding and doing my subject area.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I can choose technologies that enhance the content of a lesson.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I know how to choose technologies that enhance students’ learning for a lesson.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I can adapt the uses of technologies I learn about or am familiar with to different teaching activities.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I can teach lessons that appropriately combine my subject area, technologies, and teaching approaches.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

9. How did you first hear about Google Docs (also known as Google Drive, Google Apps for Education, or Google Apps)?

- ○ I have not heard of Google Docs.
- ○ Informally (self-taught; friend or colleague gave me tips; etc.)
- ○ Formally (from a supervisor/administrator; during a professional development experience/class/training; etc.)

If I have not heard of Google ... Is Selected, Then Skip To End of Survey

10. To what degree is each of the following items a barrier to increasing your professional use of Google Docs?

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Not a barrier at all: 0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>MAJOR barrier to implementation: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Class size</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Computer access</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
11. How did you come to the decision to use Google Docs for professional use? (Note: "Google Docs" includes any or all of the following applications: Document, Spreadsheet, Presentation, Form, Drawing, Collection)
   - I don’t use Google Docs professionally.
   - I decided to do so on my own.
   - I and other colleagues/friends made the decision together.
   - A supervisor/administrator required me to use it/It was implemented by the district, and I was required to start using it.

If I don’t use Google Docs Is Selected, Then Skip To End of Survey

12. How were you trained in the use of Google Docs? Please choose the answer which best represents the main method of learning used to gain information about how to use Google Docs. (Note: "Google Docs" includes any or all of the following applications: Document, Spreadsheet, Presentation, Form, Drawing, Collection)
   - Informally (self-taught; friend or colleague gave me tips; etc.)
   - Formally (attended PD experience/class/training, etc., either in or out of district)

13. How would you characterize yourself as a Google Docs user?
   - I was the first in my school/district to use Docs.
   - I decided to start using Docs after someone showed it to me, but before most others.
   - I decided to start using Docs at about the same time that a noticeable group of others started to use it.
   - I decided to start using Docs after most others were using.
   - I was forced to start using Docs because almost everyone else was using (group pressure) or because of official policy.
14. Please check off how frequently you use Google Docs in each of the following ways. (Note: "Google Docs" includes the following applications: Document, Spreadsheet, Presentation, Form, Drawing, Collection)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Rarely (1-2 times per year)</th>
<th>Sometimes (once a month)</th>
<th>Regularly (once a week)</th>
<th>Frequently (daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have viewed a file or document created and shared by someone else via Google Docs (&quot;Forced&quot; interaction with Google Docs).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I have transferred files from one location to another via upload to/download from Google Docs for my own use (not shared with others).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I have used productivity tools in Google Docs - creating word processing documents, spreadsheets, slide show presentations - for personal use (not shared with others).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>During school hours I have introduced students to Google Docs and/or allowed students to use it for school-related work and/or collected assignments via Google Docs.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>During school hours I have shared files (notes, outlines, documents, spreadsheets, etc.) with others (students, colleagues, administrators, etc.).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>During school hours I have utilized the collaborative features of Google Docs (synchronous editing, instant messaging, etc.) or encouraged others to utilize those features (student-to-teacher, student-to-student, teacher-to-teacher, etc.) to get or give feedback or to work on group materials.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td></td>
<td>Never</td>
<td>Rarely (1-2 times per year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
<td>Frequently (daily)</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-----------------------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>I have used Google Form to gather information from students during school hours.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I have had students utilize a Google Form rubric to reflect on and self-assess work done at the end of a project.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I have required students to utilize collaborative features of Google Docs to work on projects outside of classroom hours.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I have utilized collaborative features of Google Docs with colleagues in other schools and/or districts to create resources, either during or after school hours.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I have used Google Form to create auto-grading quizzes, etc., to assess students and/or to auto-email responses to a form.</td>
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</table>
Appendix G: Annotated Survey

Use of Google Docs in Monmouth County Middle Schools

This survey is part of a study by Rutgers doctoral students of the diffusion of Google Docs in Monmouth County, New Jersey schools. Your responses to this survey will help us to learn about the factors involved in the successful diffusion of technologies within schools, and may provide guidance to school administrators' future plans regarding the implementation of new technologies.

With minor exceptions, this survey contains only quick-answer, multiple-choice responses. We estimate that you should be able to complete the survey in approximately 10 minutes. Your responses to this survey will be kept strictly confidential and will only be reported at the aggregate. The results will never be reported in any way that would permit any response to be associated with a specific individual.

After completing the survey, you will be assigned an identification number that will correspond to your responses so that your identity is not linked to your responses. Information gathered from the survey will be kept confidential and will be used only for the purpose of this project by the study authors. Because the information you provide in this study is strictly confidential, there will be essentially no risk from your participation. All study data will be kept for 7 years after the completion of the study and then will be destroyed.

The information you provide in this study will enhance our ability to understand the diffusion of technology through schools. Information learned will be shared with participating districts. This survey will be distributed to approximately 800 participants. All participants, regardless of gender, age, or ethnicity, are encouraged to respond. Your participation in this study is completely voluntary, and you may stop taking the survey at any point.

If you have any questions concerning this project, please feel free to contact the Principal Investigator, Dr. William Firestone, or the Rutgers University's Institutional Review Board using the following contact information:

Dr. William Firestone, Principal Investigator
Rutgers University Graduate School of Education
10 Seminary Place, New Brunswick, NJ
Tel: 732-932-7496 x 8231
Email: william.firestone@gse.rutgers.edu

Rutgers University Institutional Review Board for the Protection of Human Subjects
Office of Research & Sponsored Programs
3 Rutgers Plaza, New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

Thank you for your time and patience in completing this survey. Please read each question and the possible responses carefully, and then fill in the requested information or mark the appropriate check boxes.
NOTE: Once the survey is begun, you cannot return to previous questions, so please be thoughtful with your responses.

<table>
<thead>
<tr>
<th>Variables &amp; Categories</th>
<th>#</th>
<th>Survey Question</th>
<th>Question Choices</th>
<th>Response Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informed Consent</td>
<td></td>
<td>By selecting “Agree,” you will be agreeing to the conditions of the survey. Once you have made your choice, click on the forward arrow located toward the lower-right of the screen.</td>
<td>Agree, Disagree</td>
<td>Disagree = no survey</td>
</tr>
<tr>
<td>District ID</td>
<td>1</td>
<td>Please choose the name of your school district.</td>
<td>Drop-down list of Monmouth County districts with middle school grade levels</td>
<td></td>
</tr>
<tr>
<td>School ID</td>
<td>2</td>
<td>Please type the name of your school.</td>
<td>(Text box to enter school names)</td>
<td></td>
</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>3</td>
<td>How many years have you been teaching? Please count year one as your first full (Sept. – June) year of teaching.</td>
<td>Drop-down menu listing numbers from 0 to 30, and &quot;More than 30 years&quot;</td>
<td></td>
</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>4</td>
<td>What subject area do you teach? If more than one, please choose the area you feel is your main responsibility.</td>
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</tr>
<tr>
<td>Category: Subject area</td>
<td></td>
<td>Language Arts</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Social Studies/History</td>
<td></td>
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<td></td>
<td></td>
<td>Science</td>
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<td></td>
<td></td>
<td>Mathematics</td>
<td></td>
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<td></td>
<td></td>
<td>Visual and Performing Arts</td>
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<td></td>
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<td>Technology</td>
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<td></td>
<td>Special Education</td>
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<td>Health and Physical Education</td>
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<td></td>
<td></td>
<td>World Language</td>
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<tr>
<td></td>
<td></td>
<td>Other (write-in box)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>5</td>
<td>Which grade(s) do you teach? Please choose all that apply.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category: Grade Level</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>6</td>
<td>Of the following technologies, which do you use on a regular basis for PERSONAL USE (that, is not counting your use for professional or school-related reasons) and/or for PROFESSIONAL USE (as part of your professional practice with colleagues or students)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category: Type of personal technology use</td>
<td></td>
<td>(Respondents can select neither, either, or both check boxes)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>More &quot;Personal Use&quot; selections = greater personal technology use</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Productivity software (e.g. Microsoft Office [Word, PowerPoint, Excel, etc.], Open Office, Google Docs, etc.)</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
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<td></td>
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<tr>
<td>6a</td>
<td>Email</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
</tr>
<tr>
<td>6b</td>
<td>Text messaging via cellular/smart phone</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
</tr>
<tr>
<td>6c</td>
<td>Instant or text messaging online via computer</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
</tr>
<tr>
<td>6d</td>
<td>USB storage device (aka: memory stick, pen drive, thumb drive)</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
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<tr>
<td>6e</td>
<td>Cloud-based storage (e.g. Dropbox, Bitcasa, iCloud, Box, SkyDrive, Google Docs/Drive, etc.)</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
</tr>
<tr>
<td>6f</td>
<td>Social media (e.g., Facebook, Twitter, Google+, etc.)</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
</tr>
<tr>
<td>6g</td>
<td>Online video chat/conferencing (e.g. Skype, Facetime, G+ Hangouts, etc.)</td>
<td>Personal Use</td>
<td>Professional Use</td>
<td></td>
</tr>
<tr>
<td>6h</td>
<td>Please enter the name of any software, other than Google Docs, that you use for PROFESSIONAL use (as part of your professional practice with colleagues or students) that allows you to do any or all of the following: • cloud-based storage • document creation • document sharing • social media • online video/chat</td>
<td>(Text entry box)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>Category: TPACK - Technological Knowledge (TK)</td>
<td>I can learn technology easily.</td>
<td>Strongly disagree</td>
<td>Disagree</td>
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</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>Category: TPACK - Technological Knowledge (TK)</td>
<td>I frequently play around with technology.</td>
<td>Strongly disagree</td>
<td>Disagree</td>
</tr>
<tr>
<td>Variable (Independent): Personal Characteristics</td>
<td>Category: TPACK - Technological-Content Knowledge (TCK)</td>
<td>I know about technologies that I can use for understanding and doing my subject area.</td>
<td>Strongly disagree</td>
<td>Disagree</td>
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<tr>
<td>8d I can choose technologies that enhance the content of a lesson.</td>
<td>Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree</td>
<td>8e I know how to choose technologies that enhance students' learning for a lesson.</td>
<td>Strongly disagree Disagree Neither agree nor disagree Agree Strongly agree</td>
<td>8f I can adapt the uses of technologies I learn about or am familiar with to different teaching activities.</td>
</tr>
</tbody>
</table>

"Agree" or "Strongly agree" = has TCK
"Agree" or "Strongly agree" = has TPK
<p>| Variable (Independent): Personal Characteristics | Category: TPACK - Technological, Pedagogical, and Content Knowledge (TPACK) | 8g | I can teach lessons that appropriately combine my subject area, technologies, and teaching approaches. | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree | &quot;Agree&quot; or &quot;Strongly agree&quot; = has TPACK |
| Variable (Independent): Communication Channels | Category: Formal v. Informal | 9 | How did you first hear about Google Docs (also known as Google Drive, Google Apps for Education, or Google Apps)? | I have not heard of Google Docs. | Informally (self-taught; friend or colleague gave me tips; etc.) | Formally (from supervisor/administrator; during a professional development experience/class/training, etc.) | &quot;I have not heard of Google Docs&quot; = Non-use (Dependent variable - Patterns of use); respondent directed to &quot;Thank you&quot; page |
| Variable (Independent): Environmental Barriers | Category: Time | 10 | To what degree is each of the following items a barrier to increasing your professional use of Google Docs? | Higher rating of category = greater perception as barrier to implementation |
| Variable (Independent): Environmental Barriers | Category: Time | 10a | Time | Not a barrier at all: 0 | 1 | 2 | 3 | MAJOR barrier to implementation: 4 |</p>
<table>
<thead>
<tr>
<th>Variable (Independent): Environmental Barriers</th>
<th>Category: Class Size</th>
<th>Not a barrier at all: 0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>MAJOR barrier to implementation: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Size</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable (Independent): Environmental Barriers</th>
<th>Category: Computer Access</th>
<th>Not a barrier at all: 0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>MAJOR barrier to implementation: 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Access</td>
<td></td>
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</tbody>
</table>

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<thead>
<tr>
<th>Variable (Independent): Decision type/method</th>
<th>Categories: Optional, Collective, Authority</th>
<th>How did you come to the decision to use Google Docs for professional use?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision type/method</td>
<td>Categories: Optional, Collective, Authority</td>
<td>How did you come to the decision to use Google Docs for professional use?</td>
</tr>
</tbody>
</table>

(Note: "Google Docs" includes any or all of the following applications: Document, Spreadsheet, Presentation, Form, Drawing, Collection)

I don't use Google Docs professionally.  
I decided to do so on my own.  
I and other colleagues/friends made the decision together.  
A supervisor or administrator required me to use it. It was implemented by the district, and I was required to start using it.

"I don't use..." = Non-use; respondent directed to "Thank you" page  
"I decided..." = Optional  
"I and other[s]..." = Collective  
"...required..." = Authority
| Variable (Independent): Method of Learning | Categories: Informal, Formal | 12 | How were you trained in the use of Google Docs? Please choose the answer which best represents the main method of learning used to gain information about how to use Google Docs. (Note: "Google Docs" includes any or all of the following applications: Document, Spreadsheet, Presentation, Form, Drawing, Collection) | Informally (self-taught, friend or colleague gave me tips, etc.) Formally (attended PD experience, class, training, etc., either in or out of district) |
| Variable (Independent): Level of Innovativeness | How would you characterize yourself as a Google Docs user? | "…first…” = Innovator  
| I was the first in my school/district to use Docs.  
| I decided to start using Docs after someone showed it to me, but before most others  
| I decided to start using Docs at about the same time that a noticeable group of others started to use it.  
| I decided to start using Docs after most others were using.  
| I was forced to start using Docs because almost everyone else was using (group pressure) or because of official policy.  
| "…before most others” = Early adopter  
| "…about the same time…” = Early majority  
| "…after most others…” = Late majority  
| "I was forced…” = Laggard  
| a, b, c = Earlier adopter  
| d, e = Later adopter |

| Variable (Dependent): Patterns of Use | Please check off how frequently you use Google Docs in each of the following ways.  
(Note: "Google Docs" includes the following applications: Document, Spreadsheet, Presentation, Form, Drawing, Collection) | Greater types and frequencies of use = closer to "Advanced Interactions" typology |
<table>
<thead>
<tr>
<th>Variable (Dependent): Patterns of Use</th>
<th>14a</th>
<th>I have viewed a file or document created and shared by someone else via Google Docs (&quot;Forced&quot; interaction with Google Docs).</th>
<th>Never</th>
<th>Rarely (1-2 times/year)</th>
<th>Sometimes (once a month)</th>
<th>Regularly (once a week)</th>
<th>Frequently (daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category: Personal Productivity</td>
<td>14b</td>
<td>I have transferred files from one location to another via upload to/download from Google Docs for my own use (not shared with others).</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
<td>Frequently (daily)</td>
</tr>
<tr>
<td>Category: Personal Productivity</td>
<td>14c</td>
<td>I have used productivity tools in Google Docs - creating word processing documents, spreadsheets, slide show presentations - for personal use (not shared with others)</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
<td>Frequently (daily)</td>
</tr>
<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>Category: Basic Interaction</td>
<td>Interaction</td>
<td>During school hours I have introduces students to Google Docs and/or allowed students to use it for school-related work and/or collected assignments via Google Docs.</td>
<td>Never</td>
<td>Occasionally (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
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<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>Category: Basic Interaction</td>
<td>Interaction</td>
<td>During school hours I have shared files (notes, outlines, documents, spreadsheets, etc.) with others (students, colleagues, administrators, etc.)</td>
<td>Never</td>
<td>Occasionally (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
</tr>
<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>Category: Basic Interaction</td>
<td>Interaction</td>
<td>During school hours I have utilized the collaborative features of Docs (synchronous editing, instant messaging, etc.) or encouraged others to utilize those features (student-to-teacher, student-to-student, teacher-to-teacher, etc.) to get or give feedback or to work on group materials.</td>
<td>Never</td>
<td>Occasionally (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
</tr>
<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>Category: Basic Interaction</td>
<td>14g</td>
<td>I have used Google Form to gather information from students during school hours.</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Occasionally (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
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<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>Category: Advanced Interaction</td>
<td>14h</td>
<td>I have had students utilize a Google Form rubric to reflect on and self-assess work done at the end of a project.</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Occasionally (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
</tr>
<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>Category: Advanced Interaction</td>
<td>14i</td>
<td>I have required students to utilize collaborative features of Google Docs to work on projects outside of classroom hours.</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Occasionally (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
</tr>
<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>14j</td>
<td>I have utilized collaborative features of Google Docs with colleagues in other schools and/or districts to create resources, either during or after school hours.</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
<td>Frequently (daily)</td>
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</tr>
<tr>
<td>Variable (Dependent): Patterns of Use</td>
<td>14k</td>
<td>I have used Google Forms to create auto-grading quizzes, etc., to assess students and/or to auto-email responses to a form.</td>
<td>Never</td>
<td>Rarely (1-2 times/year)</td>
<td>Sometimes (once a month)</td>
<td>Regularly (once a week)</td>
<td>Frequently (daily)</td>
</tr>
</tbody>
</table>
Appendix H: Subject Area - “Other” Text Responses (Alphabetical)

academics coach
Admin
Admin
Administration
Administration
administrator
Algebra 1
art
Art
art+
Basic Skills
Child Study Team
Child Study Team
Child Study Team
Child Study Team
Child Study Team
Child Study Team
Child Study Team
Child Study Team
Child Study Team
Computer Applications
computers
Consumer Science
Counselor
Creative Arts/select Prog.
debate
elementary education
ELL
English As A Second Language
English As A Second Language
English As A Second Language
English As A Second Language
English As A Second Language
Family and Consumer Science
Family and Consumer Science
Family and Consumer Science
Gifted & Talented
Guidance Counselor
Guidance Counselor
Guidance Counselor
Health
Home Economics/Life Skills
ICS Soc St and Spanish
In School Suspension
In-Class Support
In-Class Support
k-8
Library
Library
Library
Library
Library /Research skills
Library Media
Library Media
Library/Media
Life Skills
Life Skills, Electives
Media Literacy
Music
Music
occupational therapy
Reading
Reading
Reading
Reading
Reading Specialist
Related Services
School Counselor
School Counselor now
School Nurse
Secretary
speech
Speech and Language
Speech and Language Therapy
speech therapist
Speech Therapy
Student Assistance Counselor
Substance Awareness Coordinator/Anti-bullying specialist
Team Problem Solving
Technology-Computers
Wood Shop / Technology
Appendix I: Professional Technology Use – “Other” Text Responses (Alphabetical)

- ActivInspire
- ActivInspire
- ActivInspire
- ActivSoftware
- ActivStudio
- ActivStudio
- Adobe
- Adobe CS6
- ADOBE Products (All)
- Adobe suite
- Android for Kindle
- Animoto
- Animoto
- Animoto
-_animoto
- aol
- apple
- Apple Applications
- apple pages
- Artsonia.com
- Artsonia.com
- AutoDesk AutoCAD and Design Software
- Blackboard
- blackboard
- blog spot
- blogger
- Box.net
- class dojo.com
- cloud
- Cloud On
- Cloud-based
- cloud-based storage
- cloud-based storage
- cloud-based storage
- Corel
- Criterion.org
- delicious.com

- Docs to Go
- Document Camera
- document creation
- document creation
- document creation
- document creation
- document creation
- document sharing
- document sharing
- document sharing
- document sharing
- document sharing
- Dropbox
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<th>Edmodo</th>
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<td>EasyTestMaker.com</td>
<td>Edmodo</td>
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<tr>
<td>eCampus</td>
<td>Edmodo</td>
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