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Revisualizing Composition: How First-Year Writers Use Composing Technologies

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Abstract

Reporting on survey data from 1,366 students from seven colleges and universities, this article examines the self-reported writing choices of students as they compose different kinds of texts using a wide range of composing technologies, both traditional (i.e., paper, pencils, pens, etc.), and digital (i.e., cell phones, wikis, blogs, etc.). This analysis and discussion is part of the larger Revisualizing Composition study, which examines the writing lives of first-year students across multiple institution types throughout the United States. We focus especially on what appear to be, at first glance, contradictory or confusing results, because these moments of ambiguity in students' use of composing technologies point to shifts or tensions in students' attitudes, beliefs, practices and rhetorical decision-making strategies when writing in the 21st century. The implications of these ambiguous results suggest paths for continued collaborative research and action. They also, we argue, point to a need to foster students' reflexive, critical, and rhetorical writing – across composing technologies – and to develop updated writing pedagogies that account for students' flexible use of these technologies.

Keywords: Students' writing lives; Composing technologies; 21st century writing; Genres

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1. Introduction

Notebook paper and pencil, word-processing programs, cell phones, and Facebook: these are just a few of the composing technologies today's students use to write in their everyday, academic, and professional lives. And we know – partly from emerging scholarship (Yancey, 2009; "The Stanford Study," (n.d.); Lenhart, 2012; Lenhart, Arafeh, Smith, & Macgill, 2008; Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013; Purcell, Buchanan, & Friedrich, 2013), and most certainly from our own personal observations of students in the classroom, on campus, and in social places like restaurants and bars – students are writing more than ever with the diverse range of composing technologies and platforms that are widely available to them. Even though we know that students are active writers throughout their daily lives, how exactly students write with this wide range of composing technologies remains unclear: With whom do they choose to write and with which composing technologies? What are they writing when they compose with paper and pencil, a word-processing program, or a cell phone? When and where do they write Facebook status updates? Why do they use their cell phones to write personal or academic notes? How do they decide to write someone an email instead of a Facebook post or a text message? Asking questions, such as these, about students' writing habits and rhetorical decision-making strategies can provide answers that speak to concerns about literacy development, pedagogy, and technology design.

Partly as a way to begin exploring the above questions, and partly as an extension of other high-profile studies of students' writing lives (e.g., Sommers, 2008; "The Stanford Study" (n.d.); and the multiple projects emerging from the Pew Research Internet Project), we conducted the "Revisualizing Composition" study, which examines the writing lives of first-year students across multiple institution types throughout the United States. This article examines the self-reported writing choices of students as they compose different kinds of texts using a wide range of composing technologies, both traditional (i.e., paper, pencils, pens, etc.) and digital (i.e., cell phones, wikis, blogs, etc.). As Shipka (2011) argued, it's important to pay attention to the entire spectrum of composing technologies, since they all are part of students' composing landscape today. As our results demonstrate, students have more flexible understandings of composing technologies than are accounted for in most traditional writing pedagogies.

Reporting on a multi-institutional survey of 1366 students, this article highlights students' flexible use of composing technologies and genre/technology pairings. Although some students use technologies in traditional and expected ways, others blur the boundaries of traditional technology use, reimagining how these technologies can be used in daily writing. We focus especially on what appear to be, at first glance, contradictory or confusing results, because these moments of ambiguity point to shifts or tensions in students' attitudes, beliefs, practices and rhetorical decision-making strategies when writing in the 21st century. The implications of these ambiguous results suggest paths for continued collaborative research and action. They also, we argue, point to a need to foster students' reflexive, critical, and rhetorical writing – across composing technologies – and to develop updated writing pedagogies that account for students' flexible use of these technologies.

2. Literature review

We focused on first-year students' use of writing technologies as a way to echo and extend other multi-institutional studies in international contexts. In addition to both the Harvard Study (Sommers, 2008) and "The Stanford Study" (n.d.), a 2010 multi-institutional study in the United Kingdom (Jones, Ramanau, Cross, & Healing) examined first-year university students' self-reports of the extent to which they had access to and valued the Internet, Web 2.0 tools, and other technologies. These results suggested that most students use e-mail for study purposes, but for much less time than they use other technologies. Not surprisingly, Jones et al.'s (2010) study found that first-year students use digital technologies more extensively for social and leisure purposes than for academic purposes. A similar multi-institutional study conducted in Australia found that while students used "mobile phones, e-mail, MP3 players, chat or instant messaging, and the Internet" in their everyday lives, they made limited reference to Web 2.0 technologies in the study (Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010, p. 1205), which suggests, again not surprisingly, that social and cultural contexts impact how students use writing technologies.

As part of a larger examination of students' technology use and learning habits, Penny Thompson (2013) reported results of a survey of first-year students at Oklahoma State University; her study blurred technology, genre, and activity distinctions, though, complicating our understanding of the students' nuanced rhetorical decisions about their composing technologies. A series of large-scale Pew Internet Research studies also have examined students' technology

use and attitudes, as well as those of parents and teachers, finding, in general, that the composing activities of teenagers have increased with access to mobile technologies. Amanda Lenhart (2012) found that the texting activities of teenagers have increased since 2009, and "much of this increase occurred among older teens ages 14-17, who went from a median of 60 texts a day to a median of 100 two years later" (n.p.). A second Pew study examining a similar increase in cell phone use of teenagers (Madden et al., 2013) found mobile access to the internet through cell phones was becoming ubiquitous given, "One in four teens are 'cell-mostly' Internet users, who say they *mostly go online using their phone* and not using some other device such as a desktop or laptop computer" (emphasis original n.d.). A third study examined the attitudes of both teenagers and their parents in regard to how technologies may impact student writing (Lenhart et al., 2008); while both teenagers and parents believed that being able to write effectively was important for future success, students themselves do not consider their Internet communication or text messaging as "writing." A fourth Pew Internet Research study surveyed teachers to learn about their attitudes toward how digital composing technologies affect both the teaching and learning of writing (Purcell et al., 2013). The authors found that teachers think that Internet-based writing and digital composing technologies help students communicate in creative ways, encourage students to write for different kinds of audiences, and give students a chance to "write more often in more formats than may have been the case in prior generations" (n.p.). They note, however, that with the increase of composing with technologies comes the potential for the informal style of social media writing to "creep" into formal, academic kinds of writing.

Broad studies, like those reviewed above, have given us valuable insight into students' attitudes toward composing with digital technologies. By examining in more detail the ways in which students actually compose with a range of technologies, including digital technologies, our research responds to Yancey's (2009) request for educators to adjust for writing in the 21st century by studying and valuing the new ways that students compose today. To support such work, Yancey (2009) called for new research into the actual composing processes of students and into the actual genres that students produce. Our study examined a range of composing technologies – both traditional and newer digital ones – because we sought to capture a picture, as full as possible, of the entire writing lives of students today, and of the ways in which composing technologies, genres, purposes for writing, and choices about writing collaborations may overlap, compliment, compete with, or supersede one another.

Our results lend credence to Mueller's (2009) concept of the "digital underlife" of students, a concept referring to the rich and robust kinds of technology-enhanced writing activities that students engage in everyday inside and outside of the classroom, but which are sometimes ignored by academia. Like Yancey (2009), Mueller argued, "we must take stock of the ways in which digital underlife is framed as promising and productive" (2009, pp. 248–49). Frost took this idea further and argued that students' innovative uses of technologies should impact pedagogical practice, as a way to complicate "the lines between 'private' student underlife and 'public' classroom practice and legitimize(s) the creation of student-produced learning spaces" (2011, p. 269). Students are composing with a range of writing platforms and producing a variety of genres that have become important parts of their everyday writing lives in personal, professional, and academic contexts. Even though the nature of texts, textuality, textual production and reception, and the writing lives of students have changed drastically, we are, as Yancey (2009) claimed, still teaching writing like we taught it 100 years ago.

Based on the flexible – and sometimes ambiguous – ways students use composing technologies, we believe that traditional composition and rhetoric pedagogies aren't appropriate for teaching students how to invent, draft, arrange, revise and deliver texts today, with the wide range of composing and collaboration technologies available. We need new models of composing and new pedagogies for teaching writing, because as the following results show, students have much more fluid ways of using composing technologies than we typically acknowledge in our writing pedagogies.

3. Methods

3.1. About the survey

The survey instrument, data collection methodology, and strategies for interpreting and disseminating the data were designed specifically to involve, throughout the entire research process, researchers and students from multiple institutions in order to achieve a sample that could be reasonably understood as "representative" of a diverse and complex population of undergraduate students at U.S. universities (more below).

The survey asked participants questions about their demographics (i.e., six questions about institutional affiliation, the student's current writing course, the total number of writing courses taken, gender, race, and birth year) and about

the kinds of writing in which they most often engaged. Three writing-related questions first asked participants to identify which types of writing, out of a list of 30, they had done at least once before; second, from that resulting list, participants were asked to rank, in order, the five types of writing they used most often; third, participants were asked to rank, in order, the five types of writing they most valued. Finally, in an effort to collect information about the rhetorical situations surrounding students' writing practices, for each of the five types of writing a participant indicated she used most often and for each of the five types of writing a participant indicated she most valued, the participant also was asked to explain why, where, with whom, and with what technologies she most often writes (4 questions per most often used or most valued type of writing, resulting in 40 questions total for this section of the survey). For these final selections about the rhetorical situations for their most often used and most valued types of writing, participants could choose more than one option, indicating, for instance, multiple purposes or multiple technologies for the same genre. The 50-item survey (counting the initial informed consent statement) took ten minutes or less to complete.

3.2. Institutions and sampling

The participating institutions were selected in an effort to involve a reasonable sample of U.S. institutions, according to the Carnegie classification system. The seven participating institutions represented six different institution types:

- Associate's, Rural-serving, Large, Public (in the Midwest)
- Associate's, 2-year Colleges under 4-year Universities, Public (in the Pacific)
- Master's Colleges and Universities, Small, Private (in the Southeast)
- Master's Colleges and Universities, Medium, Public (one in the Southeast and one in the Midwest)
- Research University, high activity, Public (in the South Central)
- Research University, very high activity, Public (in the Midwest)

We used a purposive, stratified sample as a way to reflect the demographic profiles of U.S. college students enrolled in four-year and two-year institutions in 2010. As noted above, we selected institutions in an effort to involve a reasonable sample of U.S. institutions, according to the Carnegie classification system, as well as those that would allow us to construct a reasonable sample of higher education U.S. institutions.

3.3. Survey distribution

The online survey was distributed primarily to first-year students during Spring 2010 (April–June). A total of 2,110 students began the survey and 1,366 students completed the survey, giving a completion rate of 65%. Depending upon institution-specific IRB requirements or recommendations, survey distribution methods somewhat varied. At the Research Universities and the Associate's College in the Pacific, all students in first-year composition classes received the survey via e-mail; at the small Master's University, *all* first-year students received the survey via e-mail. At the Associate's College in the Midwest and the Master's University in the Southeast, writing program faculty who teach first-year composition were e-mailed the online survey link, and the faculty then forwarded the link to students enrolled in their writing courses, which for some faculty also included first-year business and technical writing classes. At the Master's University in the Midwest, the survey was given to all students who were enrolled in a writing class in spring 2010, including advanced writing and technical writing classes, with the majority of students enrolled in first-year and intermediate writing courses.

3.4. Data analysis

We used two similar tests for data analysis: Fisher's Exact Test (to determine relationships between variables when possible) and Chi-square tests. Results were considered significant at the .05 level. The first set of data was processed and the results were distributed online to all research team members for further analysis and discussion. Subsequently, the team cross-referenced data to explore questions like those raised in this article about technology use by genre.

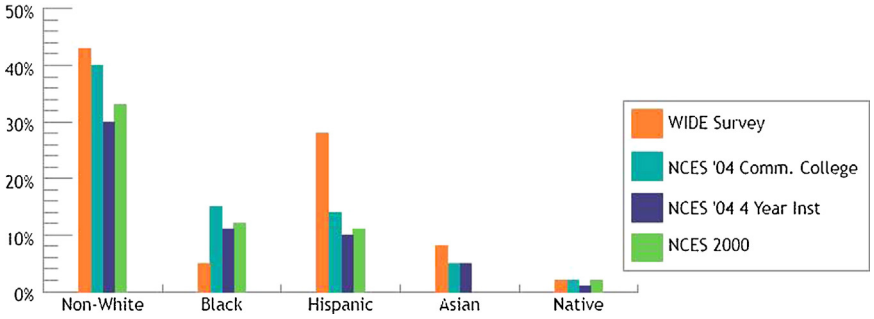

Fig. 1. Race and ethnicity breakdown for *Revisualizing Composition* and two National Center for Education Statistics Studies (Revisualizing Composition Study Group, 2010).

3.5. Demographic information

Our sampling method resulted in the following participant profile:

- *Age*: 90% of participants were between 18-23 years old, which means that a vast majority were a "traditional" age for U.S. institutions of higher education, at least as historically understood. Half of the participants were 19 years old, which means that they likely enrolled in college immediately after high school graduation.
- *Gender*: 58% of participants identified as female, 40% identified as male, and less than 1% identified as transgender. A small percentage of students (less than 2%) opted not to indicate their gender identities.
- *Institution type*: 58% of our sample attended a research university, 20% attended a master's granting institution, and 11% attended a community college.
- *Participant race and ethnicity*: 43% of participants were non-white, with 5% African American, 28% Hispanic, 8% Asian, and 2% Native American.

We also assessed our sample by comparing the demographics of our survey's participants with data from the 1999–2000 and the 2003–2004 "National Postsecondary Student Aid Study: Profile of Undergraduates in U.S. Post-secondary Education Institutions," reports which are issued by the U.S. National Center for Education Statistics (NCES). According to this comparison (see Figure 1), it seems likely that our study oversampled Hispanic students and, to a lesser degree, Asian students, while under sampling African American students. It also seems likely that participants from two universities—the Research University in the South Central and the Associate's College in the Pacific—contributed greatly to the numbers of minority participants, with the exception of African American students. We acknowledge that, for future surveys, we need to ensure better participation of African American students at a level that corresponds with their numbers in the overall demographic profile of U.S. college students (12-15%).

4. Students' technology use in writing

Students regularly use a range of technologies when composing, but they—not surprisingly—use them for different purposes. After students indicated which types of writing they completed at least once, which types of writing they used most often, and which types of writing they most valued, our survey asked students to associate those types of writing with the technologies they used to compose them. As Table 1 shows, students reported using cell phones, Facebook, notebook or paper, pencil, word-processing programs, e-mail, and Twitter to compose the genres they wrote most often. As an example to help explain Table 1, even though students used cell phones to compose a variety of genres that they identified as most often composed or most valued (85.8% across all genres), their usage of cell phones jumped when we consider only the genres they compose most often (97.6% for the most often used genre, which is not surprising given that "texts (SMS/cell)" was the most frequently composed genre). In other words, students try composing a wide range of genres with cell phones, as we will unpack in more detail below, but there are other genres that students wrote at least once that they did not use cell phones to compose.

The following subsections highlight our findings about some of the most often used technologies. Since each participant could have reported multiple instances of use for one technology (i.e., using cell phones for both a most

Table 1
Percentage of students who associate each technology with the writing they do and with a most often written genre.

	% of Students Who Used This Technology For a Most Valued or Most Often Composed Genre	% of Students Who Used This Technology for a Genre Composed Most Often
Cell Phone	85.8%	97.6%
Facebook	67.2%	95%
Notebook or Paper	89%	94%
Pencil	79.5%	91.9%
Word-Processing Program	90.3%	90.5%
E-mail	75.7%	90.1%
Twitter	16.3%	90.1%
Wiki	11.6%	74.7%
Blog	19.%	73%
Other	40%	86.6%

Table 2
Genres composed, as percentage of the cases of technology use.

	Word-Processing Program	Notebook or Paper	Pencil	Email	Cell Phone	Facebook	Blog	Twitter	Wiki
# of Cases	5714	5388	4678	2920	2853	2822	600	580	346
Academic Papers	15%	10%	10%	7%	*	5%	7%	5%	16%
Blogs	*	*	*	*	*	*	10%	*	*
Comments on Status Updates or Posts	*	*	*	*	5%	14%	6%	10%	*
Emails	8%	5%	5%	28%	9%	11%	8%	8%	7%
Instant Messages	*	*	*	*	5%	11%	*	5%	*
Lecture Notes	10%	16%	16%	5%	*	*	5%	*	*
Lists	*	10%	10%	*	5%	*	*	*	*
Outlines	5%	5%	5%	*	*	*	*	*	*
Reading Notes	*	6%	5%	*	*	*	*	*	*
Research Papers	13%	9%	8%	7%	*	5%	6%	5%	17%
Resumes	5%	*	*	*	*	**	*	*	*
Status Message Updates	*	*	*	*	6%	11%	*	18%	*
Texts (SMS/cell)	5%	6%	6%	10%	39%	12%	7%	13%	5%

* indicates the genre accounts for less than 5% of the technology use.

often used type of writing and a most valued type of writing), potentially creating more instances of use for a single technology than the number of participants in the study, we report the cases or instances of technology use, rather than reporting by participant use. What becomes apparent as we explore students' technology use is that students see much more flexibility in genre/technology pairings than writing faculty might anticipate.

4.1. Genres students write with composing technologies

Table 2 reports the percentage of technology use associated with each genre. For example, the students surveyed reported 2853 cases of cell phone use among their top five most valued genres and top five most often used genres. Of those 2853 cases of cell phone use (the technology), 1111 of them (or 39%) are associated with texts (SMS/cell, the genre). When students write with cell phones, then, they are most likely composing texts (SMS/cell, 39% of cell phone use), but they also use their cell phones to compose email (9%), status message updates (6%), instant messages (5%), comments on status messages or posts (5%), and lists (5%). Other uses included writing websites, outlines, reading notes, lecture notes, and chat room posts, as well as academic and research papers.

Table 3
Purposes for writing, as percentage of technology use.

	Word-Processing Program	Notebook or Paper	Pencil	Email	Cell Phone	Facebook	Blog	Twitter	Wiki
# of Cases	5714	5388	4678	2920	2853	2822	600	580	346
For Personal Fulfillment	32%	47%	48%	51%	63%	58%	58%	61%	32%
For Entertainment	13%	12%	12%	40%	63%	75%	62%	72%	28%
To Participate in Public Life (citizenship, community)	8%	6%	7%	31%	31%	31%	23%	30%	15%
To Fulfill a School Assignment	79%	66%	63%	54%	23%	22%	38%	27%	84%
To Fulfill the Requirements of a Job	14%	10%	12%	24%	12%	8%	16%	12%	18%

Table 4
Where students write, as percentage of technology use.

	Word-Processing Program	Notebook or Paper	Pencil	Email	Cell Phone	Facebook	Blog	Twitter	Wiki
# of Cases	5714	5388	4678	2920	2853	2822	600	580	346
Home	79%	76%	75%	89%	93%	95%	82%	86%	76%
Classroom	63%	67%	66%	58%	63%	49%	48%	50%	64%
Public Café	19%	19%	20%	38%	60%	40%	39%	46%	33%
Library	47%	40%	39%	54%	55%	44%	47%	44%	62%
Computer Lab	37%	28%	27%	51%	49%	43%	44%	49%	55%
Work/Office Space	17%	16%	18%	51%	38%	21%	21%	31%	19%

All the technologies were used *at least once* for the genres listed, with one exception: students reported no use of wiki technology to compose cover letters. The following genres account for less than 5% of the technology use for all of the listed composing technologies and are not included in Table 2: bulletin board posting, business writing, chat room posts, cover letters, creative non-fiction, fiction, forms, grant and research proposals, journals/diaries, journalism, lab reports, letters, peer review response, personal statement, play/screenwriting, poetry, and websites.

4.2. Students' purposes for writing with these composing technologies

Table 3 shares the percentage of technology use associated with students' purposes for writing. To discern students' purposes for writing, the survey asked, "For this type of [most valued or most often used] writing, why do you usually write?" with five listed purposes and an "other" option. Students could, and often did, select multiple options for their purpose for writing to explain their rhetorical situations.

Looking at the top three purposes for writing with each identified technology (Table 3), trends become more apparent regarding which types of technologies students use for varied purposes. For instance, students using notebook or paper, pencil, a word-processing program, email, or wiki technologies are most likely to be using the technology to complete a school assignment. Likewise, students tend to write for entertainment when they use Facebook, Twitter, and blog technologies.

Table 5
Students' collaborators, as percentage of technology use.

	Word-Processing Program	Notebook or Paper	Pencil	Email	Cell Phone	Facebook	Blog	Twitter	Wiki
# of Cases	5714	5388	4678	2920	2853	2822	600	580	346
Alone	88%	87%	87%	76%	61%	67%	75%	61%	84%
Friends	19%	20%	20%	45%	70%	62%	38%	55%	28%
Family	11%	13%	13%	38%	55%	38%	24%	38%	21%
Classmates	40%	40%	39%	42%	49%	40%	32%	41%	49%
Roommates	8%	8%	8%	17%	32%	25%	17%	27%	15%
Work Colleagues	7%	6%	6%	19%	22%	15%	12%	22%	14%
Instructors	18%	17%	17%	26%	13%	11%	13%	16%	25%
Writing Center Consultants	7%	6%	6%	6%	5%	3%	7%	10%	15%

4.3. Places students write with these composing technologies

Table 4 highlights where students write when they use these composing technologies. To discern students' sites for writing, the survey asked, "For this type of [most valued or most often used] writing, where do you usually write?" with six locations listed and an "other" option. As with their purposes for writing, students could select multiple locations for writing to explain their rhetorical situations. Regardless of the technology they use, students do most of their writing at home, in a classroom, or in the library.

4.4. Collaborators for writing with these composing technologies

Finally, Table 5 shares with whom student write, when they use these composing technologies. Students were asked, "For this type of writing, with whom do you usually write?," with the collaboration options listed in Table 5 and an "other" option. Once again, students could select multiple collaborators for writing to explain their rhetorical situations. Students predominantly write alone; the exception to this trend is their collaboration with friends when they write with cell phones. Further, even though students identify that most of their writing fulfills the purpose of completing school assignments, they rarely identify instructors or writing center consultants as collaborators when they use these technologies.

5. They do *what?!*?: Reflections on students' technology use

As the results above highlight, students report a range of technology uses for their composing tasks. Some of those uses are traditional and expected (e.g., using a word-processing program to fulfill a school assignment, such as an academic paper or a research paper), but others raise questions about the roles of technologies in students' composing practices. Still others indicate that students are blurring the boundaries of what is meant by terms like "e-mail" or "IM" that writing teachers and researchers often use to describe particular forms of online writing. Some students seem to push the boundaries of traditional technology use, demonstrating the flexibility of composing technologies, but also reimagining how they can be used in daily writing.

5.1. Notebook or paper, pencil, and word-processing program: Traditional, but flexible

Writing faculty might be least surprised by students' reported use of these older technologies. As we report above, students continue to use notebook or paper, pencils, and word-processing programs for writing academic papers, research papers, lecture notes, reading notes, and outlines, and most of students' uses of these technologies focus on fulfilling school assignments. They most often use these technologies in their homes, classrooms, and libraries. Most of these findings follow patterns we might expect, with students using these technologies extensively for academic tasks and personal fulfillment.

Nevertheless, we do see some flexibility in students' technology uses. For instance, students report using word-processing programs for e-mail (8% of word-processing program use) and text messages (5% of word-processing program use). Perhaps they draft these genres using word-processing programs. We simply aren't sure, but we'd like to see future studies explore how students use word-processing programs in these unexpected ways.

While gender differences in the use of word processing technology were not statically significant, female participants reported almost twice as many instances of pencil use and notebook or paper use as male participants – differences that are statistically significant. Future studies may want to more thoroughly examine this difference in students' uses of traditional composing technologies in order to explore potential reasons for these gender differences because the implications for classroom instruction, and for being open to diverse ways of composing, could be significant.

5.2. Cell phone, Facebook, and e-mail: Multipurpose connectors

Students' use of cell phones, Facebook, and e-mail highlights the ways in which writing for the 21st century is different – and the ways that students are moving beyond the scope of many writing pedagogies. Many universities have required first-year writing courses, presumably with the goal of preparing students for future writing in and beyond the academy, but are they meeting this goal if they are not accounting for these 21st century differences?

The results shared above suggest that students already take advantage of these technologies' flexibility and portability, using them for a variety of purposes in a variety of contexts. While they use cell phones for expected genres (e.g., texts (SMS/cell)), for example, students also report using cell phones to write academic papers, reading notes, and lecture notes. Given that a quarter of teens are "'cell-mostly' Internet users" (Madden et al., 2013), our participants might be using their cell phones to conduct online research in preparation for papers and using cell phone apps to take and access reading and lecture notes and to draft their academic papers. How often, though, do writing pedagogies include strategies for using cell phones for these genres? In a climate where many faculty still ban cell phone use in the classroom, it seems unlikely that the technology receives much play in classroom discussions about composing strategies. If these pedagogies are intended to prepare students for future writing, strategies for embracing the flexibility of these technologies should be a central component of writing curricula.

We also see students testing the flexibility of Facebook as a technology. Although writing faculty might anticipate that students would use Facebook primarily for writing status message updates, students report using the technology for a wider range of purposes. Furthermore, students use the technology more often to respond to writing (e.g. commenting on status messages) or to engage in conversations (e.g., texting and instant messaging), than they use it to post updates, and they write alone on Facebook in 67% of the instances of Facebook use, but they also write collaboratively – with classmates in 40% of the instances and with family members in 38% of the instances.

Students also use these technologies in unexpected ways: 11% of Facebook use is associated with e-mail (as a genre). 4% of e-mail use (as a technology) is associated with instant messages and 10% is associated with texts (SMS/cell). We do not fully understand *how* students are using these technologies for these genres, or if they simply misunderstood the question, but understanding these unexpected uses could better inform our writing pedagogies. Additionally, female participants reported statistically significant more use of e-mail (as a technology) and accounted for statistically significant more instances of instant messages and text messages (as genres) than male participants. Therefore, future studies of these unexpected uses should also explore the role of gender.

Collectively, these Facebook, cell phone, and e-mail use results also highlight the technologies' potential for collaborative writing. Students already report using the technologies to write with friends, family, classmates, roommates, and others. What might writing scholars learn from students' early adoption of cell phone technology for collaborative writing that could impact emerging writing pedagogies?

5.3. Twitter, wikis, and blogs: Trendsetters?

Twitter, wikis, and blogs are used by fewer students, but student who do use them write with them frequently, and with uniquely tailored motives for writing, locations for writing, and collaboration trends. Female participants account for a statically significant higher use of Twitter and wikis (as technologies), which suggests these usage differences by gender deserve further study; there were no significant differences in blog use by gender. While it's not surprising that 18% of Twitter use was for status message updates, students demonstrate an apparent flexibility in genre terms associated with the composing technology, as they identify another 23% of Twitter use for text messages and instant

messages (combined). Since another 8% of Twitter use was for e-mail, it appears that students use "e-mail," "IM," and other terms across platforms and media. Yet, it's unclear whether the direct messaging capabilities of Twitter invite this cross-platform use, or if students have other underlying reasons for the associations.

Students writing with a wiki technology were most likely to be completing research papers (17% of wiki use) or academic papers (16%), which corresponds with students' motives when writing with wikis. Students most often wrote with wikis to fulfill school assignments (84% of wiki cases), although some reported writing with the technology for personal fulfillment (32%) or entertainment (28%). While writing studies scholars might anticipate the prevalent use of wikis for academics (e.g., research and academic papers), earmarking it as a classroom – or course-based – technology, students' use of the composing technology still reveals surprises. 7% of wiki use is associated with e-mails, and 5% is for composing text messages, again suggesting flexible use of genre terms or an innovative, if unexplained, use of the technology.

Not surprisingly, student writers most frequently used blog technologies for blogging (10% of blogging use). More surprisingly, students also report using blog technologies for e-mail, writing academic papers, texting, commenting on status messages or posts, writing research papers, and taking lecture notes. In spite of the academic-oriented genres in this list, students predominantly used blog technologies for entertainment or personal fulfillment. Again, we're left asking what "e-mail" means to students when they see themselves doing it with blog technologies. Exploring this flexible use of genre terms would help inform the field's understanding of how students are using the composing technologies available to them for *all* the writing they complete in their daily lives.

6. Future directions for study and action

We offer the findings in this article as one way to respond to Yancey's (2009) call, and in particular, as one way to understand the real discursive practices of real people in the real world. A word of caution is appropriate, however, as we do not intend to argue that simply knowing *which* platforms students use when composing is enough or gives us a rich picture of the deeply social and rhetorical nature of composing. On the contrary, these results are useless if we fail to keep in mind that writing is always socially and contextually situated; thus, we offer this report as a snapshot into the material, social practices of writing of first-year students and invite scholars to pose new questions for further research.

As Table 3 shows, students use fairly traditional technologies for school assignments, while they use a wider variety of technologies, including Facebook, cell phones, and Twitter for writing for personal fulfillment and for entertainment. Furthermore, students seem to be changing how they compose, even before most writing pedagogies offer scaffolded strategies for using a *full range* of composing technologies to invent, draft, arrange, revise, and deliver texts. Since students are embracing these newer digital technologies, academia should consider how they could be integrated into school writing, how classroom instruction can better prepare students to write effectively with these technologies when they use them for self-sponsored genres, and whether any kind of transfer occurs when students use these composing technologies to write for academic and self-sponsored purposes. Further, students use these digital technologies extensively for writing to participate in public life; therefore, these results suggest a disconnect between what is happening in students' academic experiences and how school could be preparing them to make more rhetorically-savvy choices in these public writing contexts. Students already are using cell phones, Facebook, and Twitter in public life. Madden et al. (2013) reported, for instance, 74% of teens "are 'mobile Internet users' who say they access the Internet on... mobile devices at least occasionally," and 25% of teens indicate, "the cell phone has become the primary means by which... [they] access the Internet" (n.p.). In contrast, only 55% of adults are "mobile Internet users" and only 15% rely primarily on cell phones for Internet access (Madden et al., 2013, n.p.). Given this comparative use and teachers' conflicted perceptions of digital tools' roles in fostering (or hindering) student writing (see, for example, Purcell et al., 2013), we are not surprised that students are not encountering these technologies much in academic courses and, as a result, are not necessarily encouraged to view composing with these technologies from a rhetorical perspective. Quite simply, writing faculty are missing opportunities to foster students' reflexive, critical and rhetorical writing - across composing technologies.

As we look ahead, we have identified three paths for further consideration: 1) learning more about students' writing lives—and how academia can support these writing lives—through detailed case studies; 2) applying what we are learning to our institutional practices; and 3) examining how network technologies can facilitate rich institutional and multi-institutional research.

First, as our discussion above suggests, we continue to have questions about students' writing lives. For example, *what precisely* are students writing when they use specific technologies to write in specific genres? *How* are they using these technologies to write these genres? Do they *use* these technologies differently when they write for different audiences? *What* do students mean when they say they write collaboratively? Do students continue to use pencils for some tasks because, in the context where they most often write the corresponding genre, they are not allowed to use or do not have access to digital composing technologies? Additionally, how do writing lives vary by identity groups and socioeconomic status? Our data hints at some gender-based differences, but to better understand students' writing lives, future studies should dig deeper into correlations among participants' use of writing technologies and their identity groups, as well as attempt to understand the activity systems shaping students' writing lives.

Public concern over whether or not texting destroys a student's ability to write a sentence and debates over banning cell phones from classrooms because they distract students seem to focus on a moot feature of the changing reality of writing: newer composing and digital technologies are highly integrated into many students' lives, they are part of the 21st century landscape of writing, and attempting to prevent students from using these composing technologies is an uphill battle. Therefore, academic energy is best directed at understanding how to prepare students both to make rhetorically-sound choices in all aspects of their writing lives and to develop rhetorical strategies for "adapt[ing] to the evolving character of IText" (IText, 2001, p. 286). What we need to do, then, as Yancey (2009) has articulated, is not just gain a deeper understanding of how students use these digital composing technologies in their everyday lives and how these practices impact students' ability to analyze writing situations, but also to respond appropriately in the classroom through a wide range of writing tasks using a wide range of composing technologies.

When we first began examining data collected from this study, we were delighted with the rich results. However, this initial moment of delight was quickly superseded by our realization that the data raised even more questions than it answered. Phase two of the Revisualizing Composition study examines many of these questions by using texting technologies and a time-use diary methodology with follow-up interviews to examine students writing lives in more detail. We look forward to sharing the results of this new study in the future. Our field also can learn about students' writing lives from studies in other disciplines. Fulkerson, Loth, Bruening, Berge, Eisenberg, & Neumark-Sztainer (2014), for example, studied media use by teens during family meals; although their focus is on food choices and families' mealtime practices, their survey of 1858 parents who indicated that their households eat family dinners suggests, "adolescent mealtime media use [including cell phone use] is highly prevalent, particularly among girls, older adolescents, black youth, and youth with parents with low education" (p. 1057). These findings reiterate the importance – as we construct new models of composing – of understanding the social norms and community expectations that shape students' use of composing technologies (IText, 2001) and of exploring how 21st century writing lives might vary (to the extent that we might generalize) across identity groups and activity systems.

Second, what we are learning about students' use of composing technologies should prompt us to rethink what we do with these composing technologies in our own classrooms and how we use them in curricular development. Writing in the 21st century is different, Yancey argued, because with Web 2.0, writers are everywhere, and they engage in self-sponsored writing as a way to share, to encourage dialogue, and especially to participate in conversations (2009, pp. 4–5). She suggested that we now face three new challenges: "developing new models of composing, designing a new curriculum supporting those models, and creating new pedagogies enacting that curriculum" (Yancey, 2009, p. 8). We are pleased to share some examples of how we have used the results of this study to inform our curricular work:

- At the medium, public Master's University in the Southeast, the results informed a general education review and a curricular proposal to integrate an objective on rhetorically-minded composing with technologies into the shared objectives of the first-year writing course.
- The study also enabled an undergraduate researcher at the same institution to extend her rhetorical research into the texting lives of students, demonstrating an example of faculty-student collaborative research.
- At the Midwest Associate's College, the college administration invited a Revisualizing Composition researcher from the Midwest Research University to participate in a college-wide summit on writing. The invitation to the summit calls attention to an "ever-changing landscape of technological advances - advances hugely impacting even what we define as 'writing'" (internal document).

Other teacher-scholars also are exploring ways to develop new pedagogies and curricular models that are responsive to 21st century writing practices and technologies. Alvey and her collaborators (2011) propose revising I-Search

assignments as iSearch 2.0 assignments that purposefully incorporate Web 2.0 technologies into writing activities. Randall McClure (2011) hypothesizes how the eventual emergence of a Semantic Web could impact students' research processes. Carter and Arroyo (2011) imagine a 2020 version of participatory pedagogy that accounts for the increasingly collaborative remixing and re-sharing of video compositions. Chanon Adsanatham, Bre Garrett, and Aurora Matzke (2013) share a delivery-focused heuristic for teaching first-year students multimodal composing. Of course, these are only a few of many examples from computers and composition research; we might argue though, in light of this study's findings, that even these 21st century practices overlook students' flexible use of composing technologies. A key goal in responding to Yancey's call (2009) is to continue these curricular efforts within the field *and* to forge collaborations with other writing studies teacher-scholars and writing program administrators to make implementation and study of these 21st century writing pedagogies more mainstream.

Third, the Revisualizing Composition study itself is an example of what network technologies allow us to do with research. We used conference calls, e-mail, and an online survey and results interface to facilitate participation by researchers at seven different institutions that are up to 4,700 miles apart. As a result, the study benefits from a richer sampling of first-year students that is more representative of student writers at a wider variety of institutions than if researchers at any one of these institutions had worked alone. The Revisualizing Composition team has invited other researchers to contribute to and use the resulting data set, leading to many additional possibilities for extending this and future research in a collaborative way.

We hope others will take up Yancey's (2009) charge to study the new ways in which students compose today, and our own call to examine in more detail the flexible ways students use technologies and genres. We would be more effective writing teachers if we helped students solve their real-world personal, professional, and academic writing problems by building on their existing practices, including their flexible use of the composing technologies that permeate their everyday lives.

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