From The Office to the Classroom: Computer Simulations and Student Engagement in Advanced Composition

Lauren Fine
Brigham Young University

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From *The Office* to the Classroom: Computer Simulations and Student Engagement in Advanced Composition

Lauren Fine

A thesis submitted to the faculty of Brigham Young University in partial fulfillment of the requirements for the degree of Master of Arts

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May 2016

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ABSTRACT

From *The Office* to the Classroom: Computer Simulations and Student Engagement in Advanced Composition

Lauren Fine
Department of English, BYU
Master of Arts

Higher education professionals are always seeking new and better ways to prepare students for life after college—a goal that requires not only providing knowledge and experience in their chosen field, but also helping them stay engaged in the process. Recently, computer based simulations have magnified role playing and case study techniques that have been used in classrooms for many years. These simulations have found great success in many settings, including engineering, business, and medicine, but there have been very few computer simulations designed for writing classes. Given that some of the greatest challenges in such classes are teaching students to respond to a context, write to an audience, and stay engaged in the process, simulations have great potential to improve pedagogy in writing classes by providing a more authentic and engaging context.

In this pilot study of a computer simulation designed for technical writing classes, we examined how the simulation affected these factors (authenticity and engagement). We combined qualitative and quantitative methods, doing surveys in three classes (the class using the simulation and two classes with other pedagogies) and focus groups with the simulation class. While the results of the survey were rather inconclusive, the surveys and focus groups combined taught us two main lessons: (1) the simulation needs to be believable to be effective—making it too much like a game can backfire with some students, and (2) students remain more interested when the simulation is complex and leaves them some autonomy concerning what happens. While not necessarily groundbreaking, knowing what worked and what didn’t in our simulation can provide valuable insights for future simulation designers.

Keywords: Computer Simulations, Technical Writing, Student Engagement
ACKNOWLEDGMENTS

I thank the University Writing Program at Brigham Young University for funding this project through the Thayer Award. I also thank my committee chair, Brian Jackson, and my committee members, Jon Balzotti and Kristine Hansen, for their insightful direction and comments. Most of all, I thank my friends, my family, and my God for their support.
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Introduction

In his book *Minds on Fire*, Mark Carnes claims that role-immersion games “provide access to the often untapped wellsprings of motivation and imagination” (13). While Carnes’s book can, at times, seem overly optimistic about the potential of immersive computer simulations, it’s hard to deny that something is working when a class of college students collectively petitions the professor to start class 30 minutes early for several weeks in order to complete the whole simulation by the end of the semester. This is a request few professors could even imagine hearing from their students, yet this is exactly what Paul Fessler experienced when he started using a Reacting to the Past simulation in his Western Civilization class (Carnes 1).

But Carnes isn’t the only one proving that educational role-immersion games (sometimes called alternate reality games or ARGs) and simulations\(^1\) are more than just a fad. Harvard Business School has developed dozens of very successful simulations that teach a number of valuable business skills, from finance to entrepreneurship. These simulations use real world contexts, similar to a case study except students can connect with characters and learn about the business in a far more interactive way.

Search through any scholarly archive and you’ll find dozens of articles detailing the success of business, medical, and engineering simulations, claiming they teach leadership skills effectively (Siewiorek et al. 121), help future doctors develop surgical skills (Chan and Sun 187), and give engineering students the opportunity to learn how to make appropriate managerial decisions before they have to on the job (Sherif and Mekkawi 188).

---

\(^1\) The difference between a game and a simulation can be a bit fuzzy. Kapp, Blair, and Mesch claim that simulation are realistic, while games don’t have to be, and therefore games might employ more fanciful methods of rewarding progress, such as gaining lives or coins or leveling up (chapter 3). Both simulations and games attempt to create an immersive environment for players in which players “engage in an abstract challenge, defined by rules, interactivity, and feedback” (Kapp 7).
And it’s no wonder these simulations have been so effective when we consider how they tap into known factors of human interest and engagement. Paul Silvia has found that the two consistent factors in interest are “novelty-complexity” and “comprehensibility” (58). In other words, when people perceive something as requiring thought to figure out (because it is new, unexpected, or complex) but not so much thought that it is beyond their capacity to understand (i.e., it is comprehensible), they find it interesting. This willingness to engage is often stimulated by narrative, which we have been conditioned to find interesting because our ability to grasp what someone else is doing and imitate it “enables us to cooperate with each other to build human culture,” which is crucial to our survival as a species (“Why is entertainment…”).

Simulations and role-immersion games are especially good at engaging interest because they create a complex (yet comprehensible) problem to solve in a way that also initiates other ingrained factors of human interest: competition and reward. As Jane McGonigal explains, the feeling of triumphing over adversity, called Fiero, is a powerful emotion that is born out of competition and stimulates our brain with dopamine, the neurotransmitter associated with reward and motivation. And because it makes players an active part of the story, “narrative transport” (a mental process in which a person becomes fully integrated in a story, feeling the emotions of the narrative as if they were actually living it) (Green, Brock, and Kaufman 313), is even deeper in a game (when it happens) than in a movie or book. These factors, combined, illustrate the potential of games and simulations, which can create this kind of immersive experience to engage students’ interest.

But we don’t just want our students to be engaged for the sake of their own enjoyment. Research has shown that students who are interested in their work learn better in a number of ways. According to Kapp, Blair, and Mesch, “when well designed, [simulations]… encourage
thoughtful consideration of content, and provide meaningful impact to the individual and the organization.” This claim mirrors a number of studies that show that interest has the potential to improve learning in multiple ways, including improving memory (McDaniel et. al. 496; Scheifle and Krapp 141), increasing persistence (Tulis and Fulmer 43), and encouraging deeper levels of learning in students (Silvia Exploring 69-70). Also, interest is especially motivating because it’s an emotion, and recent research in neuroscience has shown that emotion is a crucial part of making decisions and acting (Hidi 69). Altogether, engaging student interest has a lot of potential for student learning, which makes the development of new methods like simulations worth the time, energy, and funding it requires.

While many fields are taking advantage of the enormous potential of computer simulations, the humanities are just beginning to incorporate them into teaching and learning. Some have been developed for literature or history courses (such as the Reacting to the Past game mentioned earlier), and many successful role-playing or case study methods have helped create more interesting rhetorical situations in writing classes (see Anson; Jackson). However, few online computer-based simulations have been designed to be used in writing classes with the goal of helping students produce better writing. One notable exception, David Fisher’s Omega Molecular simulation, made important discoveries about computer simulations’ potential to create more authentic discourse communities. However, Fisher’s simulation, created almost 10 years ago, did not explore the effect the simulation had on student interest. In fact, the simple design (a website that mirrored a remote access desktop for a company) used few game elements\(^2\) and a limited narrative structure; therefore, it did not maximize the potential of simulations to engage students. The simulation was also long and complex (from the teacher’s point of view), meaning it might not be transferable to other classes or teachers.

\(^2\) Points, leveling up, rewards for completing tasks, immediate feedback on performance, etc. (Kapp; Mecgonigal)
But if role-playing and paper case studies effectively create a rhetorical situation for students in writing classes, why spend the time and money to create simulations? Well, for one, there are many problems with the case study method—mainly that it still feels just like a school assignment to most students. They aren’t necessarily immersed in the rhetorical situation—they don’t think of their audience as anyone but the teacher; they don’t consider the stakes to be any different than any other class. It’s just school (see Smit 152-154; Freedman, Adams, and Smart).

In an effort to improve upon the case study model through a simulation, a team of developers and researchers at Brigham Young University created a computer simulation designed to give students in English 316, a technical writing class, experience writing for a business. Our motivation in developing the simulation was (1) to see if the more immersive environment of a computer simulation (including real people with personalities) would be more authentic to students; (2) to create something that might be easier to generalize to different classes with different teachers (especially those that might not have experience with this type of company); and (3) to better engage students by “gamifying learning,” which, as silly as it sounds, has been extremely successful in many cases (see Carnes; McGonigal). The simulation, which takes two to three weeks of a semester, uses videos, emails, photos, and a professional website to immerse students in an internship where they are asked to complete certain tasks, culminating in a proposal about how to solve an internal company problem.

Our research question as we tested the simulation for the first time was this: “How is engagement (sense of authenticity and interest) in technical writing students influenced by a simulated learning experience?” To answer this question, the team of researchers designed evaluative measures (surveys and focus groups) based on theories of student engagement, including Hidi’s four-phase model of motivation and Silvia’s novelty-complexity theory. This
research adds to simulation research of the past by exploring how well a simulation fits into a writing classroom and by paying particular attention to student responses in this setting (relevant in determining things like engagement and motivation), as opposed to focusing on the researchers’ perspective. Overall, the results indicate that while simulations are effective in providing additional context, a believable narrative and complexity through a sense of autonomy are crucial to student engagement. While our simulation wasn’t a home-run success, noting what worked and what didn’t can add to body of scholarship about how to create a well-designed simulation ((for example, see Kapp, Blair, and Mesch), an addition that will be particularly helpful for those hoping to use simulations in a technical writing context, where development and research of this kind has been limited.

**Project Design and History**

Before explaining the methods and results of this study, however, it is necessary for the reader to understand the nature of the simulation. In designing our computer-assisted learning tool, we first had to choose whether to use a game or a simulation. According to Kapp, Blair, and Mesch, the main difference between a game and a simulation is that a simulation tries to represent reality, while a game doesn’t have to (see note 1). Because the purpose of technical writing is to prepare students for technical careers, we thought that a simulation would be the best way to make the tool effective for their career preparation. However, following a suggestion from one of our student developers, we did include some elements for comedic effect that, while authentic, were perhaps a bit exaggerated (some of the characters are reminiscent of the TV show *The Office*). We made this choice to improve the narrative structure of the simulation, hoping to make the story more interesting. Also, as with most simulations, we gamified the process by assigning daily tasks, which, when successfully completed, received feedback from the teacher
of the class and allowed students to advance to the next day, thus incorporating the reward cycles that make video games so successful (see McGonigal).

The basic structure of the simulation is as follows. After signing into the system, students see the following home page, which simulates a professional website.

Once they enter the simulation, they see something like this.
On the first day, they mostly get acquainted with the company, and the second day they attend a meeting via conference call, in which they learn that something has gone wrong with a recent test of the medical nanorobots the company produces: the robots, which can repair wounds and bones, failed to stop replicating in a pig they were tested on, and the pig basically exploded. The interns (the participating students) are then given the task of investigating the incident by interviewing employees, reading past emails, and visiting the scene of the incident. They then have to report back in various ways: emails, a press conference, and ultimately a proposal explaining what happened and what the company should do to fix it. As can be seen from the image above, these tasks are laid out for them each day, and the tabs on the top give them access to places to make video calls (for the interviews), correspond through email, and upload files for their assignments. Following is the introduction video they’re met with on the first day.

Altogether, the sim was designed to look like an online portal for a real business, incorporating game elements (like completing tasks and progressing to the next day) while maintaining a professional, realistic experience for students. This differed from a more conventional case study (where the events and people are often laid out on paper and then discussed as a class) or even a teacher-run simulation (in which the teacher might role play as
different characters) in a couple of ways. First, it allowed much of the investigation of the case to happen outside of class, thus reserving class time for group work, more explicit writing instruction, or a workshop of their writing. And second, the videos provided a new face and voice for each character, as opposed to just the teacher, thus allowing the students to draw conclusions and respond to each character independently, which, we believe, is more true to what they will experience in the workplace.

Methods

In order to accurately answer our research question, several types of triangulation were employed in the research design, following Norman Denzin’s theory of triangulation. Although I am the sole author of this article, the study design, data collection, and data analysis were all completed by a team of researchers, including Brian Jackson, Jonathan Balzotti, Derek Hansen, and me. This created investigator triangulation, thus increasing the likelihood that our analysis of the data would be accurate. Methodological triangulation was also employed by using two main research methods: surveys and focus groups. While these two methods certainly serve the purpose of cross checking and verifying the data (as methodological triangulation is designed to do [Hastings 1537]), the focus groups also help explain the results of the surveys, providing insights into the research that numbers alone could not provide.

Participants

All participants were from three sections of English 316, Technical Writing, one of several advanced writing options students are required to take; it is the option required or preferred for more technical majors such as engineering, computer science, or life sciences. We discovered early on that in order to answer our research question, we would need to compare the class using the simulation to at least two other groups: a class using a traditional paper case study and a class
using a more open-ended, genre based proposal prompt. Just comparing the simulation group to
the genre group would reveal the what changes when we provide additional context, but it
wouldn’t necessarily indicate whether a simulation does that better than more traditional case
methods. So, we incorporated analysis of variance (ANOVA) and selected three technical
writing classes to be a part of our study. One professor taught two of these classes: the class that
used the simulation (referred to hereafter as the sim class) and the class that used a paper case
study to provide context for the proposal (referred to as the case study class). Another professor
taught the class whose assignment simply asked them to find a problem in their community and
write a proposal to answer it (hereafter referred to as the genre class). Ideally, the same instructor
would have taught all 3 classes to control for differences in the teacher, but there were no
instructors teaching 3 sections of technical writing that semester. However, having the first
professor teach two of the sections makes it possible to compare the case study and simulation
methods more directly, which is especially useful since there has already been quite a bit of
scholarship about how case studies methods or non-computer-based simulations compare to
more context-less methods (Dorn; Williams; Freedman, Adam, and Smart; Anson).

The participants in this study were the consenting members of these three classes (IRB
clearance number E15234). Almost all students in the class were juniors or seniors, and most
were between 20 and 25 years old. Lawrence’s class (the genre group) was taught at a satellite
campus about an hour away from the main campus, which accounts for the greater diversity in
his class evident below in Tables 1 and 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Enrolled</th>
<th>Male</th>
<th>Female</th>
<th>Lower classes</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sim</td>
<td>24</td>
<td>18 (78%)</td>
<td>5 (22%)</td>
<td>3 (12%)</td>
<td>21 (88%)</td>
</tr>
<tr>
<td>Case Study</td>
<td>25</td>
<td>15 (60%)</td>
<td>10 (40%)</td>
<td>3 (12%)</td>
<td>22 (88%)</td>
</tr>
<tr>
<td>Genre</td>
<td>29</td>
<td>20 (69%)</td>
<td>9 (31%)</td>
<td>18 (72%)</td>
<td>11 (38%)</td>
</tr>
</tbody>
</table>
Table 2. Majors of the participants in each group

<table>
<thead>
<tr>
<th>Group</th>
<th>Engineering</th>
<th>Life Sciences</th>
<th>Math and Physics</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sim</td>
<td>6 (25%)</td>
<td>10 (42%)</td>
<td>6 (25%)</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>Case Study</td>
<td>7 (28%)</td>
<td>15 (60%)</td>
<td>3 (12%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Genre</td>
<td>4 (14%)</td>
<td>10 (34%)</td>
<td>7 (24%)</td>
<td>8 (28%)</td>
</tr>
</tbody>
</table>

Instrument

Most of the relevant data came from surveys. The surveys, which were given after each assignment we collected (the proposal and a research report in each class), used a Likert scale, asking students how much they agreed with 41 different statements about the assignment they had just completed. The scale had 5 points, from Strongly Disagree (SD) to Strongly Agree (SA). The statements could be separated into three categories dealing with the students’ interest in the assignment (their level of engagement or motivation), students’ perception of authenticity (how well the assignment mirrored what they thought they would experience in their careers), and students’ ability to perceive and write for the appropriate audience. While the focus of this article is student engagement, writing studies research has shown that levels of student engagement are connected to whether students can connect their assignments to their lives outside of school (Yancey, Robertson, Taczak 27). Therefore both engagement and authenticity will be considered as important factors hereafter (see Appendix A for the complete survey).

The surveys included a number of features designed to control for certain biases. A mixture of positive and negative statements about the assignment were included in order to control for acquiescence (while there is some debate as to the effectiveness of this practice, “many Likert item scholars still recommend the practice” [Barnette 717]). Basic demographic data (gender, year in school, and major) were collected so we could test whether differences between classes were due to any of those factors. Because of our primary interest in how the simulation compared to the case study and genre-based prompt, an identical survey was also
distributed and collected for the report that all three classes wrote in order to compare and control for differences in class dynamics.

The second data collection method was focus groups. Since focus groups were conducted in class (for about 20 minutes) in order to ensure more participants, questions were restricted to the following 4, with any follow-up questions used as necessary:

1. Tell me your name and major (it will not be disclosed—we just need to keep track).
2. Tell me what you liked about the sim game/case study.
3. What about the sim game/case study wasn’t as helpful for you as a writer?
4. How did this assignment differ from other assignments in the class?

Procedures and Analysis

During the semester the simulation was tested, one or more of the investigators visited the class twice: at the beginning of the semester to explain the study and obtain consent from students, and towards the end of the semester when focus groups were conducted in the simulation and case study classes. For the focus groups, willing participants were divided into three groups, and all three groups were questioned simultaneously with each investigator leading one group. Anyone who did not want to participate spent the class time doing a similar reflection activity with their professor. It wasn’t feasible to conduct a focus group in Lawrence’s class, but since the focus group was mostly used to illuminate the survey data for the simulation class, we have only included data from the sim class anyway (the case study focus groups provided little insight to our research question, so those results have been omitted).

To obtain results for the surveys, the professors gave the students the link to a survey (a separate survey for each assignment—the proposal and the report) and required that they

---

3 A research-based paper in the style of a recommendation and feasibility report
complete it whether or not they had signed the consent form. All students were required to complete the surveys, regardless of their participation in the study, because their teachers were interested in the results for their own purposes.

With the help of statistician Dennis Eggett, we analyzed the survey data in several steps to test the null hypothesis that there is no significant difference in student experience between technical writing students engaged in a sim learning experience and students using case study or genre-based prompts. The survey data had to be adjusted to give us an overall average because we had both positive and negative survey questions, so the best assignment would come out neutral (very positive for the positively phrased assignments, and very negative for the negatively phrased assignments). Therefore, in order to analyze all of the data together, we first reversed the scores for the negatively phrased questions so the overall scores for the groups wouldn’t come out neutral. To give us an idea of the overall differences between groups, we ran analysis of variance for the three groups on each assignment (the proposal across groups and then the report across groups) and then ran t-tests comparing the assignments within each class (sim class—proposal v. assignment, case study class—proposal v. assignment, genre class—proposal v. assignment). But since our primary interest was in what changed the most, which factors did or didn’t make a difference, we also did analysis of variance on each survey question, comparing how the three groups responded to each question.

To analyze the focus groups, all six short focus group tapes (ranging from 10 to 20 minutes) were transcribed, and the responses were then coded in three phases, according to the

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4 Prompts that ask students to write in a specific genre but don’t offer extensive details about the rhetorical situation like a case study does
5 For example, we had the statements “This writing task is irrelevant to what I’ll be doing in the future.” and “This writing task seemed relevant to my career.”
6 For example, a score of 2.5 for the statement “this assignment was irrelevant to what I’ll be doing in the future” indicates they students disagreed slightly with that statement. 2.5 seems like a negative response for positively-phrased questions, but for this one, it’s actually a positive response. Therefore, we would change it to the equivalent positive response of 3.5 in our data set.
grounded theory model (see Neff 125). First, open coding using computer software was conducted to detect any initial patterns (word frequency, etc.); and then the transcripts were read again to discover any themes not coded. A list of codes was established, and notable words or phrases that related to those codes were recorded. Next, axial coding was conducted to look for relationships among the codes and divide them into overarching categories. Finally, selective coding was performed, to analyze the data and compare it to the results of the surveys in order to establish relationships between the methods and draw out a central conclusion from the research.

Results

Quantitative Data

These surveys were based on a Likert scale where 1=strongly disagree, 3=neither agree nor disagree, and 5=strongly agree, so greater than 3 is a positive response while less than 3 is a negative response. The overall means for the proposals were as follows.

<table>
<thead>
<tr>
<th>Table 3. Overall means for proposal for each class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>3.31</td>
</tr>
</tbody>
</table>

\[ d.f.=2, 84; F-Ratio=1.41 \]

\[ p=.248 \text{ (not significant)} \]

The overall means for the reports, using all positively phrased questions, were as follows.

<table>
<thead>
<tr>
<th>Table 4. Overall means for report for each class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>3.44</td>
</tr>
</tbody>
</table>

\[ d.f.=2, 84; F-ratio=1.229 \]

\[ p=.296 \text{ (not significant)} \]

Comparing all three proposal surveys to all three report surveys produced the following results.

<table>
<thead>
<tr>
<th>Table 5. Comparing the proposal to the report overall means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposal Mean</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>3.31</td>
</tr>
</tbody>
</table>
Group by group, the difference between the two assignments was as follows.

Table 6. The proposal compared to the report by class.

<table>
<thead>
<tr>
<th></th>
<th>Difference</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case</td>
<td>.13</td>
<td>.65</td>
</tr>
<tr>
<td>Sim</td>
<td>.33</td>
<td>.004*</td>
</tr>
<tr>
<td>Genre</td>
<td>.19</td>
<td>.30</td>
</tr>
</tbody>
</table>

* p < 0.05

After doing these basic comparisons, we did ANOVA testing on each of the survey questions. We then looked at the pair-wise comparison of mean scores for each question with a p-value less than .1 to see which of the groups had caused the difference in the initial ANOVA test. Figure 7 lists which questions differed and by how much for the proposal surveys (in order to simplify the table, only the significant means are reported). We only tested the report to catch any differences in the dispositions of the classes (one class that responded significantly more positively on both assignments might throw off the comparison for the proposal) and didn’t find any significant differences there. Therefore, we report only those survey questions that had significant results for the proposal surveys, since those correlate more directly with our question of interest.

Table 7. Questions with Statistically significant differences between classes
SE=Standard Error;

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean-Case</th>
<th>Mean-Sim</th>
<th>Mean-Genre</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. I learned valuable skills completing the proposal.**</td>
<td>3.4</td>
<td></td>
<td>3.86</td>
</tr>
<tr>
<td></td>
<td>SE: 0.145</td>
<td></td>
<td>SE: 0.134</td>
</tr>
<tr>
<td>6. I had no problem imagining my audience as I wrote.**</td>
<td>3.44</td>
<td></td>
<td>3.93</td>
</tr>
<tr>
<td></td>
<td>SE: 0.16</td>
<td></td>
<td>SE: 0.149</td>
</tr>
<tr>
<td>30. The audience I was writing to resembled employers I’ve had or will have.*</td>
<td>3.16</td>
<td></td>
<td>2.41</td>
</tr>
<tr>
<td></td>
<td>SE: 0.188</td>
<td></td>
<td>SE: 0.175</td>
</tr>
<tr>
<td>34. The topic of the proposal was realistic.*</td>
<td>3.56</td>
<td></td>
<td>4.14</td>
</tr>
<tr>
<td></td>
<td>SE: 0.173</td>
<td></td>
<td>SE: 0.161</td>
</tr>
<tr>
<td>34. The topic of the proposal was realistic.*</td>
<td>3.56</td>
<td>2.96</td>
<td>4.14</td>
</tr>
<tr>
<td></td>
<td>SE: 0.173</td>
<td>SE: 0.177</td>
<td>SE: 0.161</td>
</tr>
<tr>
<td>36. The topic of the proposal interested me.*</td>
<td>3.16</td>
<td></td>
<td>4.03</td>
</tr>
<tr>
<td></td>
<td>SE: 0.156</td>
<td></td>
<td>SE: 0.149</td>
</tr>
<tr>
<td>36. The topic of the proposal interested me.*</td>
<td></td>
<td>3.17</td>
<td>4.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 8. Comments from focus groups, classified into codes.

<table>
<thead>
<tr>
<th>Code Description</th>
<th>Sample Quote</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Codes relating to how believable/authentic the simulation was.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Too goofy to be taken seriously (the characters, in particular)</td>
<td>“I felt the fantasy that was presented in the simulation was very silly and not true to life, whereas if the point of the class is trying to prepare us for real-world application...”</td>
<td>13</td>
</tr>
<tr>
<td>Sim didn’t merge well with rest of class</td>
<td>“There was a tone change between what we had going on in class and the online assignment. Adjusting to that was a weird transition for me to have.”</td>
<td>8</td>
</tr>
<tr>
<td>Realistic—similar to a real workplace</td>
<td>“I liked how fast-paced it was. It felt more realistic than when you’re given tons of time to do an assignment.” “The character types today are fairly believable, even if they’re a little crazy.”</td>
<td>8</td>
</tr>
<tr>
<td>Unrealistic or Unprofessional</td>
<td>“When our professor does it, it feels real and professional and like it’s a real setting. The simulation lacked that.”</td>
<td>7</td>
</tr>
<tr>
<td>Applicable to what they’ll be doing in careers</td>
<td>“I feel like it actually prepared me for things after college that would actually be applicable to my life instead of just writing random essays.”</td>
<td>7</td>
</tr>
<tr>
<td>Demoted from employee to intern</td>
<td>“I was not a huge fan of how it was different of what we were doing in class. In class we had roles and then it changed from being employees to interns, so it wasn’t quite in line with the rest of the class.”</td>
<td>7</td>
</tr>
<tr>
<td>Technical difficulties</td>
<td>“There were some technical issues like none of the emails were going through to the professor.”</td>
<td>5</td>
</tr>
<tr>
<td>Personalities gave insight into corporate culture</td>
<td>“I think the personalities of each individual helped highlight the culture problem and the importance of a company culture when we go and get those jobs.”</td>
<td>2</td>
</tr>
<tr>
<td><strong>Codes relating to how engaging or motivating the material was.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not enough complexity or variety</td>
<td>“I felt like because there was so much given to us, we didn’t have to think quite as deeply as some of the other ones [other assignments]. Here’s the problem. Here is why everything</td>
<td>10</td>
</tr>
</tbody>
</table>
happened. Then we came up with a solution but it wasn’t quite as challenging as the other assignments because mostly things were given to us instead of us fabricate it on our own.”

“The fact that the simulation was a pig that blew up, I felt like that was entertaining and I feel like the humorous aspect of that made everything else more enjoyable just because you could make jokes.”

“I was less interested in engaging because it wasn’t a topic I picked. It was pretty clear cut what needed to happen and what you needed to do to fix it.”

“I hate Walter with a passion. Caroline just kind of annoys me and Andy acts like a little kid.”

“It gave me more back story because previously I just had a piece of paper with a paragraph back story, but this had a long back story even through the assignment including video calls. I thought this made it easier to do the assignment because you knew more details about what was going on.”

“We’re comparing this with our professor’s teaching methods, so we’re a little bit biased because he’s absolutely amazing.”

“Story was good. User friendly. With this website, it was easier to find where an assignment was and if it was due that today.”

“It was modeled after our professor’s class so I feel like the model was really good.”

Table 9. Codes, according to positive, negative, and neutral responses.

<table>
<thead>
<tr>
<th>Category</th>
<th>Positive</th>
<th>Negative</th>
<th>Neutral</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authenticity</td>
<td>18</td>
<td>40</td>
<td>1</td>
<td>59</td>
</tr>
<tr>
<td>Engagement</td>
<td>13</td>
<td>14</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>54</td>
<td>12</td>
<td>105</td>
</tr>
</tbody>
</table>

Discussion

Quantitative

Although we have controlled for as many variables as possible in our study design by testing multiple assignments, using positively and negatively phrased questions, and using the same teacher for two of the sections, we should also acknowledge the possible imperfections of this
type of research. Since we chose classes that students put themselves in, our sample isn’t totally random, and since we couldn’t have the same teacher for all three sections, some differences could be attributed to differences in teacher. The genre-based class was taught at a satellite campus, rather than our main campus, and that may have contributed to the slightly different demographics of the classes as well—differences in age, major, and gender could contribute to different perceptions. However, most of these flaws have to do with the genre class, and since most of our interesting data came from focus groups and the comparison of the sim and case study classes, we believe these flaws do not invalidate our results. Our relatively small sample size remains an issue, but valuable research has been done with smaller samples, and we hope to expand our sample as we continue to explore this topic.

Despite a few limitations, the data gives us valuable insights about how the students in our study perceived their assignments. The initial ANOVA test illustrated no significant differences in the three classes’ overall response to the assignments for the proposal or the report. Therefore, we failed to reject the null hypothesis that there is no difference between the three teaching methods used. Initial testing did, however, show that students responded more positively on the report than the proposal overall (p < .0001), with the strongest difference in the simulation class. This suggests that the report assignment seems more engaging, perhaps even more authentic, to students (it is difficult to separate these two elements since they are inherently intertwined). The focus groups illuminate why this might be the case—the lack of complexity in the proposal simulation was expressed ten times in the focus groups. Some of this certainly came from the methodology of teaching the proposal, but, compared to the report, the assignment itself also involved less personal research and less freedom to choose the topic for all of the classes,

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7 One of the teachers who agreed to let his class be part of the study just happened to be teaching at the satellite campus that semester. While a more typical class would have been ideal, we were limited by which teachers (1) use a proposal assignment and (2) were willing to add something to their agenda by participating in a study.
not just the sim class. Two students explicitly expressed that the reports had led to more interesting, “diverse” papers than the proposal. While we can only conjecture that this contributed to the greater interest in the report, such a conjecture is consistent with the theory of interest that humans are interested in things that are complex enough to require work to figure out (see Silvia).

But regardless of whether the assignment itself was the most effective, we wanted to know how the three methodologies compared. Because the overall p-value does not exhibit significant differences between the three classes, even those survey questions that did differ significantly from one class to another are somewhat inconclusive, since, statistically, a couple questions would prove to be significant just by chance. However, analyzing which questions were significantly different can still give us insights into how the students received the simulation and where we should go in future research.

**Engagement**

Surprisingly, the genre-based class proposal scored higher than the other two classes on almost every significant question. The one exception to this pattern was the statement “the audience I was writing to resembled employers I’ve had or will have,” probably because in the genre-based assignment, they weren’t asked to write to employers. The better response in the genre-based class might be due to the complexity factor since, in this assignment, the students could select a topic and audience that seemed the most relevant to them. This is particularly apparent in question 36 (one of the two questions in which the simulation class had a meaningful difference): “The topic of the proposal interested me.” The simulation and case class were almost the same.

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8 When 41 tests are considered simultaneously (we have 41 survey questions), the probability of one of them being significant purely by chance is 88%. The general principle is that for every 20 tests you do, you can expect at least 1 false positive (something that yields significant results purely by chance rather than because of actual significance).
on this question, which makes sense because they had the same topic, but the genre class scored significantly better because they students could select something that interested them.

**Authenticity**

Perhaps one of the most important statements with a significant difference was “the topic of the proposal was realistic.” This is particularly important because these two classes were the most comparable since that had the same professor and close to the same assignment (just in different formats). Based on the focus groups, believability was one of the main issues with the simulation, which led the participants to rate the simulation as significantly less realistic than the genre and case study methods. Since one of our goals was to create an authentic experience, it is important that we dive into why we were unable to do that, which will be explained in the qualitative discussion.

While most survey questions didn’t yield significant differences between the classes, the results for all of the classes were mostly positive. Overall, students felt the assignments they were given were teaching them valuable skills and preparing them for their futures. For example, observe the positive response to the statement “this writing task prepared me to write in the workplace” in Table 10.

### Table 10. Responses to the statement “this writing task prepared me to write in the workplace” on a Likert scale from strongly disagree to strongly agree.

<table>
<thead>
<tr>
<th>Group</th>
<th>SD/D</th>
<th>N</th>
<th>A/SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation Proposal</td>
<td>3</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>Case Study Proposal</td>
<td>3</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Genre Proposal</td>
<td>1</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Sim Class Report</td>
<td>0</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Case Class Report</td>
<td>3</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>Genre Class Report</td>
<td>2</td>
<td>11</td>
<td>17</td>
</tr>
</tbody>
</table>

While the students in the focus groups for the simulation gave critical comments as often as positive or neutral comments, we can see from Table 10 (especially the simulation proposal line)
that the majority of students in the class had a positive experience. While the simulation wasn’t an overwhelming success, the suggestions given in the focus group combined with the positive experience of most students lead us to conclude that, with some specific improvements, the simulation could be an effective teaching tool.

**Qualitative**

**Engagement**

The quantitative results seem to suggest that the simulation made little difference in students’ experience and, particularly in the workplace authenticity category, actually made their experience worse. The focus group responses illuminate why students responded this way. Returning to the research about human interest is useful here. Factors that lead to human interest include novelty, narrative, complexity, interactive game elements that engage our reward cycles, and, in an educational setting, applicability to life outside of school (Silvia; Stromberg; McGonigal; Yancey, Robertson, and Taczak). Based on the focus groups, some of these elements seemed to be present in the simulation while others were lacking.

The first factor, novelty, seemed to be present in the simulation. Students expressed appreciation for the way the simulation broke up the normal format of an essay, saying things like “It was interesting to have a different form of media besides tech files of videos. It at least switched it up and made it interesting.” Altogether, there were ten comments about it being humorous, fun, or interesting, many of them remarking that, especially compared to other classes where they are given a very open prompt, the simulation offered something new and interesting.

The narrative element had mixed reviews. The students remembered detailed elements of the simulation very clearly, which was worth noting, since students’ descriptions of other assignments in the class were much less detailed (this may speak to McDaniel et al.’s research
that interest and narrative improve memory [496]). Three students also expressed strong feelings about the characters, which shows that they were emotionally engaged with the simulation, even if their views of the characters were somewhat negative. While at least eight students found the simulation realistic and applicable, with two students specifically claiming the characters’ personalities were useful practice for interacting with different people in a corporate setting, many others thought the characters were exaggerated and unrealistic (there were at least thirteen comments about the simulation being too “goofy”). This is a problem for the issue of student engagement because one reason narratives captivate human interest is that people experience narrative transport, where they feel they are really part of the story. When the story is unrealistic or unbelievable, it essentially kicks the viewers out of the immersive experience and they recognize that they are only spectators to an unreal event. This lack of immersion in the story leads to decreased focus as well as decreased enjoyment (See McGonigal; Green, Brock, and Kaufman). Therefore, the mixed response about whether they enjoyed the narrative is an important factor in understanding why not all of the students viewed the simulation positively.

The complexity factor was, unfortunately, missing, perhaps because some of the interactive game elements we had planned were not finished or polished by the time we had to run the simulation. We wanted students to do more investigating, to select from a list of questions that would lead to other questions, therefore making it seem like more of an investigation (maybe even leading students to different conclusions depending on which questions they selected in what order). However, the programmers we were working with didn’t have enough time to incorporate all of the elements before we had to do our test run, so the video interviews were instead just one long video with questions appearing as a pop-up bubble throughout the video. This, along with other technical difficulties the students mentioned in
focus groups (such as the professor not being able to access their work through the company interface and instead requiring them to submit work to his normal email) took away the feeling of the students being an actual part of the company, actively involved in the investigation. Instead, they were just watching videos and completing tasks, but without really making many choices about how to go about the tasks, which led to some students’ perception that the simulation felt like “jumping through hoops.” Thus, the benefits of an immersive game weren’t really present because the sim wasn’t as interactive as it was supposed to be.

But even if the simulation had worked exactly how we had planned, the streamlined nature of the simulation (checking off tasks each day and moving on) and the limited number of questions we had prepared in the video interviews still might have led to a lack of complexity and variety in their responses, a problem students brought up ten times in the focus groups. One student remarked, “A lot of the ideas and solutions that people came up with in different groups were very similar…. We all had the same ideas: we need to improve company culture.” This is a significant observation because it points to a problem that could be prevalent in simulations of this nature. When students are asked to do more independent research to understand an issue, they may experience a lack of context or clear audience, but they will be able focus on issues they have a topical interest in, which may lead to deeper thinking. Simulations, on the other hand, can provide a clearer rhetorical context, but perhaps sacrifice complexity to do so.

If one of the benefits of engagement is that it gets students to think more deeply about their projects, then it make sense that something that isn’t as complex and doesn’t require as much deep thinking won’t engage students’ interest as much. It seems likely that’s what we saw with the simulation. However, there is also a question of whether interest and engagement come at the price of authenticity. Students may prefer having more autonomy and complexity, but how
often does that happen with writing in the workplace? Dorn’s research shows that most workplace writing happens in fairly straightforward, familiar situations that require the ability to “disseminate information” (45). Realistic writing scenarios are not particularly complex or variable—employees themselves usually wouldn’t label these tasks as interesting, so there seems to be some tension between authenticity and engagement in classes that try to prepare students for workplace writing.

**Authenticity**

But there are other factors that influenced authenticity in our study. The most significant problem with the simulation, according to the focus groups, was that it didn’t feel realistic or professional and, therefore, students had a hard time seeing how it applied to their careers. The authenticity factor wasn’t there for many of the students in the simulation class, usually because they saw the characters as too silly for the simulation to really seem like a corporate environment (this was the most mentioned comment in the focus groups, with 13 instances). This was interesting because we had added many of the slightly comedic characters in an effort to be more engaging, an idea that many of our undergraduate assistant developers had responded positively to (many of these assistants were humanities students, while most of the students in the class were STEM majors, which may account for the different perspective). However, many students seemed to think the simulation went too far (both in the script and in the acting), making it seem less useful because, especially compared to how their professor used case studies in the rest of the class, the simulation seemed less like what they would actually experience in the workplace rather than more so. For writing assignments, applicability to life outside of school can be crucial to student engagement and motivation, and through the trial and error of this pilot simulation, we at least know that adding too much humor can break the façade for students.
**Conclusion**

Altogether, the simulation was not as successful as we had hoped. The participants in our study were not as engaged or as fully immersed in the rhetorical situation as the participants in other studies seem to have been (Carnes; McGonigal). But it was also not a total failure, and we learned valuable principles that we can apply to future simulations. Some of the main things we learned include:

1. A great teacher can create a sim-like environment, sometimes more effectively than a computer simulation can. The sim class’s professor acted the parts of different characters and had his students ask him questions, so students were able to get the context and have a bit more complexity in the assignment.

2. The simulation was still helpful in providing additional context.

3. The narrative in a simulation needs to be believable to be effective and create a sense of workplace authenticity.

4. Interactivity and autonomy (some variety in process and response) are key to an engaging simulation.

5. There may be a trade off between engagement and authenticity.

These findings give us insight into how to improve this simulation, and any other simulations, in the future.

**Future Development and Application**

Specifically, we have three main suggestions for those wishing to learn from our successes and mistakes to improve their own computer simulations. We will be applying these suggestions in our own future models.
1. **Use game elements to create a level of complexity appropriate for the level of the students.** Responding to the focus groups, we’ve come up with a couple ways to do this for our simulation including:

   a. Give students autonomy about how they will investigate, rather than a checklist. This was one student’s suggestion for how to make the simulation feel less like jumping through hoops.

   b. Create more content (videos, documents with clues, etc.). This will allow for a greater variety of response, especially if (in combination with part a) the students don’t watch all of the videos, but are given certain options based on which interviews and questions they choose first. This will make it more like a detective role-playing game.

2. **Consider how teachers will integrate the simulation into the class, and create tools to help them do so (handbooks, lesson plans, etc.).** One of the barriers to a sense of workplace authenticity in our study was simply that it didn’t fit into the rest of the class. They were employees and then they were interns. They had a pattern for all other assignments and then it was thrown off. If we had prepped the professor better for what was in the simulation, he might have placed the simulation differently in the class (several students thought it would have worked better earlier in the semester) and mediated the transition for students.

3. **Consider your audience and how they would respond to the characters you’ve created.** The authors of *Worlds Apart* claim that attempts to simulate workplace writing don’t really meet their aim because simulations lack the social motives and “local rhetorical complexity” of workplace writing (Dias et al. 201). However, as Boscolo and
Gelatti point out, authentic writing isn’t simply about “practical relevance”; it’s largely about teaching students that writing is a social act (288). We do not expect that the line between school and work will become blurred through the simulation, but we do expect that a simulation students can become immersed in will help them conceive of writing as social, able to contribute to the solving of real problems. Some things we plan to do to increase the rhetorical complexity and believability of the simulation include:

a. Downplaying the humor a bit. This won’t work for every group of students, but in a technical writing class, the humor was too much for many students.

b. Include a few more “normal” characters. Every office has a few people with extreme personalities, but when too many of those are combined into one space, it starts to feel more like a sitcom than an office (one student felt like he was just watching an episode of *The Office*, which isn’t necessarily a bad thing, but it does make it feel less real).

There are obviously many other lessons we could draw from the students’ responses to our simulation, which I hope readers will draw from the data we’ve given. The list we’ve provided is simply a starting point for us based on what seemed most important in the focus groups we conducted.

*Future Research*

An area for future research could be to try the simulation in a variety of classes. One advantage of a simulation is that it’s more usable for less experienced teachers than a basic case study. As many students remarked, their professor didn’t really need the simulation to make his class feel interesting or similar to a workplace—he was already doing that, drawing from his experience as a technical writer in a corporate environment. But not all teachers have the background necessary
to run case studies the way the professor in our study did, and in those cases, a simulation could be very helpful in giving students more of a workplace context. As we develop the simulation further, we are planning to test it in an online version of the class and in a high school setting, two places where we think the simulation could have a more positive impact. Eventually, we’d also like to try this and other simulations in other writing-based classes such as humanities classes or first-year writing and see if different demographics receive the simulation differently.

Finally, future study with improved simulations should test other aspects of the simulation’s effect. While this study focused on student experience, any teacher knows that how much a student likes an assignment isn’t the only factor determining how much they learn. Motivation alone deals with many other factors, including cognitive processes like working memory (Hayes 4), social support (Lipstein and Renniger), and previous knowledge (Benton et al.). Future research could begin to incorporate some of these factors. A comparative analysis of students’ actual writing could be performed. Authenticity and engagement could be emphasized separately to see how to maximize results (can they both be emphasized equally? Does one come at the expense of the other?). Tests could be administered after doing a simulation and a case study testing how well students understood or remembered the context they were writing about. Overall, other ways of testing the simulation’s effect should be done in order to really understand this new technology and find ways for it to succeed in writing classes as it has in other types of classes.

Looking Up

Despite the problems with the simulation we tested, several factors give us reason to hope that simulations could still have a positive effect in writing classes. First of all, the success of other simulations, as discussed in the introduction, suggests that with better design, this simulation
could have a more positive aspect (after all, scholarship that touts the benefits of simulation always has the caveat that it must be well-designed to be effective [Carnes; Kapp, Blair, and Mesch]). And while simulations might not be the most effective option in every situation, the fact that most teachers could use the simulation with very little training speaks to its potential to provide a clear rhetorical situation for teachers who are looking to give students more contextualized assignments but perhaps don’t have enough technical or corporate background to feel comfortable designing their own case studies. And since the simulation is already in a digital format, it has an even greater potential for online education, where, at least at our university, most assignments for the technical writing class provide little in the way of an authentic rhetorical situation for students to respond to. They may be told to write to a certain audience, but without personal interaction with the teacher (who can clarify or even role-play the audience members), it’s hard for them to really get to know the imagined audience they are writing to. Therefore, the simulation has a lot of potential in the ever-growing world of online education.

Overall, the main reason to hope is that students’ responses were mostly positive, if with a few caveats. There is reason to believe the positive response will only increase as we learn more about simulation and develop better, more immersive educational simulations in the future. As we continue to seek for new and better ways to keep students engaged in the cognitively difficult task of writing, computer simulations should certainly be part of that search.
Works Cited


Yancey, Kathleen Blake, Liane Robertson, and Kara Taczak. “The Content of Composition, Reflective Practice, and the Transfer of Knowledge and Practice in Composition.”

Appendix A

Survey Questions:
1. The intended audience motivated me to do my best work.
2. I'll likely write these kinds of papers in my career.
3. I enjoyed solving the problem that was presented in this writing task.
4. I did my best work for this writing task.
5. I learned valuable skills completing this writing task.
6. I had no problem imagining my audience as I wrote.
7. I wrote in a genre appropriate to my audience.
8. This writing task seemed relevant to my career.
9. How I thought about my audience influenced my writing process.
10. I understood what my audience wanted or needed from my writing.
11. I thought more deeply about this writing task than I have for other tasks.
12. My primary concern was to please my teacher for a good grade.
13. I would like to learn more about this topic in the future.
14. I was self-motivated to complete this paper beyond getting a good grade.
15. I do not like to write.
16. I had a mental picture of my audience as I wrote.
17. In this scenario, I thought of my audience as someone other than my instructor.
18. This writing task prepared me to write in the workplace.
19. This writing task felt like any other—I just wanted to get it over with.
20. The audience for this writing task was my teacher.
21. I'll likely never write this kind of paper again.
22. This writing task seemed artificial to me.
23. I feel confident now in my ability to write these kinds of papers in real-life.
24. Writing these kinds of papers doesn't interest me.
25. This writing task was a school exercise—nothing more.
26. This writing task is irrelevant to what I'll be doing in the future.
27. The way this writing task was presented to me (curriculum, technology, out-of-class activities) was exciting.
28. I felt like I was an active part of finding a solution to the problem.
29. I was interested in the context (purpose for writing, audience, situation, etc.).
30. The audience I was writing to resembled employers I've had or will have.
31. I was interested in this writing task from start to finish.
32. I structured my writing to address my audience's reading needs.
33. I felt like I didn't need to think much or deeply to solve the problem presented in this task.
34. The topic of the writing task was realistic.
35. I did not think much about audience as I wrote.
36. The topic of this writing task interested me.
37. This project helped me improve as a writer.
38. This project helped me learn how to respond more effectively to writing situations.
39. The way this writing task was presented to me (curriculum, technology, out-of-class activities) did not enhance my writing experience.
40. To complete this writing project, I drew from what I have learned in other settings (prior classes, prior writing assignments, work experience, etc.).
41. I look forward to working on proposals in the future.