The effect of automated fluency feedback on written text production

Emily Nicole Dux Speltz
Iowa State University

Follow this and additional works at: https://lib.dr.iastate.edu/etd

Recommended Citation
Dux Speltz, Emily Nicole, "The effect of automated fluency feedback on written text production" (2020). Graduate Theses and Dissertations. 17872.
https://lib.dr.iastate.edu/etd/17872

This Thesis is brought to you for free and open access by the Iowa State University Capstones, Theses and Dissertations at Iowa State University Digital Repository. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
The effect of automated fluency feedback on written text production

by

Emily Dux Speltz

A thesis submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
MASTER OF ARTS

Major: Teaching English as a Second Language and Applied Linguistics

Program of Study Committee:
Evgeny Chukharev-Hudilainen, Major Professor
Carol A. Chapelle
Jo Mackiewicz

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University
Ames, Iowa
2020

Copyright © Emily Dux Speltz, 2020. All rights reserved.
# TABLE OF CONTENTS

LIST OF FIGURES ........................................................................................................... iv

LIST OF TABLES ............................................................................................................... v

ACKNOWLEDGMENTS ...................................................................................................... vi

ABSTRACT ........................................................................................................................ vii

CHAPTER 1. INTRODUCTION .......................................................................................... 1

CHAPTER 2. LITERATURE REVIEW .................................................................................. 4
   Strategy-Focused Interventions .................................................................................... 4
   Learning Theory ........................................................................................................... 6
      Skill Acquisition Theory .......................................................................................... 6
      Cognitive Process Theory of Writing ..................................................................... 8
   Product and Process Measures of Writing ................................................................. 13
      Fluency ..................................................................................................................... 14
         Definition of fluency .............................................................................................. 15
         Operationalizing writing fluency ......................................................................... 19
      Complexity ............................................................................................................... 22
         Definition of complexity ...................................................................................... 23
         Operationalizing complexity .............................................................................. 24
      Accuracy .................................................................................................................. 26
         Definition of accuracy .......................................................................................... 26
         Operationalizing accuracy ................................................................................... 27
   Discourse Constituent Unit Analysis ......................................................................... 28
      Definition of DCU analysis ..................................................................................... 28
      Operationalizing DCU analysis ............................................................................. 29
   Holistic Quality .......................................................................................................... 30
   The Current Study ....................................................................................................... 31

CHAPTER 3. METHODOLOGY ......................................................................................... 32
   Participants .................................................................................................................. 32
   Materials ..................................................................................................................... 32
      The Intervention ...................................................................................................... 33
   CyWrite ....................................................................................................................... 34
   Tasks ............................................................................................................................ 35
   Questionnaire ............................................................................................................. 36
   Procedures ................................................................................................................... 36
   Writing Measures ....................................................................................................... 38
Process Measures ............................................................................................................. 38
Product Measures .......................................................................................................... 39
Statistical Analysis ........................................................................................................ 40

CHAPTER 4. RESULTS AND DISCUSSION ..................................................................... 42
Process Measure Results .............................................................................................. 42
Product Measure Results .............................................................................................. 44
Questionnaire Responses .............................................................................................. 46
  Q1: How did you feel as you were writing with the disappearing text condition? ...... 46
  Q2: Did you feel like you had to sacrifice grammatical/spelling accuracy while
      writing with the disappearing text condition? ....................................................... 48
  Q3: Did you feel like you had to sacrifice complexity while writing with the
      disappearing text condition? ................................................................................ 49
  Q4: How do you think the disappearing text condition impacted your writing
      process? .................................................................................................................... 50

CHAPTER 5. CONCLUSION ............................................................................................ 55

REFERENCES .................................................................................................................. 58

APPENDIX A. QUESTIONNAIRE .................................................................................. 63
APPENDIX B. HOLISTIC RATING GUIDELINES ............................................................ 64
APPENDIX C. DATASET OF PARTICIPANT RESPONSES ............................................ 65
APPENDIX D. IRB APPROVAL ...................................................................................... 87
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Progression of the intervention condition’s text from 100% opacity to 0% opacity upon pausing</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>Visual representation of the four counter-balancing groups.</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>Feelings expressed in participants’ responses to “How did you feel as you were writing with the disappearing text condition?” (Note: Categories were not mutually exclusive.)</td>
<td>47</td>
</tr>
<tr>
<td>4</td>
<td>Proportion of participants expressing that they felt they sacrificed accuracy during the forced-fluency condition</td>
<td>48</td>
</tr>
<tr>
<td>5</td>
<td>Proportion of participants expressing that they felt they sacrificed complexity during the forced-fluency condition</td>
<td>49</td>
</tr>
<tr>
<td>6</td>
<td>Questionnaire responses to “How do you think the disappearing text condition impacted your writing process?” (Note: Categories were not mutually exclusive.)</td>
<td>53</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1. Summary of aforementioned theoretical approaches from previous literature and their implications for this study’s automated forced-fluency intervention ............. 12

Table 2. Process measures across conditions for all participants ........................................... 42

Table 3. Mean IKIs across conditions and locations ................................................................. 43

Table 4. Product measures across conditions for all participants ............................................. 44
ACKNOWLEDGMENTS

I would first like to thank my committee chair, Dr. Evgeny Chukharev-Hudilainen, for seeing potential in me when he was the instructor of my Introduction to Linguistics class and for guiding me in my academic endeavors ever since. He has helped me discover what I am passionate about, and this thesis would not have been possible without him. I am truly grateful for his endless and kind support.

I would also like to thank my committee members, Dr. Carol Chapelle and Dr. Jo Mackiewicz, for their interest in my project and feedback throughout the completion of this thesis. I feel very lucky to be surrounded by such intelligent and kind female professors who allow me to picture myself in this field in the future.

Additionally, I would like to thank the staff at the Writing and Media Center (WMC). Not only did the student employees volunteer to participate in my study without a second thought, but they also supported me throughout the duration of my bachelor’s and master’s degrees. I am also grateful for Dr. Kelly Wenig, Intercultural Learning Specialist at the WMC, for his friendship and encouragement throughout my education.

Finally, I would like to thank my friends and family for encouraging me to pursue this degree and for helping me maintain a work-life balance throughout the process. I would especially like to recognize my parents, Darin and Gina Dux, and my husband, Jake Speltz, for always reassuring me of my abilities and encouraging me to achieve great things.
ABSTRACT

Fluency is undoubtedly an important aspect of written language production, but little is known about the best ways to encourage the fluent production of text. This article presents a new intervention for improving first language (L1) writing fluency and reports an empirical study investigating writing quality with this intervention. The intervention explicitly encourages fluent text production by providing automated real-time feedback to the writer. The design of this intervention was informed by previous studies on strategy-focused interventions and by two learning theories: skill acquisition theory and the cognitive process theory of writing. Guided by previous research and these theories, this study developed two research questions concerning the new intervention. These questions concerned the impact of this intervention on product and process measures of writing and on users’ perceptions of the intervention.

To address these research questions, this study employed a mixed-methods approach. It collected quantitative and qualitative data from twenty native-English-speaking undergraduate students at a large Midwestern university. The quantitative data consisted of scores earned by the participants upon completing two writing tasks: one which included the new fluency intervention and one which served as the control condition. These tasks were conducted using an online text editor with embedded keystroke logging capabilities. Linear mixed-effect models were run to analyze the effect of the intervention on the final product of writing (i.e., the text that is produced) and the process of writing (i.e., the time-course of the moment-by-moment actions that taken to produce the text). Findings demonstrated that there were significant differences between the fluency intervention condition and the control condition in terms of the product and the process. Specifically, participants wrote more text, expressed more ideas, and produced a higher-quality text in the fluency intervention condition. The qualitative data consisted of
responses to questionnaires in which participants reported their perceptions of the intervention upon completing it. They expressed some potential benefits of the intervention, including being able to think faster and generate more ideas, feeling motivated to write, and writing more intentionally. After presenting these findings in more detail, this thesis concludes by discussing potential practical applications of this intervention.
CHAPTER 1. INTRODUCTION

Cognitive accounts of written language production incorporate pausing as a natural, and necessary, behavior exhibited by writers (Chukharev-Hudilainen et al., 2019; Alamargot et al., 2007). Arguably, the ability to pause and think without disrupting the flow of communication is a distinct benefit of writing over speaking. However, certain disfluencies in production (e.g. occurring mid-sentence or mid-word) can damage the quality of production by inhibiting the writer’s train of thought and causing them to forget what they were about to say (Chukharev-Hudilainen et al., 2019; Christiansen & Chater, 2016).

Christiansen and Chater (2016) attributed this phenomenon to the concept of just-in-time language production: successful language production requires that low-level linguistic decisions (e.g., those related to phonology, syntax, and word retrieval) be made rapidly so as to not interfere with the communicator’s limited cognitive capacity. When a writer has difficulty with low-level processes, these low-level processes inhibit the writer’s ability to execute higher-level decisions. In other words, if a writer is explicitly concerned with their use of certain grammatical forms or spelling choices as they are composing mid-sentence or mid-word, there will be less cognitive capacity available for this writer to focus on higher-level decisions such as the production of complex thoughts or the organization of information.

This explanation leads to a conclusion about the importance of writing fluency. While hesitation in speaking is quite obvious and may hinder the listener’s comprehension, the receiver of written communication has no idea that there was a disfluency when the writer was producing the text, and that disfluency has no immediate visible effect on the communication (Van Waes & Leijten, 2015). Pausing, of course, is a natural (and necessary) component of the writing process: writers frequently stop to think, select the right word, or edit something just written to state it
better. However, Chukharev-Hudilainen et al.’s (2019) and Christiansen and Chater’s (2016) findings show that excessive pausing can damage the quality of the text by causing the writer to lose their train of thought. For example, Chukharev-Hudilainen et al. (2019) found that L2 writers tend to have longer mid-sentence pauses than L1 writers. A writer that stops in the middle of the sentence to worry about surface-level linguistic issues (such as grammatical or spelling accuracy) might, in a literal sense, forget what they were going to say next. Intuitively, then, it would make sense to investigate how to assist writers in their attempts to write fluently. For example, would it suffice to simply tell writers to avoid excessive pausing, or would feedback about the writer’s real-time performance be more helpful? Little is currently known about the impact of this type of process-based instruction, let alone how the benefits of this instruction might vary across different populations of writers and different types of writing.

Chukharev-Hudilainen et al. (2019) argued that “developing fluent written production can be, in and of itself, an important focus of intervention” (p. 585). A potential intervention called “forced fluency” has been proposed, wherein the writer is pushed to continue writing without extensive pauses. Feng and Chukharev-Hudilainen (2017) conducted a proof-of-concept study where this strategy was implemented by having a researcher observe the process of writing and intervene should pauses occur. This implementation, although found to be effective for removing disfluencies, is not efficient as it requires a researcher’s (or teacher’s) constant attention to an individual student during the composition process.

Following Chukharev-Hudilainen et al.’s (2019) call for a fluency-focused writing intervention, the present project explores the potential of a computer-assisted forced-fluency intervention for written language production. Participants, native-English-speaking undergraduate students writing in their L1, responded to an argumentative task in two conditions:
the forced-fluency intervention and a control condition. In the forced-fluency intervention, participants received automated real-time feedback about their pausing behavior and were encouraged to write continuously without excessive pauses. In the control condition, participants were given a time limit for completing the task, but no real-time feedback on the duration of their pauses was provided. Each text produced by participants was then analyzed in terms of both writing-process and written-product measures to examine how the forced-fluency intervention impacted the writing process and the linguistic characteristics of the participants’ texts. The goal of the study, therefore, is to determine whether this type of automated forced-fluency intervention would have the potential to change, in desirable ways, the process of written text production and the linguistic characteristics of the written products. This study, thus, may be viewed as a first step in paving the way toward a possible pedagogical intervention that might directly modify the process of written text production through the provision of automated, real-time feedback to the writer.

This thesis will begin by reviewing the existing literature on pedagogical interventions that focus on modifying the process of writing (i.e., the so-called “strategy-focused interventions”), theories of learning that inform writing pedagogy, and indices that are used to capture the process of text production and the characteristics of the written text—including fluency, accuracy, and complexity measures; measures based on discourse constituent unit analysis; and holistic writing quality—in Chapter 2. It will then describe the methodology used for the present study, including information about this study’s participants, materials, procedures, and data analyses in Chapter 3. Chapter 4 will then report and discuss the results of the present study. Finally, Chapter 5 will present a summary of the findings and the limitations of the study, and it will conclude with a discussion of potential implications and areas of future research.
CHAPTER 2. LITERATURE REVIEW

This thesis describes the development and evaluation of an automated forced-fluency intervention wherein writers receive automated real-time feedback about their pausing behavior during text production and are encouraged to use this feedback to write more fluently. This chapter focuses on three bodies of literature that were essential to the development of this study. First, it describes the research on existing strategy-focused interventions (i.e., pedagogical interventions that aim to change the process whereby the text is produced) and outlines their success documented by previous research. This chapter then provides an account of the two theoretical approaches that guided the development of the present intervention: skill acquisition theory and the cognitive process theory of writing. Finally, this chapter provides definitions and operationalizations of various process and product indices that are used to capture the process of written text production and the characteristics of the final text. These measures are needed to assess the effect of this intervention on the process and product of writing relative to the control condition. Therefore, it is valuable to present the ways in which these measures have been defined and operationalized in previous studies before the following chapter will address the ways in which the present study employed them.

Strategy-Focused Interventions

This section will discuss strategy-focused interventions and their relevance for writing pedagogy. The ability to write successfully depends on more than fluent language-production skills and an awareness of what makes a text complex, accurate, and dense with ideas; it requires procedural skills for planning that content, producing it in comprehensible sentences, and reviewing and revising those produced sentences (Hayes & Flower, 1980; Fidalgo et al., 2015). In order to help learners develop these procedural skills, strategy-focused interventions have
been proposed and evaluated. Alexander, Graham, and Harris (1998) consider “strategies” to be “procedural, purposeful, effortful, willful, essential, and facilitative,” and they must represent procedural knowledge (p. 130). Therefore, a strategy-focused intervention is one that presents learners with explicit knowledge about the procedures required for the task at hand. In the case of writing interventions, a strategy-focused intervention presents not only information about what qualifies as successful writing but also guidelines that can be deliberately employed in the writing process.

Graham et al. (2012) conducted a meta-analysis of writing intervention research, and their findings revealed much about the efficacy of various strategy-focused interventions. Their meta-analysis included 115 articles investigating writing interventions, and to be included in this analysis, each strategy-focused intervention had to be included in at least four studies to calculate statistical significance and effect size. They found six writing interventions that involved the explicit instruction of writing processes, skills, and knowledge, and a statistically significant effect size was found for all but one of those interventions. Four additional interventions were also found to be statistically significant, all of which involved scaffolding and supporting students’ writing processes (Graham et al., 2012).

Other meta-analyses have also found strategy-focused interventions to be successful. Graham and Perin (2007) found that, of the 11 interventions they researched, strategy instruction and summarization had the greatest effect sizes on the studies in their meta-analysis. Rogers and Graham (2008) supported the finding that strategy interventions were effective, and more specifically, they found that these were effective in single-subject research designs as well. Clearly, these strategy-focused interventions have been successful for writing instruction, and in fact, they have been proven to be more successful than other writing instruction strategies such
as grammar instruction or extra writing practice (Graham et al., 2012). The theoretical underpinnings of these strategy-focused interventions will be discussed in the following section.

**Learning Theory**

This section will discuss the two learning theories that guided the design of the present study’s intervention: skill acquisition theory and the cognitive process theory of writing. A discussion of learning theories for a study about writing certainly could include a wide variety of factors from sociolinguistics, cognitive science, and beyond, but these two principles are most relevant for the present study on native English writers who are learning how to improve their writing skills in an undergraduate university setting.

**Skill Acquisition Theory**

Skill acquisition theory, developed in cognitive psychology, addresses the process of learning new skills, and it can be applied to the study of skills learned in classrooms, sports, industry, and beyond. The overarching idea of skill acquisition theory is that all skills are acquired in similar ways, and as DeKeyser (2007) put it, there is a “remarkable similarity in development from initial representation of knowledge through initial changes in behavior to eventual fluent, spontaneous, largely effortless, and highly skilled behavior” (p. 97). Naturally, then, the question that follows to those who wish to teach or gain a skill is exactly how one can reach the “largely effortless” display of that skill. Researchers who study skill acquisition have found that in general, there are three stages of development that one must progress through in order to fully acquire a skill: the cognitive stage, the associative stage, and the autonomous stage (e.g., Anderson, 1982; Anderson, 1993).

In the cognitive stage, a learner initially either observes or analyzes a certain skill or is instructed on that skill by an expert. With regard to writing, a new learner sees how others have written in the past, and they receive explicit instruction from a teacher about how to write. This
is the stage in which strategy-focused interventions are utilized. Next comes the associative stage in which the learner begins to practice writing as a skill. Instead of merely hearing about how to write or watching others do it, the learner will now begin to produce their own writing. After some practice, the learner will no longer have to retrieve every piece of information about writing that was passed on from the instructor; the writing will become proceduralized, and the learner will be able to call upon their ability to write when needed. However, the process is not yet fully automatic; there will still be errors in the learner’s writing, and the process will not yet be fully fluent. Only with extensive practice will a writer eventually be able to reduce the time that it takes to write, the rate of errors in any piece of writing, and the effort and attention required to produce writing. Eventually, there will be a gradual automatization of knowledge, but this process is never complete. Even a professional basketball player may miss a free throw on occasion, or an adult who types on the computer every day may make typographical errors, despite these skills nearly being automatized. What is important, then, is not achieving absolute perfection of a skill; rather, it is the continuous practice of a skill that is important to shift from declarative knowledge (awareness of information related to the skill) to procedural knowledge (awareness of how to perform the skill) and eventually to a nearly automatized skill (DeKeyser, 2007).

Fan and Ma (2018) applied skill acquisition theory to their study on feedback provided during writing instruction, namely, written corrective feedback. They argued that written corrective feedback provided to learners is a source of declarative knowledge and that with continued practice with that feedback, learners will eventually be able to proceduralize their writing and avoid making errors that have already been corrected. Bitchener and Ferris (2012) made a similar argument in which they explained how the three stages of skill acquisition theory
apply to written corrective feedback. They explained that the cognitive stage should include specific descriptions of the procedure to be learned, and in the case of written corrective feedback, this means that teachers should explain why learners made a mistake and how they should correct it. Next, the associative stage involves the actual practice of the methods required for correcting an error. This means that if a learner made a mistake and received information about how to fix that mistake in the cognitive stage, the associative stage should then involve that learner discovering how to address similar mistakes in similar contexts. In the autonomous stage, the learner should then make the correct decision, thereby avoiding the initial mistake, more rapidly and automatically. Through this process, Fan and Ma (2018) argued that skill acquisition theory provides “a solid rationale” for written corrective feedback (p. 1633). The present thesis takes a similar approach by using the skill acquisition theory to guide the development of an intervention that targets the fluency (vs. accuracy) of written text production.

**Cognitive Process Theory of Writing**

This section will now overview the cognitive process theory of writing which, along with skill acquisition theory, guided the present study. In general, the cognitive process theory of writing addresses the cognitive processes involved in composing written text (Flower & Hayes, 1981). The theory rests on the idea that writing involves a series of “distinctive thinking processes” (p. 366) that writers orchestrate while composing. In opposition to the stage process model—a commonly used model for thinking about writing processes which asserts that the composing process is a linear series of stages that leads to the gradual development of a piece of writing—the cognitive process theory asserts that there is a hierarchical structure of elementary mental processes. In other words, the process of generating ideas, for example, is a sub-process of planning, and evaluating and revising are sub-processes of reviewing. Furthermore, these processes do not necessarily occur in a linear way; instead, each of these cognitive acts may
occur at any given point in the writing process (Flower & Hayes, 1981). The three studies presented in this section adhere to the ideas of the cognitive process theory of writing as they offer a discussion of what is important for students as they learn how to navigate the writing process. The views presented in these three studies guided the present study in its creation of a writing intervention focused on the writing process.

Lillis (2001) discussed how there are conventions for student academic texts which students are expected to know but may actually be invisible to both students and tutors. Similarly, Casey and Selfe (2008) claimed that there are features of written text that are accepted to be common sense and revered as “the best way to communicate serious intellectual matters” (p. 153), but teachers must be able to explain both the declarative and procedural knowledge required of written communication before students can understand what comprises academic written communication. For example, they discussed how students are forced to write in an essay format for most assignments in writing composition classes, but this may actually cause them to not realize the importance of that specific genre as a method of achieving certain rhetorical goals. Without allowing students to experiment with their writing, students do not have to consider the reasons that an essay may be more persuasive or effective for a given situation.

To combat this issue, Casey and Selfe (2008) suggested allowing students to experiment with their writing and “explore the possibilities of academic composing tasks” (p. 158). Casey and Selfe only discuss these issues for students in terms of the types of writing assignments (digital compositions, written books, speeches, essays, etc.) they may work with, but it could also be argued that students are simply not told enough about how to improve their own writing strategies for any given writing genre. While they are told that they must write an essay with certain requirements, they are often clueless about how to begin the writing process or what to do
once they get started. In order to help students learn, teachers (or writing consultants) should be transparent with both the goals of writing assignments and the ways that students can accomplish those goals successfully in their own writing processes (Lillis, 2001).

Huck (2015) took a somewhat more philosophical approach to the process theory of writing in his book entitled *What is Good Writing?* The purpose of his quest for finding a definition for “good writing” is perhaps best summarized by the following quote in his book: “Although there have been many well-designed experiments that attempt to provide empirical proof of the effectiveness of one or another compositionist strategy, the evidence is not very compelling” (Huck, 2015, p. 25). Therefore, instead of focusing on a particular strategy for teaching good writing processes and failing to find compelling evidence for one strategy over another, Huck argued that the focus should be on how writing can become fluent. While Huck acknowledged that there is not the same concept of a “native writer” as there is with a “native speaker,” he argued that the concept of fluent writing should be evaluated similarly to the concept of fluent speaking. He noted that those who are considered “fluent speakers” are generally those who native speakers have deemed to approximate their own linguistic abilities in conversation. Certainly, this type of comparison is different with writing as humans acquire writing ability quite differently than speaking ability, but Huck argued that there are the same “critical foundations” of writing ability that account for fluent speaking ability as well and that “recognizing and gaining facility with patterns that occur in written language” is what primarily matters for developing the ability to write fluently (p. 31).

Huck (2015) continued to say that, by definition, professional writers (or those who make a living through wages earned from writing) must be fluent writers. Therefore, others who are to be considered “fluent writers” must be those who have been motivated to communicate among
the world of professional writers, and they would be able to recognize when other writers have the appropriate skills necessary for certain communicative tasks, just as native speakers are able to recognize when other speakers are fluent. In summary, Huck proposed that there are two critical components of fluent writing: 1) motivation and 2) “subsequent immersion in the culture of mature writers through avid reading and then through writing in order to communicate in that culture” (p. 43).

Therefore, one could summarize the most important aspects of teaching academic writing according to Lillis (2001), Casey and Selfe (2008), and Huck (2015) as the following: 1) explicit communication about the conventions of academic writing to students (perhaps in the form of strategy-focused interventions), 2) motivation of students to become part of the academic writing community, and 3) immersion of students in the culture of academic writing through the promotion of relevant reading and writing activities. Additionally, in order to develop the fluency skills called for by Huck (2015), writing teachers should consider the three stages of skill acquisition theory (DeKeyser, 2007)—the cognitive stage, the associative stage, and the autonomous stage—by developing lessons which allow students to move from declarative knowledge to procedural knowledge to eventual automatization with deliberate practice. This study draws pedagogical implications from these theories to develop an intervention which will aim to effectively teach students how to write fluently. Such instruction will be accomplished through a computer-assisted forced-fluency intervention in which students are provided with immediate feedback on this one aspect of their writing process. Table 1 presents an overview of the relevant literature that guided the present study.
Table 1. Summary of aforementioned theoretical approaches from previous literature and their implications for this study’s automated forced-fluency intervention

<table>
<thead>
<tr>
<th>Relevant Literature</th>
<th>Main ideas</th>
<th>Implications for the present study</th>
</tr>
</thead>
</table>
| DeKeyser (2007)     | - To learn a skill, a learner must progress through the cognitive stage, the associative stage, and the autonomous stage  
                      - These stages include explicit instruction about the skill, deliberate practice, and gradual automatization  
                      - Students learning to write fluently should be told explicitly about how to write fluently and the benefits of doing so  
                      - Students learning to write fluently should have enough deliberate practice with writing fluently to eventually automatize this skill | |
| Lillis (2001)       | - Students are often not explicitly told how to write in an academic setting, but they are expected to know how to do so anyway  
                      - Students should be informed of the conventions of writing in order to be successful  
                      - To help students write fluently, they should be informed of a method for doing so effectively  
                      - Writing instruction should inform students about specific ways to improve their writing processes | |
| Casey & Selfe (2008) | - Aspects of writing that are known to be common sense may not be readily apparent to learners  
                       - Allowing students to experiment with their writing could be beneficial for improving students’ writing abilities overall | |
| Huck (2015)         | - Since there does not seem to be compelling evidence that any one writing strategy is better than another, the focus should be on learning to write fluently  
                       - Students should be explicitly informed about aspects of writing that are important such as how writing fluently is important for successful writing  
                       - An intervention that allows students to try out a new way of writing may be beneficial  
                       - An intervention that focuses on teaching students to write fluently is important  
                       - Students should be given opportunities to practice their writing in order to feel that they are involved in a culture of writing |


Product and Process Measures of Writing

There are two primary approaches to analyzing writing. The nearly ubiquitous way is the product-oriented approach; this approach is used to assess a final written text as is done with most graded writing assignments in academia. Different assessment criteria are used depending upon the purpose of the written product, but there are often similarities among these measures. For example, accuracy and grammatical complexity are used quite often, especially in measures of L2 writing proficiency (Wolfe-Quintero et al., 1998). Discourse constituent unit (DCU) analysis may also be used to quantitatively measure the ideas present in a written text (Polanyi, 1995). A few other common product-oriented measures include the total number of words, clauses, T-units, and sentences and type/token ratios per text. Other holistic measures may also be used when the global quality of the writing is needed to be assessed (Mutta, 2019).

The second approach to analyzing writing, the process-oriented approach, is far less utilized, although it has been gaining popularity among writing researchers in recent years. In this approach, the writing process itself is observed. Variables capturing typing and pausing behavior, including pause length, median transition time, total writing time, and the lengths of different writing phases (Mutta, 2019; Torrance, 2015; Chukharev-Hudilainen, 2014); planning strategies (Ellis & Yuan, 2004); or revision types are analyzed (Conijn et al., under review). These variables may be observed via keystroke logging (Chukharev-Hudilainen et al., 2019), think-aloud protocols (Fidalgo & Torrance, 2017; Fidalgo et al., 2015; Hayes & Flower, 1980), eye-tracking (Chukharev-Hudilainen et al., 2019), or a combination of these techniques.

Both approaches to analyzing writing are useful for writing researchers and teachers, but few studies have combined product and process measures to describe writing. Mutta (2019) is one of the few studies which has taken measures of both product features and process features.
This type of multifaceted evaluation is useful for providing a more complete picture of the complex phenomenon of writing. As the present study will utilize this type of multifaceted evaluation, the following sections will provide a more comprehensive overview of the variables used to measure writing processes and products.

**Fluency**

Fluency is one variable that has been defined with both process- and product-based methods of evaluation. Teachers and researchers often look to the fluency, accuracy, and complexity of written or spoken production as measures of language proficiency. In general, accuracy has had a relatively consistent definition amongst researchers, usually generalized as writing or speech free from errors. In contrast, there has been a lack of consensus among researchers as to how exactly complexity and fluency should be described linguistically (Hasselgren, 2002; Wolfe-Quintero et al., 1998). While researchers have agreed that complexity, accuracy, and fluency are all useful constructs for assessing language proficiency, they also agree that their definitions are not sufficiently specific and “do not exhaust performance description” (Pallotti, 2009, p. 590). For example, the definitions and operationalizations of complexity vary in terms of their measures of what makes a text complex.

As this study centers around fluency feedback in the form of an automated forced-fluency intervention, this section will include in more detail the various ways in which fluency has been defined in the past, including the variables used to describe fluent writing or speech, the difference between cognitive fluency and performance fluency as observed in reading, and the differences between L1 and L2 writing. It will then delve into how researchers measure fluency in written production. This study will not aim to create an all-encompassing definition of fluency to eliminate the confusion of past research; rather, it will present these previous definitions and
measurements of fluency in order to create an operationalization for the purpose of the present study.

Additionally, as noted by Chukharev-Hudilainen et al. (2019), many studies investigating written fluency utilize methodologies that closely resemble those of oral fluency studies (e.g., Ellis & Yuan, 2004; Chenoweth & Hayes, 2001). Therefore, although the present study focuses solely on writing, this section will discuss definitions and operationalizations used by studies of oral fluency as well as written fluency in order to gain a more complete idea of fluency as a method of assessment.

**Definition of fluency**

Fluency is the construct that captures the ability to produce language quickly and without substantial hesitations. Most research on fluency has been done on oral language, while the fluency of text production has historically received less attention. Götz (2013) examined how oral fluency has been defined in the past and developed four categories of fluency variables based on patterns found in previous research: (1) “temporal variables in speech production,” (2) “the use of formulaic language,” (3) “certain performance phenomena which contribute to a perception of naturalness in native speech,” and (4) “other global variables in native speech” (p. 2). Within each of those four categories, there are multiple fluency variables, which Götz calls “fluencemes,” and she claims that these are what contribute to the perception of a native English speaker being fluent and sounding natural. For example, the fluencemes within “temporal variables in speech production” are speech rate, mean length of runs, filled vs. unfilled pauses, and the phonation/time ratio (i.e., the time spent articulating divided by the total speech time). Götz then compares learners’ output with native speakers’ output in terms of these fluencemes. This was done with the aim of finding what is responsible for the perception of “non-nativeness” of even advanced L2 speakers. It was found that despite having high-proficiency participants, the
learners deviated from native speakers across all fluencemes, and Götz attributed this to the fact that they had not yet acquired “a nativelike degree of automaticity” (p. 140). Götz also cited Rossiter et al. (2010) and Schmidt (1992) who have suggested that it is this level of automaticity in learners’ L2 which ultimately differentiates them from native speakers and negatively impacts their L2 fluency.

Segalowitz (2000) studied this idea of automaticity in fluent performance by examining the speed, fluidity (smoothness and freedom from interruptions), and accuracy of bilingual students’ reading performance. He claimed that these were the characteristics that “correspond to psychologically measurable aspects of complex cognitive performance” (p. 200). In his view of fluency, teachers and researchers are measuring observable, qualitative surface characteristics that represent underlying cognitive processes, and they should try to determine how well those underlying cognitive processes are automatized in order to understand fluency improvement. Important here is the distinction between cognitive fluency and performance fluency: cognitive fluency is the underlying cognitive mechanisms that deal with the automatic processing and attention-based processing, while performance fluency refers to the “observable speed, fluidity, and accuracy of the original performance” as seen in reading, speaking, listening, or writing (p. 202). Based on his study of the automatic and controlled processes in fluency, he makes a claim which suggests a plan of action: “Training that increases performance fluency by bringing about qualitative changes to underlying cognitive operations may result in wider benefits than might training that improves performance without changes to cognitive fluency” (pp. 202–203).

In order to create a measurement of fluency that could be easily understood and replicated by other researchers, Wolfe-Quintero et al. (1998) provided a more complete overview of the various ways in which fluency has been defined. Although they also looked at measures of
fluency in both speaking and writing, they decided to concentrate on conceptualizations of writing fluency for their own empirical study with the goal of determining whether the same measurements that are used to compare spoken and written fluency make sense when interpreted alone. To begin their discussion of fluency measures, they noted that their most basic understanding of measures of fluency is that they aim to demonstrate the writer’s level of comfort with language production. This is, according to them, the overarching goal of fluency research. The problem, as discussed above, is that despite sharing this overarching goal, fluency research has not been consistent in its operationalizations.

Wolfe-Quintero et al. also noted that perhaps the biggest problem when it comes to consistently defining fluency is that measures of complexity and accuracy are also often considered factors for fluent writers or speakers. For example, Fillmore (1979) claimed that fluent speakers were those with an appropriately fast rate of speech while also speaking coherently, complexly, appropriately, and creatively. Even Fillmore acknowledged that this characterization was vague since it encompasses measures of accuracy and complexity as well. In order to avoid this vagueness and confusion, Wolfe-Quintero et al. limited their view of fluency to one which considers rate and length of production. Therefore, according to their view, fluent writing is that which includes a high rate of words and linguistic structures in a limited time. They do not consider the levels of accuracy or sophistication of those words or structures, but rather they merely measure the number of “words or structural units” a writer can produce within a particular time frame (p. 14).

Pallotti (2009) noted another issue with common definitions of fluency: they often rely on some idea of what is “normal” for speakers or writers. For example, Skehan (2009) defines fluent speech as that which is produced at a “normal rate” and without interruption. Ellis and
Barkhuizen (2005, p. 139) define fluency as “the production of language in real time without undue pausing or hesitation.” Everyone pauses and hesitates at times, but this definition assumes that there is some normal amount of pausing and hesitation which is acceptable. One natural assumption would be that these “normal” rates of speech or amounts of pausing are those which are held by native speakers of a language, but native speakers undoubtedly encompass a wide variety of skill levels in speaking and writing. This lack of clarity begs the question: is there one “best” rate of speech or amount of pausing which indicates fluency in a speaker or writer?

Similar to studies on spoken language, studies on written language have investigated pausing behavior and the implications that can be drawn from different amounts of pausing. In these studies, pausing has been assumed to provide an inside look at the cognitive processes that underlie written language production (Wengelin, 2006). Studies on pausing behavior in writing have provided some clarity for the above discussion on appropriate amounts of pausing, though there is still no clarity as to the “best” rate or amount of pausing. In writing studies, pauses are usually considered as breaks in production that are at or above a certain threshold; this threshold is often set at 1–2 seconds (Alves et al., 2007; Olive et al., 2009; Van Waes & Schellens, 2003). Chukharev-Hudilainen (2014) determined that pauses in writing over 1.2 seconds long may indicate processing beyond the word-level, and Torrance (2015) argued that pauses between two and ten seconds long may indicate even higher-level processing. Torrance also argued that pauses over ten seconds long may show that a writer is engaging in a more complex, problem-solving cognitive activity. Although there still may not be a concrete idea of what is “normal” for pauses, this knowledge about the internal cognitive processes that are present during pausing can allow researchers to determine whether the pauses are indicative of below-word, word-level, or
higher-level processing, and conclusions about a writer’s internal processing could be drawn by measuring the lengths of all pauses in a writing session.

**Operationalizing writing fluency**

With all of the varying definitions of fluency, it makes sense that there would be multiple ways to operationalize it in written production. Wolfe-Quintero et al.’s (1998) restricted definition of fluency (considering only rate and length of production) leads to the most popular way to operationalize fluency: counting the number, length, or rate of production units including sentences, T-units (units consisting of an independent clause and all of its subordinate clauses), clauses, phrases, or words produced by the speaker or writer in a given period of time. They examined 39 studies to analyze precisely how the researchers measured fluency with rate or length of production. It is important to note that Wolfe-Quintero et al. consider all length measures to be measures of fluency, rather than measures of complexity as has traditionally been done, because they note that length can be achieved in various ways which are not always valid indications of increased complexity. In the studies they examined, they found the following fluency frequency measures:

1. total number of words,
2. total number of verbs,
3. total number of clauses,
4. total number of sentences,
5. total number of T-units,
6. total number of words in T-units,
7. total number of words in clauses,
8. total number of words in all error-free T-units,
9. and total number of words in all error-free clauses.

They also researched fluency ratios, which they claim to be “much more successful than frequencies in distinguishing between proficiency levels/indicating language development” (p. 21). They found the following fluency ratio measures:

1. words per minute,
2. total number of words divided by the total number of clauses,
3. total number of words divided by the total number of sentences,
4. total number of words divided by the total number of T-units,
5. total number of words in error-free T-units divided by the total number of error-free T-units,
6. total number of words in error-free clauses divided by the total number of error-free clauses,
7. total number of words in complex nominals divided by the total number of T-units,
8. and total number of words in complex nominals divided by the total number of clauses.

Of all 17 of those measures, they claim that the best measures of fluency are three of the ratio measures: words per T-unit, words per error-free T-unit, and words per clause. These measurements showed a consistent linear relationship to proficiency level (defined as program or school level) across the studies they found, regardless of other variables.

Chukharev-Hudilainen et al. (2019) followed a similar thought as Wolfe-Quintero et al. (1998), arguing that interventions that focus on fluent written production “need to rely on more detailed measures of fluency than the global speed (rate) of text production” (p. 585). However, they went a step further by utilizing keystroke logging to measure writing fluency. They were then able to automatically calculate inter-keystroke intervals (IKIs) from keystroke logs. IKIs were calculated by taking the difference in time between two keystrokes. To explain this process, they provided an example for typing the word hello. When a writer is fluently typing hello, the keys h and e are pressed consecutively on the keyboard at t₁ and t₂; therefore, to find the IKI for the letter e, \( IKI = t_2 - t_1 \). Therefore, they argued that prolonged IKIs, also known as pauses, demonstrate disfluencies in writing. Additionally, they determined that IKIs at linguistically relevant locations can assist researchers in inferring the cognitive cause of a disfluency, meaning that they could identify the reason that a writer has prolonged IKIs at certain points in their written production. For example, Torrance et al. (2016) analyzed IKIs in word-initial, word-final,
and inter-word positions to analyze dyslexic students’ writing processes. Chukharev-Hudilainen et al. (2019) focused their analysis on IKIs at word-, clause-, and sentence-boundaries, and they determined that L2 writers were significantly slower—and therefore, less fluent—than L1 writers based on their pausing behavior at these locations. This type of analysis of disfluencies allowed Chukharev-Hudilainen et al. (2019) to learn more about writers’ processes rather than only relying on product-based measures.

Pallotti (2009) argues that fluency, accuracy, and complexity cannot be sufficiently evaluated with one-dimensional measures. Instead, she calls for a multidimensional approach in which multiple subdimensions of fluency can be established. As examples, she cites Tavakoli and Skehan (2005) who utilized breakdown fluency (measuring how often continuous speech is interrupted), repair fluency (measuring how often corrections or repetitions are made), and speed fluency (measuring the rate of speech) as subdimensions of one fluency evaluation. By identifying the various subdimensions of fluency, Pallotti (2009) argues that fluency measures will more accurately refer to a “well-identifiable construct” (p. 599).

Van Waes and Leijten (2015) took a similar approach to Wolfe-Quintero et al. (1998) by investigating the various ways in which fluency has been operationalized in the past, but they followed Pallotti’s (2009) recommendation for developing a multidimensional fluency model. The fluency definitions they found had been used to analyze the differences between L1 and L2 writing. Based on their research, their multidimensional understanding of fluency considered production (mean number of characters, including spaces), process variance (standard deviation of characters, including spaces), revision (mean number of revised characters, including spaces), and pausing behavior. Each of these components included multiple variables; for example, Pausing Behavior includes mean pause time length between words and proportion of total pause
time. This multidimensional approach allows researchers to have a better definition of what “fluency” actually means for application in analysis. While previous research has already suggested that writers are more fluent in their L1 than their L2, which was based on analyzing one component (aspect) of fluency at a time, Van Waes and Leijten confirmed this using the multidimensional approach discussed above. Even though their participants were highly proficient L2 users, the differences between L1 and L2 writing were found to be significant among production, process variance, and revision parameters. Their differences in pausing behavior between L1 and L2 writers were not statistically significant, but writers did have longer P-bursts (text production between two pauses), less pausing time, and shorter pausing time between words while writing in their L1 compared to their L2. While their findings were influential for the evaluation of fluency in future studies, they only evaluated fluency between students’ L1 and L2 writing rather than utilizing a fluency intervention to assess students’ fluency improvement. Therefore, they conclude their paper by calling for future intervention studies on the effect of instruction on writing dynamics.

In sum, it is clear that the lack of consensus among researchers as to exactly how to define fluency has led to a multitude of approaches to measuring and analyzing fluency development in research. Therefore, this study will consider multiple operationalizations discussed above in its measurements of fluency, as outlined in the following chapter.

**Complexity**

Complexity, a product measure, is concerned with the variation and level of sophistication of grammatical units. This section provides an overview of the varying definitions and operationalizations of complexity.
Definition of complexity

Pallotti (2009) and Biber, Gray, and Poonpon (2011) discuss the difficulty in defining complexity, in part because this same term is used for both task complexity and language performance complexity, and even different fields of linguistics vary in their use of the term. For example, Biber et al. (2011) note that in typological linguistics, a complex language would be one with more phonological or morphological distinctions than other languages. In psycholinguistics, a complex linguistic structure would be one that takes more time to process. However, even when there is a focus on language performance complexity specifically, there are difficulties in defining exactly what that means.

In Biber et al.’s (2011) view, “complex” language is that which is acquired late. On the other hand, Pallotti (2009) argues that “complexity” should be considered separately from “development” as there are some linguistic forms that are simply infrequent rather than cognitively complex. Therefore, in Palloti’s view, simply developing certain linguistic abilities later in language acquisition does not mean they are inherently more complex. As Pallotti put it, “Progress in a learner’s language ability for use may include syntactic complexification, but it also entails the development of discourse and sociolinguistic repertoires that the language user can adapt appropriately to particular communication demands” (p. 598). In other words, a speaker or writer may increase their syntactic complexity in some situations, such as in academic discourse or professional settings, while they decrease their syntactic complexity when appropriate, such as in casual conversations or while introducing themselves on the phone. Even though the speaker’s language is syntactically less complex in those casual conversations, Pallotti argues that their awareness of discourse and sociolinguistic repertoires and their ability to adjust syntactic complexity is an important aspect of linguistic complexity.
Wolfe-Quintero et al. (1998) discuss complexity in a different way, but like Pallotti (2009), they consider it separately from development:

Grammatical complexity means that a wide variety of both basic and sophisticated structures are available and can be accessed quickly, whereas a lack of complexity means that only a narrow range of basic structures are available or can be accessed (Wolfe-Quintero et al., 1998, p. 69).

To them, it is not important whether a writer can include sophisticated structures in their writing; it is when a “wide variety” of both simple and complex structures can be accessed quickly that a writer demonstrates their ability to write with advanced complexity.

**Operationalizing complexity**

Wolfe-Quintero et al. (1998) discuss two main ways that grammatical complexity has been measured by researchers in the past: (1) frequency measures in which the researcher analyzes clauses, sentences, or T-units compared to each other (e.g., measuring clauses per sentence or T-unit) and (2) ratios in which the researcher analyzes certain grammatical features in terms of their presence in clauses, T-units, or sentences (e.g., counting the number of nominals in each T-unit). The studies they analyzed found mixed results in terms of the validity of these measures. Clauses per T-unit was found to generally show a positive correlation to proficiency level across studies, although this relationship was best shown when “proficiency level” was defined as a “program or school level” rather than as short-term changes within the same class of students (p. 98). Additionally, Wolfe-Quintero et al. note that the ratio of dependent clauses per total clauses and the ratio of dependent clauses per T-unit were found to increase linearly with proficiency levels. However, many studies also showed declines in proficiency when these ratios increased; whereas seven studies demonstrated a correlation between program level and T-unit complexity ratios, eleven did not. As Biber et al. (2011) point out, this means that 61% of the
studies that Wolfe-Quintero et al. examined failed to demonstrate a significant relationship between proficiency and complexity when they used these T-unit complexity measures, implying that perhaps T-unit measures are not the best option for measures of complexity.

Despite the fact that the majority of the studies found by Wolfe-Quintero et al. (1998) showed no significant relationship between proficiency and T-unit measures, most studies, surprisingly, still measure grammatical complexity with T-units and clausal subordination. Using T-units has been widely accepted in research because they provide a way to apply the same term to both spoken and written language research. Instead of attempting to measure sentences in spoken language where there is no punctuation to mark the end of a sentence and people do not necessarily speak in complete “sentences,” using T-units allowed researchers to conceptualize a complete unit that could be applied to both speaking and writing. However, there is actually little empirical evidence that this is appropriate for measuring writing development. Some studies have even argued that these measures do not accurately reflect the knowledge of learners (e.g., Bardovi-Harlig, 1992). When spoken versus written discourse analysts have compared spoken dialogue and written academic texts, they found that clausal subordination is more common in speech than academic writing, while academic writing had more embedded noun and prepositional phrases. According to Biber et al. (2011), “Most researchers unquestioningly apply clausal subordination measures to evaluate writing development, never considering the possibility that those measures are actually more characteristic of speech than writing” (p. 10). To investigate this possibility, they conducted a large-scale corpus-based analysis to determine the types of features more common in academic research articles than conversation. They found that their hypothesis was correct: not only are the types of grammatical complexity found in academic writing different than those of conversation, but also the T-unit system was not
sufficient for successfully determining levels of complexity in writing. Instead, they suggest measuring the grammatical complexity of academic writing with complex noun phrase constituents and complex phrases rather than clause constituents and clauses. In particular, they found three types of complexity that were significantly more common in academic writing than conversation: (1) attributive adjectives in noun phrases, (2) premodifying nouns in noun phrases, and (3) postmodifying prepositional phrases in noun phrases (Biber et al., 2011). These measurements are promising for addressing the problems with inconsistent results via T-unit measurements found by Wolfe-Quintero et al. (1998). To provide a more complete picture of the complexity of the writing in this study, the present study will utilize T-unit measures and two of the phrasal measures (1 and 2) from Biber et al. (2011), as described in the following chapter.

Accuracy

Although “accurate” writing is much easier to conceptualize than “fluent” or “complex” writing and researchers generally agree on how to operationalize accuracy, there are still some areas of confusion that should be discussed before selecting one definition over another. The following section provides an overview of the discussion on accuracy in terms of its definition and operationalization.

Definition of accuracy

Generally, accuracy refers to error-free language production. Pallotti (2009) notes that accuracy can sometimes be confused with comprehensibility, defined as the amount of effort required for listeners or readers to understand (Isaacs & Trofimovich, 2012). Pallotti discusses how certain errors are sometimes classified or weighted differently based on their effect on comprehensibility; however, this should not mean that one 100-word paper with 10 errors that do not hinder comprehension is “more accurate” than another 100-word paper with 10 errors that do hinder comprehension. Similarly, one paper with 10 errors on subjunctives and conditionals is
just as accurate as a paper with 10 errors on pronouns or articles, but one may simply be considered more developed than the other due to the types of inaccuracies present. Therefore, Pallotti argues that accuracy and comprehensibility are separate constructs and should be considered as such when identifying accuracy measures.

Furthermore, Foster and Skehan (1996) and MacKay (1982) have noted that there are actually trade-offs between fluency, complexity, and accuracy in language development. In fact, while writers are still automatizing their productive abilities, trade-offs between speed and accuracy are common, often leading to more errors when production is particularly fast or slow.

Whereas fluency measures capture the automaticity of language skills, accuracy represents how well the language skills are deployed in language production. Therefore, it could be argued that part of the core definition of accuracy is that there is more conscious access to the rules of the language that should be followed. As Wolfe-Quintero et al. (1998) note, “Writers are dependent on the state of their language knowledge when it comes to the types of errors they search for, notice, or are able to correct, whether automatically or through a conscious struggle” (p. 34). In sum, writers’ accuracy depends on their language knowledge, not on their fluency, and accuracy is often reduced when writers are still working on automatizing their writing skills.

**Operationalizing accuracy**

There are two main approaches to measuring the accuracy of written text: (1) counting the number of units which are error-free, usually clauses, sentences, or T-units, and (2) analyzing how many errors occur compared to the total number of units, usually words, clauses, or T-units. One problem with the first approach is that it does not distinguish between units with one error and units with multiple errors. Additionally, all types of errors found in the first approach must always be treated equivalently, no matter how minor one error is compared to another. The second approach was developed to solve those problems by comparing only quantities of errors
while also allowing those errors to be classified more easily. For example, one could calculate the number of morphological errors per clause and compare that to the number of semantic errors per clause. Although these approaches are useful for determining the types of errors found in texts, Wolfe-Quintero et al. (1998) found that the basis for determining the type and gravity of errors is quite often based on the intuition of the researchers which varies among studies. Overall, however, they found three measures of accuracy that were closely related to holistic ratings: the number of error-free T-units, error-free T-units per total T-units, and errors per T-unit. With these three measures, the perceived type and “gravity” of errors is not considered, but researchers can gain a general idea about the amount and frequency of errors present in a given text.

**Discourse Constituent Unit Analysis**

Fluency, complexity, and accuracy are certainly important measures of writing, but they do not provide a complete picture of the ideas that are represented in a given piece of writing. In order to provide a more complete overview of writing, “discourse constituent unit (DCU) analysis” (Polanyi, 1995) allows researchers to consider the most basic units of discourse and determine how they should be analyzed and interpreted semantically and pragmatically. This section will begin by identifying the general definition of DCU analysis and conclude with the ways in which DCU analysis will be operationalized in the present study.

**Definition of DCU analysis**

In Polanyi’s (1995) article entitled “The Linguistic Structure of Discourse,” an argument for a specific type of discourse analysis was made. Rather than accepting the common idea that discourse is simply “too messy” or “ill-defined” for rigorous analysis, Polanyi proposed a theory of discourse analysis that aimed to methodologically identify the “atomic units of discourse” (1995, p. 2). Polanyi’s theory provides a clear methodology for replicable studies that aim to
measure or compare the atomic units of discourse. In the past, researchers had proposed elementary discourse units to be everything from clauses to paragraphs, but Polanyi provided reasoning for rejecting these measures, arguing instead in favor of a measure she coined “the discourse constituent unit,” or DCU.

Polanyi defined a DCU as “a contextually indexed representation of information conveyed by a semiotic gesture, asserting a single state of affairs or partial state of affairs in a discourse world” (p. 5). With this definition, it is clear as to why Polanyi rejected clause- and sentence-level measures as acceptable units of discourse: a single clause or sentence can express multiple states of affairs. For example, nonrestrictive relative clauses or appositives can provide new spatio-temporal information to the discourse while remaining in a single finite clause structure. Therefore, Polanyi concluded that a new unit was needed to most accurately reflect the elementary units of linguistic discourse while clearly and methodologically determining individual structures representing singular states of affairs. The operationalization of this new unit, the DCU, is explained in the following section.

**Operationalizing DCU analysis**

The most general way to summarize the operationalization of the DCU according to Polanyi (1995) is that a new DCU begins whenever the following occurs:

1. “phonological (i.e. pausal or prosodic) criteria indicate a break”
2. “sentential syntactic criteria indicate a clause break”
3. “sentential semantics requires a change in any of the contexts (spatial, temporal, modal, etc.) that index the discourse worlds where the events (and in general, states of affairs) are interpreted” (p. 16).

Let us consider the following example discourse fragment: “A girl likes to explore new places. She likes to take fun photos and to eat different foods.” In these two sentences consisting of only two finite clauses, three DCUs can be identified: (1) there is a girl who likes to explore new places, (2) this girl likes to take fun photos, and (3) this girl likes to eat different foods.
These DCUs were determined from Polanyi’s definitions operationalizations above: a clause break was indicated by the sentence-final punctuation, and the sentential semantics of the second sentence indicated that there were two different worlds (one in which the girl takes photos, and one in which she eats different foods). Further analyses could distinguish whether the second and third DCUs should be subordinated with the first DCU, but this basic analysis is the level of DCU analysis that will be utilized for the present study.

**Holistic Quality**

The final product measure of writing that this section will discuss is holistic writing quality. This is usually assessed by assigning a single holistic rating to a piece of writing with the goal of addressing raters’ general impressions of a text and its success in fulfilling its communicative purpose (Tillema et al., 2012). It is perhaps easiest to explain holistic rating by comparing it to its antithesis: analytical rating scales. Analytical rating scales are “rubrics that include explicit performance expectations for each possible rating, for each criterion” (Galti et al., 2018, p. 6). One important aspect of analytical rating scales is that they provide diagnostic information for the writers since writers can see their scores for each category on the rubric (Tillema et al., 2012). On the other hand, this type of rating can be problematic at times because the overall score may poorly reflect overall writing quality if a writer can “compensate” for weak categories of the rubric by having one exceptionally strong category (Tillema et al., 2012).

Tillema (2012) and Van der Hoeven (1997) argued that subskills of writing that are represented on analytical rating scales do not directly correlate with overall text quality, and Tillema et al. (2012) suggested that this means that overall writing performance is more than the sum of its parts. Therefore, global evaluations of writing quality may be better assessed through holistic scores which will be used in the present study.
Holistic scores have been operationalized in different ways in past research. For example, Olinghouse et al. (2012) operationalized a holistic rating as one in which four different criteria were equally weighted to create a final holistic score. Schoonen (2012) and Van den Bergh (2012) used predefined rating scales with descriptions of good and poor essays, and their raters were given a benchmark essay to compare to each essay being rated. Other studies simply ask raters to assign a single score based on their overall impressions of the texts without any rubrics, predefined criteria, or benchmark essays (Barkaoui & Knouzi, 2012). For the present study, holistic scores will be assessed by using predefined rating scales with descriptions of good and poor essays in a similar way to Schoonen (2012) and Van den Bergh (2012).

**The Current Study**

This study aims to investigate the feasibility of an automated forced-fluency intervention that explicitly encourages the fluency of text production by providing automated real-time feedback to the writer. This study focuses on overall competent writers (college students who have successfully completed the required composition curriculum) who are producing text that is generally below their proficiency level, but under time pressure. This kind of writing task would be representative, for example, of composing a memo or an email in the workplace. Specifically, this study is guided by the following research questions:

1. How does an automated forced-fluency intervention impact the writing process and the written product (as measured by the indices of fluency, accuracy, complexity, density of DCUs, and holistic quality) of competent native English speakers’ writing?

2. What are writers’ perceptions of the automated forced-fluency intervention?
CHAPTER 3. METHODOLOGY

This chapter presents the methodology used in this thesis. To address the first research question regarding the impact of the forced-fluency intervention on process and product measures of writing, this study employed a quantitative approach based on statistical modeling and inferential tests. To address the second research question, this study collected writers’ opinions via a post-intervention questionnaire. This chapter begins by providing a detailed account of the present study’s participants, materials, and procedures. It then presents the writing measures and statistical analyses used to answer the first research question.

Participants

The participants in this study were 20 adult, native-English-speaking students enrolled at Iowa State University. These participants were overall competent writers, defined as students who had successfully completed (or tested out of) the two required composition courses at their university. Furthermore, all participants were employed at the university’s Writing and Media Center, which provides writing consultancy services to university students.

Participants were not compensated for taking part in the study. Participants’ gender and age information were collected in order to be reported in aggregate following an established convention in applied linguistics research. Of the 20 participants, 17 were female and three were male. The average age was 20 years old (range 19–23 years). Each participant was assigned an identification number to be used to anonymize the data before analysis.

Materials

This section explains the materials used in this study. It begins by introducing the intervention. Next, it describes CyWrite, the web-based tool used in this study to develop the
intervention. It then describes the tasks completed by the participants, and it concludes with a description of the questionnaire presented to participants upon completion of the study.

**The Intervention**

The intervention in this study implemented the principles identified in the previous chapter. Specifically, guided by skill acquisition theory, the cognitive process theory of writing, and previous studies on strategy-focused interventions, the present intervention aimed to encourage fluent written text production by (1) intentionally and explicitly providing instruction about the benefits of the strategy of writing fluently (i.e., avoiding extensive pauses during text production) and (2) subsequently providing an opportunity for deliberate practice of the strategy, assisted (in the experimental condition) by focused, automated, real-time feedback on the participants’ pausing behavior as they write in their native language. Participants in this study were not allowed to use any external resources during the composition process.

The condition that was experimentally manipulated in this study was whether automatic real-time fluency-focused feedback was provided during a writing session. In the experimental condition (“forced-fluency condition”), for each second of an inter-keystroke interval during typing, the opacity of the participant’s text on the screen was decreased incrementally at the rate of 20% per second; thus, when the inter-keystroke interval reached five seconds, the text on the screen became completely transparent and invisible, as seen in Figure 1. The text, however, was not deleted, but the participant was not able to see it until they continued typing. Once the participant resumed typing, the text reappeared in the normal black font. It was explained to the participant that the goal of this manipulation was to encourage them to write fluently and to avoid losing sight of their text. In the control condition, participants were able to write and pause as normal.
This study utilized CyWrite, a web-based tool developed by the English department at Iowa State University (Chukharev-Hudilainen et al., 2019; Feng et al., 2016; Chukharev-Hudilainen & Saricaoglu, 2014). This tool was originally developed as an automated writing evaluation system for L2 English students, but it has since been used as a platform for multiple research projects on writing. CyWrite features a user interface that allows users to type on a screen similar to more familiar applications such as Microsoft Word or Google Docs. For the purpose of this study, all automated feedback was suppressed, but a special feature was built into CyWrite to manipulate the appearance of the user’s text.
CyWrite also features the ability to capture process data such as keystroke logging and pausing behavior. All of this information is sent to a server and stored throughout composition sessions. The final written product of each session was also stored automatically on the server. After the sessions are complete, an animated reconstruction can be played back in a post-session viewer for the researcher which shows the entire composition process (including all pauses). This post-session viewer also contains a process graph at the top of the screen in which the researcher can view multiple metrics at once, including the user’s cursor location (in terms of its position in the document relative to the leading edge), the length of the text including deletions, the number of characters typed, and the length of the text (in terms of what was included in the final written product). Importantly, data from the post-session viewer is available in a machine-readable format for automated analyses.

Tasks

Each participant wrote two essays in response to argumentative prompts. The two writing prompts used in this study were as follows:

1. Should there be free college for everyone in the United States? Present both sides of the argument.
2. Should Americans have the right to buy guns? Present both sides of the argument.

These prompts were chosen because (1) they encouraged participants to utilize higher-order writing skills (such as developing claims, incorporating evidence, and organizing ideas) to develop both sides of an argument and (2) the topics were accessible for and well-known to college students in the United States, thereby not requiring them to conduct outside research in order to complete the tasks.
Questionnaire

A questionnaire with four open-ended questions was provided to participants after completing both tasks (see Appendix A). The four questions were provided as follows:

1. How did you feel as you were writing with the disappearing text condition?
2. Did you feel like you had to sacrifice grammatical/spelling accuracy while writing with the disappearing text condition?
3. Did you feel like you had to sacrifice complexity while writing with the disappearing text condition?
4. How do you think the disappearing text condition impacted your writing process?

This questionnaire data was collected in order to provide information about students’ affective responses to this type of activity and to determine how accurate students’ perceptions were about their varying levels of accuracy and complexity in the tasks of this study.

Procedures

The forced-fluency manipulation was pilot-tested with eight individuals before the start of the present study. In these pilot tests, writers would often type random characters and subsequently delete them when they desired more time to think without having their text disappear. This strategy was a “trick” negating the purpose of the intervention. Therefore, in the present study, participants were explicitly discouraged from following this strategy. They were told that the purpose of the study was to evaluate the benefits of the forced-fluency intervention; therefore, the disappearing text should be taken as feedback reminding them that they should continue typing.

Prior to the data collection, this study was approved by the Institutional Review Board (IRB) (Appendix D). Participants were invited to volunteer for this study via convenience sampling. Upon participant agreement, the researcher arranged a time to meet one-on-one with each participant. The study and its purpose were explained in full, including the tasks and procedures, at the beginning of the meeting with each participant. The benefits
of writing fluently were also explained at the beginning of the meeting. The researcher then showed the participants what they would be doing on the CyWrite website and allowed participants to ask any questions about the task.

Figure 2. Visual representation of the four counter-balancing groups.

Participants were then randomly assigned to one of four counterbalanced groups. The study followed a counterbalanced within-participant design, with counter-balancing for prompt order and condition order. Each participant was randomly assigned to one of the four counter-balancing groups, as shown in Figure 2.

Participants wrote for ten minutes in response to the first prompt that they were given. This ten-minute timeframe was selected to mimic a real-life condition where people need to produce texts that are generally below their proficiency level (i.e., do not pose insurmountable challenges in terms of ideas, rhetorical strategies, or linguistic complexity), but under time pressure: for example, writing emails or memos in the workplace. It was assumed (and confirmed in the pilot tests) that participants would be able to produce complete texts to the two
prompts within 10 minutes. The imposed time limit was, by itself, encouraging fluent text production. However, in the forced-fluency condition, the fluency of text production was further encouraged by a targeted intervention that directly modified the writing process by providing real-time feedback on the participants’ pausing behavior.

After the ten minutes were up, the CyWrite system automatically stopped participants’ composition sessions. They were allowed to take up to ten minutes for a break in between tasks. Once they were ready to begin the next task, they proceeded to write to the second assigned prompt, again for ten minutes. The CyWrite system automatically stopped the task after those ten minutes were up. After participants were finished with both writing tasks, they were asked to respond to the qualitative questionnaire about their experience with the intervention by writing their responses on a piece of paper; this method, as opposed to oral post-session interviews, was used in order to receive more honest responses since participants did not have to explain their opinions orally to the researcher.

**Writing Measures**

This section presents the writing measures that were used to analyze participants’ texts in this study in order to answer RQ1. It is split up into two subsections: process measures and product measures.

**Process Measures**

Process measures in this study included measures of fluency. Text production fluency was measured as the number of characters written per minute—both in terms of the total number of characters produced (typed) during the writing process (including those subsequently deleted) and in terms of the total number of characters that remained in the final written product (i.e., subtracting all deletions)—and the percentage of characters deleted during the writing process. Additionally, the distributions of inter-keystroke intervals at linguistically-relevant locations in
the text (sentence-initial, word-initial, and mid-word) were found. These measures were automatically extracted by the CyWrite software.

**Product Measures**

Product measures in this study included measures of complexity, accuracy, DCUs, and holistic ratings. This section will present the methods for calculating each of these measures and information about inter-annotator and inter-rater reliability, as applicable.

To calculate complexity, the number of T-units per text was manually calculated by the author. To ensure the reliability of the author’s T-unit annotation, a graduate student in applied linguistics also annotated a random sample of 20% of the texts (n = 8). Inter-annotator reliability was assessed using Krippendorff’s α with interval metric (Hayes & Krippendorff, 2007; Krippendorff, 2007), yielding $\alpha = 1.0$ (perfect agreement). Mean length of T-unit was then calculated by dividing the length of text in words by the number of T-units in the text. To further measure the grammatical complexity of texts, two features were counted that are known to be significantly more common in academic writing than conversation: (1) attributive adjectives in noun phrases and (2) premodifying nouns in noun phrases (Biber et al., 2011). To count these features, the texts were tagged with the part-of-speech tagging software CLAWS (Rayson & Garside, 1998), and then a Python script was written to automatically count the features of interest based on part-of-speech tag sequences. Counts were normed per 100 words.

To assess linguistic accuracy, the author manually annotated texts for errors. Then, accuracy was determined by calculating the number of error-free T-units, the rate of error-free T-units per total T-units, and the rate of errors per T-unit. A second annotator, a graduate student in applied linguistics, annotated all of the texts for accuracy, and inter-annotator reliability was $\alpha_{\text{natural}} = 0.99$ (perfect agreement).
Next, the author manually marked DCUs in each text and calculated the number of DCUs per text. A second annotator, a faculty member in applied linguistics, did this for a random sample of 8 texts, yielding $\alpha_{\text{interval}} = 0.98$ (perfect agreement).

Finally, a holistic measure of overall writing quality was obtained from two independent raters, both of whom were graduate students in applied linguistics, using a holistic writing rubric. This rubric was constructed following a holistic rubric used in first-year written communication courses at Iowa State University that every participant in this study had completed. However, the rubric band descriptors were modified to be task-specific by adding in language specific to the type of argumentative prompts at hand (see Appendix B). The rating was done on a 9-point scale.

To calculate inter-rater reliability for these measures, both raters evaluated an overlapping random sample of 15% of the texts ($n = 6$). Krippendorff’s $\alpha$ with interval metric showed high reliability at $\alpha_{\text{interval}} = 0.92$. For texts which were rated by both raters and received different scores, the average score was used for analysis.

**Statistical Analysis**

To address RQ1, a series of linear mixed-effects regression models were run using the lme4 package in R. In each model, the intercept was allowed to vary by participant as a random effect. For each dependent variable of interest, the data was first screened by plotting a histogram. If the data visibly deviated from the normal distribution, it was log-transformed. Log-transformations yielded acceptable results in all cases. Then, for each dependent variable, two nested models were built: the baseline, intercept-only model; and the model adding a fixed effect for Condition (control vs. forced-fluency). The likelihood-ratio test was used to evaluate the gains in the goodness of fit of the second model relative to the first one. If the full model (i.e., the one adding the fixed effect for Condition) fit the data significantly better than the intercept-only model, it was then concluded that the Condition significantly affected the dependent variable of
interest. Wald estimates of the confidence intervals (CIs) for means of the dependent variables were then derived from the full models.

The analysis of IKIs followed the methodology proposed by Chukharev-Hudilainen and colleagues (2019). The durations of IKIs during text production were extracted from the keystroke logs provided by the CyWrite system. Using a script, these IKIs were automatically classified into sentence-initial, word-initial, and within-word. A sentence-initial IKI was that occurring before typing a capital letter after a sentence-final punctuation character (a period, a question mark, or an exclamation point) and a space. A word-initial IKI was that occurring before typing the first character of a word that was not sentence-initial. Finally, a within-word IKI was that occurring before typing a letter that was not word-initial or sentence-initial. Only IKIs produced without an intervening revision were considered. That is, for example, no revision or cursor movement could be initiated between typing the sentence-final punctuation character and the sentence-initial letter. IKI durations were trimmed at 8,000 ms and log-transformed. Linear mixed-effects models were fit to IKI data to predict the duration of IKIs based on the Location (i.e., sentence-initial, word-initial, within-word) and the Condition. Thus, four nested models were built: an intercept-only model; a model adding a fixed main effect of Condition; a model adding a fixed main effect of Location; and a model adding an interaction between Condition and Location. Wald estimates of the means and CIs of IKI durations at each Location and in each Condition were then derived from the full model.

To address RQ2, simple descriptive statistics were utilized to explore the frequency of participant responses that fell under inductively derived categories. No tests of statistical significance were necessary for answering RQ2.
CHAPTER 4. RESULTS AND DISCUSSION

This chapter presents the results pertaining to the two research questions guiding this study. The first research question concerned the impact of the intervention on process and product measures of writing. The second research question concerned participants’ perceptions of the intervention. This chapter will begin by presenting and discussing process measure results, proceed by presenting and discussing product measure results, and conclude with a presentation and discussion of the findings from the questionnaire. The complete dataset of responses to the prompts is provided in Appendix C.

Process Measure Results

Table 2 shows the means and 95% CIs of the three process measures for both conditions, along with results of significance tests.

<table>
<thead>
<tr>
<th></th>
<th>Forced Fluency, Mean [95% CI]</th>
<th>Control, Mean [95% CI]</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characters per Minute</td>
<td>244 [223, 265]</td>
<td>203 [182, 224]</td>
<td>$\chi^2(1) = 31.60$, $p &lt; 0.00$</td>
</tr>
<tr>
<td>(including deletions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characters per Minute</td>
<td>195 [172, 218]</td>
<td>158 [135, 181]</td>
<td>$\chi^2(1) = 24.60$, $p &lt; 0.00$</td>
</tr>
<tr>
<td>(excluding deletions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of Characters</td>
<td>0.20 [0.15, 0.25]</td>
<td>0.22 [0.17, 0.27]</td>
<td>$\chi^2(1) = 1.46$, $p = 0.23$</td>
</tr>
<tr>
<td>Deleted</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As it can be seen from the table, participants wrote significantly faster and produced more characters per minute in the forced-fluency condition, both in terms of the total number of characters produced and the number of characters that were kept after deletions in the final product. In terms of the percentage of characters deleted during the writing process, no statistically significant differences were found between conditions. This suggests that
participants were not simply writing more characters per minute in the forced-fluency condition for the sake of getting something down on the screen that they could delete later to “override” the forced-fluency intervention (like they tended to do in the pilot testing of the materials). Rather, the lack of a significant difference between conditions for the percentage of characters deleted may suggest that participants took the forced-fluency feedback seriously by producing meaningful text.

Table 3. *Mean IKIs across conditions and locations*

<table>
<thead>
<tr>
<th></th>
<th>Forced Fluency, Mean [95% CI]</th>
<th>Control, Mean [95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>sentence-initial</td>
<td>320 [288, 356]</td>
<td>488 [437, 545]</td>
</tr>
<tr>
<td>word-initial</td>
<td>209 [193, 226]</td>
<td>216 [200, 233]</td>
</tr>
<tr>
<td>within-word</td>
<td>122 [113, 132]</td>
<td>123 [114, 132]</td>
</tr>
</tbody>
</table>

The model with one fixed factor of Condition did not fit the data significantly better than the intercept-only model ($\chi^2(1)=0.93$, $p=0.34$), meaning that the main effect of Condition on IKIs was not significant; in other words, overall, the latencies before non-revision keystrokes were not significantly different across the two conditions. However, adding the fixed factor of Location significantly improved model fit ($\chi^2(2)=90.95$, $p<0.00$), meaning that the main effect of Location was significant. Finally, adding the interaction between Location and Condition has further significantly improved model fit ($\chi^2(2)=57.27$, $p<0.00$). As can be seen from Table 3, the confidence intervals for the two conditions are almost identical for within-word IKIs, and largely overlap for word-initial IKIs (with participants being faster at the start of the word by only 7 ms in the forced-fluency condition). This allows us to conclude that there was no significant difference between the forced-fluency and the control condition in the duration of IKIs at these locations. However, for sentence-initial IKIs, the confidence intervals for the two conditions do
not overlap. Participants were faster at the start of a new sentence by 168 ms in the forced-fluency condition relative to control, and that difference was significant.

**Product Measure Results**

Table 4 presents the means and 95% CIs for the product measures and the significance of the differences between the two conditions. Number of T-units per text, number of words per T-unit, normalized frequency of attributive adjectives, and normalized frequency of premodifying nouns were used as measures of complexity. Rate of error-free T-units, number of errors per T-unit, and total number of errors were measures of accuracy. The number of DCUs and the holistic ratings of writing quality are also provided as product measures.

Table 4. *Product measures across conditions for all participants*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Forced Fluency, Mean [95% CI]</th>
<th>Control, Mean [95% CI]</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-units</td>
<td>18.5 [15.0, 22.0]</td>
<td>13.5 [11.0, 16.0]</td>
<td>(\chi^2(1) = 11.90, p &lt; 0.00)</td>
</tr>
<tr>
<td>Words per T-unit</td>
<td>18.5 [17.0, 20.0]</td>
<td>19.0 [17.0, 21.0]</td>
<td>(\chi^2(1) = 0.11, p = 0.74)</td>
</tr>
<tr>
<td>Attributive Adjectives</td>
<td>4.00 [3.0, 5.0]</td>
<td>4.85 [3.70, 6.00]</td>
<td>(\chi^2(1) = 3.19, p = 0.07)</td>
</tr>
<tr>
<td>Premodifying Nouns</td>
<td>2.05 [1.40, 2.70]</td>
<td>1.75 [1.20, 2.30]</td>
<td>(\chi^2(1) = 0.57, p = 0.45)</td>
</tr>
<tr>
<td>Error-free T-unit ratios</td>
<td>0.54 [0.46, 0.62]</td>
<td>0.64 [0.55, 0.72]</td>
<td>(\chi^2(1) = 6.25, p = 0.01)</td>
</tr>
<tr>
<td>Errors per T-unit</td>
<td>2.00 [1.60, 2.40]</td>
<td>1.75 [1.40, 2.10]</td>
<td>(\chi^2(1) = 8.08, p &lt; 0.00)</td>
</tr>
<tr>
<td>Total Errors</td>
<td>10.20 [7.40, 13.00]</td>
<td>6.35 [4.50, 8.20]</td>
<td>(\chi^2(1) = 16.30, p &lt; 0.00)</td>
</tr>
<tr>
<td>DCUs</td>
<td>41.50 [36.0, 47.0]</td>
<td>33.5 [28.0, 39.0]</td>
<td>(\chi^2(1) = 21.00, p &lt; 0.00)</td>
</tr>
<tr>
<td>Holistic Ratings</td>
<td>3.55 [3.00, 4.10]</td>
<td>3.20 [2.70, 3.70]</td>
<td>(\chi^2(1) = 5.28, p = 0.02)</td>
</tr>
</tbody>
</table>

T-unit-based measures of complexity included the number of T-units per text and the number of words per T-unit. In the forced-fluency condition, participant texts contained significantly more T-units than those in the control condition. There was no significant
difference between conditions for the number of words per T-unit. As discussed in the literature review above, these T-unit measures may provide some insight regarding the complexity of the texts, but a more adequate understanding of complexity may be gained by investigating phrasal measures of complexity such as the use of attributive adjectives and nouns as premodifiers in noun phrases.

As shown in Table 4, there was no significant difference between conditions for the number of attributive adjectives and nouns used as premodifiers. Whereas texts in the forced-fluency condition had slightly fewer attributive adjectives, they also had slightly more nouns as premodifiers; however, neither of these differences were statistically significant. From these results, it can be inferred that the forced-fluency intervention did not significantly impact the levels of grammatical complexity present in these texts.

Accuracy was measured in three ways: the ratio of error-free T-units, the number of errors per T-unit, and the total number errors per text. As shown in Table 4, the ratio of error-free T-units was lower in the forced-fluency condition; this was statistically significant. The number of errors per T-unit and the total number of errors per text were both greater in the forced-fluency condition. In sum, participants wrote with less accuracy in the forced-fluency condition compared to control.

The number of DCUs was significantly higher in the forced-fluency condition. This demonstrates that participants developed and expressed more ideas in the forced-fluency condition than in the control condition. Holistic writing quality ratings were also significantly higher in the forced-fluency condition, implying that not only were the additional ideas beneficial for increasing the word count, but these ideas also helped the participants develop more complete arguments to satisfy the holistic rating requirements.
To further investigate the effect of forced fluency on final text quality, an additional pair of nested mixed-effects models were fit to the data, predicting the holistic ratings, but this time adding the total number of characters in the final product (i.e., text length) as a controlling variable. In this series of models, the difference between conditions was not significant: $\chi^2(1) = 0.34$, $p = 0.56$. This suggests that aspects of writing quality that were not directly connected with the length of the text produced (such as, for example, the quality of transitions between paragraphs, etc.) were not significantly improved in the forced-fluency condition relative to control.

**Questionnaire Responses**

Questionnaire responses provided information about students’ perceptions of the study tasks. They also allowed for a comparison between how participants felt that they completed the tasks and how they actually did. This section will discuss the participants’ responses to each of the four questions.

**Q1: How did you feel as you were writing with the disappearing text condition?**

Participants expressed a wide range of emotions present during the forced-fluency condition (which was referred to as the “disappearing text condition” in the questionnaire to streamline participants’ understanding). The responses were open-ended. Figure 3 shows the themes that emerged from these responses and the number of participants who expressed each emotion. A second coder was not necessary because all participants used the same keywords to refer to each emotion, and these keywords could be formally extracted from the participants’ responses to the questionnaire.
Figure 3. Feelings expressed in participants’ responses to “How did you feel as you were writing with the disappearing text condition?” (Note: Categories were not mutually exclusive.)

As Figure 3 shows, the most common feeling evoked by the forced-fluency condition by far was “stressed.” It should be noted that the emotions represented in this coding scheme were not mutually exclusive; the total number of responses exceeds 20 because many responses included multiple emotions, and a few even expressed how the participant felt stressed at first but eventually became more focused or comfortable over time. One response even discussed how the initial stress of the task eventually gave way to relief: “I was certainly a bit more stressed out, but it was also almost a relief to just get all my thoughts and ideas out of my head. I felt more focused on the prompt and task at hand because of the urgency.” This type of response suggests the pedagogical potential of forced-fluency interventions. If students in writing classes are struggling to formulate ideas or get them down in writing, this task could provide a “relief” to
such students by forcing them to write their ideas without worrying as much about typical writing conventions, such as proper grammar or organization, for example.

Another response expressed that the forced-fluency task was challenging, but it was also enjoyable to approach a writing challenge in a new way: “I also enjoyed how it challenged me to think on my toes and be flexible with my writing and approach.” Clearly, this participant recognized one of the most salient benefits of the forced-fluency condition: more ideas can be generated in this way by forcing participants to think quickly and make decisions about what to write next without hesitation.

**Q2: Did you feel like you had to sacrifice grammatical/spelling accuracy while writing with the disappearing text condition?**

A majority of the participants (n = 14) reported that they felt they had to sacrifice the accuracy of their grammar and spelling in the forced-fluency condition. Figure 4 shows the breakdown of responses from all participants.

Figure 4. Proportion of participants expressing that they felt they sacrificed accuracy during the forced-fluency condition.

A few participants added additional comments to the questionnaire to explain the reasoning for their answer, and these additional comments are worth considering. One participant
noted, “Yes. For more complex concerns, I didn't have time to correct them. I focused on easier things like spelling.” Another participant shared the following: “I felt like I had to sacrifice accuracy just in terms of my limited knowledge of the issues. I didn't have time to dwell on whether I accurately communicated the complex ideas—but that is a revising step anyway!”

These responses may indicate that participants had different understandings of precisely what “accuracy” meant in their writing. Whereas the first comment seems to have considered accuracy in terms of word- and sentence-level mistakes such as spelling concerns, the second comment considered accuracy in terms of the validity of information that was being written (even though the question explicitly stated “grammatical/spelling accuracy”). This type of misunderstanding may have impacted other participants’ responses to the question as well.

**Q3: Did you feel like you had to sacrifice complexity while writing with the disappearing text condition?**

In contrast to the previous question, 55% of participants (n = 11) reported that they did not feel that they had to sacrifice complexity in the forced-fluency condition. Figure 5 presents a breakdown of participants’ responses to this question.

![Figure 5. Proportion of participants expressing that they felt they sacrificed complexity during the forced-fluency condition.](image)
These responses are inconsistent with the results obtained from the complexity measures above since 45% of participants (n = 9) felt that they were sacrificing the complexity of their writing when, in reality, there was no significant difference between the forced-fluency and control conditions. Once again, many participants expressed the reasoning behind their answers, and these comments are worth discussing.

One participant shared why she felt that her complexity was sacrificed: “My sentence structure and word choice were less sophisticated because I was more concerned with writing than with my prose and technical presentation.” Another participant shared a different understanding of complexity: “I believe my sentences were still as complex, but the organization of my ideas was not complex at all. Additionally, I usually look up synonyms to diversify my vocabulary, but I did not have time to do that here.” Whereas the first comment understood complexity as “sophisticated” sentence structure and word choice, the second comment discussed organization of ideas and diversity of vocabulary selection. As with accuracy, these varied understandings of complexity may have impacted the results of this question. Regardless, in order to combat the negative feelings that complexity had been sacrificed for future users of a forced-fluency intervention, the results from the complexity measures above should be shared.

**Q4: How do you think the disappearing text condition impacted your writing process?**

This question yielded the most in-depth, and perhaps the most revealing, responses from participants. Although Q1 revealed that a large majority of participants felt that they were stressed while completing the forced-fluency condition, many responses to this question revealed that participants actually appreciated the changes that happened to their writing process in this condition. Answer 1 (A1) is one such response:

A1: “I think it pushed me to consider more avenues around the same prompt. It encouraged me to just get my ideas out instead of truly considering whether they were
good or bad. It contributed to stress but resulted a [sic] simple rough draft that would
generally take me longer as I would want it to be more polished.”

In this response, the participant acknowledged the stress, but she also appreciated the way she
was able to “consider more avenues” and produce a draft in less time than she would normally
take. A2 also presents valuable benefits to the forced-fluency condition:

A2: “I actually liked the disappearing text more. I felt like it forced me to be more
intentional in what I wrote because I didn't have time to read back. For the prompt, I felt
strongly one way, but the condition made me quickly consider the other side. I actually
wrote the opposing viewpoint first, which I don't think I would have done otherwise.

Overall, I felt that this essay was the stronger of the two.”

A2 presents an opposing view to A1 in that the participant felt that she had to be more intentional
in her writing, whereas the A1 participant felt that she had to create a rough draft that was less
polished than she would normally write. Interestingly, despite these two opposing viewpoints,
both participants found the strategy to be beneficial to their final product. Additionally, A2
shows that the participant felt that the forced-fluency condition allowed her to consider more
about the opposing viewpoint from her own because she had to quickly consider more ideas to
discuss to continue writing without excessively pausing. Since part of the requirement of the
prompt included a discussion of both sides of the argument, this was beneficial for this
participant’s final product.

A3 captured one of the potential ways that a forced-fluency condition could be used as a
writing intervention:

A3: “It helped me start simply getting my ideas onto the page, which is what I struggle
most with in my writing process. I also have a tendency to revise heavily while I write, so
I felt like I could really focus on the actual content with the forced fluency instead of getting hung up on writing style. This would be hugely helpful in the drafting stage.”

This participant recognized the way that a forced-fluency intervention could potentially be used in the drafting stage of composition in order to allow writers to focus more on content and less on writing style. Additionally, this participant also recognized the clear benefit of increased idea production.

A4 builds on this idea of increased idea production by recognizing the way that this participant was able to make connections:

A4: “At one point, I definitely felt like I made a connection I wouldn’t have without it (as of desperation to keep the text there). That was cool to see. I think my overall quality was similar to the ‘normal’ one, and I definitely wrote more.”

The “desperation” to prevent the text from fading during the forced-fluency intervention allowed this participant to not only produce more ideas but also connect her ideas in an unforeseen way. This benefit should not be overlooked when considering the applications of this type of intervention in future writing contexts.

A5 concludes with an insightful (and almost humorous) evaluation of this continued idea of increased idea production in this forced-fluency task:

A5: “I didn’t know if any of my ideas were worth anything, but potentially losing those ideas freaked me out.”

Although the goal of this intervention was not to “freak out” the participants, it seems to have been successful in allowing participants to develop ideas first and then consider those ideas’ worth after they were documented in writing. In fact, 14 of the 20 participants expressed this as a benefit of the forced-fluency condition. Figure 6 provides an overview of this and the other
general themes that were expressed by the responses to Q4. The total number of responses indicating each theme exceeds 20 because some responses indicated multiple themes.

![Bar chart showing questionnaire responses to “How do you think the disappearing text condition impacted your writing process?”](image)

Figure 6. Questionnaire responses to “How do you think the disappearing text condition impacted your writing process?” (Note: Categories were not mutually exclusive.)

In sum, these questionnaire responses provided insight into RQ2 by showing participants' perceptions of the forced-fluency intervention. While the majority of the participants reported feeling stressed from the forced-fluency condition, they also recognized its potential to keep them focused and to challenge them as writers. Most participants recognized that their accuracy was sacrificed by writing in this condition, but they did not feel that they had to sacrifice the complexity of their writing. This finding is promising for the potential real-life use of this intervention as participants can be told that time for revision will be allowed later. Therefore, participants may feel less concerned about the intervention’s impact on their accuracy if they know they do not have to be perfectly accurate on their first draft during the intervention. Finally, participants identified many benefits of the intervention on their writing process,
specifically citing thinking faster, generating more ideas, being motivated in their writing, and being more intentional in their work. Some participants expressed that they felt their writing was of lower quality, but ideally, reporting that holistic quality ratings were significantly higher during the forced-fluency condition may relieve future users of this concern.
CHAPTER 5. CONCLUSION

This study explored the potential of a computer-assisted intervention that directly encouraged fluent text production through automated real-time feedback to the writer. The study was guided by two research questions: (1) How does the automated forced-fluency intervention impact the writing process and the written product (as measured by fluency, accuracy, complexity, density of DCUs, and holistic quality indices)? and (2) What are writers’ perception of the automated forced-fluency intervention?

The first question was addressed by comparing product and process measures of participants’ writing between the intervention and a control condition. It was found that although accuracy suffered and complexity remained unchanged in the forced-fluency condition, all other measures improved, demonstrating that this intervention was not only successful at improving fluency, but also has the potential to improve the assessed writing outcomes.

Holistic quality gains between the two conditions, however, were not significantly different when the length of the final text produced by the writers was controlled for. This finding was expected because producing a more sophisticated argument requires writing more text. At the same time, this suggests those aspects of writing quality that might not be directly associated with the length of the text were not different across the two conditions.

An analysis of IKIs (i.e., latencies between keystrokes) revealed that writers attained higher fluency of text production primarily through reducing pauses that occurred at the start of sentences. Word-initial pauses and mid-word pauses were not significantly different across the two conditions. Thus, reducing the amount of cognitive processing at the beginning of each sentence has allowed the writers to produce longer (and better) texts, albeit less accurate. Since keystroke latencies are explained, in part, by planning the linguistic unit that follows, it can be
inferred that (1) in the control condition, participants may have been “overthinking” their ideas or “overplanning” the structure of their sentences, and the forced-fluency intervention may have boosted their productivity by reducing the amount of “unnecessary” planning; and (2) linguistic decisions that are important for attaining accurate output may happen at the start of a sentence to a larger extent than mid-sentence.

The second question was addressed by administering a questionnaire to participants after they completed both tasks. While participants revealed that the forced-fluency condition made them feel stressed, they also identified many benefits of this condition. They recognized their ability to think faster and generate more ideas, and some participants even reported feeling more focused, intentional, and motivated in their writing. If a forced-fluency intervention is implemented with students of academic writing, such students could be proactively informed about the findings of the present study in terms of the intervention’s positive impact on fluency, ideational density, and holistic quality to both lessen their stress about the intervention as a whole and, ideally, to alleviate concerns about lower-level issues such as accuracy. It could be emphasized to future users of this intervention that revisions can be made to improve accuracy after the initial forced-fluency writing session.

Several limitations were present in this study. First, the study did not collect eye movement data which could be useful in interpreting the findings of the present study. Knowing where participants looked during sentence-initial pauses that were different across conditions could provide further insight into the differences in cognitive processing that occurred during these pauses. Future studies, therefore, could incorporate eye-tracking technology. Additionally, this study only examined participants’ writing during a single ten-minute session in each condition. Future studies could investigate student writing over a longer period of time to see
how the forced-fluency intervention impacts subsequent writing sessions. Finally, participants only composed texts that were below their proficiency levels (as they had successfully completed classes that taught this kind of writing). It is not clear how the forced-fluency intervention would affect writing that occurs at or beyond the writer’s level of proficiency (for example, when composing more complex discipline-specific texts, writing from sources, or writing in a non-native language).

Despite its limitations, this study paves the way for developing fluency-focused interventions that could be useful in writing pedagogy. The study demonstrated that the real-time fluency-focused feedback was useful not only for increasing the fluency of written text production, but also for improving the overall writing quality. Therefore, future studies may investigate the benefits of this type of intervention for writing pedagogy (for example, in the context of writing classrooms or university writing centers). The forced-fluency intervention could also be used to specifically target students who may struggle to write fluently. For example, if a student is pausing too frequently or for too long (and such pausing behavior is diagnosed), then the student might benefit from a forced-fluency intervention similar to the one described in this thesis. Future work should focus on implementing and evaluating such pedagogical interventions, as well as on investigating their effects on the long-term learning gains in the learners.
REFERENCES


Huck, G. J. (2015). *What is good writing?*. Oxford University Press, USA.


APPENDIX A. QUESTIONNAIRE

Participant #: _____

Gender:

Age:

How did you feel as you were writing with the disappearing text condition?

Did you feel like you had to sacrifice grammatical/spelling accuracy while writing with the disappearing text condition?

Did you feel like you had to sacrifice complexity while writing with the disappearing text condition?

How do you think the disappearing text condition impacted your writing process?
## APPENDIX B. HOLISTIC RATING GUIDELINES

<table>
<thead>
<tr>
<th>Grade</th>
<th>Quality of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 5</td>
<td>Excellent and outstanding. The qualities of a B assignment, plus imagination, originality, and engaging expression. Writer responds thoughtfully and creatively, requiring very little or no revision. Both sides of the argument have been thoroughly addressed, and even the opposing viewpoint of the author has been discussed in terms of its argument and counterarguments. Supporting details are relevant and provide important information about the topic.</td>
</tr>
<tr>
<td>B = 4</td>
<td>Thorough analysis of and satisfactory solution to the communication task; good organization and solid expression. Writer responds fully, requiring some revision. Both sides of the argument have been addressed or recognized, though one side may still be more developed than the other.</td>
</tr>
<tr>
<td>C = 3</td>
<td>Satisfactory analysis of the communication task, clear organization, and competent style; nothing remarkably good or bad. A 3 means the work meets the demands of the assignment in a minimally acceptable way. Writer responds mostly competently, requiring focused revision. Writer mainly addresses only one side of the argument; the other side is very briefly mentioned. Supporting details for the dominant argument are provided but may lack some depth.</td>
</tr>
<tr>
<td>D = 2</td>
<td>Presence of a significant defect in context, substance, organization, style, or delivery in a lackluster paper; incomplete analysis of the communication task. Writer responds incompletely, requiring extensive revision. Writing may seem more like a haphazard collection of thoughts or notes than an argument or analysis of arguments. Some details are off-task; the prompt is only somewhat addressed.</td>
</tr>
<tr>
<td>F = 1</td>
<td>Inadequate coverage of essential points, uncertain or misguided purpose, poor organization; ineffective and inconsistent expression; significant defects in standard usage; inadequate or inappropriate analysis of the communication task. Writer responds inadequately; paper is not acceptable.</td>
</tr>
</tbody>
</table>
APPENDIX C. DATASET OF PARTICIPANT RESPONSES

S01: P1, FF
Should there be free college for everyone in the United States? Present both sides of the argument.

I believe that the importance of education is what will lead to further development into a better functioning world. I completely agree that college should be accessible for everyone. Whether that means free, I believe that fees still hold a purpose. There is the question to if education did not cost as much whether students would take the concept of college as seriously as it is taken now. Even so, now there is not a consistent standard of seriousness taken already in curriculum.

The positives of free college is that it aids with the fight for equity. Since the literal beginning of white men taking over the world, they have always had the upper hand. Marginalized communities have been left with the remains and have lagged behind due to obstacles placed by the normative leaders in our society. Free college would allow everyone a free playing field. The arguments and controversies around affirmative action, privilege, and other external reasons would become obsolete. The accessibility and acceptance into free colleges would almost solely be based on academic performance.

This leads to the roots as to why affirmative action versus privilege controversies exist. Students score higher and do better academically because of what is provided to them even at the beginning of their lives. What is the family life of the student? What location were they raised? How diverse and inclusive was their education? Were they provided with the same amount of resources? How supporting are their parents both financially and ideologically? If college became free, there may be a more rigorous, exclusive fight for acceptance and that may expose cracks in the general public education system in America in general. When improvements in college are done, the rest of the system must follow or it will still function as a broken wheel.

Free college sounds fantastic. Some European countries do and and look at them! Their kind of okay. I don't really know. I should really be more informed. I know Germany has got a bunch of free college programs. The thing is, their gradeschool education system is very preparitory and advanced. I believe in this vast country, there are so many polarized results from the education system. From Alabama to New York, the differences on how to combat the issues of current education systems varies greatly.

I wish college was free. Money is such a burden and loans suck. I don't have to worry about that though because of scholarships and parenrts AKA PRIVILEN

S01: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

Americans should have the right to buy guns. There is no inherent reason why every single person should be unallowed to own a gun. If used responsibly, there are benefits to having a gun. For instance, deer have become very overpopulated in the area. When it's gun season, it's nice that some on them are gone.

In regards to gun violence, I believe in strict gun laws. I believe that guns made for war should not be accessible to the general public. In Scotland around the 1990s, there was a shooting at a school. Since then, hand guns were almost immediately made illegal. In America, gun violence is high. In 2019, there have already been over one-hundred shootings
(this is a very small estimated number because I do not have the time to do my research for
the exact number, but I am one-hundred percent positive). The cost of lives and bestowed
American freedoms has become a source of contention between political parties.

What must be decided is in who should be able to own guns and why are so many
crazy people getting a hold of them? One reason is the existence of gun shows where gun
shop owners do not need to ask for gun licenses. Another reason is that in actual gun shops,
the questioning that goes on can be very dependent on the owner and staff.

The argument that 'we should keep our guns', assault rifles and all, is very difficult to
understand. But to make progress and desperate change, there must be some sort of
compromise to begin this domino effect of more effective gun control. In that statement there
lies empathy and the belief in the goodness of human beings. One can believe that those who
are adamant about guns desire safety; for themselves and for their families. We can wonder,
how far would one go to defend their family, and in what ways does this demographic of gun
owners believe that the feeling of safety can be achieved? Understanding the psychologics
behind what deep ties are connected to guns can create more persuasive and satisfying
counterarguments.

What ways can we make guns safer? How can we keep guns from those dealing with
mental illness? Is there a way that we can combat both issues without dismissing one or the
other? Guns have been in America since its start and the affiliation it has with independence
and free will is strong. But the safety of children

S02: P1, FF
Should there be free college for everyone in the United States? Present both sides of the
argument.

The argument that college should be free for everyone in the United States in an
interesting topic with different sides to this. On one hand, people may think that college
should be free for everyone in the United States and on the other hand, people disagree with
this statement.

For people who think college should be free for everyone believe that because college
is so expensive and difficult to pay for we should make this easier for students to create equal
opportunity for higher education and better-paying jobs. Not everyone can afford to go to
college or have the means to provide financially for their children or relatives. In today's
world, a college diploma is often the difference between a good job and a "bad" one. In order
to combat this issue, create free college tuition for everyone allows people this equal
opportunity and creates a better economy with more access to well-paying jobs. Those who
think this way may see the opportunities this argument provides in allowing people who
would never be able to attend college otherwise to be a first-generation college student and
pave a new path for their family in the academic and professional world. This may lead to
these people being willing to help pay for the college of these students later in life when they
reap the benefits of free college tuition.

Those who believe that college should not be free for everyone often have concerns
with how this cost will be taken care of. If college tuition costs nothing to the individual
attending, who will provide for this cost? This might cause higher-paid people to cover this
cost which may upset them. Additionally, people may think that making college free will not
create the work ethic in people needed for life after graduation. If a college education is
simply given to them and they do not have to come up with a way to pay for it, people may
think this will make them lazy or unmotivated to pursue their dreams if they had to put in the
work to receive the education they desired.

There also may be other sub-categories to the sides of this argument. Some people
may think that college tuition should not be completely free, but that at least it should be less
expensive or more accessible to those who cannot afford. Or maybe less conventional
methods of receiving a college education could be pursued such as online resources that
could be the equivalent to a college diploma.

Overall, this is a topic that requires careful consideration and thought, especially
when voting for political candidates. Both sides have pros and cons and these need to be
weighed by individuals to see which side is best suited for the needs of the United States.
People should be informed on this topic and develop the

S02: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

In light of several years of mass shootings, especially in schools, people have debated
intensely over the topic of the right to buy and carry guns. The Bill of Rights states that
Americans have the right to bare arms, but with the tragedy these weapons have caused in
American, many people are considering the good that could come from taking away this
right.

Those who believe that Americans should always have the right to purchase and use
guns say that it is a right to self-defense. If someone breaks into your home with a gun, it
may be less likely that items would get stolen or people would be injured if the family also
owned a gun. This is not true in every case, of course, but being able to defend yourself with
a gun in this situation is still helpful. In response to those who believe people should take be
ganted the right to buy guns, this side often says that if is illegal to purchase guns, the "bad
guys" will still find a way to accumulate guns illegally. This creates a problem because not
only will law-abiding citizens not have access to guns, those who abuse the power of guns
will still have access to them.

On the other side of this argument, people believe that because guns are the weapon
of choice in mass killings, taking them away would solve this problem, or at least help. If
access to guns is largely taken away, people who intend to misuse them will have less access
to them, resulting in a decrease in mass shootings and murders. This side often bases their
beliefs on the fact that these mass shootings keep happening and nothing is being done to
stop them. To them, taking away the means to kill is the best solution.

This debate of guns in America is a tricky topic with many opinions. People often
look to other countries for examples, but even these can be contradictory or confusing to
decipher. People should work together through their differences to come up with solution,
because in the end, everyone wants these mass shootings to stop. It is important to be
informed on this topic and engage with those who believe differently from you to form a well-
developed opinion.

S03: P1, FF
Should there be free college for everyone in the United States? Present both sides of the
argument.

The topic of college tuition in the United States has become more prevalent within the
last few years. Many college students as well as parents to those students have formulated an
opinion on whether universities should offer free tuition for a student's education. There are various reasons why students believe tuition should be free such as the fact that not very many people can afford university and end up in debt by the time the graduate or the fact that in this day in age it is quite difficult to obtain scholarships in this competitive climate for universities. Students nowadays would like to get an education at a lower cost which is seeing many students attend community college or not attending college at all. Many of those students are very well qualified to enroll in a university but money seems to be the issue for many. If universities were to grant free tuition for everyone in the United States, then those students who have the potential to become someone notable in the future for the work they have done will have the opportunity to fulfill that potential.

On the other hand, the problem with granting students free tuition is that they could possibly be wasting their education opportunity. In addition to this, it may cost too much for the university to allow so many students to attend classes for free. Take a big school with over 20,000 students for example. The cost to allow each and every one of those students attend their university for free would be immense and bringing in money could be difficult. While free tuition for college seems like a great idea, it may be very costly to the university as well as taxpayers as their taxes may be increased to help fund this free tuition. Furthermore, universities should be wary in considering free tuition as there may be much more cons than pros.

S03: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

As time goes on there is much more conversation on gun laws. Many believe that one should be able to buy a gun freely whilst others believe otherwise. Although there are many arguments for both sides of the issue, one of the big reasons people argue that Americans should have the right to buy guns is for self defense purposes. I would understand if someone were to purchase a gun to keep in case of an intruder or any situation where one may need a gun. While this may be a reason Americans should have the right to buy guns, they should still get the proper background check procedures and the vendor should make sure they are careful about selling the gun to the right person and for the right reason. Those who keep a gun in their home for safety purposes are prime examples of those who have a gun for the right reason and further adds to the idea that Americans should have the right to buy guns.

On the other hand, many believe that Americans should not have the right to buy guns. With the more recent development of school shootings, many are boycotting the selling of guns as it can put the lives of children and adults in danger. Although vendors are meant to run a background check on a buyer, they don't always properly background check the person purchasing the gun. In addition to poor background checks, obtaining a gun from someone else or stealing one from somewhere is far too easy. More and more teenagers and adults are using these guns to cause terror to their fellow peers and if those guns weren't sold in the first place, tragedies would not occur. To conclude, Americans should not have the right to buy guns as it can be a posing threat to our society.

S04: P1, FF
Should there be free college for everyone in the United States? Present both sides of the argument.
There are positives and negatives to having free college in the United States for everyone. To begin with, free college promotes a society that focuses on education and promotes higher learning. Even students who do not particularly enjoy academics can now choose majors and fields of study that are more dynamic and illustrate more technical, active, and dynamic subjects. This also provides them with exposure to other students, studies, and perspectives that they would not otherwise gain. Such exposure is particularly important so that students can participate in broader discussions surrounding social programs, politics, and ethics. Financial stress prevents students from pursuing higher education or even considering pursuing higher education. By providing free college, that burden is lifted, so students can feel free to pursue what they are best at rather than what is monetarily accessible for them. Free college may also encourage students to pursue a masters or a Ph.D. which contributes to a more highly educated society overall and promotes technological innovation as well as more sophisticated approaches to participating in an increasingly global world.

However free college also creates a burden for the taxpayer and may contribute to lower less ambitious student populations. Students would be attending universities for free, so the stakes are not as high. Lack of a financial contribution puts less weight and monetary value on the education and may contribute to a less dedicated student population. Free experiences do not have as much pressure because failure to fully immerse oneself in such an experience does not necessarily mean that the student has lost anything. They have merely gained the experience they participated in, but the program itself may experience a loss because the investment in the student is essentially wasted. Free college may draw students away from technical or vocational schools because it is easier to attend a free university. This may result in poor student participation in programs they may be more well suited for as they take the easier, free route rather than more specific program education.

Overall, free college has positive and negative aspects that impact our society. Free college opens up higher education to demographics that may not necessarily been able to afford such education despite ability. However,

S04: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

America is built on a Constitution that promotes individualistic rights and a fundamental attention to personal ability and humanity. The right to buy guns is illustrated in this individualistic thinking. Americans should absolutely have the right to buy guns despite an array of positive and negative elements that come with weaponry.

Guns can be dangerous weapons. They are used to hunt and kill, and weapons accessible to the public are inevitably accessible to dangerous people as they are part of the public. Accidents, mass shootings, and violent criminals contribute to gun death statistics in the United States that shock other countries around the world. Such violence would likely be lessened if accessibility to guns was limited or denied.

Guns can be useful, necessary tools. People around the world struggle with their governments. Some people struggle so fundamentally that they consider revolution as a means of political and social resolution. It is important to acknowledge the significance of guns in these discussions. People need to be able to protect themselves from their own government. That's not to say that the United States government is violently suppressing its people like third world dictatorships, but the fundamental right to own a gun illustrates a sense of respect and equality between government and citizen. Being informed about proper
use of guns also contributes to gun safety, enables people to protect themselves, and illustrates acknowledgement of individual rights. Guns would not disappear from the face of the earth if people were not allowed to buy them, they would merely proliferate in black market gun trades that already exist. Allowing Americans to own guns contributes to a safer more equal society.

The ability to own something, be it land, guns, or money, is a fundamental aspect of independence. Limiting that independence can contribute to dire consequences that increase that limitation. Although guns can be dangerous weapons and contribute to violence, they also contribute to safety and equality between government and

S05: P1, FF
Should there be free college for everyone in the United States? Present both sides of the argument.

College is getting more expensive as time goes on. If you look back a few centuries ago, college was just for the rich or for the gifted. Land grants universities were created to give opportunity to more of the "common" people. This opened up doors for even women to go to school before the culture would expect them to get married. Now the cost of college is continuing to increase. Even Iowa Stat which is a land grant university is increasing the tuition every year making it less and less affordable for the "common" people.

Most people see college as the only way to succeed in the world. Pricing someone out of the opportunity, would be pricing them out of a bright future. Although if you make college free for everyone where would the funding come from and who wouldn't go to college? There are several jobs in the United States that do not require a degree, some of which people can do their whole lives. If we increase the number of people getting a college degree and treat it more like highschool, where you are expected to then the value of a college degree would go down.

On the other hand, studies show that the more education you have the more likely you will have happy future relationships, content with their job, decrease the chance of mental and physical health issues.

S05: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

Side 1:

By taking away guns from the common person, the government and the people who attain illegally would be the only ones with guns. This in itself create a dangerous situation as if someone who broke into your home was assured that you wouldn't have anything to defend yourself. I feel like it would give the people who are in power more power over the common person then they should have.

Side 2:

Several people get killed by guns every year. Some people are killed by accident or on purpose. By taking away to the right to have a gun, it would make it harder to obtain a gun in order to carry out a incident. This would in theory prevent some people from carrying out their plans. This would save m

S06: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.
In today's world, guns have become an issue that are prevalent in every political conversation. It's hard to not discuss this issue when so many Americans die each year from gun violence, whether it be mass shootings, gang violence, or even gun accidents. The problem doesn't have one obvious answer and it has divided Americans to the point of extreme political polarization. The options commonly offered are either to do nothing or to eliminate guns altogether. Are these two extremes the only option? Or can there be a happy middle ground. In my opinion, there is a solution between these two sides that can satisfy both sides with compromise. However, both sides are important to discuss in this debate to understand the best compromise.

The easiest response to the gun debate is essentially to do nothing - allow Americans to continue to buy guns with little to not restrictions as it is now. This option satisfies right-winged conservatives and gun advocates. While this option does not do much to curb the current influx of gun violence, particularly mass shootings, it does honor the Second Amendment as it is written. The right to bare arms is a fundamental right written into the Constitution. Removing the right to buy guns would force Americans to reconsider how we interpret the Constitution and what the writers truly meant. In defense of buying guns, is honoring what our country was founded on and the Second Amendment.

On the other hand, the alternative extreme option is the ban the selling and buying of guns. This option, popular with left-wing liberals, would eliminate personal purchasing of guns by everyday Americans. This option aims to eliminate the problem of extreme gun violence by removing the weapon, most notably automatic assault rifles. Countries like Australia operate on this kind of ban and many Americans would like to see a ban altogether in an effort to

**S06: P1, N**

Should there be free college for everyone in the United States? Present both sides of the argument.

College is commonly seen as a way to advance oneself in their career and society as a whole. Education offers an avenue to pursue the career paths that intrigue a person. Furthermore, it can act as a path to overcome poverty and other hardships. The problem is that college in the United States, is expensive. At times, it reinforces the class divide that so many are trying to escape. Should college be only for those who can afford it or should it be accessible to everyone through free tuition programs? Both sides of the cost vs. free college debate offer strong points worthy of discussing.

As it stands currently, college in the United States is expensive for the everyday person. Even a middle class person will likely need to take out loans to pay for the increasing cost. Scholarships help alleviate this cost, but are only available to academic high achievers. The price of college tuition increases faster than the rate of inflation, thus causing college tuition to rise rapidly year after year. For this reason, college should be free. Education is a right not exclusive to the wealthy. Due to the price and limitations facing the impoverished, the government or other programs need to offer options for free schooling.

On the other hand, the government already struggles to allocate funds for education. Budgets are constantly cut for the education sector, affecting the quality of schools. Reasons to not allow for free college is the potential that the quality would diminish and the funds are too hard to find. The United States has the highest quality universities in the world.
Unfortunately, these universities are able to be such high performers because of the billions of dollars they receive in tuition.

**S07: P2, FF**

Should Americans have the right to buy guns? Present both sides of the argument.

Americans should have the right to bear arms. It is apart of the constitution. Many people especially in todays world want to feel safe. This is an american right. There is no problem with guns. Everyone likes to say that guns kill people. This is false. Guns dont kill people, people kill people. If you put a gun on the table its not going to kill someone. If you put it in the hands of someone who intends to harm someone then yes, it will kill someone. Its all about a persons mentality. This is something many americans dont understand. Yes gun violence is a huge problem and its always so sad to hear about. However if more precautions were taken when buying a gun maybe this would not keep happening. All people buying a gun should go through a mandatory pschy evaluation. This would eliminate the fact that people who have a mental illness should not have guns. This would help people and make gun safety more doable for all americans.

That being said many people would argue that guns are bad and the cause of violence. They have a great point. Guns are a very dangerous weapon. There are all kinds of accidents that happen with guns. Not to mention that school shootings are becoming more and more popular. There is at least one school shooting every few days in this country. Yes it is a tragedy but at the same time the shock wears off after they happen so many times. Its awful to say but true. If less americans had guns maybe this would not be such a huge problem. Many things contribute to gun violence. Its just a matter of who is in possession of the gun. This is a argument that has no winning side. No matter how you look at it. Its a shame and a trave

**S07: P1, N**

Should there be free college for everyone in the United States? Present both sides of the argument.

College is a privilage and not a right. People work extremly hard to get into college. For some people college is a goal that they may never reach because they have no money. College should be free for those who deserve it. When applying for college there is always that doubt that you wont be able to afford it. If college was free for students that goal would be attainable to them. With free college students would have less stress and be able to acheive dreams with out being in a finacial bind. It would be a great opportunity and beautiful experience for all students.

College is something many people think they are entitled to when that is simply not true. How could college be free for everyone. Where could this money come from and how would they get it. For the average person to go to a public university like Iowa State its 50,000 $ a year thats tuition and other expenses. How would the government come up with that much money for 30,000 students. Thats over 150,000,000 a year. How could the government afford that. It would be nice to have free college but it is just not feasible. Free college is something I hope to have happen but its just to expensive and even though its fair because all students would get free college its just not reality. Some people should have to pay because they do not work as hard as other students. This is a concept that everyone wants but no one can make happen.
S08: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

Americans should have the right to buy guns, however this right should only be given to those who understand how to safely use them. When buying guns, there should be thorough background checks so that it is ensured the owner is both capable of understanding safety precautions for using guns and ensure that the mental health of the owner is stable. Americans should be able to use guns for sport and safety purposes like hunting or keeping a gun locked in a safe or drawer in their homes. If this right is taken away, Americans could risk losing other liberties like speech. But, there are certain guns that are unnecessary for hunting or safety purposes, meant for the singular purpose of killing. Guns like AR-15’s which are horrifyingly common to mass shootings in the last decade are unfortunately too easy to obtain. Although Americans should have the right to own guns and protect themselves as they see fit, that desire can be met with handguns or hunting rifles. Many will make the argument that "guns don't kill people, people kill people," but shouldn't we make it a little harder for people to obtain what are essentially just killing machines? There is a way to protect the first amendment while also protecting American people from gun violence.

S08: P1, N
Should there be free college for everyone in the United States? Present both sides of the argument.

The argument for free college comes down to making schooling beyond elementary, middle, and high school education less elitist. What keeps smart, deserving students from a college education is money. Often students who could succeed in college do not have the opportunity because they grew up in socio-economic conditions which preemptively sanctioned them to a certain way of life.

However, when faced with the nation's crippling national debt- the question must be asked- where will the money come from? Although other first-world countries have implemented free college or something close to it successfully, it seems that a free education for absolutely anyone who wants it is a bit idealistic. Americans can scream for free college, but how will they feel when their taxes are increased? Of course, free college is ideal, but is it realistic? There needs to be a more solid plan of how it will be paid for and how the increase of students in colleges will be handled.

S09: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

I think Americans should have the right to purchase firearms. There are limitations of this of course, such as explosive firearms and incinadeary weaponry that can pose a more potent risk than small arms such as rifles and handguns. Already in the United States there exists many other limitations, such as bans on certain attachments and type of fire. For example, fully automatic weapons, those of which fire non-stop while a finger is pressing the trigger, are banned for sale and civilian use within the United States. Semi-automatic rifles, handguns and shotguns exist and are widely carried by millions of responsible residents across the United States. The right to bear these weapons is enshrined in the United States'
constituion in the 2nd Amendment, and the pro-gun movement has long argued for a reduction in what they perceive as gun control legislation.

Conversely, there is a prominent group of people in the United States that argue for a reduction in the number and sales of weaponry to the public. They cite the rise of mass shootings where many perpetrators use an AR-15 semi-automatic rifle to kill large amounts of people. They argue that these "assault style" weapons should not be available for purchase by civilians and other non-military personnel. There is something interesting about this argument, that they still argue that guns should be able to be purchased and owned by civilians, but limit the scope of weapon types.

Interestingly enough, both sides of this argument agree that there should be certain restrictions on the scope of arms available to be bought and owned by civilians. They both argue that weaponry like I mentioned before, that of heavy artillery, ordinance, explosive and incendiary devices should not be sold or in the hands of civilians. This is a common ground both sides share where fruitful legislation can be molded from. Many Americans argue that the United States should take on a similar model to that of Europe when it comes to weaponry and its purchase. For example, while countries such as France, Ireland and the United Kingdom contain an outright ban on the purchase of all guns to its citizens, states like Switzerland have high rates of gun ownership with nearly zero mass shootings or gun related homicides. The Swiss own aut

S09: P1, N
Should there be free college for everyone in the United States? Present both sides of the argument.

One of the most divisive debates in the United States right now is that of free college. Those who either support or reject the notion of free college do so for a variety of reasons and fall onto clear ideological lines.

Those who argue for universally free college specify different levels that would be available to all without charge and argue a variety of payment methods. These methods include lightening the burden of high college costs by relieving all college debt and by increasing income taxes on the wealthy. Proponents of free college argue that the high cost of college ostracizes poorer individuals with potential for success and that graduates are being crushed under the costs of student debt and tuition.

Those who argue against free college point to various issues with many of the proposed payment plans, highlighting impracticalities and a more centralized government as reasons to avoid this policy. They argue that students have a personal responsibility in their lives to first, choose majors that will provide them with profitable careers that will enable them to avoid crushing debt, and second that forcing others to provide a fraction of their income for someone else's extra costs is fundamentally unfair. They argue that college is not something you need to go through in order to be successful, and that the high cost of schooling cannot be solved through free

S10: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

I think some Americans should have the right to purchase guns. I think there needs to be routine background checks. I also personally believe that guns should not be kept in homes I believe they should be kept at a special facility to be able to check them out and
check them back in. I believe guns can be used for shooting target practice for or for hunting and for this reason I do not see why guns need to be kept in people homes. I think this is important because there is a lot of gun violence happening and guns are getting into the wrong hands of the wrong people. People kill people, not guns. I personally don't see any fun in using guns as I am not a hunter but I do understand the fact that some people enjoy using guns as a safe recreational activity. This is why I would like to still be able to allow people access to guns but also allow them a safe and secure place they can store them while they are not in use for the recreational activities. Additionally, I recognize there are a lot of people who do not agree with my side of the argument. There are many people who believe every American should have the right to a gun without any sort of background check because what is stated in the 2nd amendment. I personally believe that law, including what is written in the constitution is flexible and should be adapted to the time period, since the constitution was written in an extremely different time than we are in now. The 2nd amendment, and the fact that everyone had the right to a gun worked back then but I don't think that this should be the case for the time we are in now. It is obvious due to all of the school shootings that guns are getting into the hands of mentally ill people and people who are ignorant to gun safety. It is very important to me that we change the gun laws in some way so we have less guns getting of the hands of people who intend on misusing them. I believe in much stricter gun laws in order to be able to do this and I am going to vote for a presidential candidate who has these values as well. I think that this is going to be the best for the best number of people, even though it is obvious that not everyone agrees with this idea and it might even be considered an unpopular opinion. Changing these laws is imperative for our nations safety.

S10: P1, N
Should there be free college for everyone in the United States? Present both sides of the argument.

Is anything truly free? My answer to this is no, nothing is truly free. It may seem free from one perspective, but look at it from another perspective and it can be seen it is not truly free. Keeping this value in mind, I do not think there should be free college, but I do believe it should be way more affordable than it is today. Prices of college and the fear of college debt is still keeping young adults from going to college. Education should not be a privilege or a luxury, it should be something that is available to everyone who wants it. But I do think there should be some expense to college. I don't know the real cost of this, I am not sure if these prices are the real costs or if companies and universities are simply hiking up the price because they know people will pay, my assumption to what is happening is the latter. For prices of college to go down there needs to be a culture change in the world of higher education, which is something incredibly difficult to do and I understand this change will take years to accomplish. I am also no politician, so I am not really sure where the money will come from if it is not coming from the people who attend the colleges and universities. Because of this lack of knowledge, I do not have a plan on how to go about lowering the cost of college to make it affordable to everyone who wants it. I plan on voting for a president whose values align with mine; someone who also values decreasing the cost of higher education and someone who sees education as something that should be affordable to everyone no matter their financial situation. One possible system could be a tier system, where there are multiple financial tiers. If a wealthier family can afford to pay the top tier than they will, but lower tiers will be available to those who can not pay the top amount. But
note that I think this top amount should not be a ridiculously high number and that this top
tier should still be less than some universities are charging now for their public universities. I
also believe that this should be the case for all public universities. I think private colleges
should be able to charge as much

S11: P1, N
Should there be free college for everyone in the United States? Present both sides of the
argument.

I believe there should be free college for everyone in the United States, to an extent. I
do not stand by a complete free college pass. However, I do stand by free college for those
individuals that are attending a community college. Individuals that want to get a college
degree of some sort, will have the opportunity to do so. In addition, they will not be
burdened by the debt that goes along with even attending a community college. I don't see
why free community college would necessarily be an issue because shouldn't we value
furthering your education for everyone?

Even though I support free college at a community college level, I do not agree with
offering free college at a university level. My first argument supporting this, is the fact that it
would be significantly expensive. It would place an extreme burden on our middle class with
taxes to help support the state universities. Another argument I have against free college at a
university level, is the worry that the quality of the education would decrease. Without the
funding from tuition, all the amenities and updates the university offers and partakes in,
would perhaps no longer be a possibility.

I have a fairly strong opinion about this particular topic; just like any other human, I
believe my views are correct, yet I can see where other individuals may disagree with me.
For example, for someone arguing for all college, regardless of the level to be free, I could
see them feeling my view is not entirely fair. Those that have the money to go on to a
university will, but those that don't have the money will have to stick with a community
college. I understand that perspective; I am by no means advocating for a division of fairness
in education. However, as I see it, if someone decides to first attend community college for
free, they can get a job while going to school and/or apply for scholarships and grants to help
support them if they do decide to pursue a bachelor's degree.

An argument against free college in general may be that it decreases the level of
accomplishment one receives when they receive a degree.

S11: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

Overall I believe that Americans should have the right to buy guns. However, I am
not fully convinced, nor do I think I ever will be, that there should be no restriction on the
guns that Americans are able to purchase. I am by no means a gun expert. However, with the
current society we are living in, I feel as though I have been encouraged to take a stance due
to the unfortunate events that have happened because of guns. I believe that Americans should
be able to purchase guns that have the sole purpose of hunting. A example of a gun for
this purpose is a shot gun. I am certain that many Americans value hunting; in fact, they
consider hunting a favorite hobby of theirs. I do not agree with this, but I can see this point
of view. A few of my uncles are avid hunters; they take pride in the size of deer they are able
to find. They consider it a hobby, or even a sport because of it's pure challenge and difficulty tied to it. Therefore, I do not find it feasible or a smart decision to get rid of guns all together.

On the other hand, I do believe there should be some serious limitations to the types of guns individuals are able to purchase. High powered assault rifles, and other guns that can fire out many bullets just with the pull of a trigger, are extremely and utterly dangerous. In fact, I think it’s rather scary to think that these types of guns actually exist in our society. These types of guns are the ones that can hurt a lot of people at once. They are used in the military, for military purposes. They are not intended to be carried and handled by regular Americans. In addition, they cannot be used for hunting, to my understanding, which leads me to say: what is the point in having these?

Instead of taking away guns all in general, I believe there should be law enacted that extremely limit what guns are available, and who is able to buy them. I was walking around Walmart one day, I happened to notice by the gun section, there was a sign that read, "Must be 18 or older to buy. Must present a valid ID." This sign sickened me a bit. It's as if the guns were being treated as cigarettes. Just because I am 18 and have a valid ID, does not mean I should be able to go to Walmart and purchase a gun. I am not aware of any other measures taken by Walmart to limit the purchase of weapons, but nothing else was listed on the sign. I believe individuals should have to get a very detailed background check before they are allowed to purchase.

I also believe individuals should be offered "buy backs," for any weapon the

S12: P1, N
Should there be free college for everyone in the United States? Present both sides of the argument.

I believe that college should be free but not without taking many different factors into consideration. If college was free for everyone I think that a lot of young students might take advantage of the system, so there should be some things in place to avoid this from happening. Of course if college was free it would open a lot of different doors for those who never would have thought they could go through which is why I feel it is so appealing to others. I also understand that the opportunities we have at the university in addition to the education is what costs a lot of money for the school. Things like student services wouldn't be available or as

S12: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

I personally do not like the idea that Americans should buy guns without many many texts and precautions put in place first. I am biased because of my time living in China where guns are not allowed and I watched how the government and police handled and stored guns, I felt safer and felt it was a really good system they had in place. Of course I only know one side of the story and I things are not perfect with their system similar to how things are not perfect with ours. Americans have had the right to buy guns my whole life and have never felt personally threatened by the fact that people have guns so I like to remain unbiased to the question. If Americans did not have guns the uproar that would occur is what people are worried about, because people already have guns how can you trust everyone to give them up? It is harder to change a system to limit people than it is to give them more freedom. If
America continues to keep the right for citizens to carry guns. I think that the issues we have with gun violence will continue to occur if we don't adjust the laws already in place.

**S13: P1, N**

Should there be free college for everyone in the United States? Present both sides of the argument.

Free college in the United States has long been a contested issue, and never more so than in the present election cycle. While there are various arguments to be made on either side of the question, the most relevant involve availability and remaining up-to-date with the rest of the developed world.

Availability, once again, has two sides. Free college would allow a much larger proportion of the United States population to obtain a higher education and, thus, increase their earning potential. A mass increase in the education levels in the United States could have wide-ranging positive ramifications in terms of productivity and advancement. However, increasing the availability of a university education could serve to devalue it. By making it a widely-available commodity, it is less impressive to successfully obtain a college degree. By devaluing such a skill, it is possible that salaries and prestige would decrease exponentially.

In comparison to the rest of the world, the United States is one of the only developed countries that does not provide free - or highly subsidized - education to its citizens. By changing this policy, the United States would successfully catch up to the rest of the world. On the other hand, the United States already has an impressive university reputation. We house most of the best colleges in the world, which makes it appear that the nation is doing something right. By trying to "catch up" to other nations, it is possible that the quality of a United States education would decrease.

Clearly, this is a multi-faceted issue that requires much consideration and a broad understanding of potential implications. Only by analyzing availability and comparisons to the rest of the world, among various other issues, can one come to a sound decision on this issue.

**S13: P2, FF**

Should Americans have the right to buy guns? Present both sides of the argument.

In recent years, the right to buy guns has been hotly contested. Spectacles that involve the misuse of such firearms appear on our TV screens on what seems to be a daily basis, yet some individuals maintain that they have the right to own these weapons. The primary argument against owning firearms is the danger that they present to the community, while the argument for the right is one's need to protect oneself.

School shootings have become so common in recent years that Americans have begun to get desensitized to their occurrence altogether. It is not uncommon to see news headlines reporting the death of a number of students or bystanders, followed by various editorials about how this impacts the Second Amendment. In order to prevent such instances from occurring, some argue that Americans must not have the right to purchase guns. If individuals are unable to obtain weapons capable of such consequences, than the events will surely decrease in frequency. This side of the argument is supported by studies of other countries where firearms are highly regulated or banned altogether.
Nevertheless, others maintain that they need to own a gun to protect themselves and their families. It is common to hear the argument that the only way to stop a bad guy with a gun is a good guy with a gun. Such appeals have been expanded to a world-wide level, provoking outrage and support from around the globe. Social media networks such as Twitter are full of instances of people either supporting this point or arguing against it.

While there seems to be some validity to this point, it seems counterintuitive overall. After all, if no one had access to firearms, then there would be no need for "a good guy with a gun." This seems as though it would only be a viable argument in the situation that the nation is currently in - where everyone has nearly unrestricted access to guns and various other weapons capable of wreaking havoc.

Regardless of one's stance on the issue, it is clear that reforms are necessary to develop a safer and more cohesive country. For example, background checks and increased regulations on the type of weapons that can be purchased are necessary, as well as a national registry to keep track of gun owners. For now, this middle ground on the issue may be where the nation needs to settle, as the current political climate makes it appear unlikely that a broad consensus will be reached at any time soon.

The right to buy guns is a contentious issue in the United States, and it is clear that reforms and increasing regulations are necessary to resolve the issue until a broader consensus can be reached.

S14: P1, N
Should there be free college for everyone in the United States? Present both sides of the argument.

With rising tuition costs across the country, both in private and public schools, affording the experience of obtaining a degree is becoming significantly more costly for Americans. This financial burden can be carried for years after graduation, hampering the success and stability of many young adults and growing families. To offset this initial difficulty in establishing a career and ensure that critical labor roles in society are filled, the federal government should subsidize higher education costs for everyone who pursues it. Modern tuition costs for in-state schools can often times stand in the way of bright students pursuing their desired calling. Even with abundant scholarships, students in the lower brackets of the socioeconomic ladder often have little to no help from family to attend college, and even if students work 60+ hours per week at a minimum wage job every summer, that still barely makes a dent in paying tuition costs for 4+ years of college, let alone housing and meal costs.

College education is a critical necessity to fill invaluable positions in today's workforce. Although some may argue that not every trade requires a college level education, and therefore only those who can afford it should attend college, the opportunity to attend college can be provided by the government, to ensure

S14: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

A heavily debated topic in the United States has been around the ownership of firearms. Many innocent deaths have occurred in the past decade due to firearm violence, and the government has struggled to reign this in. Some positions advocate for complete removal of firearm possession, only allowing authorities like military or police forces to carry them
responsibly. Others evoke the argument of the 2nd Amendment, citing that all firearms should be legal to carry. While these are extremes of both ideologies, I believe Americans should inherently have the right to buy guns, but several checks should be established to ensure their responsible storage and use.

For Americans who wish to buy guns and use them responsibly, for hunting or target practice or merely self-defense, firearms with small magazines should be available to the general public to purchase. That being said, not every person is capable of owning a firearm. Some individuals should be restricted, like past felons or anyone with mental health issues. Ideally, there should be a screening process in place to check the background of anyone attempting to purchase a firearm, with a minimum wait time. This would potentially help in reducing gun-related crime caused by spur of the moment emotions, and help in monitoring the amount of licensed guns in the public. Additionally, revoking the right for Americans to own guns is unconstitutional at its core, since the general populace needs to own guns in the event that they need to rise up against grievances imposed on them by the government. For those who advocate that the right to own firearms should be revoked, the main concern is reducing violence and innocent deaths. By prohibiting the populace from purchasing weapons,

S15: P1, N
Should there be free college for everyone in the United States? Present both sides of the argument.

Free college for everyone could significantly decrease the anxiety surrounding tuition, application fees, and financial aid for students. Students experience a wide variety of stress during their time at college including academic pressure, being away from home, affording food and rent. Mental health and general student wellness is a major discussion concerning the health of college campuses. Financial struggles and student debt contributes to the anxiety, depression, and stress that students face both during and after college. It becomes a lingering weight that impedes students' ability to deal with the other, important concerns they need to address during this time, and free college for everyone could alleviate at least one burden.

On the other hand, free college for everyone would require a considerable increase in the budget allotted to each college. Without any student contributions to funding, large donations will have to be found from a wide variety of sources. There are also many students who attend college who can afford their education, either because of their parents' financial resources or their own. Instead of making college free for those who can easily afford it, efforts should be focused on making college free for those students who cannot otherwise pursue education or experience considerable complications to doing so.

S15: P2, FF
Should Americans have the right to buy guns? Present both sides of the argument.

If Americans do have the rights to buy guns, there need to be considerable and thorough conditions and standards for their mental health, what they plan to do with those guns, and how often those licenses and contracts need to be renewed. Improving and intensifying the certifications and standards for gun ownership should be a step towards eradicating guns all-together in the U.S. There is a disproportionate level of gun violence in
this country and massive numbers of civilian lives are not worth risking. The very possibility of easily acquiring a firearm in the U.S. makes it easy to commit violent crimes on impulse, leads to school shootings, and suicides. No child should go to school fearing for their lives and no people should live in anxiety and distrust of law enforcement because they have firearms.

Americans do have the right to bear arms and protect themselves, according to our constitution. If there is gun violence in this country, it is because everyone is not not trained properly and prepared to defend themselves. We need improved law enforcement and gun distributors to ensure that violent people are not given guns, but this does not mean every other person's rights should be stripped. Guns will always be available somehow and violent people will always be able to build or acquire them and commit crimes. Citizens should have the option to be trained to protect themselves, their families, and their communities from danger when it arises. Taking guns away from properly trained citizens and bias-tested officers will put communities at greater risk and make it easier for even greater violence to occur.

S16: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

I believe that Americans should have the right to buy guns, but I think that there need to be far more restrictions on how people obtain them. It is, in my opinion, far too easy for individuals to obtain guns. We have had countless situations within the United States where there have been mass shootings and innocent lives have been lost. Some of the individuals that were shooting were racist, white supremacists, dealing with mental illness, or many other examples similar to this. For this reason, I think that Americans should have to undergo psychological testing, have immense background checks which would include looking into their social media because some people share very problematic things. This would possibly hint that maybe this person is a racist, or maybe this person has said something about wanting to get rid of a certain group. This would possibly lessen the number of mass shooting and make it harder for these people that are threats to society to obtain guns. I do not think that guns are necessary, I do not think anyone should be able to buy them, and I think that if they are going to be available to Americans, there need to be heavy restrictions.

Some people argue that everyone should be able to buy a gun because it is the second amendment and it allows individuals to protect themselves. I disagree with this. I understand that it is a way of people protecting themselves, though no one needs a gun walking down the streets. This is more of an issue of conceal carry, though I think it also falls into this category. Guns are a manner of protections, though if it is more difficult for everyone to obtain a gun, then there is less of a need for everyone to have a gun to protect themselves. Having guns in the house to protect in the case of an intruder is a situation that I understand, though having a gun in the house could lead to carrying that gun to Walmart and shooting innocent people. Therefore, in my opinion, there is no justification for guns in any environment because people, by nature, are unpredictable. Though, the unpredictability of people is why some may argue that it is our right for us to all carry a gun in a case to protect ourselves. Therefore, if there was a situation where someone was shooting in a park or a store, a person with a gun on their person would be able to stop this active shooter and protect many people. I believe that is the side and the argument of those who think that guns should be available to all. Overall, I still feel that there need to be more res
S16: P1, FF
Should there be free college for everyone in the United States? Present both sides of the argument.

There should be free college for everyone in the United States. College, in my opinion, is one of the largest expenses in the world. I am an out of state student and luckily I have scholarships, though each academic years costs $34,000 for me. I still have to take out loans, because of course my scholarships are not able to cover all of my expenses. I will also be attending graduate school for my career and this program is even more expensive than my undergraduate degree. Unfortunately, there are not many funded positions in my graduate program. Therefore, I will likely be in debt for a long time because of this drive I have to attend school after school. These dollar amounts are something that will haunt me, my family, and my bank account for the rest of my life. I think that college should be free because there are countless students are unaware of the scholarships available to them or are daunted by the cost of college and never attend because of this fear. By granting free college to everyone, I think that more people would be able to attend college and achieve their dreams and educational goals. Furthermore, many students may not be attending school after school to become doctors, like they may wish, because they are daunted by the expenses of school. I think that by granting free college to all, more people will achieve their career goals.

Some believe that there should not be free college to everyone in the United States. I see this side of the argument as well because it would raise our taxes immensely. This is hugely problematic because many people believe that our taxes are high enough already. Many tax payers already do not want to pay for education. Therefore, if they are told they are paying for everyone's college, I think that they will be angry and be more against education in the future because it is costing them so many tax dollars. I think that by making college free to everyone, it may also lose it's value and possibly not be as strong of a system as it is right now. Since there will be likely less funding for research if the government is paying for it all, there may be less opportunities for students and the education will not be as valuable or hold as high of standards as college currently does right now. I think that keeping college a thing that costs money may be beneficial for the value of the education that we are receiving. Though, of course, the cost could go down just a little bit.

S17: P2, N
Should Americans have the right to buy guns? Present both sides of the argument.

Although there is a slew of feelings and opinions on this topic, two main arguments have emerged.

The first argument is that Americans should have the right to buy guns. Supporters of this side of the argument believe that the Constitution has instated this right, and it should not be revoked. They cite the need to possess guns for hunting or protection in rural areas. Additionally, they note that it is difficult to protect against a gun if you do not have one yourself.

The second argument is that Americans should not have the right to buy guns. Supporters of this argument believe that access to guns will not help protect people, but instead creates a greater risk for everyone. They also assert that guns are not necessary for
the general public to conduct their everyday lives, and that the US would be better off if access to guns was limited or banned.

Aspects of both arguments are compelling and should be taken into consideration. There may be farmers who need a gun to protect their livestock or people who want a gun for personal protection. However, the government should create stricter legislation surrounding background checks and types of guns sold to help ensure they are not being bought into "the wrong hands."

**S17: P1, FF**

Should there be free college for everyone in the United States? Present both sides of the argument.

As tuition costs continue to rise and the student debt crisis compounds, the merits of free college are being hotly debated, particularly during election cycles. The group that advocates for free college argues that education should be free for everyone, and that rising college costs have made that difficult, if not impossible. They note that the people who are most frequently and heavily affected by rising college costs are minorities or those who are disadvantaged in some way. This group believes that we need their voices to move forward as a nation, and should ensure they can attend college. Another part of their argument is that the more educated its citizens, the more economically productive an nation's economy is.

The group that is against free college is most concerned with how it will be paid for. They don't want their taxes raised in order to pay for someone else's college expenses. Additionally, they note that there will be severe pushback from those who have already been through college and paid off their loans, only to turn around and have to pay a stranger's. After taking both arguments into consideration, I believe that college should not be free. To combat rising tuition and related college expenses, tuition ceiling should be instated and an assessment of truly necessary costs should be made.

**S18: P2, N**

Should Americans have the right to buy guns? Present both sides of the argument.

Under the second amendment of the United States Constitution, American citizens earn the right to purchase and bear arms, which is another term for guns. However, this does not necessarily mean that an individual can purchase any and every gun of their choosing. Within this amendment, there are limitations as to what type of gun can be purchased and how. Although these limitations exist, there still continue to be ongoing controversy as to whether or not American citizens should have the right to buy guns in the first place.

To begin, there are many views that would support the right to purchase guns which often refer to citizen rights. As it is declared a right within the amendment of the Constitution, many people believe that it would not be just to take this right away. This does not necessarily mean they are against restrictions, but they believe that making guns illegal in the United States can potentially be harmful. For instance, this amendment was put in place to allow citizen the right to protect themselves from others and the government overpowering its citizens. By taking away the right to own and purchase guns, there is a belief that we risk government taking control and becoming more communist. In addition, guns are commonly used in self-defense. As a result, taking away these guns will only increase the chance of
injury. As many say, a "bad guy" will always find a way to get their hands on a weapon, whereas the "good guy" is left defenseless.

On the contrary, there are also many views that believe guns should be illegal in the United States. With the rising of mass shootings, gun ownership and wrongful use has be

S18: P1, FF

Should there be free college for everyone in the United States? Present both sides of the argument.

As it currently stands in the United States, various forms of colleges all require an admission fee. These fees vary based upon the type of college, but the fee always remain. For instance, it costs less to attend a community college, whereas it costs a lot more to attend a public university, and even more so at a private college or university. Within recent years, especially in the realms of politics, the debatable topic as to whether or not college should be free has become more popular.

To begin, many individuals support the view of college being free for all students in the United States based on the support of equal educational opportunities. As it stands, college can be very overwhelming and expensive. In order to gain a "better" education or more valued degree, you pay more to attend a higher-standing college or university. However, with these alarming and rising rates, it is very unforgiving when considering lower-economic standings and backgrounds. If an individual does not have the money to attend these universities, they are therefore not receiving an equal educational opportunity in relation to their peers who may be of a higher economic standing. This then has negative implications past college. In addition, many students entering college accumulate a lot of student debt that can take years to pay off, all for a degree. This puts a lot of financial strain on individuals, which can hurt their future and career potential.

Despite their being many reasons to support free college in the United States, there are still many views that do not support it. First of all, many fear that by making college free, the value of a degree will decrease. If students exiting college have an essentially free degree, it would seem as if it is not worth anything. In addition, individuals against free college also fear that it may reinforce an idea of "entitlement" instead of working for something to earn it. Many people in today's society believe that you have to work for things instead of

S19: P2, N

Should Americans have the right to buy guns? Present both sides of the argument.

When it comes to controversial topics, such as the second amendment, the views of each side are quite polarized. For example, the extreme right wants to keep legal gun rights in the United States with minimal regulations (as it currently is). In contrast, the far left believes that civilians should have limited access to guns and that assault rifles should not be available for any normal citizen to purchase. Both sides have specific reasons for their beliefs; the following essay will elaborate on each group's side.

First, those who believe that Americans should have the right to buy guns normally use the second amendment in their defense. They believe that all citizens "have the right to bear arms." In addition to that specific policy, the pro-gun side argues that guns are necessary for self defense and for recreational activities, such as hunting. They want to be able to conceal carry weapons so that they are prepared to protect no only themselves but also their families in dangerous situations.
The anti-gun side, however, disagrees with the ideas mentioned above and takes the opposite side on each aspect. For example, many believe that the constitution, written in the 1770s, and the amendments are out-of-date and no longer applicable to modern society. Additionally, they believe there should be minimal access to guns because of tragic recent events which have ended in the suffering of many innocent lives. If

**S19: P1, FF**
Should there be free college for everyone in the United States? Present both sides of the argument.

The topic of free post-secondary education is very popular in the United States right now due to the presidential election. After analyzing some countries (such as Sweden, Denmark, Norway, etc.) success with the implementation of free university education, many Americans want the same education opportunity in our own country. For those who are pro-free college, they believe that the access to education is a right for all, regardless of socioeconomic status or family background. In making free education for all, we would have to increase the funding for said education, which would increase income taxes which many Americans already think are too high. This would be a drawback of making education free for all; we would still be paying for it but in a different way.

In contrast, those on the other side of the argument believe that education is not a right and that anything beyond the standard high school education is considered a privilege and not a right. They believe that if people want to gain an additional degree, they should incur the financial debt to obtain one, in the same way that all those before them have done so. For example, many people in the "Baby Boomer" generation, a very active group in election turnout, paid for college by themselves and now think that students today should have to do the same thing. Additionally, people who choose not to attend college do not believe that it would be fair to have their income taxed for post-secondary education because they will not benefit from that tax. They believe that they could have spent that money in a different way than giving it to the government to distribute to students seeking a bachelor's degree.

Another potential drawback from making education free is that employers might expect candidates to have more advanced degrees because four-year ones are so common. This would result in more pep

**S20: P2, N**
Should Americans have the right to buy guns? Present both sides of the argument.

Americans should have the right to buy guns. It is within the language of the second amendment that the people have the right to bear arms. However, the context within the language of the amendment is important to consider. At the time of the American Revolution, drafters of the constitution felt that bearing arms was a way to protect oneself against tyranny of the British, as was forming a militia. It seemed to be a vital addition because of the circumstances, but the original intent is not always how the amendment must be interpreted. Some individuals believe that the meaning of the constitution should be openly interpreted and depend on current context. With recent outbreaks in school shootings and gun violence across the country, citizens and lawmakers alike must consider whether the right to buy guns should be reinterpreted to exclude certain types of guns. Where the questii
S20: P1, FF
Should there be free college for everyone in the United States? Present both sides of the argument.

College should be free for every person in the United States. Education is such an integral part to a democratic republic, which is why public schools and college have such a great responsibility. Not everyone wants to go to college, which is perfectly acceptable; there are many trades that require other types of knowledge and training to do well that are important pieces of society. For those who choose to attend, however, it is an expensive endeavor. FASFA, for example, is intended to help students pay for their schooling, but life is often too complex to fit a standard mold of the expected student that needs help with their tuition. It is often based off of parents’ salaries, which can be a good indicator occasionally, but perhaps parents choose not to help their child financially. These situations make qualification for grants more difficult than they should be. Some may believe that free college may change the services offered and lower the level of education that more expensive universities are able to offer. If we were starting from scratch, perhaps this would be the case. However, in the U.S., we have a great deal of infrastructure for schools already in place. It makes sense to build off of this existing infrastructure and lift the financial burden from students. Money may seem like a good incentive to work hard, but if learning is the focus, providing the ability for students to focus simply on school
The project referenced above has been declared exempt from most requirements of the human subject protections regulations as described in 45 CFR 46.104 or 21 CFR 56.104 because it meets the following federal requirements for exemption:

2018 - 2 (i): Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) when any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation.

2018 - 3 (i.e.): Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses or audiovisual recording when the subject prospectively agrees to the intervention and information collection and any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation. If research involves deception, it is prospectively authorized by the subject.

The determination of exemption means that:

- You do not need to submit an application for continuing review. Instead, you will receive a request for a brief status update every three years. The status update is intended to verify that the study is still ongoing.

- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, nature or duration of behavioral interventions, use of deception, etc.), any change in privacy or confidentiality protections, modifications that result in the inclusion of participants from vulnerable populations, removing plans for informing participants about the study, any change that may increase the risk or discomfort to participants, and/or any change such that the revised procedures do not fall into one or more of the regulatory exemption categories. The purpose of review is to determine if the project still meets the federal criteria for exemption.