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Students' Strategies for Writing Arguments from Online Sources of Information

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Graduate Program in Education

A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy

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STUDENTS' STRATEGIES FOR WRITING ARGUMENTS FROM ONLINE
SOURCES OF INFORMATION

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by

Lori C. Kirkpatrick

Graduate Program in Education

A thesis submitted in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

The School of Graduate and Postdoctoral Studies

The University of Western Ontario

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THE UNIVERSITY OF WESTERN ONTARIO
THE SCHOOL OF GRADUATE AND POSTDOCTORAL STUDIES

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Abstract

This study builds on previous work on writing (e.g., Bereiter & Scardamalia, 1987; Hayes & Flower, 1980) and writing from sources (e.g., Spivey, 1997). Its purpose was to investigate processes and strategies for writing from online sources of information. High-achieving Grade 12 students were recorded as they researched on the Internet and wrote arguments about cosmetics testing on animals. Data included think-aloud protocols, video recordings of participants and computer screens, writing products, and interviews. Data was analyzed using narrative summaries and cross-case comparisons. A coding scheme was developed and applied, in order to establish interrater reliability.

Writers used one of three overall processes: 1) Writers alternated between researching online and structuring content into an outline, and then drafted a text; 2) Writers researched online, writing notes and a separate outline, and then drafted a text, drawing on both documents; 3) Writers drafted the text and their research while drafting. Each process comprised subordinate strategies and operations.

Two contributions of this work are discussed. First, the strategies of participants were similar in that they demonstrated translations between content and rhetorical problem spaces (cf. Bereiter & Scardamalia, 1987). These translations occurred during researching, as well as drafting and reviewing, and were apparent through students' Internet activity. Second, participants constructed different task environments (cf. Hayes & Flower, 1980) and used different strategies; all were adapted to the affordances and constraints of the Internet, the electronic writing medium, and internal cognition. Final sections address writing instruction, the method, and future research.

Keywords: Writing, Writing from Sources, Persuasive Writing, Arguments, New Literacies, Internet, Think-Aloud Protocols, Grade 12, High-Achieving

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Fundamentally, this project rested on the participation of the students, English Department Head, and Principal of a local secondary school. The students' dedication to the project and to their writing allowed for our greater understanding of the phenomenon of writing from online sources. They were a pleasure to work with and astounded me with their intelligence, depth, and maturity. The interest and commitment of the Department Head and Principal made the collection of data easy and efficient, and I am extremely thankful for their efforts.

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Many school-based writing assignments require students to read sources (e.g., articles) and incorporate information from those sources into their own written work (e.g., essays). This is referred to as *writing from sources* (Kennedy, 1985), *discourse synthesis* (Spivey, 1984), or *reading to write* (Flower et al., 1990). It is also related to *intertextuality* (Bazerman, 2004). Writing from sources is a common and important task in school, and the ability to write from sources is a determinant of school success that can make important contributions to student learning (Boscolo & Borghetto, 2002; van Meter & Firetto, 2008). The research on writing from sources forms a tight-knit body of literature, which has focused on the process of writing from sources and on students' strategies for writing from sources (e.g., Spivey, 1997; Segev-Miller, 2004, 2007). Another body of literature has focused on students' learning from multiple sources (see Bråten, Britt, Strømsø, & Rouet, 2011 or Rouet, 2006 for discussion), but the emphasis has not been on writing.

Much of the existing writing-from-sources research has focused on students' use of textual, paper-based sources (e.g., Mateos, Martín, Villalón, & Luna, 2008; Risemberg, 1996; Spivey, 1997). Today however, students increasingly turn to the Internet as a source of information and much of students' writing is based on sources from the Internet and other Information and Communication Technologies (ICTs) (Kuiper & Volman, 2008; Lenhart, Simon, & Graziano, 2001). The shift from paper-based sources to ICT-based sources of information has happened so quickly that research and classroom instruction have fallen behind (Leu, Kinzer, Coiro, & Cammack, 2004).

Indeed, it may not be simply a matter of applying print-based writing-from-sources research to ICT-based writing from sources. Rather, ICT sources differ from print-based sources in ways that may change the nature of reading and writing tasks, and the behaviours and strategies needed to perform those tasks successfully (Coiro & Dobler, 2007; Eveland & Dunwoody, 2000; Leu et al., 2004). Some go so far as to argue that because of the prevalence of technology, today's students are fundamentally different in the ways that they learn and process information (e.g., Prensky, 2001).

Despite much theoretical and/or anecdotal discussion of how the Internet has changed literacy, empirical research on reading and writing remains limited. However, Leu and his colleagues in the New Literacies Research Team have begun to examine students' strategies for reading from the Internet (e.g., Coiro & Dobler, 2007; Leu et al., in press). Rouet and colleagues have examined how students construct knowledge and understanding of a situation, based on Internet sources, and have also recently presented a descriptive model of activities requiring the comprehension and use of multiple documents, be they print- or Internet-based (Britt, Rouet, & Perfetti, 1996; Rouet, 2006; Rouet & Britt, in press).

Writing researchers have also begun to examine writing from the Internet. Research on writing from the Internet has focused on motivation (Desjarlais & Willoughby, 2007; Mistler-Jackson & Butler Songer, 2000; Schuh & Farrell, 2006), searching the Internet (Adair & Vohra, 2003; Boerner, 1998; Coiro & Dobler, 2007; Hoffman, Wu, Krajik, & Soloway, 2008; Kuiper & Volman, 2008; Kuiper, Volman, & Terwel, 2005; Recoupero, 2007; Zviell-Girshin & Rosenberg, 2005), evaluating Internet

material (Brand-Gruwel & Statler, 2011; Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005; Kienhues, Stadler, & Bromme, 2011; Kiili, Laurinen, & Marttunen, 2008; Kuiper & Volman, 2008; Leu et al., 2004; Luke, 1997, 2003; The New London Group, 2000; Mason, Boldrin, & Ariasi, 2010; Strømsø, Bråten, & Britt, 2011), and learning content from the Internet (Desjarlais & Willoughby, 2007; Rouet, 2006; Rouet, Levonen, Dillon, & Spiro, 1996; Thruman, 2005; Wiley & Voss, 1999; Willoughby, Anderson, Wood, Mueller, & Ross, 2009). Although they have been partially addressed in some projects (Cerdán & Vidal-Abarca, 2008; O'Hara et al., 2002; Priemer & Ploog, 2007; van Meter & Firetto, 2008; Wiley & Voss, 1999; Yang, 2002), students' overall process and strategies for writing from Internet sources have not been the focus of research.

The goal of this project is to identify and describe students' processes and strategies for writing arguments from online sources of information. I am interested in students' overarching writing process as well as the strategies and sub-strategies / operations that students use throughout the process. The central research question is, *What are students' processes, strategies, and operations for writing arguments from online sources of information?*

Before turning to a description of the project itself, I will first present relevant theoretical perspectives and empirical work. Please note that there are a variety of relevant bodies of work, many of which are only loosely connected to one another. Together, these provide a foundation on which to build the research questions and methodology of the current project. But there is no unified theory or body of work from which to draw. Thus, the existing relevant work is organized to the degree possible, and

presented as bodies of work (e.g., on students' writing strategies, on students' learning from the Internet, etc.). Following the Theoretical Perspectives and Literature Review are Methods, Results, Discussion, and Conclusion chapters.

Theoretical Perspectives on Writing, Writing from Sources, and New Literacies

Writing

Writing as a process. Prior to the 1960s, writing was conceived of largely in terms of the written product (Galbraith & Rijlaarsdam, 1999; Schultz, 2006). Writing instruction was concerned primarily with identifying the features of model texts written by exemplary writers, and having students emulate these features in their own writing, as noted in reviews by Galbraith and Rijlaarsdam (1999), Nystrand (2006), and Pressley, McGoldrick, Cariglia-Bull, & Symons (1995). There was a strong emphasis on form, rules, and grammar (Galbraith & Rijlaarsdam, 1999; Pressley et al., 1995), and empirical research on writing was quite limited (Nystrand, 2006).

According to these same reviews, a significant shift in conceptions of writing occurred in the 1960s and 1970s. This shift consisted of two elements. First, empirical research on writing began in earnest. Second, writing came to be viewed not just as a *product*, but also as a *process*. This shift coincided with, and was related to, the Cognitive Revolution, in which the previously dominant behaviourist theory was being challenged, and in some respects, replaced by, cognitive theory.

Two important publications are typically heralded as marking the beginning of a process approach to writing, and the beginning of true empirical research on writing. The first is Rohman (1965), in which he presented a three-stage model of writing: 1) prewriting (planning), 2) writing (composing a draft), and 3) rewriting (editing and revising) (Pressley et al., 1995; Zimmerman & Risemberg, 1997). The second important

publication was that of Emig (1971) (e.g., Galbraith & Rijlaarsdam, 1999; Nystrand, 2006). Emig studied the thought processes of Grade 12 students while they wrote using think-aloud protocols (e.g., Galbraith & Rijlaarsdam, 1999; Nystrand, 2006). Emig's research reflects the influence of cognitive theory on writing research and reflects a movement toward considering how ordinary students actually wrote, as opposed to the previously prescriptive approach to writing (Nystrand, 2006). As noted, what is significant about this work is that writing came to be seen as a *process* that encompassed prewriting activity, the actual writing itself, and postwriting activity as well.

In the current project, the *process* will be defined as the overall approach participants take to the task. It encompasses all writing-related activities (actions and thoughts) performed by students, from the moment they are given the task to the moment that they indicate that they are finished. But the emphasis with the process will be on the higher order elements such as prewriting, writing, and revising.

Cognitive perspectives on writing. Building on the work of Rohman (1965) and Emig (1971), two pairs of researchers developed highly influential models of writing. First, Hayes and Flower (1980) used think-aloud protocols with expert writers to develop a model of *competent* writing. Like Emig, they focused on the cognitive composing process. However, they went beyond this to create a “formal model, delineating the components and organization of the writing process” (Nystrand, 2006, p.18). The model consisted of three major components. The first two components, the task environment and long-term memory, provide the context in which writing takes place. The task environment consists of the writing assignment (topic and audience) and the text

produced so far; long-term memory consists of knowledge of topic, knowledge of audience, and stored writing plans.

The third component in Hayes and Flower's (1980) model is the writing process itself, consisting of planning, translating, and reviewing. Planning consists of generating, organizing, and goal setting. Generating occurs under the guide of the plan. It refers to generating content. Often, a writer will make brief jot notes that reveal the content generated. Organizing consists of selecting the most useful of the content generated and imposing structure upon it. Often, organizing results in an outline. Goal setting includes planned actions and criteria for judging the text. Translating is characterized by the writing of complete sentences. Reviewing is characterized by reading and editing. Editing is assumed to be an automatic process, which interrupts translating. Reviewing refers to a later stage of the process, devoted solely to revision.

In contrast to Rohman's linear model of writing, the writer in the Hayes and Flower (1980) model moves back and forth between the writing-process components throughout the creation of the text. That is, writing is considered a *recursive* process. The process is overseen by a cognitive "monitor." This monitor coordinates the processes (e.g., allows for the interruption of the editing process and the return to the primary process (e.g., translating)), maintains orientation toward the current goal (e.g., write down ideas in proper sentences), and is what is responsible for individual differences in completing the writing process.

This concept of goals is extremely important. In Hayes and Flower's (1980) model, writing is seen as a problem-solving process, in which the problem is to produce a

piece of written work and the solution is that work itself. Writers set goals to help them achieve this solution.

Hayes and Flower's (1980) model was followed closely by a second highly influential cognitive model, that of Bereiter and Scardamalia (1987). They also conceived of writing as a process, including the physical act of writing, but also higher order mental processes such as goal setting, planning, memory search, problem solving, evaluation, and diagnosis. While similar to Hayes and Flower in their conception of the writing process, Bereiter and Scardamalia were more concerned than Hayes and Flower with differences in writing and writing ability.

Bereiter and Scardamalia (1987) provided two models of writing, one of which characterizes the writing of novices and children, and the other of which characterizes the writing of adult and/or expert writers. In both models, writing begins with a mental representation of the assignment. For children and novices, this representation consists of topic cues and discourse cues (e.g., an essay's discourse cues might be statement of belief and reason). The problem, for children and novices, is to generate sufficient content in response to these cues. Children's solution to this problem is to use a *knowledge telling strategy*, in which they simply write what they know about a given topic. They attempt to meet the assignment demands by retrieving all relevant knowledge about a topic from long-term memory, and then they communicate that, in close to its original form, in their text. It is natural, in that retrieval occurs automatically, through the activation of related topical content. It requires no more sophisticated goal setting than that required in oral communication.

In contrast, Bereiter and Scardamalia argue that adult and expert writers use a *knowledge-transforming strategy*. As they write, these writers “actively rework their thoughts” (Bereiter & Scardamalia, 1987, p. 11). For them, the writer’s mental representation of the assignment is followed by problem analysis and goal setting. Problem solving occurs in two domains. In one—the content space—writers work out problems of belief and knowledge. In the other—the rhetorical space—writers work out problems related to the goals of the composition. The key feature of this model is the “problem translation” between the two spaces. That is, problems in one domain result in the setting of subgoals in the other domain. Bereiter and Scardamalia use the following example. A writer might be working on the *rhetorical problem* of being clear in the text. That writer might read a definition that he or she wrote, and determine that it is not clear. The writer must then determine, *in the content space*, what he or she actually means by the term. This might result in the writer reconceptualizing what they mean by the term, *in the content space*, and the new *rhetorical goal* would be to communicate the new meaning effectively. Bereiter and Scardamalia argue that it is the interaction between the content and rhetorical spaces that is the basis of reflective thought in writing.

Common to both of these models—Hayes and Flower (1980) and Bereiter and Scardamalia (1987)—and to cognitive theory in general, is the concept of memory. Memory has typically been divided into short-term or sensory memory, working memory, and long-term memory (e.g., Woolfolk, Winne, Perry, & Shapka, 2010). Short-term memory lasts only seconds and represents what has just been sensed in the environment. Working memory refers to the contents of your mind at the moment, that to which your

attention is directed. A key concept is that working memory is *limited*; one can only direct one's attention to a certain amount of information at once. If the *cognitive load* becomes too great, one can no longer function effectively or attend to all the items or information. Long-term memory refers to the seemingly infinite store of knowledge, retained over extended periods of time, possibly over a lifetime. McCutchen (2000), also a writing researcher, advocates for the addition of long-term working memory, which links (shorter) working memory items to items in long-term memory.

The role of memory in writing is significant. Short-term memory must play a role in text perception, but that is not a typical emphasis. The limitations of working memory are a crucial issue in writing. If one must focus attention on one element of the writing task (e.g., physical printing), then the cognitive load of attending to that and other elements (e.g., generating ideas) may be too great and the other elements may suffer. This has been used as an explanation of differences between younger and older writers; the younger writers may have to focus attention on things like printing, which become automatic for older or more experienced writers (e.g., Bereiter & Scardamalia, 1987). Strategies are sometimes effective via their role in reducing demands on working memory. For example, if one first creates an outline, then one must later focus only on writing, as opposed to planning and writing (Kellogg, 1988). Long-term memory is important, as it may hold content, rhetorical, or procedural knowledge necessary for the writing process (e.g., Bereiter & Scardamalia, 1987; Hayes & Flower, 1980; Pressley & Harris, 2006).

Also common to conceptions of writing (e.g., Harris & Graham, 1996; Spivey, 1997) are the notions of metacognition and self-regulation. Metacognition is “knowledge of cognition, including knowledge of the value of cognitive strategies” (Pressley & Harris, 2006). Zimmerman and Risemberg (1997) write: “self-regulation of writing refers to self-initiated thoughts, feelings, and actions that writers use to attain various literary goals . . .” (p. 76) and note that the fact that writing is typically self-planned, self-initiated, and self-sustained, combined with the difficulty of writing, means that writing requires self-regulation in order to be successful. Thus, metacognition has more to do with an awareness of one’s cognition, and self-regulation has more to do with the ability to control it, along with behaviours and emotions. Note that self-regulation can be considered from both cognitive and sociocultural perspectives (Graham & Harris, 1997; Zimmerman & Risemberg, 1997).

A last key element of cognitive theories of writing is strategies. In terms of defining *strategy*, Bereiter and Scardamalia’s (1987) use of the term strategy in knowledge telling and knowledge transforming is quite broad—it refers to one’s overall approach to the writing task. They also refer to much more precise or lower order strategies such as “checking over pronouns to make sure their reference is clear” (p. 250). Thus it seems that *strategy* can be used to describe quite high order, overarching processes, as well as lower order, precise processes.

Difficulties around defining the term strategy are well recognized. Pressley and Harris (2006), two of the most influential writing researchers, devote the opening of their chapter on cognitive strategies to this issue. They conclude that an enduring definition

has been that provided by Pressley, Forrest-Pressley, Elliot-Faust, and Miller (1985, in Pressley & Harris, 2006):

A strategy is composed of cognitive operations over and above the processes that are natural consequences of carrying out the task, ranging from one such operation to a sequence of interdependent operations. Strategies achieve cognitive purposes (e.g., comprehending, memorizing) and are potentially conscious and controllable activities (p. 266).

Harnishfeger and Bjorklund (1990) define strategies as goal-directed operations to facilitate task performance. Citing the National Dissemination Centre for Children with Disabilities (1997), Edmunds and Edmunds (2008) write,

Learning strategies are the tools and techniques we all use to: (1) help ourselves understand and learn new material or skills, (2) integrate new information with what we already know in a way that makes sense, and (3) recall the information or skill later, even in a different situation or place. Our strategies include what we think about ... and what we physically do (p. 118).

Synthesizing these definitions, *strategies* are defined here as cognitive or behavioural actions, which are carried out—potentially consciously—in order to facilitate the achievement of a particular goal.

Social and cultural perspectives on writing. In recent years, social and cultural perspectives on writing have gained prominence (Nystrand, 2006). Several insights from these perspectives inform the project proposed here. From a cultural perspective, writers write within a discourse community, which has its own values, norms, forms, and jargon (Faigley, 1985 in Nystrand, 2006; Galbraith & Rijlaarsdam, 1999; Nelson, 2008). From a social perspective, one writes to an audience (Nelson, 2008), often to influence that audience (Miller & Charney, 2008); one incorporates the work of other authors into one's writing (Nelson, 2008); and there is an interaction between writer and subsequent readers of the text (Galbraith & Rijlaarsdam, 1999; Nelson, 2008; Nystrand, 2006). Note that when writing is considered as a social and cultural practice, the written product gains prominence once again, as it is often through that product that one can identify social and cultural aspects of writing (Galbraith & Rijlaarsdam, 1999).

Genre. One of the most prominent discourse conventions is the use of genre. Tardy and Swales (2008) open their chapter on genre with the comment: "written texts are known to have culturally preferred shapes that structure their overall organization and influence their internal patterning . . . they exist to provide orientation to the reader" (p. 565). They go on to point out that how genres are defined depends on the orientation or tradition from which one works. Some emphasize the broad function of a text; some emphasize the more local-level linguistic patterns of a text; some emphasize the patterns of language used to achieve rhetorical (social) goals; and some emphasize the overall text structure. Also, cognitive theorists might emphasize the notion of genre as a mental schema and the importance of knowledge in genre theory, whereas social theorists might

emphasize the role of social norms and discourse communities. For the purpose of this project, it is sufficient to say that genre is a way of classifying texts seen as similar, in terms of their purpose, rhetorical goals, structure, or language. Common genres include persuasion, explanation, compare-contrast, narrative, and report.

Genre plays a significant role in both the writing and reading of texts. Skilled writers and readers develop a mental schema, or template, of the structure, organization, and language which should be used for each genre (Meyer, 2001). According to Spivey (1997), skilled writers may use genre schemas as a guide and prompt for their writing, in that they will attempt to include content that meets each component of a given genre (e.g., evidence, when writing a persuasive piece) and may read a text with an eye to its genre: “When reading texts suggesting conventional patterns, readers sense the opening of rhetorical spaces. If the spaces are not filled, the text seems incomplete or inadequate” (p.207). Thus, the more genre-appropriate a text, the better its reception by a reader may be.

The genre used in this project is *argumentation* or *persuasion*. Arguments may be a particularly important writing genre, as they can facilitate learning (Wiley & Voss, 1999) and may empower students to participate in the discourse of society (Crammond, 1998). van Eemeren and Grootendorst (1999a) write: “Argumentation is a speech act complex aimed at resolving a difference of opinion” (p. 43), which, they described in an earlier paper (van Eemeren et al., 1996), “is a verbal and social activity of reason carried out by a speaker or writer concerned with increasing (or decreasing) the acceptability of a controversial standpoint to a listener or reader; the constellation of propositions brought

to bear in this endeavor is intended to justify (or refute) the standpoint before a rational judge.”

Less formally, the argument may take the form of the common five-paragraph school essay, in which a student puts forward a thesis and then defends it, using reasons and evidence (Fulkerson, 1996, in Nussbaum, 2008). This essay typically consists of an introduction, three body paragraphs, and a conclusion. Each paragraph is also structured; for example, Harris and Graham (1996) suggest the use of a topic sentence, reasons, an examination of reasons, and an ending. As with every genre, how one conceives of and defines argumentation depends on one’s orientation (see Miller & Charney, 2008 for a review); but the van Eemeren and Grootendorst (1999a) definition suits the purposes of this paper and is consistent with its theoretical orientation.

Writing from Sources

Writing from sources is related to the concept of *intertextuality*, a term coined by Kristeva (1968, in Spivey, 1997). Bazerman (2004) describes intertextuality as “the explicit and implicit relations that a text ... has to prior, contemporary and potential future texts” (p. 87). A given text may rely on other texts as sources of meanings (e.g., taking another text as authoritative), in order to create a drama or picture of a struggle (e.g., describing two sides of a conflict), as support (e.g., figures or statistics from a report), as contrast, or more implicitly, when relaying a text’s contents as common knowledge (e.g., freedom of speech) or when using typical genres or linguistic styles (Bazerman, 2004). The fundamental concept is that texts do not exist in isolation; they are a part of a larger body of literature and knowledge (Bazerman, 2004; Spivey, 1997).

Whereas the emphasis in intertextuality is on the *texts*, the emphasis in this project will be on the social and cognitive aspects of the *reader-writer's* activity.

Rouet and Britt (in press) have recently presented a descriptive model of the resources and cognitive processes involved in reading multiple documents, in order to complete a particular activity (e.g., make a decision about a product, prepare for a test, write an essay). It is called the MD-TRACE model (for Multiple-Document Task-based Relevance Assessment and Content Extraction). The five core processes involved in working with multiple documents are “the construction of a task model; the assessment of one’s information needs; the selection, processing, and integration of document information; the construction of a task product; and the assessment of product quality” (p. 2 of manuscript). The model emphasizes the fact that the reader must make judgments about the relevance of the information to the task at hand throughout the process. The model also outlines the role of internal and external resources, language and memory demands, and developmental issues and limitations in multiple-document comprehension and use. The model is an outstanding overview of work with multiple documents, but necessarily broad. In the current project, I wish to develop a more specific understanding of the use of multiple documents, as it relates to writing.

An important theoretical perspective on writing from sources is that of constructivism. Constructivism may be more apparent in some types of writing from sources than in others. For example, one type of writing from sources is summarizing, in which the writer’s primary goal is to summarize and convey what has been said by other authors (Segev-Miller, 2004, 2007; Spivey, 1997; Wiley & Voss, 1999). This type of

writing requires some synthesis of source material (Wiley & Voss, 1999); however, it is primarily concerned with reproduction (Segev-Miller, 2007; Spivey, 1997). This type of writing from sources is contrasted with the type of writing from sources that is of interest here: writing that requires writers to read and use information from source texts in order to meet their *own* writing goals. In such cases, writing from sources is a process of *conceptual transformation* (Flower et al., 1990; Segev-Miller, 2007). Ideally, a writer must read several texts, each of which have a different and even contradictory position or purpose and then integrate or synthesize information from those texts into a new text that reflects the writer's overarching conception of, or position on, the topic (Boscolo & Borghetto, 2002; Segev-Miller, 2004). In argument writing, the ability to weigh and combine arguments into a new position is referred to as the *argument-counterargument integration* (Nussbaum, 2008). From a constructivist perspective, the reader-writer *builds* or *constructs* meanings of the texts they read and write, rather than simply receiving and transmitting meaning from the authors of the source texts.

The development of this new conception / position / meaning is one of the benefits of using multiple sources in academic reading and writing tasks: it promotes deep learning and understanding. Citing multiple empirical studies on intertextual *reading*, van Meter and Firetto (2008) argue that integrated representations (those based on the integration of information from various sources) differ from nonintegrated representations in terms of quantity and quality. They are quantitatively different because they incorporate multiple perspectives, and they are qualitatively different because the resulting cognitive model is more complex and more flexible (van Meter & Firetto,

2008). Moreover, consulting multiple sources can have a corrective impact on understanding, in that prior beliefs or incorrect information from one source will ideally be overridden by correct information in multiple other sources (van Meter & Firetto, 2008; see Rouet, 2006, for a similar discussion). Research has also shown a relationship between high-level academic achievement (admission to continued law studies) and the degree to which students make intertextual connections while reading (Strømsø & Bråten, 2002; Strømsø, Bråten, & Samuelstuen, 2003).

Writing may offer additional benefits. Boscolo and Borghetto (2002) conducted an experiment in which they compared Grade 12 students who read multiple texts with Grade 12 students who read and then wrote a synthesis of multiple texts. Students who wrote syntheses performed better on both inference questions and transfer questions. There is a significant body of literature examining the impact of writing on learning that does not necessarily focus on writing from sources. For a review, see Klein (1999).

Focusing on the role of multiple sources in writing, Wiley and Voss (1999) compared the writing and learning from multiple primary sources to writing and learning from one textbook-like, secondary source. Undergraduate students who wrote texts on the basis of multiple primary sources had more transformed sentences, less borrowed sentences, more connections, and more causal connections than students who wrote from the single, secondary source, the textbook. They were also better able to recognize inferences that followed from the presented texts. There was an interaction such that students who wrote *arguments* from multiple sources were better able to identify the underlying principal causes of an event than the other students. The only benefit of

writing from the textbook was that students who did so were better able to recognize sentences from the text following the writing activity. Similar benefits for writing from multiple texts have been found by Cerdán and Vidal-Abarca (2008), Le Bigot and Rouet (2007), and Robinson and Raineri (2006).

Wiley and Voss's (1999) interpretation of these results is that argument writing from multiple sources requires students to build a mental model of the *situation* rather than a more superficial model of the *text read*. Perfetti, Rouet, and Britt (1999) argue that in intertextual reading / writing tasks students must construct a *documents model*, consisting of an *intertext model* and a *situation model*. The intertext model “represents the relationships among documents and among a document and elements of the situation”; the situations model “represents situations very broadly construed—both real situations and hypothetical ones; and, importantly, multiple interrelated situations” (Perfetti et al., 1999, p. 102). This brings us back to the notion of writing from sources as conceptual transforming or construction, where writing from sources requires writers to form new conceptions, understandings, and knowledge. For a review of mental models of text comprehension, see Bråten et al. (2011).

There are two well-known constructivist models of writing from sources. In Spivey's (1997) model, the writing-from-sources process consists of *selecting* (material from sources), *organizing* (the material into a new text), and *connecting* (ideas within and between sources). Spivey conceives of each of these—selecting, organizing, and connecting—as transformations, in that student writers are selecting, organizing, and connecting, in order to transform source material into a new text. Segev-Miller (2007)

organizes her model somewhat differently. In her model, the process consists of *planning* (the task), *evaluating* (sources, new text, task, oneself), and *executing* (selections, transformations, revisions). In moving from the source documents to their own texts, writers transform *conceptually* (e.g., by creating a macroproposition), *rhetorically* (e.g., by creating a new structure), and *linguistically* (e.g., by linking sources through the use of linguistic devices). Spivey's categories of selecting, organizing, and connecting, are subsumed under these.

Combining these theories with those discussed in the previous section then, we have a conceptualization of writing from sources as both a cognitive and a social practice. Cognitive elements include self-regulation, goal setting, the use of strategies, memory, mental models of texts and content, and the conceptual transformation of material to meet writing goals. Social elements include the interaction between authors and the use of discourse conventions such as genre. The models of writing from sources (Rouet & Britt, in press; Segev-Miller, 2007; Spivey, 1997) provide a framework for understanding how the process takes place. An issue of interest in this study is the degree to which the data fit with these theoretical models, as none were developed to account specifically for writing from online sources of information.

The Impact of the Internet: Digital Natives, New Literacies, and the Nature of the Internet and Electronic Writing Medium

As noted in the opening of this dissertation, the Internet and other ICTs have gained increasing prominence as a source of information for students—including a source of information for writing (Kuiper & Volman, 2008; Lenhart et al., 2001). Thus, it is

important to understand theoretical perspectives on the impact of the Internet on today's students and on literacy, as well as what it is about the Internet that is seen to be the cause of this impact.

In 2001, Prensky wrote a controversial article in which he claimed that today's students are fundamentally different from students of the past. Prensky argued that today's students are Digital Natives: “‘native speakers’ of the digital language of computers, video games, and the Internet” (p. 1). He compared these students to Digital Immigrants: “those of us who were not born into the digital world but have, at some point in our lives, become fascinated by and adopted many or most aspects of the new technology” (p. 2). Prensky argued that because of their interactions with technology, digital natives think and process information in fundamentally different ways than digital immigrants. The trouble, according to Prensky, is that the education system was designed for and by digital immigrants and teachers themselves are digital immigrants (though this would be changing, now). Thus, Prensky argued that the education system and teachers within it are struggling to provide an education that is appropriate and meaningful for today's students.

Despite its popular appeal, many researchers argue that Prensky's (2001) distinction between digital immigrants and digital natives is vastly oversimplified and that the ideas are based on claims rather than evidence (e.g., Bennett & Maton, 2010). For example, Kennedy et al. (2010) investigated first-year undergraduate students' use of technology in Australia. These are students who would fit in Prensky's digital-natives category. Applying cluster analysis to questionnaire data, Kennedy et al. found that there

were actually four distinct types of Internet users: power users, ordinary users, irregular users, and basic users. Thus, Prensky's simple categorization did not fit with their data.

As another example, Margaryan, Littlejohn, and Vojt (2011) investigated undergraduate students' use of technology in the UK, using a questionnaire and subsequent in-depth interviews. They found that students' use of technology differed quantitatively across faculties, but not qualitatively, and that there was some influence of the lecturer or instructor. In contrast to Prensky's (2001) claims, Margaryan et al. found that students used traditional learning styles, supplemented with new technology. Thus, research shows that there is in fact considerable variability among today's students and the differences between these students and students of the past may not be as substantial as Prensky claimed. For a review of research concerning students' technology use and further discussion about this debate, see Bennett & Maton (2010).

In addition to claims about changing students, there has been significant discussion about the changing nature of literacy. New literacies theories have emerged to address literacy in a digital, globalized world. Tyner (1998) explains: "It has been of concern to a diverse and growing number of people that traditional notions of alphabetic literacy, that is, the reading and writing of print, do not begin to encompass the wide range of perceived literacy needs for contemporary times" (p. 62). Researchers differ in the broader theoretical perspectives that they bring to theory and research on new literacies. Indeed, *new literacies* is an umbrella term, used to describe a multitude of theories including critical theories (e.g., Luke, 1997), media theories (e.g., Tyner, 1998), and multiliteracies theory (The New London Group, 2000). Researchers also differ in the

degree to which they believe that the Internet has changed literacy. There are theorists who believe that the nature of literacy has been fundamentally changed and there are others who believe the effects have been more moderate (MacArthur, 2006).

A useful starting place, I think, in terms of the new literacies and digital natives / digital immigrants debates, is to review what may be different between print- and Internet-based sources. These differences include the amount, type, mode, and structure of information available. In terms of the amount of information, the Internet has allowed for the storage, retrieval, and connection of vast amounts of information, a phenomenon commonly referred to as the “information explosion” (Adair & Vohra, 2003; Duff, 2001). Such access to information is one of the greatest benefits of the Internet, but it can also result in people feeling overloaded or overwhelmed (Jankowska, 2004).

In terms of the type of information, Internet users have access to current, primary sources from linguistically, culturally, politically, and regionally diverse sources (Hoffman et al., 2008; The New London Group, 2000). The Internet may also include information from people with strong political, economic, religious, or ideological stances (Leu et al, 2004); people who are relatively uninformed in terms of the issue about which they are writing (Kuiper & Volman, 2008); and large, private, multinational corporations, whose primary goal is profit. In addition, it may not be clear who has authored a particular source.

In terms of the mode of information available, the Internet contains text, images, graphics, hyperlinks, icons, and audiovisual material, and information is often presented in more than one mode (Leu et al., 2004). The inclusion of information in more than one

mode is typically referred to as multimodality (Ainsworth, 2006; Iedema, 2003). The multimodal nature of the Internet is often emphasized as one of its distinguishing features, but many “traditional” texts have also contained a good deal of nontextual material, such as pictures, diagrams, equations, tables, and graphs (Mackey, 2003), and researchers have examined the role of multimodality in understanding and learning, without an emphasis on computers or the Internet (e.g., Ainsworth, 2006).

Finally, some argue that print-based texts are linear and that they are read primarily from beginning to end (e.g., Thruman, 2005). Internet texts, on the other hand, are characterized by interlinked pages, images, and texts (Coiro & Dobler, 2007; Kuiper & Volman, 2008; MacArthur, 2006). With print-based texts, reader-writers can typically preview the structure and can cover the material by simply flipping through the pages in order (Coiro & Dobler, 2007). Readers can also more easily remember the spatial location of information within a print text, facilitating subsequent retrieval (Haas, 1996). With Internet texts however, the structure of any given document and its relationship to other documents is often not clear (Coiro & Dobler, 2007). As Klein (personal communication, August, 2009) and Rouet and Levonen (1996) note, however, print-based texts may also be read nonlinearly, and many Internet sites provide an orienting front page or set of tabs which link to various sections of the document. Thus, the degree of structural difference may be exaggerated.

Theorizing on the impact of these differences on the nature of literacy, Leu et al. (2004) highlight several skills and strategies that they believe will be central to new literacy. These include: using search engines effectively, making inferences about what is

to be found by following a particular hyperlink, knowing what to pay attention to and what to ignore, evaluating information in regard to one's purpose, evaluating the author's influence, and understanding how to coordinate and synthesize information. Leu and The New Literacies Team at the University of Connecticut have an extensive research program in which they have begun to evaluate these various skills and strategies. However, their research is focused on reading in online environments, as opposed to writing.

The central issue in this section on the Internet is how the Internet differs from print-based sources. Note that there may also be significant differences between writing in hard copy and writing electronically. I am reminded here of Gibson's (1979) notion of affordances. Gibson was interested in visual perception, which is quite a different topic than writing from the Internet. But one of his tenets was that objects offer *affordances*, perceivable uses of those objects. For example, a bucket may afford holding or carrying an object, or turned upside down, it may afford sitting on.

This notion of affordances (Gibson, 1979) may become central in writing electronically from Internet sources, in that word-processing programs and the Internet may offer different *affordances* than paper and pencil, and/or a book or other hard-copy source (cf. Haas, 1996; O'Hara et al., 2002). The affordance might be perceived as a result of users' experience with the medium, rather than visually, but the central idea holds. Conversely, writers must often deal with constraints; these include the constraints of internal cognition (Flower & Hayes, 1980) as well as the constraints of the medium in which one is working (Attfield, Fegan, & Blandford, 2009; Haas, 1996; Olive, Rouet,

Francois, & Zampa, 2008). Hence Hayes's (1990, 1996) recommendation that the Internet and electronic texts have become a part of the task environment, and we should thus investigate their impact on writing processes.

I am approaching the current project with these various perspectives on the impact of the Internet in mind. Rather than be guided by one or another of these theories, I am attempting to collect and analyze data in such a way as to address some of these theoretical issues and debates.

Literature Review

Writing

Much research has been done on writing (see Nystrand, 2006 and Pressley, 2003 for reviews). In the interest of space, I will provide only brief summaries of the writing research most relevant to this project, first as it relates to writers' overall processes or strategies; second as it relates to metacognition, memory, self-regulation, and strategy use; and third as it relates to argumentation / persuasion.

In terms of writers' overall processes, it has already been noted that writers use a recursive process consisting of planning, translating, and reviewing (Hayes & Flower, 1980). Furthermore, they may tell knowledge or they may transform knowledge (Bereiter & Scardamalia, 1987). Hayes and Flower (1980) note that writers also have different *goal configurations*: 1) depth first (one perfect sentence at a time); 2) get it down as you think of it, then review; 3) perfect first draft; or 4) breadth first (planned, then written). The writing process of each individual will depend on his or her goal configuration.

Metacognition and knowledge, stored in long-term memory, are key characteristics of high-achieving writers. There is a direct correlation between performance on a writing task and metacognitive variables (Englert, Raphael, Fear & Anderson, 1988). Put simply, high-achieving readers and writers are knowledgeable about the writing process, strategies, and elements of the written product; at least, they are more knowledgeable than low-achieving students or students with learning disabilities (Englert et al., 1988). Though the degree to which genre was a consideration is not clear, the high-achieving students in the Englert et al. (1998) study were aware of specific text

structures and how they could guide the writing process. Note though, that research has shown that knowing about writing is not a sufficient condition for good reading and writing (Bereiter & Scardamalia, 1987; Chambliss & Murphy, 2002; Chambliss, Christenson & Parker, 2003). Skills, strategies, self-efficacy and motivation also play a role (Hidi & Boscolo, 2006; Pajares & Valiante, 2006; Pressley, 2003).

Zimmerman and Risemberg (1997) frame strategies as being essentially self-regulatory in nature. They identify ten types of such writing strategies and then categorize them as relating to environmental, behavioural, or personal (covert) processes. The strategies for environmental processes consist of: environmental structuring (i.e., creating effective writing settings) and the use of self-selected models (i.e., selecting a writer to imitate). The strategies for behavioural processes consist of self-monitoring (i.e., tracking one's behaviour or products), self-consequences (i.e., rewarding or punishing oneself), and self-verbalization (i.e., articulation of text to oneself). The strategies for personal (covert) processes consist of time-planning and management (i.e., managing time for writing), goal setting (i.e., writing targets), cognitive strategies (i.e., methods for organizing, producing, and transforming text), and mental imagery (i.e., creating a mental image from which to write). Likewise, Harris and Graham (1996) list examples of strategies as goal setting, considering one's audience, planning prior to writing, rereading text after a break, and so on.

Zimmerman and Risemberg (1997) outline the empirical research support for each of these strategies and also provide examples of how they are used by expert writers. Graham and Harris (1997) provide an important response however, noting that neither

experts nor struggling writers always use these strategies, particularly when they are “in the groove” (p. 105). Thus, self-regulation is not necessary in all writing. That said, a multitude of empirical research shows that the use of strategies often plays an important role in successful writing (Bereiter & Scardamalia, 1987; Hayes & Flower, 1980; Segev-Miller, 2007) and can be used as the basis of successful writing instruction (Englert, Raphael, Anderson, Anthony & Stevens, 1991; Graham, 2006; Harris & Graham, 1996; Kirkpatrick & Klein, 2009; Pressley, 2003).

Of course, it is not only the process that is important in skilled writing; it is also the product. There are a multitude of studies examining writing products. Here, we will focus briefly on persuasive texts. Santos and Santos (1999) reviewed empirical research in order to describe what constitutes a good argument. They identify five views on what constitutes a good argument:

- 1) Argument in which elements that support as well as oppose a defended position are considered [and as they note later, refuted].
- 2) Argument in which the quality of the inferential chain leading from premise to conclusion is seen as appropriate.
- 3) Being the result of a set of personal individual dispositions.
- 4) Argument suitable for achieving the goal of argumentation.
- 5) Being acceptable to the addressee (Santos & Santos, 1999, p. 86).

van Eemeren and Grootendorst (1999b) note the features that detract from the comprehensibility and acceptability of an argument; these are, redundancy, digressions, implicitness, disarrangement, and lack of clarity.

Crammond's (1998) work extends this by providing more detail and by looking at the development of persuasive writing from middle school to adulthood. Crammond had 6th, 8th, and 10th grade students, as well as adult experts, write persuasive pieces on the ethics of animal training (e.g., in circuses). She analyzed the texts for the presence of argument features, and then compared the texts of the different groups of participants. All but two writers (both students) used at least one argument structure in their texts; it was the predominant structure used by all participants. There was a significant effect of group; experts used more argument structures in their texts than students, even when length was accounted for.

The majority of students in Crammond's (1998) study (over 80%) included elements of a rebuttal (the other side). There was a significant effect of group; 10th-grade students included more rebuttals than did the other students. The 10th-grade students were like the experts, in this way. Embedded arguments were more frequent among experts and they were usually counterrebuttals. In contrast, students used embedded arguments less frequently, and when they did, they used them for subclaims, data, or reservations. The 10th-grade students used them more frequently for data and the younger students more for reservations. Thus, there are differences in the persuasive essays of experts versus students, and also developmental trends among the student groups.

Linking the process and product approaches, Nussbaum (2005) examined the effect of explicit goal instructions (included with the task instructions) on the Web-based collaboratively written arguments of 180 pre-service students. Students wrote about the influence of violence on television. This was a three-by-three design. In addition to the topical part of the assignment, students were directed to explore, persuade, or neither (general goals); and to provide as many reasons as possible, to consider counterarguments, or neither (specific goals).

In the study (Nussbaum, 2005), the persuade and reason conditions resulted in significantly more claims being made. Examined by type of claim, the reason conditions resulted in more contingent and divergent claims, and the persuade conditions resulted in more oppositional claims. The counterargument condition resulted in more counterarguments and the explore condition resulted in more divergent claims. The control-condition texts were shorter than the other texts and contained almost no indication of counterarguments. The persuade condition texts contained more opposition, typically by raising additional reasons for the problem under study. The explore condition resulted in more divergent claims, but these were not necessarily related directly to the topic or the pedagogical goals of the task. Thus, this research demonstrates the influence of writing goals on the product, and also the degree to which these goals are shaped by the assigned writing task.

Nussbaum (2008) conducted an instructional study with 45 undergraduate students in educational psychology. There was a control group who received no instruction and an experimental group who received instruction on integrating arguments

as well as instruction in the use of a graphic organizer developed for the project. All participants wrote four persuasive essays, one a week for four weeks.

Students in the Nussbaum (2008) study used four strategies for developing their position: 1) synthesizing arguments into a new position, either by describing how an alternative solution could avoid the negative consequences or by placing conditions on the claim; 2) weighing arguments, either in terms of their value, the frequency of costs and benefits for each, or the possibility of the argument claim being able to offer the same benefits as the opposing claim; and 3) refuting counterarguments by showing that they were irrelevant, false, weak, or insufficiently supported. Students also used a nonintegration strategy in which they chose a side and supported it, without reference to the counterargument. There was a treatment-by-time interaction, such that by the third session, more students in the treatment condition than the control condition used the synthesizing strategy. This did not transfer to the fourth session however, when the organizers were not used.

Nussbaum (2008) then examined the strategies more closely. Approximately half of students used little or no integration; those who did used synthesizing most frequently, while weighing and refuting were less common. In terms of experience, students had experience with writing persuasive pieces and with considering counterarguments, but not with synthesizing them (indicating possible past experience with *reflecting* on arguments, rather than synthesizing them).

Writing from Sources

Approaches to the research. Textual analysis has been used to identify students' strategies for writing from sources. Spivey (1997) breaks the source texts down into units; she analyzes which units appear in the new text (i.e., which are selected), how they appear there (i.e., how they are organized), and how the writer has related ideas to one another (i.e., how they are connected). She then examines what factors influence this process (e.g., genre of the to-be-written text). Students' strategies are deduced from the texts they write and from experimental manipulation of relevant factors. Other researchers have approached textual analysis somewhat differently. For example, Wiley and Voss (1999) begin with students' new texts, and then compare them to the source texts. They are interested in what material in the new text has been borrowed from sources, transformed from sources, and added by the student.

Researchers have also analyzed the by-products of writing: students' marking up of source material, notes, plans, and so on (e.g., Kellogg, 1988, 1990; Kirkpatrick & Klein, 2009; Risemberg, 1996; Spivey, 1997). With some research, the emphasis has been somewhat more on the *process* of writing than on the final product. In these studies, researchers have observed writers while they write (e.g., O'Hara et al., 2002), videotaped writers as they wrote collaboratively (e.g., Klein, 2009), had writers complete process logs (e.g., Segev-Miller, 2007), or had writers think aloud while writing (e.g., Hayes & Flower, 1980; Mateos et al., 2008; Segev-Miller, 2007). Note that the majority of writing-from-sources research uses situations in which writers are given a limited number of texts from which to work, which have been chosen by researchers prior to the

beginning of the research project (e.g., Kellogg, 1988, 1990; Kirkpatrick & Klein, 2009; Risemberg, 1996; Spivey, 1997). Thus, the writing process is considered from the reading of sources onward—a limitation of this body of research.

Two exceptions to this are Segev-Miller (2007) and O'Hara et al. (2002). These researchers worked with adult writers in naturalistic settings who were completing authentic writing tasks. Segev-Miller's participants were students in a teacher education program, working on a literature review for a course. O'Hara et al.'s participants were a variety of adult expert writers, each working on one of his or her own writing tasks. All participants wrote from a variety of authentic sources, which they selected themselves. Segev-Miller and O'Hara et al. used a variety of data sources (e.g., observations, think-alouds, writing by-products, final products, interviews, process logs) to understand the writers' processes. Segev-Miller's goal was to develop a taxonomy of writing strategies; O'Hara et al.'s was to examine the physical or material aspects of writing from sources.

Thus, researchers' approaches have differed significantly, depending on their particular interests. Some researchers have focused more on participants' high-level processes for writing from sources, while others have focused on lower level component strategies. The research differs in the degree to which it is tightly controlled versus naturalistic. What this body of literature provides, as a whole, is a picture of writing-from-sources processes and strategies.

Students' processes and strategies for writing from print-based sources.

Students have various *overall* processes or strategies for writing from sources. These include summarizing sources, responding to the topic, reviewing and commenting on

sources, synthesizing ideas around a central concept, or using information and ideas for their own rhetorical purpose (Flower et al., 1990). Focusing more on the components of writing from sources, Spivey (1997) framed the writing-from-sources process as *selecting, organizing, and connecting* information from sources. Spivey's (1997) model is highly cited, has received considerable empirical support, and can subsume, somewhat, the process as conceived by other researchers. The organization of the model also lends itself to a process-based discussion. This is compared to Segev-Miller's (2007) model, for example, in which elements from across the process are considered under a conceptual banner and thus the temporal process is somewhat difficult to follow. Thus, Spivey's model will be used to organize the review of students' lower level strategies for writing from sources.

Selecting. In terms of selecting, students get information from the assigned source texts, the texts plus their own comments and ideas, what they already knew about the topic, and previous concepts plus the text (Flower et al., 1990). When writing from sources, writers must select only some of the source information for inclusion in the next text. Many factors influence writers' decisions as to which information to select. Most obviously, writers select material that is relevant to the text they are writing (Nelson, 2008). They may also select information based on the writing persona they wish to create or based on the audience of their text (Nelson, 2008). Spivey (1997) conducted several text-analysis studies to examine what determined undergraduate students' selection of particular source material. She found that students were more likely to select information that was signaled to be important in a source text, as well as information that was

repeated in several of the source texts (Spivey, 1997). Repetition across texts was also an important factor in the writing of Grade 6, 8, and 10 students, and there was an interaction such that this was particularly influential among the older students (Spivey, 1997).

Another determinant of source selection can be the genre in which one is writing. Spivey (1997) found that when writing a compare-contrast report, undergraduate students selected corresponding / parallel information about each of the objects being compared, presumably because they understood that the genre demanded a direct comparison of the objects. Indeed, the degree to which writers are able to use genre conventions to guide their writing is dependent on their knowledge of those conventions (Englert et al., 1988).

In some advanced academic writing, selection can be even more nuanced and sophisticated; citations themselves can serve rhetorical purposes. Harwood (2009) interviewed academic sociologists and computer scientists about their inclusion of citations (i.e., citations to sources) in academic work. Harwood found that there were 11 functions of the citations: signposting (i.e., directing readers to other sources), supporting (i.e., supporting a claim), crediting (e.g., crediting an idea), positioning (e.g., providing an example of a perspective), engaging (e.g., in critical dialogue), building (e.g., on others' methods), tying (e.g., alignment with methodology), advertising (e.g., one's own work), future (i.e., staking claim on future projects by citing parts of own texts), competence (e.g., displaying knowledge), and topical (e.g., show relevance of topic). There were also disciplinary differences. Computer scientists were more apt to use citations to direct their readers to additional sources, and sociologists were more often critiquing the sources they cited. The type of paper (theoretical / empirical), audience, and publication venue also

affected citation. Secondary-school students will likely not display quite this level of sophistication, but some of these elements may nonetheless play a role in their selection of sources and/or content.

O'Hara et al.'s (2002) work with professional writers provides some insight into the physical aspects of how writers select information. They noted that writers often moved their gaze and their attention back and forth between source documents and the new document, particularly when they were copying or paraphrasing information into the new document. They also held their place in the documents, while selecting, by pointing with their finger or lining the documents up in particular ways. It appears that the writers in this study often wrote directly from the source documents.

Another approach is to select text for inclusion prior to actually writing the new document. In a study of Grade 7 and 8 students, many students highlighted information in sources that they planned to include in the new text (Kirkpatrick, 2007). Likewise, Spivey (1997) found that undergraduate students underlined or otherwise marked the information to be included in the new text. A still more sophisticated approach is to transfer information into a writing plan or set of notes prior to writing. This strategy has been shown by multiple researchers to be effective in improving the quality of texts that are written from sources (Kellogg, 1988; Kirkpatrick & Klein, 2009; Risemberg, 1996; Spivey, 1997).

Organizing. When writing, a writer must determine the organization, or structure, of the new text. This structure should be determined by the writer's rhetorical goals (e.g., to describe, to explain, to compare and contrast). When writing from sources, organizing

material into a new text structure can be particularly difficult. Writers must take information out of the text structure used by the original author and incorporate it into a new structure that reflects the goals of the new text (Segev-Miller, 2004, 2007; Spivey, 1997). Research has shown that writing with good structure when writing from sources is challenging for students from elementary school throughout university (Segev-Miller, 2004, 2007; Spivey, 1997).

There are multiple strategies that students can use to organize their texts when writing from sources. One highly effective approach is to plan the structure of one's text prior to writing (Kellogg, 1988; Risemberg, 1996; Spivey, 1997). This strategy is used frequently by professional writers (O'Hara et al., 2002). Planning can be done by marking the source texts in particular ways (Spivey, 1997), laying the source documents out in a way that signals the organization of the to-be-written text (O'Hara et al., 2002); and/or creating an outline or plan that addresses the structure and content of the to-be-written text (Kellogg, 1988, 1990; Kirkpatrick & Klein, 2009). Plans might consist of summaries of sources or they might be framed around a central organizing concept (Flower et al., 1990).

Outlining may be particularly effective. In an experimental design, Kellogg (1990) found that outlining prior to writing resulted in better writing style, content, overall quality, length, and fluency than other prewriting strategies. In a quasi-experimental design, Kirkpatrick and Klein (2009) found that teaching students to outline prior to writing resulted in better writing structure and better overall quality. There is also evidence to suggest that more organization in an outline (e.g., a hierarchical outline

versus a list of notes) is related to better overall text quality (Bloom, 1998 in Risemberg, 1996; Kellogg, 1990; Risemberg, 1996).

These findings should be interpreted somewhat cautiously though. The relationship may be complicated by other relevant factors, specifically, reading ability (Risemberg, 1996), and other strategies, such as mentally outlining, may sometimes prove as effective (Kellogg, 1988). In addition, while outlining may improve text quality it does not necessarily reduce writing time or decrease the effort put toward drafting (Kellogg, 1998). What outlining does appear to reduce is reviewing. In Kellogg's (1988) study, those writers who created an outline prior to writing spent less time reviewing than other participants.

In terms of the structure of the text itself, a highly effective strategy is to write a text that conforms to genre conventions (Spivey, 1997). A conventional genre structure can actually help writers to write, by serving as a schema or template for the to-be-written text. The text can be built around these schemas. It can also improve the reception of a text. Texts that conform to structural genre conventions receive higher ratings than those that do not, at least in some genres (Spivey, 1997). As with selection, the degree to which students are able to write with appropriate genre conventions depends on their knowledge of those conventions (Englert et al., 1988).

Another organization strategy is to use the structure of one of the source texts as a starting point, and then fit information from the other texts into that structure, in order to form a new text. Nash et al. (1993) found that when writing compare-contrast texts, university students used the first of two source texts read as a "base." On a global level,

students organized their new texts in the same way as the first source text was organized, and then fit material from the second source text into that structure (Nash et al., 1993). On a local level, students' statements contained information from the first source text, followed by information from the second source (Nash et al., 1993).

The same general strategy was used by some preservice teacher candidates when writing a literature review (Segev-Miller, 2007). One of the participants explained: "I decided to use Schmeck—on growth climate—as a frame or skeleton and to incorporate the other texts in it" (Segev Miller, 2007, p.242). It is not clear whether candidates always used the first source read as the base text, and it appears that the strategy was used to determine the global, but not necessarily the local, structure of the text. This strategy is referred to as *structure mapping* by Nash et al. (in reference to Gentner's (1983) model of analogical reasoning), and as *incorporating sources in one source* by Segev-Miller (2007). The intention here is not to consider the epistemic basis of this strategy (as Nash et al.'s (1993) was); thus the latter term will be used.

Segev-Miller (2007) framed this incorporating-sources-in-one-source strategy as less demanding than creating one's own structure. The effectiveness of the strategy likely depends on the task. It seems likely that if the source structure matches the structure demanded by the new task, and if corresponding information from each text is required (e.g., as in compare-contrast writing), it may be a useful approach. However, if it results in shallow processing of material, or in the missing of relevant material in a text read later in the reading process (Nash et al., 1993), it will not be effective.

Yet another organization strategy is simply to discuss one source text after another. Students in several studies of writing, from elementary school to university, have used this approach (Kirkpatrick & Klein, 2009; Spivey, 1997). The effectiveness of this one-source-at-a-time strategy may depend on the genre in which one is writing. Although it may result in high grades in some writing activities (e.g., reports, in which authors review and identify gaps in prior research by addressing one article at a time; Spivey, 1997), studies have generally found that high-synthesis texts receive higher ratings (e.g., Kirkpatrick & Klein, 2009; Segev-Miller, 2004; 2007; Spivey, 1997).

High-synthesis texts are those that are organized around ideas, with information from various sources appearing in the discussion of each idea. Segev-Miller (2007) conceives of this as true synthesis; her participants used metaphors of “lattice,” “weaving,” and “complex weaving” to describe it. Segev-Miller’s research with teacher candidates suggests that this may not be an all-or-nothing strategy, but rather may reflect a development from simpler strategies, such as incorporating sources in to one source or one-source-at-a-time, to true integration of source information. High-synthesis texts likely receive higher ratings (e.g., Kirkpatrick & Klein, 2009; Segev-Miller, 2004; 2007; Spivey, 1997) because they reflect the fact that student writers have been able to generate their own, integrated representation / meaning / position on a given topic: the goal of many writing-from-sources activities.

Connecting. A large part of the writer’s role in writing from sources is generating connections between the ideas, facts, and information presented in the source texts (Nelson, 2008). Some of the generating of connections likely occurs before the actual

writing process, when writers are reading their source texts (Klein, 2009). Indeed, *reading* research shows that many students from elementary school to university make meaningful connections between sources, but also that there are significant individual differences in this ability (Hartman, 1995; Strømsø & Bråten, 2002; Strømsø et al., 2003; Wolfe & Goldman, 2005).

Writing research also provides evidence of writers making connections between sources, while still in the prewriting reading stage. This research also points to the strategies that writers use to make these connections. Spivey (1997) found that writers sometimes made references to other texts in the margins of the text being read. In their study with professional writers, O'Hara et al. (2002) noted that while preparing to write, professional writers moved their attention back and forth between multiple source documents and that this occurred when participants were comparing and contrasting information across the sources. The connection process continues in the actual writing phase, with writers continuing to shift attention between source documents and the new text (O'Hara et al., 2002).

Writers do not always make intertextual connections (Flower et al., 1990; Kirkpatrick & Klein, 2009; Mateos et al., 2008). Mateos et al. (2008) had nine 15-year-old students think aloud as they read information texts and wrote a new text, in order to learn. Students wrote either a summary or a synthesis. Analyzing the think-aloud protocols, researchers found a “striking absence of attempts to integrate the different ideas of the source text during the making of a summary and a similarly striking low incidence of intra- and inter-text integration during synthesis” (Mateos et al., 2008,

p.687). In the written products, one of nine students highly integrated information from two sources; four students integrated information from both sources, but did not connect or link the information; one student juxtaposed summaries, and three students included information from only one source. The researchers also found that students who created more elaborate written products were more recursive in their reading and writing, for example, rereading sources, rereading text produced, and writing while reading. Thus, it appears that while university and professional writers may be able to make these intertextual connections while reading and writing, this is a difficult task for students at the secondary level.

The connections made by the reader-writer appear in the new text, and the connections made in the text may suggest the strategies that writers have used to generate connections. For example, Spivey (1997) conducted a study with university students, in which they had to write a research proposal or a report. Some authors made large-scale connections between sources by categorizing authors as similar or different in terms of their positions on a given topic. It appears that the strategy was to figure out source authors' positions on a given topic, and then organize the texts according to those positions. Smaller scale connections may also be seen when writers make connections between pieces of information from different source texts. For example, when writing a comparison, writers might compare an object discussed in one source to another object discussed in another source, on the basis of a common aspect (e.g., cost). In this case, the strategy would have been to identify aspects on which the objects could be compared (see Kirkpatrick & Klein, 2009; Spivey, 1997).

Revising. Though not specific to writing from sources, it is important to briefly address the role of revision in writing. Myhill and Jones (2007) provide a succinct overview of research on revision. They note that revision is generally understood to occur both throughout the writing process, and at the end of the writing process as a more distinct phase (as in Hayes & Flower, 1980). They note too, that there are varying levels of revision. They advocate in favour of Allal, Chanquoy, and Largy's (2004) distinction between *editing*, which is focused on the correction of errors and inaccuracies, and *rewriting*, which is focused on transforming, adding, or deleting. No changes in meaning occur in editing, whereas changes in meaning do occur in rewriting. Myhill and Jones also note the roles of metacognition and social factors, for example, the perceived audience, in revising.

In their study, Myhill and Jones (2007) examined English secondary-school students' reflections on their revisions. They were observed during classroom writing and later interviewed about their composing and revising. The observations captured writing and revising behaviour, including pausing during writing, textual changes, peer interactions, and so on. Timelines of behaviours and texts produced were correlated and used for analysis and as the basis of postwriting interviews.

When students were asked about their writing and revising, the single strongest issue that emerged was that two-thirds of students perceived that they did not revise while they wrote; they wrote first and revised later (Myhill & Jones, 2007). Reasons given included a desire to focus on ideas, or to avoid having to think about too much. One student marked text to which he wished to return using brackets or symbols. This

revision-following-writing strategy was the only one for which the interview data did not match the observation data. Only 11% of students wrote in long bursts, with no revision; this is far short of the two-thirds of students who indicated they did. Myhill and Jones (2007) suggest that students may conduct microlevel revisions during writing, but perceive their overall strategy as being to delay revision.

Another characteristic of revision was the rereading of existing text (Hayes & Flower, 1980; Myhill & Jones, 2007). Myhill and Jones (2007) found a dual role of rereading: the first being as a generating tool and the second as a revising tool. In terms of the revisions themselves, they included revising for accuracy, for coherence, to add to the text, to avoid repetition, or to achieve general improvement. Throughout revision, students commented about their own habits as writers or about common errors they make. Though revision will not be addressed in the same depth in this study, Myhill and Jones's study provides insight into possible themes or codes in the data.

In sum, writing from sources is ideally a process of *conceptual transformation*, in which writers read and learn from source material, and generate and communicate their own meaning on the basis of that material. The process is commonly conceived of as selecting, organizing, and connecting information from sources. Writers have demonstrated a variety of strategies for writing from sources. These strategies are generally specific to the element or phase of the process. As noted, these strategies have been identified and researched in the context of print-based writing from sources. The degree to which they may apply in writing from online sources remains to be seen.

The Internet

There have been several bodies of research that have focused on issues *related* to students' strategies for writing from the Internet. These include student motivation, searching for sources, evaluating sources, reading sources, and learning content from sources. There have also been pieces of research that have addressed overall or lower level strategies related to writing from the Internet, but none of these studies provide an overall picture of writing-from-sources processes or strategies. These areas of research are reviewed below.

Student motivation. An important reason to have students write from the Internet is that it is motivating for them. Schuh and Farrell (2006) found that upper elementary-school students liked using the Internet more than traditional print-based sources, and that they reported putting forth more effort. Working with Grade 6 students, Mistler-Jackson and Butler Songer (2000) found that the Internet can be used to create a learning environment that is motivating and empowering for students. Factors that contributed to this were: providing access to current and primary data, providing opportunities for exchange with experts, and providing an authentic and interesting task. Unfortunately, Desjarlais and Willoughby (2007) found that student motivation for writing from the Internet was not a significant predictor of learning / performance, but having students who are motivated to learn and complete school tasks is surely better than having students who are unmotivated, regardless of a direct impact on performance.

Searching for sources. Although access to information is perhaps the greatest benefit of the Internet, it also presents challenges. Many researchers, particularly in the

field of information science, have noted that one of the greatest challenges of the Internet is sorting through the vast amount of information available to find the information that one wants or needs (Adair & Vohra, 2003; Kuiper & Volman, 2008; Recoupero, 2007). On the other side of that problem, Sandieson, Kirkpatrick, Sandieson, and Zimmerman (2009) note that gathering a comprehensive set of resources on a topic can be incredibly difficult. Given the nature of the Internet, the searching and selecting of sources has been a major focus of research.

Kuiper et al. (2005) conducted a review of existing literature on students' online searching. They identified four search strategies: (1) entering keywords into a search engine, either alone, or in combination via Boolean operators; (2) browsing, by following the links provided in an index; (3) entering a specific website address (URL); and (4) following links on a website. Kuiper et al. concluded that the effectiveness of each strategy depends on several factors, including the user's prior knowledge of the topic, knowledge of the Web, and skill, as well as the type of information being sought.

Kuiper et al. (2005) also noted two tendencies in students' searching. The first tendency is that students were better at browsing for general information than they were at locating specific information. The second, almost opposite tendency, is that students were focused on getting "the right answer," in the form of specific facts, as opposed to finding information upon which to form their own opinion (Kuiper et al., 2005). Related to this was the reviewers' conclusion that students had trouble applying what they learned from the Internet to problem-solving or inquiry tasks (Kuiper et al., 2005). Note that in Kuiper et al.'s review, the emphasis was on searching, not necessarily on searching for

the purpose of writing. Writing may help to override these poor tendencies when searching. When writing, students must locate information that is relevant to the new text, and must apply that information to meet the goals of the writing task. Writing can also ideally move students away from a brief “right answer” to a broader, and deeper, conception of the topic. That said, the benefits of writing may depend on the strategies that students use and the quality of work that they produce.

The importance of search strategies to learning was addressed by Hoffman et al. (2008). In this study, pairs of Grade 6 students searched the Internet using Artemis, an information-seeking interface. They completed four weeklong investigations on the Internet, in order to develop a solution or answer to a question they developed. Students’ understandings of their topics were assessed using activity sheets, online postings, posters, journals, reports, and interviews with the researchers. Students who used effective search strategies, that is, they “carefully developed a number of possible search topics relating to their driving question, demonstrated thoughtfulness in the use of these terms for queries to the UMDL [University of Michigan’s Digital Library], and were selective (high level) or somewhat selective (adequate level) in their choice of resources” (Hoffman et al., 2008, p.1067), were the same students who developed the most accurate understandings of the science issue under investigation (Hoffman et al., 2008). Likewise, students who used poor searching strategies tended to form poor content understandings.

Unfortunately, the design of Hoffman et al.’s (2008) study precluded causation from being established, and the role of a third variable (e.g., academic competence, motivation) seems likely. That said, Hoffman et al.’s work does illustrate several ways in

which successful searching might reasonably be assumed to improve learning. For example, when students search for and select sources efficiently, their time can be spent on reading the selected sources. In the Hoffman et al. study, students' learning was assessed through artifacts produced by the students (activity sheets, online postings, journals) and interviews. Although some writing was done, it was not the focus of the study.

Coiro and Dobler (2007) conducted a seminal piece on students' strategies for reading from the Internet. They also examined students' searching for and selection of sources. When trying to find brief answers (one or two words) to specific questions, they found that a number of factors influenced which sites Grade 6 students consulted. These included prior knowledge of the topic, prior knowledge of printed informational text structures, prior knowledge of informational website structures, and reasoned inferences about what might be found by following a particular link or consulting a particular source. In their review, Kuiper et al. (2005) found that features of a website (e.g., graphic content) might also influence students' tendency to consult it. Hoffman et al. (2008) found that students with good understandings of the topic under investigation and high engagement with the work were able to make use of poor sites, whereas students with poorer understandings and lower engagement were not.

A few studies have examined searching for sources *for writing*. Recall that Zviel-Girshin and Rosenberg (2005) evaluated the Web as a source of information for university students' graduation projects. Analysis of the students' writing process focused predominantly on variables related to searching, rather than writing. Most

students seemed to be fairly successful in their searching; 67% of students who used Web searches found relevant information that they used in their papers. Problems arose as a result of poor search query strings and language and translation issues. In terms of time, 73% of students searched the Web between three and fourteen times and 74% of students searched the Web once a week or once a fortnight. One behavioural writing strategy they noted was that many students downloaded source material and returned to read it at a later time.

Boerner (1998) conducted another search study with university freshman students. In the study, students searched for sources in order to write a series of papers on a single, self-selected topic. Early in the semester, students' searching was guided primarily by task demands such as generic frameworks and teacher expectations (e.g., trying to find quotes by experts in the field). Later in the semester, task demands continued to guide searching, but students' topic and situational knowledge were much greater and they were also used to guide searching (e.g., realizing that one needs more information about a subtopic, realizing that one has exhausted a particular set of resources).

The literature on searching for sources and searching for writing sources, provides some insight into what is likely the first stage of writing from online sources (i.e., the searching phase). Kuiper et al. (2005) provide an overview of search behaviours. Hoffman et al. (2008) demonstrate that search strategies may affect student learning (although van Meter and Firetto, 2008, argue that learning, or lack thereof, had more to do with students' integration of sources, as discussed above and below). Coiro and Dobler (2007) emphasize the role of prior knowledge, and the connections between print-

based and online reading strategies. The search study that is conceptually most similar to the one proposed here is that of Boerner (1998). Her emphasis was on strategies for writing, but she focused exclusively on the searching phase.

Evaluating source material. Print-based writing-from-sources researchers have typically given their participants sources, and those sources have been fairly credible. Given the type of information available on the Internet, however, many researchers have argued that the ability to critically evaluate source material is of growing importance (e.g., Kiili et al., 2008; Kuiper & Volman, 2008; Leu et al., 2004; Luke, 1997, 2003; The New London Group, 2000).

Although the critical evaluation of sources has not been a focus in writing-from-sources research, it has been the object of study in other print-based research. Bisanz, Zimmerman, and Bisanz (1998) examined how university students determined the credibility of popular press articles about scientific findings. They found that mean credibility ratings were higher for typical areas of research (those related to the sciences typically taught in school, e.g., physics, chemistry, biology), and plausible findings. There was no effect of social context, and only a marginal effect of research methods. In justifications for their ratings, social context was mentioned by many of the students, but not frequently. Research methods were mentioned by many students, and they were mentioned frequently. When Korpan, Bisanz, Bisanz, and Henderson (1997) asked students to tell them what information they would need in order to determine if popular press news briefs were true, many students frequently requested information about methods, agent / theory, and data / statistics. Less common and less frequent were

requests about social context, relevance, or related research. Thus, it seems that while university students are able to critically evaluate source material on some bases, other potential sources of bias may go undetected.

The critical evaluation of *Internet* sources has been the focus of much theoretical work on the Internet (e.g., Leu et al., 2004; Luke, 1997, 2003; The New London Group, 2000). Empirical studies have also examined the degree to which students critically evaluate their sources. For example, Gray et al. (2005) conducted focus groups with adolescent students. They found that at least some students were aware of the problems with credibility of some Internet sources of information, particularly as it relates to health.

Kiili et al. (2008) examined how upper secondary-school students evaluated potential online sources for writing. They were interested in whether students evaluated material according to relevance or credibility. Students evaluated sources on the basis of relevance far more frequently (more than five times as often) than credibility. Although some students were good at considering source credibility, most students seldom did so. More positively, despite students' general lack of critical evaluation, most of the sources that students located and read were judged by the authors to be fairly credible (e.g., public associations, expert organizations, Wikipedia). This study was focused almost exclusively on the search process (they did note that students sometimes downloaded material or links), and did not contain an examination of students' actual writing or their writing processes.

Another relevant study is that of Menchen-Trevino and Hargittai (2011). The students were given between 12 and 15 information-seeking tasks, and were observed and

interviewed while they completed the tasks. The authors were interested in whether and how students used Wikipedia, as well as any comments about the site made by the students. Seventy-seven percent of the students accessed Wikipedia at least once while completing the tasks. They did so either by searching for it directly or by clicking on it when it was returned as a link following a search. A significant portion of students, including those who accessed it directly, expressed concern about its credibility. Most students had a general idea about how Wikipedia operates (anyone can edit the site); a few knew all the details; and a few knew very little. In general, students were not concerned about the site's credibility, unless it was for a school task for which an instructor would be concerned about the use of Wikipedia. Only 23% of students actually double-checked the information elsewhere, though most seemed to see Wikipedia as a useful starting place rather than as an end source, in terms of school assignments.

Recently, researchers have begun to address the relationship between critical evaluation and other demographic or task variables. Strømsø et al. (2011) examined whether undergraduate students' beliefs about knowledge and knowing predicted their judgment of texts' trustworthiness. Mason et al. (2010) examined whether students were "epistemically active" while researching online. Kienhues et al. (2011) examined whether reading consistent or inconsistent online medical advice affected one's epistemic beliefs. The Kienhues et al. paper is part of a special section of *Learning and Instruction* (2011), edited by Brand-Gruwel and Statler. It examines the "processes involved when solving information-based problems," including the critical evaluation of sources. The

interested reader is directed there; as the research is not focused on writing, it will not be discussed further here.

Reading. Research on reading Internet sources is relevant, in that students must read textual sources in order to write from them. Coiro and Dobler (2007) wrote a seminal piece on sixth-grade students' reading comprehension strategies while reading online. They compared their findings to well-established print-based reading strategies. The authors found that students used "similar and more complex applications" (Coiro & Dobler, 2007, 215) of print-based strategies when reading online. These were: prior knowledge application (e.g., about the topic), inferential reading strategies (e.g., about what will happen next in the text), and self-regulatory processes (e.g., set a purpose and develop a mental plan). The authors provide several examples of specific skills or applications within each, and highlight how the strategies are applied on the Internet compared to with print. Coiro and Dobler ultimately argue that the skills demonstrate the impact of new technologies on literacy; however, they caution against necessarily concluding that the resulting literacy is fundamentally new. Rather, they state that new literacies may be more complex versions of preexisting literacies.

For those interested, *Applied Cognitive Psychology* published a Special Issue (2008) addressing text comprehension with information and communication technologies (ICTs). It is not reviewed here as the Coiro and Dobler (2007) article provides a sufficient overview for the current project. That is, the emphasis for this project is not on reading online per se, but on reading online for the purposes of writing, and any interaction between the two.

Writing from the Internet as learning. What is interesting about print-based writing-from-sources research is that the emphasis has been on the writing process and on students' strategies; less emphasis has been placed on students' learning through writing from sources. Of course, there are exceptions. For example, Boscolo and Borghetto (2002) found that compared to students who read source material, students who read and wrote from source material showed better performance on tests of transference and inference (as discussed earlier). Still, it remains that learning has not been a primary focus in print-based writing-from-sources work.

Research on writing from the Internet is quite different. Many studies that have examined writing from the Internet have treated students' writing primarily as content learning. Willoughby et al. (2009) had two groups of undergraduate students search the Internet for 30 minutes and then write an essay, and had another two groups write the essay without having searched the Internet. One group of students in each condition had high knowledge on the topic and the other had low knowledge. Students' essays were then assessed on the basis of how much correct content they included. Having the Internet as a source of information improved students' writing scores, but only for those that had high topic knowledge. The interpretation was that in order to search for and use Internet information effectively, students need to have sufficient topic knowledge. Given that good writing was equated with amount of content knowledge in the text though, it appears that their results show that students who have high topic knowledge are able to find and include more additional topic knowledge than students with low initial topic knowledge. Willoughby et al. did not address the impact of the Internet on the writing

process or strategies of students, or on other elements of writing such as structure, or connections between sources.

Desjarlais and Willoughby (2007) responded to Willoughby et al. (2009) (although Willoughby et al. (2009) was published later, it must have been conducted first). The focus in Desjarlais and Willoughby's experimental study was on supports for students with low topic knowledge. They compared (1) students who had plenty of time to search (60 minutes) and who took and had notes available during writing, (2) students who had plenty of time to search and who took notes but did not have them available during writing, and (3) students who were not able to search the Internet. They used writing to evaluate students' learning; essays were again scored in terms of the number of correct statements or phrases. They found that being able to search the Internet facilitated learning for students with low and high initial topic knowledge. There was no difference between students who had notes available during writing and those who did not. Finally, motivation to write from Internet sources did not affect performance. Their interpretation was that having sufficient time to search was the most effective support for students with low topic knowledge. Again, however, this speaks more to students' learning content from the Internet than it does to their *writing* from the Internet, in terms of process, strategies, and so on.

In her dissertation, Thruman (2005) asked university students to write arguments based on information they found on the Internet. The variable of interest was again how many facts from the sources students included in their arguments and how this differed across combinations of conditions (e.g., whether the original search goal matched the

topic about which they were writing). However, the number of facts included was so low across participants and conditions that none of the theories tested could be supported or refuted. The author argues that an open-ended argument task may not have provided sufficient structure or retrieval cues to support participants' memory of facts. Once again, this speaks to specific content learning rather than to broader writing or learning.

Rouet and colleagues (see Rouet, 2006; Rouet et al., 1996) have conducted several studies in which students read and learned from Internet sources. Evaluation has focused on fairly high-level learning, such as whether students grasped different perspectives on a controversial historical event, or whether they grasped that different sources present different perspectives and that these are not necessarily reconcilable. Although writing has sometimes been used to evaluate students' construction of such knowledge, the writing itself has not been an emphasis of the studies.

One of the most detailed and most cited accounts of students' learning and writing from the Internet is presented in Wiley and Voss (1999, Experiment 1), discussed earlier in this proposal. Recall that undergraduate students in their study who wrote from multiple, primary sources on the Internet learned more than did students who wrote from a textbook-like secondary source (Wiley & Voss, 1999). Although the emphasis was still primarily on learning, Wiley and Voss were also much more focused on writing than the other authors discussed in this section. Their writing-related findings are discussed in a later section.

What these studies of learning from the Internet suggest is that the Internet can be an important source of content learning, often operationalized as the number of facts

included in a student's writing (Desjarlais & Willoughby, 2007; Wiley & Voss, 1999). Having sufficiently clear task demands and having sufficient time to search may be preconditions of such content learning (Desjarlais & Willoughby, 2007; Thruman, 2005; Willoughby et al., 2009). Wiley and Voss's (1999) study begins to examine students' learning of principles, and learning transfer, as opposed to simpler content learning. What none of the studies address, however, are students' naturally occurring strategies for learning or writing from the Internet. Indeed, whereas the emphasis in print-based writing-from-sources research has been on students' strategies, the emphasis in Internet-based writing-from-sources research has been on content learning.

Thus, the literature on writing from the Internet provides a rich *context* for examining students' strategies. The literature shows that students may be more motivated to write from the Internet than from print-based texts (Mistler-Jackson & Butler Songer, 2000; Schuh & Farrell, 2006). Although students have the capacity to search and evaluate sources effectively, there is likely room for improvement (Boerner, 1998; Coiro & Dobler, 2007; Hoffman et al., 2008; Kiili et al., 2008; Kuiper et al., 2005; Zviel-Girshin & Rosenberg, 2005). Much research has shown that students can learn content successfully from the Internet, although this may depend on factors such as topic knowledge and time allowed (Desjarlais & Willoughby, 2007; Thruman, 2005; Wiley & Voss, 1999; Willoughby et al., 2009). The last section of this review will consider the little work that has been done on students' strategies for writing from the Internet, and how the Internet may change the nature of selecting, organizing, and connecting source information.

Students' strategies for writing from the Internet.

Overall strategies. To my knowledge, one study has focused directly on students' overall strategies for writing from the Internet. Yang (2002) conducted an exploratory study in order to understand the cognitive process of discourse synthesis within a hypertext environment. In the study, each of six undergraduates completed five assignments on ancient Greece. Students were to "define a problem, formulate their hypotheses, then collect, synthesize and reformulate information" (Yang, 2002, p.40). They used resources from a large-scale database (Perseus) to create "path assignments," also referred to as "interpretive essays." It appears that they were to link and annotate existing sources, in order to convey their interpretation of events in ancient Greece. Data consisted of think-aloud protocols, observations, and interviews.

Yang (2002) created a taxonomy of undergraduate students' cognitive processes, while creating these path assignments. Broad categories of cognitive processes included executive control, information seeking, interpreting, intertextuality, reflexivity, reasoning, structuring, and affective responses. Examples of cognitive processes included, for example, identifying the problem, assessing goals and constraints, strategic and tactical planning, monitoring and evaluating progress, and modifying (the five processes grouped into executive control) (Yang, 2002).

Yang's (2002) study provides a broad and important picture of the cognitive processes involved in online discourse synthesis, but a necessarily "coarse ... level of analysis" (p.63). With such a broad study, it was not possible to evaluate or communicate the specific details of these strategies or behaviours, and individuals' data were collapsed.

Moreover, the analysis was presented by category, so it was difficult to get a sense of how the process unfolded (i.e., the order in which things happened). Finally, the path-assignment task is quite different from a standard writing activity. Thus, Yang's study is extremely relevant to the current one in that it shows that cognitive strategies play a role and suggests what some of these strategies might be. That said, there is much to build on from Yang's work, specifically in terms of the details of the strategies, individual data, the process as it unfolds in time, and discourse synthesis as writing.

The remainder of this review focuses on what these strategies may be. Recall from the beginning of the paper that I am conceptualizing writing as a process consisting of several phases, and assuming that there will be strategies and substrategies/operations at each phase. The studies reviewed in this next section have focused on an activity (e.g., copying and pasting) that may be relevant to the current project as a strategy or operation. The review is organized into sections on selecting, organizing, and connecting. Throughout this section, I will discuss how reading, selecting, organizing, and connecting may be different with online compared to print-based sources.

Selecting. As with print-based sources of information, students must presumably select only some of the information in online sources. Recall that Wiley and Voss (1999) examined students' texts in terms of borrowed, transformed, or added material. Transformed material is sometimes considered particularly important because it reflects deep processing of the source material (Robinson & Raineri, 2006). However, Priemer and Ploog (2007) point out that borrowing may also be important to learning, as it reflects learning from other authors' work.

Priemer and Ploog (2007) provide some insight into how students select or borrow information from the Internet. They had 45 17-year-old students use the Internet in order to write essays in response to a given question about ocean tides. They were provided with access to the Internet and a word-processing program, but were not given any further directions or materials. Priemer and Ploog found that 25% of 17-year-old students electronically copied and pasted or cut and pasted information from sources directly into their new text and wrote less than 20% of the new text themselves. This is an extreme form of borrowing, as it is not simply borrowing information from sources (as is expected in writing from sources), but actually copying large chunks of text (i.e., plagiarizing). Plagiarizing is not a “strategy” that has been identified frequently in print-based writing-from-sources literature. It is possible that the Internet, or tasks used with the Internet, promote or allow this to happen through the ease of electronic copying and pasting.

How students borrow appropriately from text is not well established. Some insight comes from Cerdán and Vidal-Abarca (2008). These authors had undergraduate students write from Internet sources with the help of a software package that allowed students to have the source document open above the new text document, in the same window. Some students had to answer intertextual essay questions (had to integrate information from multiple sources) and some had to answer intratextual essay questions (had to include multiple points from one source). The project did not explicitly address this, but it appears that students paraphrased directly from the source documents into the new text. In the Desjarlais and Willoughby (2007) study, some students took notes on the source material, and then wrote from those notes. In both of these studies however,

students were following instructions, or responding to an obvious task environment. That is, their selection strategies were not naturally occurring.

It is important to note that the effectiveness of a given selection strategy may depend on the student. Igo, Riccomini, Bruning, and Pope (2006) evaluated the effectiveness of different types of note taking for middle-school students with learning disabilities. Students took notes from Web-based sources on different topics. The notes were typed, copied and pasted, or handwritten. Students then completed two measures of “facts learning” (Igo et al., 2006, p. 89): cued recall and memorization. Cued-test performance was best for topics where the notes were made in writing; multiple choice performance was best for topics where the notes were copied and pasted. Students found copying and pasting to be the easiest and least distracting way of taking notes. Thus, Igo et al. encourage this practice. Note that writing was not used as a task or measure; the results could well be different for writing, but the study illustrates the fact that the effectiveness of different strategies may depend on the students and purpose of the task.

Something that may be particularly interesting in terms of how students select source material is the multimodal nature of information available on the Internet. If students want to select and write from nontextual information, they would have to change information from one modality (e.g., video) into another (e.g., text). Iedema (2001, 2003) refers to the process of translating material from one semiotic system into another as *resemiotization*; it is referred to by Bolter and Grusin (2000) as *re-mediation*. Iedema (2001) argues that such translations are not exact, as each mode has different constraints and affordances that limit the meanings that can be communicated in that mode. Thus,

translation can be conceived of as an active, constructive process. Another perspective comes from considering learning from multiple modes. Research has consistently shown that exposure to and engagement with multiple modes of information can increase learning, but learning depends on many specific factors (Ainsworth, 1999). In the current project, the emphasis will be on whether students select nontextual information, and how they translate that from its original modality into text.

In terms of why students select particular online information, it is not yet established whether students will use the same criteria as in print-based writing from sources (e.g., importance in one text, repetition across texts, fitting conventions of genre; Spivey, 1997). Wiley and Voss (1999) found that genre affects selection (e.g., arguments contain less borrowed information than narratives or summaries), but it was not clear that it was functioning as a strategy in the same way as in Spivey (1997). It seems that print-based criteria would be appropriate, but the degree to which they will be applicable to online environments remains unclear. This study will provide additional insight in this regard.

Organizing. To my knowledge, researchers have not addressed the issue of how students organize their texts when they write from Internet sources. One feature of the Internet that may affect organization of the new text is that its structure may be different. Recall the argument, introduced in the *New Literacies* section, that the Internet is a less linear source than print-based sources (Coiro & Dobler, 2007). Moreover, the multitude of available documents means that students' source texts may have very different structures from one another. Given the structure of Internet texts, it may be difficult for

students to use the incorporate-into-one-source strategy (Nash et al., 1993; Segev-Miller, 2007). It may also be difficult to discuss each source text in turn (Kirkpatrick & Klein, 2007; Segev-Miller, 2007), as there may be an overwhelming number of source texts. A genre-structure strategy might be the easiest and most effective way for students to structure their texts, although this is a matter of speculation and there is no guarantee that students will actually do this.

Connecting. As with selecting and organizing, it is not clear how students will make connections among elements of information from the Internet. Moreover, it is not clear *if* students will make meaningful connections between the information. van Meter and Firetto (2008) reviewed Hoffman et al.'s (2008) data with an emphasis on integrated representations (recall that Hoffman et al. were interested in the relationship between search strategies and learning). van Meter and Firetto were interested in whether or not students integrated information / representations across the various websites and whether integration played a role in students' constructions of deep understanding. Although Hoffman et al.'s data were not collected to answer such questions, and were therefore limited in terms of the degree to which they could answer them, van Meter and Firetto were able to draw some speculative conclusions.

van Meter and Firetto (2008) concluded that students did not integrate information from across the various websites. The primary evidence for this was that students evaluated websites according to the comprehensiveness of the information provided; "students believed that a good website was one that contained most, or all, of the information needed to answer the inquiry question" (van Meter & Firetto, 2008, p. 1086).

This is in contrast to an approach in which students would compare and elaborate on websites in order to form an integrated representation.

A second source of evidence for this was the interviews. van Meter and Firetto (2008) argued that students' answers to questions could have been answered based on single sites, and that the students gave no indication that they were thinking of multiple sources when answering questions. *Writing* from sources may be seen as the solution to students' avoidance of integrated representations: good writing from sources *is* the integration of information from various sources, and writing may encourage integration more than did Hoffman et al.'s (2008) tasks. Of course, it is possible that students will avoid integration by discussing one source after another rather than by integrating them. Indeed, Mateos et al.'s (2007) research suggests that integration is difficult and often not attained with secondary-school students, even when writing.

Writing an *argument* may be particularly beneficial in terms of making connections. Wiley and Voss (1999) defined connections as inferences, causal attributions, temporal connections, correlations, simple conjunctions, and ideas that were included in the same sentences. They found that students who wrote arguments included significantly more connections in their texts than students who wrote narratives; students who wrote explanations and summaries fell in the middle, and did not differ from the other groups. Looking at causal connections specifically, students who wrote arguments included more causal connections than those writing summaries or narratives; those who wrote explanations did not differ from the other groups. The benefits of argument writing for integration have been replicated by Le Bigot and Rouet (2007).

Not much is known in terms of how students make connections between sources on the Internet. Cerdán and Vidal-Abarca (2008) found that when answering questions that required integration from multiple sources, undergraduate students jumped from one relevant section of source material to another. This is reminiscent of O'Hara et al.'s (2002) work with professional writers, where they switched their attention back and forth between source documents. What is not immediately clear is whether students were jumping within one source document, or across documents. Likewise, in Wiley and Voss's (1999) work, the ratio of within-source-text connections to between-source-text connections is not clear. Both pieces of research imply between-source-text connections, but this is not made explicit.

Writing Electronically

In terms of writing electronically versus writing with pen and paper, Haas (1989, 1996) has found significant differences between the two activities. Students spend less time planning when writing electronically (Haas, 1996), and may focus more on sequential planning (e.g., lexical or syntactic arrangement) than deeper conceptual planning. Students make fewer notes, and fewer students make notes, when writing electronically. This may happen because editing and revising are easier when writing electronically, and writers therefore see less benefit for planning. Indeed, students do more revisions during drafting when using a word processor, though most were focused on minor changes (MacArthur, 2006). Haas suggests that the electronic medium focuses attention on lower level considerations, as only part of the document is visible at a given time.

Indeed, when reading and writing electronically, reader-writers have a more difficult time getting a sense of their entire text, due perhaps to difficulties in physically interacting with it (Haas, 1996). Some research suggests that the products of electronic writing may be of poorer quality (Haas, 1989), but writers are likely more familiar and comfortable with the electronic medium today than they would have been when the research was conducted. Finally, it is difficult to view multiple documents simultaneously on a screen. Having to alternate between displays while writing adds to a writer's cognitive load and affects writing (Olive et al., 2008). Experienced writers may attempt to reduce such constraints, for example, by printing some documents or by cutting and pasting relevant material into a single document (Attfield et al., 2009).

Summary of Literature Review

The first section of the literature review provided an overview of cognitive factors in writing, including metacognition, knowledge, memory, strategies, and self-regulation (Bereiter & Scardamalia, 1987; Englert et al., 1988; Englert et al., 1991; Hidi & Boscolo, 2006; Pajares & Valiante, 2006; Pressley, 2003; Zimmerman & Risemberg, 1997). It also reviewed the effective and ineffective characteristics of written arguments (Crammond, 1998; Nussbaum, 2005, 2008; Santos & Santos, 1999; van Eemeren & Grootendorst, 1999a; van Eemeren & Grootendorst, 1999b). The second section discussed the research on students' strategies for writing from print-based sources of information. In order to write from sources, students must select, organize, and connect information, and they use a variety of strategies and operations for each of those tasks (Hartman, 1995; Kellogg, 1988, 1990; Kirkpatrick & Klein, 2009; Myhill & Jones, 2007; Nash et al., 1993; Nelson,

2008; O'Hara et al., 2002; Risemberg, 1996; Segev-Miller, 2007; Spivey, 1997). Effective strategies are not always used, however (Hartman, 1995; Mateos et al., 2008; Strømsø & Bråten, 2002; Strømsø et al., 2003; Wolfe & Goldman, 1995). The third section of the literature review was an overview of the research on the Internet that is related to writing. Research has shown that writing from the Internet can be motivating and interesting for students (Mistler-Jackson & Butler Songer, 2000; Schuh & Farrell, 2006). The searching literature has identified some of students' searching strategies (Kuiper et al., 2005), examined how these relate to learning (Hoffman et al., 2008), and considered variables that affect search strategies (Boerner, 1998; Coiro & Dobler, 2007). Other theorists have argued the importance of students' critical evaluation of Internet sources (e.g., Kiili et al., 2008; Kuiper & Volman, 2008; Leu et al., 2004; Luke, 1997, 2003; The New London Group, 2000). Students are sometimes aware of credibility problems on the Internet (Gray et al., 2005; Kiili et al., 2008), but may be more apt to evaluate sources on the basis of relevance than credibility (Kiili et al., 2008). Some research has examined students' online reading strategies (Coiro & Dobler, 2007). Much research has used writing to evaluate students' content learning from the Internet (Rouet, 2006); this research has shown that students can learn content effectively from the Internet (Desjarlais & Willoughby, 2007; Wiley & Voss, 1999), although this is not always the case (Thrumman, 2005; Willoughby et al., 2009).

The last section of the literature review considered what strategies and substrategies students *may* use when writing from the Internet. In terms of overall strategies, Yang (2002) illustrates that students are indeed strategic. Some literature has

suggested that students may use a copying or paraphrasing strategy to select text (Cerdán & Vidal-Abarca, 2008; Priemer & Ploog, 2007). This could be a strategy or a lower level operation depending on how pervasively it is used (i.e., the strategy could be to copy an existing text or to create a genre-appropriate text, and copying could be an operation used in conjunction with either of these strategies). An interesting factor in students' selection of material is the potential need to translate or resemiotize (Iedema, 2001, 2003) information from one modality into another. Other literature suggests that genre of the to-be-written text may be one factor that influences students' selection (Wiley & Voss, 1999). It is not yet known whether students will use an overall genre strategy; that is, whether they will use the genre of the to-be-written text to direct their selection, connection, and organization. Other print-based strategies include incorporating sources in one source (Nash et al., 1993; Segev-Miller, 2007) and source summarizing (Segev-Miller, 2007; Spivey, 1997). It is not yet known whether students will use these strategies when writing from the Internet.

Slightly more is known in terms of substrategies/operations, although they have not been categorized as such. Operations for selecting may include copying or taking notes. In terms of connecting content from sources, some literature shows that students tend not to make meaningful connections (van Meter & Firetto, 2008), whereas other literature shows that they can (Wiley & Voss, 1999). When writers do make connections, it may be necessary for them to move their attention and gaze between the relevant documents during writing (Cerdán & Vidal-Abarca, 2008; O'Hara et al., 2002)—an operation of sorts.

In sum, we know that cognitive strategies play a role in discourse synthesis from the Internet (Yang, 2002), and we know some of the operations that students may use when writing a synthesis. However, we do not know which overall processes or higher level strategies students are using and we do not know what that process looks like (e.g., what students do first, second, third, and so on). The current study will address these issues.

Introduction to the Current Study

The purpose of this project was to identify and describe high-achieving Grade 12 students' processes, strategies, and operations, for writing from online sources of information. Given the novelty of this area of research, the study was an exploratory one. The primary goal was to begin to understand what processes and strategies students use, rather than to make predictions or test hypotheses; thus the project was an in-depth, qualitative, analysis of the writing-from-the-Internet process. This has been the approach taken by many reading and writing researchers, when conducting pioneering literacy research (e.g., Coiro & Dobler, 2007; Hayes & Flower, 1980).

The central research question for the project is, *What are students' processes, strategies, and operations for writing arguments from online sources of information?* The term process is used here to describe the highest level of participants' actions. Process is defined as participants' overall temporal approach to the writing task; it is the way that they address different writing goals, in turn, and the way that they string strategies together. The term *strategies* is used here to describe the middle level of participants' actions. Strategies are defined as cognitive or behavioural actions used to achieve or facilitate goals. The term *operations* is used here to describe the lowest of participants' actions. Operations and characteristics of the strategies refer to a single action or something distinct in the use of the strategy.

For example, writing goals might include such activities as "research," "draft," and "review." Strategies for the "research" goal might include "searching for websites," "reading websites," and "taking notes." Operations within "searching for websites"

might include “searching via keywords,” “retrieving a known website,” and “clicking on a provided link.” The way that a student puts these together, for example, by researching, then drafting, then researching again, then drafting, defines his or her overall process.

Students in this study were asked to research and write an argument about a controversial topic: the testing of cosmetic products on animals. They were recorded throughout the writing process (think-aloud recordings, computer-screen recordings, and webcam recordings). This data were used to identify the process and the strategies that students used. Students’ essays, as well as follow-up interviews, were used to confirm and/or clarify the interpretation of the data.

Method

Research Context

The goal of the study was to examine writing from Internet sources, in a school context. This is fitting, in that writing from sources is common and important in school and much of students' Internet activity is related to school tasks (Skinner, Biscope, Poland, & Goldberg, 2003). In school, argumentation (persuasive writing) is one of the most common nonfiction genres. Arguments have been shown to contribute to students' learning, thinking, and communication (Cavagnetto, 2010; Venville & Dawson, 2010; Wiley & Voss, 1999), though this depends somewhat on the orientation of the argument intervention (Cavagnetto, 2010). Arguments may also be empowering to students (Crammond, 1998). Thus, arguments are a genre of particular interest and students therefore wrote a persuasive piece. Although *writing* from sources may be seen as a school activity, the ability to locate and synthesize information is, and will remain, important across students' professional and personal lives (Leu et al., 2004). Data from Statistics Canada (2008) show that Internet use remains more prevalent in urban than rural contexts, so the research was conducted in an urban school.

The topic about which students wrote, cosmetic testing on animals, was intended to represent topics that are publicly debated on the Internet and which people might reasonably use the Internet to learn more about and form an opinion on. It was also intended to be of interest to young people. The topic was assigned, rather than selected by students, in order to make students' written texts and processes more interpretable and comparable.

Recruiting Participants

Participants were recruited from a public, urban, secondary school in southwestern Ontario. The goal was to recruit very high achieving students (more on this below). In order to recruit such students, a high-achieving school was first selected. Results from provincial tests, administered by the Educational Quality and Accountability Office (EQAQO), were used as a rough measure of school achievement. Principals of the highest achieving schools in the city, according to EQAQO results, were contacted to gauge interest in the project. The school of the principal who appeared most interested in and eager about the project was selected as the school from which participants would be drawn.

From the years 2006–2010, 89%, 91%, 92%, 94%, and 92%, respectively, of the first-time eligible students in this school were successful on the Grade 10 Ontario Secondary School Literacy Test (EQAQO, 2011). This is compared to board success rates of 82% and 83% and provincial rates of 84% and 85%, during the years 2006-2010. In 2010, 90% of students at the school were enrolled in academic-level English, compared to 60% of students in the board and 68% of students in the province. In 2010, 24% of students' first language at home was a language other than English. This percentage is higher than other schools in the board, 11%, but similar to the province, 22%.

I met first with the principal of this school. We decided that the English Department Head should be my main point of contact within the school. For the purposes of this project, he is referred to as Paul. Paul and I met, and I outlined the nature of the project. I provided him with Letters of Information, and asked him to approach 10 Grade

12 students with the highest grades in their respective academic English classes. He was to explain the project briefly, provide a Letter of Information, and then indicate when I would be present in the school. This was during several lunch periods. Students who were interested in participating came to meet with me directly. To avoid the perception of coercion, I did not inform school staff of which students participated.

When students came to see me, they were provided with a more detailed verbal overview of the project, and if they did not have the letters with them, another Letter of Information, along with a Letter of Consent. I told students that they would be provided with a \$20 honorarium for participation and that this would be paid even if they withdrew from the project. I answered any questions that students had. Those who were interested were asked to take home, read, sign, and have a parent or guardian read and sign, the consent form. There were three options on the consent form:

- I agree to participate, but I do not want my video-recorded data shown to anyone outside of the research team.
- I agree to participate, and it is okay if you show my video-recorded data at the University or at conferences.
- I agree to participate, and it is okay if you show my video-recorded data on a website about the project.

Students could choose the first option, the second option, the third option, or the second and third options. A meeting time was arranged when each student could return the consent form, complete a screening questionnaire, and begin the project. The screening questionnaire contained the following questions:

- When you do research for a school project, where do you find your information?
- Are you comfortable with looking for information on the Internet?
- Do you think that you are pretty good at looking for information on the Internet?

In order to be included as participants, students had to respond that they find their information on the Internet, are comfortable looking for information on the Internet, and are pretty good at looking for information on the Internet. All students answered these questions affirmatively; thus, all interested students were included as participants.

Participants

As noted, participation was limited to students who were particularly strong writers and who were comfortable using the Internet to search for information. This was done in order to gain a picture of relatively *good* writing from online sources. That is, it was assumed that these students would be strategic in their writing process, that they would create a good written product, and that they would be able to manage the technical aspects of using Internet sources. In addition, this project was conceived of as an initial exploration of the process of writing arguments from online sources. This kind of research strategy, in which relatively skilled participants have been studied first, has been used previously by researchers such as Hayes and Flower (1980). Later research on writing from the Internet could examine the effectiveness of various strategies and processes, and even later research could attempt to teach effective strategies to students who struggle with the process.

The writers in this study were intended to be very good writers, but writers who were nonetheless high-school students, completing a high-school-type writing task.

Selecting these students (as opposed to professional writers, for example) was intended to provide a picture of strong writing *at the high-school level*, in order to later provide guidance for other students at the high-school level.

Nine students were recruited for participation in the project. This number was intended to be sufficiently small to allow for in-depth analysis of several writing sessions within given time constraints, and sufficiently large to allow several strategies to emerge (as in Coiro & Dobler, 2007). Participants provided demographic data in a follow-up questionnaire, sent by email. Note that the descriptions below contain the terminology that participants used to describe themselves.

Mark was a 17-year-old Caucasian male, whose first language was English. In the year the data were collected, he was enrolled in the ENG4U1: University Preparation English course.

Kieley was an 18-year-old Caucasian female, whose first language was English. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course.

Sarah was a 17-year-old Caucasian female, whose first language was English. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course.

Kristen was a 17-year-old Caucasian female, of Irish descent, whose first language was English. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course.

Joy was an 18-year-old Caucasian female, whose first language was English. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course and the EWC4U1: The Writer's Craft course.

Aisha was a 17-year-old Caucasian female, of Egyptian descent, whose first language was Arabic. Aisha indicated that though her first language and the language of her home was Arabic, she had been enrolled in English schools in Saudi Arabia since Kindergarten and until Grade 10, at which time she moved to Canada. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course and the EWC4U1: The Writer's Craft course.

Rebecca was a 17-year-old Caucasian female, whose first language was English. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course and the EWC4U1: The Writer's Craft course.

Ishaan was a male participant in the project; he did not provide demographic data.

Abbey was an 18-year-old Caucasian female, whose first language was English. In the year the data were collected, she was enrolled in the ENG4U1: University Preparation English course.

Materials

Students completed the writing-from-sources task on a Toshiba Satellite laptop computer. The laptop contained the necessary software and many students are familiar with them. Microsoft Word (Microsoft Corporation, 2007) was used to present sources to students (as hyperlinks) and was used for students to take notes and write their texts. Pencils, pens, lined paper, and a printer were also available.

Students were provided with a set of online resources about the testing of cosmetic products on animals (Appendix C). They were free to use these sources or to search online for their own. There were 23 documents in the provided set. The sources were searched for using the search string “cosmetic testing on animal*” in Google’s Web and Images fields. Some sources were returned directly by these searches, and some were found by following links within those returned directly. The sources were selected by the researcher, in order to maintain the “flavour” of the returned sources as a group, while ensuring that the sources varied in their form (e.g., textual, images, video), content, perspective on the issue, authorship (e.g., organizations, government sites, private citizens, companies), length, and readability. Top returns and popular and well-known sites (e.g., Wikipedia) were also included.

While students completed the writing activity, a microphone headset fed audio data in the form of think-aloud protocols to the computer. The computer’s webcam fed video data of students’ faces to the computer. The audio and video data, as well as students’ computer screens, were recorded using the software package Camtasia Studio 6.0 (Techsmith Corporation, 2009). This software creates a file that replays the recorded computer screen in the main window, with the webcam recording and accompanying audio recording of the student in a smaller floating window.

Procedure

Each student participant completed the writing-from-sources activity independently. Each student was allowed three sessions of approximately an hour each to complete the activity. The interview took place after the activity was complete, typically

at the end of the third session. These sessions took place during spare periods, lunch, or before or after school, in a quiet room in the school. I was present throughout each student's activity, in order to prompt the thinking aloud.

In the first session, the student was reminded that he or she would be asked to “think aloud” while completing the writing activity. For the purpose of practice thinking aloud, the student was asked to determine which wide-scale literacy tests (like EQAO) are administered in Nova Scotia. Students were given the following instructions: “While you are doing this, please ‘tell me what you are thinking and what you are doing’” (think-aloud instructions from Coiro & Dobler, 2007, p. 225). If, once a student had completed this activity, he or she appeared still to be uncomfortable thinking aloud, he or she was asked to think aloud while determining the March Break dates for the school board for the following year.

Once the student completed the practice activity, he or she was given the following instructions:

Please write an argument essay—also known as a persuasive essay—about what Canada's policy on cosmetic testing on animals should be. Imagine that you are writing this to a government official, such as your local member of parliament (MP). This is a highly controversial topic, and individuals and groups have different opinions about what should be done. You have been provided with several online sources about the topic. You may use these sources,

or you may search online for your own sources. Please write your essay in Microsoft Word. It should be one to two pages, single-spaced. You should provide a list of the websites that you consulted at the end of your paper, and may want to cite these throughout the paper as well.

Throughout the activity, please ‘tell me what you are thinking and what you are doing’ (Coiro & Dobler, 2007, p. 225). If you are reading, or writing, you may do so silently. But try to speak throughout any other activity or if you pause during your reading or writing. Your task is not to explain to me what you are doing, but rather to reveal what is going through your mind. Again, the task is to write an argument essay about what Canada’s policy on cosmetic testing on animals should be.

The student was provided with a hard copy of the instructions, an electronic list of Web sources, a laptop, pens, pencils, lined paper, and a printer. Recording began following the instructions and continued throughout the session. If a student’s thinking aloud waned, I reminded him or her to continue.

In the second and third sessions, the student continued the task as before. Once the student had completed the writing task, the interview began. I asked questions about the writing process and strategies. The questions were:

- What was your goal in this writing? What were you trying to achieve?
- Can you tell me how you completed the assignment? For example, what did you do before you began writing your essay? And what about during? And what about after?
- Did you have an overall strategy (could sub in “approach” or “plan”) for writing your essay that you could tell me about?
- How did you decide which information to include? How did you make connections between ideas in different sources? How did you decide how to structure or organize your essay?
- How did you decide when you were finished? Did you plan how to use your time? Can you explain that?
- Have you ever had any instruction on writing from the Internet? If so, what were you taught and by whom?
- How would your approach change, if it would, if you were researching this topic for personal interest as opposed to a school task?
- Was there any difference between what you did here and what you normally do when researching and writing?
- How did you decide your position on the topic?
- Did you have any emotional reaction to the topic?
- Is there anything else you would like to tell me that relates to this activity?

Once all student data had been collected, I interviewed Paul, the English Department Head. This was an informal interview, intended to reveal his and the department's

approach to teaching writing. For example, he was asked what genres had been taught, what typical assessments consisted of, what types of source-based writing students completed, and so on.

Data Analysis

For the purpose of analysis, each recording set (audio, screen, video) was considered as one source of data. For example, one segment might consist of a student thinking aloud that he or she was going to look for Canada's policy (audio recording), the student going to www.google.com (screen recording), and the student focusing on the screen and waiting for the source to load (video recording). The written notes and texts were considered alongside the recorded data. The interview data were considered as supplementary, and was used to clarify and support the primary recorded and written data.

Data analysis consisted of five primary steps. First, I reviewed all of the data collected in the study. This was intended to provide a sense of the data and the processes, strategies, and operations used by students. I transcribed some data, and took some notes, regarding common patterns and themes and points of interest (as in Coiro & Dobler, 2007).

Second, I wrote extensive narrative summaries of each participant's process. These summaries provided a more manageable overview of each participant's data, compared to the three-hour recorded data. Because the narratives are descriptive in nature, they allowed for a demonstration of participants' processes and strategies as highly dynamic, embedded, and complex.

The third and fourth steps were intended to confirm the reliability and accurateness of the narrative summaries, and to reduce subjectivity. I developed a hierarchical list of codes that addressed all aspects of the writing process; these were based on the narrative summaries and previous research. Because of the amount of data, the recordings were segmented into five-minute units. For each unit, I used the codes to indicate whether a goal, strategy, or operation, was present.

The codes are presented in full in Appendix D. In total, there were 5 high-level activities / goals, 16 midlevel strategies, and 67 lower level operations / characteristics of the strategies. The uppermost code was an activity in which participants would engage for an extended period of time. They correspond roughly (especially in terms of the level of analysis) to the major operations in the Hayes and Flower (1980) model or the highest level in Segev-Miller's (2007) taxonomy. Each of these activities had an associated high-level goal, often articulated at the beginning of the activity or not articulated at all. In their interviews, participants would often discuss their overall process in terms of these activities (e.g., first I did activity X, then I did activity Y). The activities and corresponding goals were Self-Regulation: to understand and complete the task; Research: to gather information and generate content for the essay; Organize: to organize the essay; Draft: to draft the essay; and Review: to evaluate and possibly change the essay in order to improve it. See Appendix D for more complete descriptions and examples.

The midlevel code was the participant's strategy. Recall that strategy was defined as a cognitive or behavioural action, used to achieve a goal. Each of the high-level goals had at least one accompanying strategy and often several. For example, recall that the

goal of the researching activity was to gather information and generate content for the essay. Strategies serving the research goal included retrieve websites, read / view websites, take notes, and so on. Please see Appendix D for a complete list of participants' strategies, as well as more complete descriptions and examples.

The lowest level code was the operation or characteristic of the strategy. It was a single observable action (e.g., retrieve websites provided) or something distinct about the strategy (e.g., take *hard-copy* notes). With the exception of rereading (which was used to draft and to review), each operation was used to serve only one goal. Thus, the data were only coded at the level of the operation; this automatically indicated which of the higher order strategies or goals were present. Please see Appendix D for a complete list of participants' operations, as well as more complete descriptions and examples.

The fourth step was to assess interrater reliability. A second coder, a doctoral student familiar with education and writing research, coded approximately 30 percent of the data. Data to be coded were selected in such a way as to draw from all participants and cover as many instances of each operation as possible. The coder coded the data independently, apart from the primary researcher, and with the primary researcher's codes masked. We then met so that she could provide me with her coding analysis.

Information on interrater reliability is presented in the Results chapter.

Fifth, and finally, I wrote a new, more succinct, narrative summary of each participant's process. Recall that the goal of this study was to investigate each student's overall process and the strategies and operations used within that process. The coding scheme fulfilled this goal in that it gave a multilayered picture of what writers were

doing. The narrative summaries are intended to provide the reader with an overview of these processes, strategies, and operations. In the Results chapter, the summaries are organized according to students who used similar processes. Following each summary is an overview of the participant's interview.

Results

Overview

This results chapter begins with an overview of interrater reliability, as assessed using the coding scheme. Following the reliability is a presentation of participants' processes and strategies. The nine participants are grouped according to similarities in overall process; there were three overall processes used. For each process, I begin with a description of the process and what is unique about it. Narrative summaries for each participant who used that process are presented; the summaries highlight the strategies used by each participant, by including selected quotations and examples of searching, notes written, websites consulted, and so on. The summaries use the language of the codes (e.g., reading refers to reading a textual source, viewing refers to viewing a visual source), so the reader is encouraged to consult the codes as necessary. Please note that all quotes are verbatim, including grammatical and spelling errors. Finally, for each participant, there is also a summary of the interview, which took place after the writing process was complete.

Interrater Reliability

To calculate interrater reliability, we collapsed operations within strategies, and calculated at the level of the strategy (see Table 1). To calculate the percentage, the primary researcher's codes were used as the denominator, and the number of time samples in which the second coder assigned the same category was the numerator.

Given the large number of codes and the complexity of the data, the interrater reliability is sufficient. In the two instances where it is low, there were several participants for whom the second coder did not code the strategy at all.

Table 1

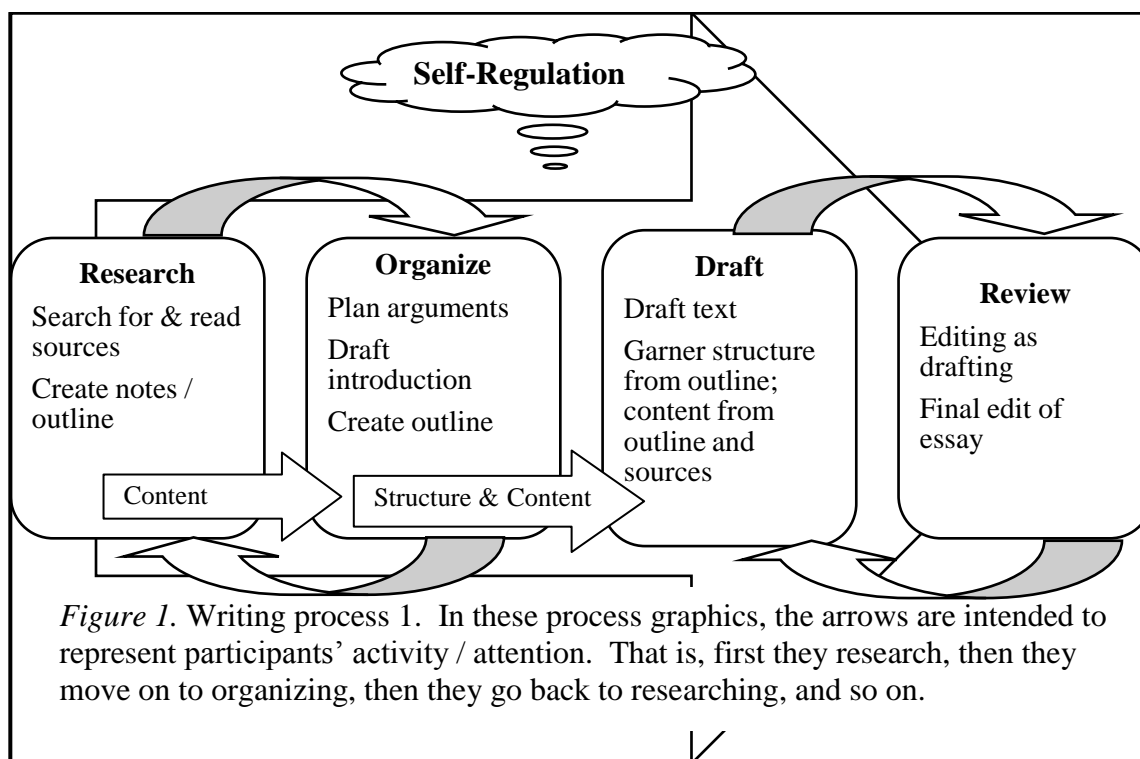
Interrater Reliability

Strategy	Raw Count	Percentage of Agreement
Self-regulation	112/150	75%
Set research goals	36/45	80%
Retrieve websites	43/51	84%
Read/View websites	76/99	77%
Deliberate on content	28/47	60%
Evaluate websites	20/29	69%
Take notes—medium	19/21	90%
Take notes—source	21/22	95%
Take notes—organization	20/27	74%
Plan structure	29/45	64%
Outline	10/22	45%
Draft sentences	78/81	96%
Garner content	86/122	71%
Garner structure	8/26	31%
Use electronic drafting functions	25/35	71%
Reread text	9/10	90%
Review text	56/64	88%

Participants' Processes and Strategies

There were three overall processes that participants used. In the first process, writers alternated between researching online and structuring content into an outline, and then drafted a text. In the second process, writers researched online, writing notes and a separate outline, and then drafted a text, drawing on both documents. In the third process, writers embedded the majority of their researching within drafting.

Process 1. The most distinct aspect of Process 1 is that participants moved in a largely linear sequence through phases, with recursion limited to adjacent phases. Mark and Ishaan each began with researching. Each began taking notes while researching; these notes quickly resembled outlines, in that they were hierarchical and predicted the structure of the essay almost exactly. This was their organizing. Note then that there was recursion between the researching and organizing phases. Each then began drafting from the outline, drawing content and structure from it. Ishaan sometimes also consulted sources while writing; Mark did so only very occasionally. Both participants reviewed during drafting. They also reviewed at the end of the writing process. Thus, there was some recursion between these phases. A graphic representation of this process is presented in Figure 1. The narrative summaries for Mark and Ishaan follow.



Mark's writing.

Session 1. Mark began by scrolling through the list of sources: “I just want to see which ones are already here . . . so they look pretty varied overall.” He spent the first half of his first session researching; his goals were to get an overview of the topic, to determine Canada’s current policy on cosmetics testing on animals, and to determine his own position. He retrieved provided sources as well as sources returned by searches with specific search terms on a public library database and on Google (e.g., “canada animal test policy”). He consulted Wikipedia because it has a “pretty good overview, even if it’s not all correct.” He spent the majority of his time reading and skim-reading textual sources; he viewed only two images. While reading, he made frequent use of internal searches, tables of content, and internal and external links. He made intertextual

connections (e.g., noting what was common across sources), and frequently evaluated and either selected or rejected sources (see criteria listed in following paragraph). Throughout this phase, Mark continually planned elements of the process; for example, where he would look next for information. He also checked the assignment; for example, he asked about the format of the essay.

Several minutes into researching, Mark evaluated his own understanding of the topic and planned his process. At this point his think-aloud included this statement: “So I think I have a pretty good overview of what it’s like in Canada right now. So let’s see if any of these have more specific views, or any sort of arguments to back them up and see which way seems more sort of logical.” Mark then continued researching, with the goal of reading additional sources and selecting a few main sources from which to write. He selected them based on: neutrality, balanced perspective, citations by and to other sources, relevance, authorship (positively evaluating sources written by associations, as opposed to blogs), content, geography (preferring sources with content relevant to Canada), and inclusion of science. He rejected sources based on irrelevance, bias, age, and mode (cartoons and pictures). He continued to use internal searches, retrieve pages within the site, and make intertextual connections.

During researching, Mark made metacognitive statements, for example, about being unsure about his position on the topic. He also continued to plan his process; for example, he planned what sources he would consult next or how many more sources he wanted to consult before starting his outline. He once planned essay content while reading a source: “It’s banned in the UK, so that’s something that could be applied to

Canada.” Mark also responded to source content, for example, by orally summarizing the major topics of a source as he skim-read it.

About halfway through this session, Mark began organizing his ideas; he was “going to make up sort of, some general points, of what I want to accomplish or get through in the essay (glances at sources). I’m just trying to decide on a general, sort of thesis or view for which side. I’m obviously not for it, but I’m not sure, to the extent.” As Mark said this, he scanned his sources. He decided that his position would be against animal testing. He set the goal of determining Canada’s current policy, searched for additional websites, and read. After reading a few sources, Mark evaluated the process, noting that he repeatedly obtained similar results when he searched. Thus, Mark planned to begin writing and then wrote a thesis-type statement.

Mark then planned, as he said, to go “back to sources that I had, and get some major points that I can use.” He repeatedly read and skim-read sources and then wrote information into the outline; he planned arguments as he read the sources. He read about product labeling in one source and wrote “not allowing for information to consumers about the testing on ingredients vs. products” as a main point in his outline. He wanted to include the European Union ban as a point, but could not find a good source. He noted that one source had listed testing alternatives. He read it, and added “many alternatives are available” as a main point. He continued reading, noting that many of the sources talked about the effects on animals as a reason to move to alternatives. He added “the negative effects on animals” as the first point.

Mark then continued reading his main sources. He added subpoints under the main points in his outline, based on the source information. A distinctive feature of Mark's research strategy was that he had not created separate research notes, but instead alternated between structuring (by organizing the outline) and generating information (by reading sources).

Mark began drafting his introduction at about 50 minutes. He drafted in the same document as his outline, but on a separate page. He referred to his outline to write; he wrote electronically and in sequence; that is, he wrote the text in the order it appears in the final draft. As he wrote, he reread his text and thought through the wording of the text carefully (before and after writing the text). He also used the word-processing functions to make edits, for example, spelling changes. While drafting, he made metacognitive statements like: "My head's just sort of stuck on a point . . . might just come to me next time I read it."

Mark then continued researching and taking notes / outlining from the sources; no writing took place at this time. He skim-read through his main sources "to see if there's anything else from these that sticks out" and conducted additional searches to supplement information that was unclear in the sources or on which he felt he needed more information (e.g., "in vitro animal testing"). He continued researching and added information from sources into his outline, out of the order in which it was read. For example, he said, "And in organization, this would come first." Mark also planned his process; for example, what he would look for next or the fact that he would "leave the points for tomorrow." He made another major revision to his outline: "So it seems like I

have two parts to this . . . the reasons why we should change it, and then . . . the stuff that should be changed about it”; he moved what had been the third main point so that it was now the second main point, to reflect that structure.

Session 2. At the beginning of his second session, Mark printed his four main sources. He planned and evaluated the process as he wrote. For example, he said, “I’m just going to go through and add any factual stuff that I can to these [notes]. And then later on it’s just really easy for me to turn it into sentences from there.” He then cycled through reading and skim-reading the sources and adding more detailed information from each source to the electronic outline. This information was added in as subpoints and supporting facts for the three main argument points outlined earlier.

Mark’s outline was organized hierarchically and by topic; its structure foreshadowed that of the essay. All text in the outline he wrote was content; recall, though, that he orally labeled the content with rhetorical headings (e.g., arguments, points), and the tone and implication of the headings was also rhetorical (e.g., “Not allowing for information to consumers . . .”). The headings were also somewhat abstract, in that they indicated the overall point of the paragraph; for example, “Many alternatives are available.” Mark occasionally returned to the Internet to clarify or supplement information in the main sources; for example, “animal testing in vitro alternatives.” At one point, he read Wikipedia for an overview. He noted that he was going to see if the information was consistent with what he had read already.

As Mark researched and filled in the outline, he planned the process. Typically, he planned his immediate next step, for example, what sources he was going to print or what

he was going to look up in the sources. He also responded to source content, for example, by summarizing what he knew about the Leaping Bunny program, based on what he had read. He also sometimes noted what information was covered in a source, and what information he would have to get from other sources. Finally, he once commented that he would have to combine information from a source in order to make a point “ ’cause they don’t make one themselves.” Mark very occasionally checked the assignment, for example, by rereading the instructions.

Approximately halfway through the second session, Mark evaluated and planned his writing process: “I think for this paper, I probably have enough about everything that I can put something together. And I’ll start to turn the points I have into more of an actual, into paragraphs.” Mark printed his outline, read it, and then said, “So, I’m thinking that I have three major points past the intro. So that’ll be enough for major arguments. And then I have enough little subpoints and proofs to make up the rest of it. I’m going to get started; I think I ordered them well yesterday.” His outline is presented in Figure 2.

- The negative effects on animals
 - Problems with irritancy tests
 - The “Draize Test” is used to measure the harmfulness of ingredients of products
 - The product is dripped into the eye of the rabbit for a period of 3 – 20 days and since rabbits do not have tear ducts, any reaction is very pronounced
 - During this time the animals are kept in confines to prevent any scratching at the affected eye
 - Problems with toxicity tests
 - Animals are force fed, injected or forced to inhale toxic substances to monitor the amount of a substance to kill a specific number of cells
 - Then the info is used to create computer models
- Many alternatives are available
 - Computer simulations
 - If the results of a test such as a toxicity test have already been determined the results should be used in computer simulations instead of repeating the tests over and over
 - Cell cultures
 - An example of a human skin culture is a NHEK system which created from the human epidermis that is used on human volunteers, and is then monitored over 24-48 hours
 - In-vitro tests
 - Use of cultures of cells in Petri dishes that contain human embryos
 - Possibly ones that are more representative of a human population
 - Rabbits for example are kept in conditions that induce psychological stress that can stimulate physiological changes in the rabbits, possibly altering the outcome of the research
 - The Draize test is an example of one that is not representative of humans because of the rabbit’s thinner cornea and therefore increased sensitivity
- Not allowing for information to consumers about the testing on ingredients vs. Products – (Leaping bunny logo/organization)
 - Products may be designated as “cruelty free” or not tested on animals
 - Only refers to finished product
 - Frequently, other companies are employed to test individual ingredients which compose the final product
 - Consumers have no knowledge of this, and should be alerted in some way so that they can make the best decision
 - Already, the Coalition for Consumer Information on Cosmetics has their “Leaping Bunny” logo that is only administered to products that have been guaranteed to have all of its ingredients and therefore the final product free of animal testing

Figure 2. Mark’s outline.

Mark continued drafting his introduction and then began his first body paragraph, about the negative effects on animals. He later drafted his second body paragraph, about alternatives. He drafted his essay electronically and in the sequence it appears in the final text by reading the outline, drafting a few sentences, and repeating. Both the structure and content came from the outline. He once left information from the outline out (about in vitro testing) as he felt he did not have enough information about it. Once, he went “back to one of the sources that I had . . . something about organ damage . . . just want to make sure I get it right.” As he wrote, he continually thought through wording and/or reflected on the text, made minor edits, and used the word-processing functions. He made a few midlevel revisions. Specifically, he altered the wording of sentences that

affected local meaning but not the meaning of the essay. For example, he changed “it is not acceptable to subject animals to” to “it should not acceptable for companies in Canada to subject animals to”. He also added a sentence to the introduction which more closely foreshadowed the topic of the first body paragraph. Mark occasionally planned the structure of the essay while writing. For example, he decided to include a bit of information that was tangential, and planned to connect back to it later in the paper. He also evaluated and planned the process. For example, he noted that he had to read back through the essay and make all the points flow together; later, he planned to go back to a source and confirm a fact about which he was writing.

Session 3. At the beginning of his third session, Mark reread his draft and then looked at his outline “to look at what I had planned out for the last paragraph.” Mark then drafted his third body paragraph and then his conclusion. The structure and content came from the outline and he wrote the text in the sequence in which it appears in the final draft. Throughout his drafting, Mark planned his immediate next steps; for example, he planned: “I’ll just read it over.” After drafting the third body paragraph, Mark then planned his conclusion: “Now I’m just going to make sure I covered everything that I wanted to and see if I can roll all of the major ideas into a little concluding sentence or paragraph.” He reread his existing draft and read over his outline. He wrote the conclusion, and indicated he was finished when he had covered all the points he wanted to.

Twenty minutes into his third session, Mark planned: “K. So I’m just going to start from the beginning again and look over more for, uh, a bit of grammar and make

sure everything sort of makes sense and it's not too wordy or anything 'cause I think I've checked it for ideas enough times." For five minutes, he reread the existing draft and made minor and midlevel revisions. For example, Mark deleted words that he felt were repetitive. He noted that he had fixed up as much as he could at that point. Mark's total writing time was 146 minutes. Mark's essay is presented in Appendix E.

Mark's interview. When asked how he formed his position, Mark responded that it was mostly "previous experience with it, or previous exposure." It was "just his moral view that hurting animals was bad." He noted that because so little was done by Canada already, it also made sense to go that route. During writing, however, it appeared that Mark formed his opinion based on information in sources, not on an existing opinion. In terms of his emotional reaction to the topic, he said, "some of the pictures are graphic . . . and the ideas."

Mark indicated that his goal in writing was "what the outline said, trying to get some sort of persuasive argument about like what Canada should do in terms of animal testing." Mark indicated that his overall strategy was to "get the main idea of what's already happening, and then see, like what else, there, like the other possibilities, what they are." He used the example of "piggybacking" on the European Union ban, but noted he did not find a lot of concise resources on this topic. When asked how he selects, organizes, and connects information, Mark noted that in his writing he selects on the basis of the source first. He tries to select legitimate sources, for example, government websites or sources that he finds through a database, as opposed to websites put out by corporations. He selects content that is directly related to the topic. When probed about

organization and connection, Mark again noted that he chooses major points according to content that is common across sources, and then goes back through individual sources to select subpoints and proofs.

In terms of his process, Mark noted that he begins by “trying to get an overview of the topic.” He then reads through different sources, and sees what content items are common to all of them. He turns those into the major arguments of his essay. He then rereads the sources to get subpoints. In this paper, he notes that the subpoints did not overlap much. He uses the individual sources as “proofs”. Mark notes that once he has “that sort of mapped out, it’s really easy just to turn all that stuff into like a paragraph-form sentences.” Mark divided his time by session, planning to have a general idea of what he would write by the end of the first session, so that he could “keep it [the writing] flowing.” He knew he was done when he had exhausted the content from his outline. This in turn reflected exhausting the chosen sources. He also made reference to expected length, based on the outline, and to trying to stay within the time constraints. He might have done more reviewing for grammar, he noted.

Mark was asked about differences between this and other assignments. If he were researching this topic for personal interest, Mark would “look more at the biased web sites” because he wouldn’t have to state why he had formed his opinion. He would not worry as much about the details, and the extent of his research would depend on his interest. Compared to other school assignments, Mark said the process was essentially the same, but was condensed into less time. He did note some differences: he usually has an electronic dictionary / thesaurus open; has citations beside his notes; sometimes

highlights hard copies of sources; and edits his essay in hard copy, because editing “in black and white, just like a page, page after page, it’s a little bit harder.” Mark also indicated that students sometimes have a teacher’s ideas to begin with. He indicated that more and more, his school projects are new, compared to what’s been covered in class. He noted the recency of Internet sources, compared to books, which means the content is new. He noted that as he progresses in school, he is more responsible for selecting his own sources.

Mark said that he had not had previous instruction on writing from the Internet, although it is assumed that most information will be Internet-based. He said that students receive “more information of how to pick a better source, or how to identify what’s biased or not, and what not to use, as opposed to what to actually do with it.” Mark indicated that this information comes predominantly from Science and English teachers. Through a special program, Mark took an online university course with a considerable writing component. He was told which topics to cover, but was responsible for selecting his sources.

Ishaan’s writing.

Session 1. Ishaan began by trying to get an overview of the topic. He read Wikipedia and responded to the content: “Ok, so, uh, that kind of provided an overview of the whole topic. And immediately I think that it’s, that it should be banned. Because other places have already banned it, and they’re getting along fine.” He read a few of the other provided sources. Ishaan then began an electronic outline. He wrote a thesis statement and three bulleted points in a Word document: “Okay, so to start off, I think I’ll

just start off by writing a brief summary of, like, some of the points why I think it should be banned. Okay, so I'll just start off with saying my opinion on this issue." He wrote four "reasons why it's bad": Many products have already been tested; other places have banned testing; animals are harmed and killed; and reactions depend on the species. He also wrote a section on what solutions are available. He noted that most products have already been tested. Shortly after, he added a section on loopholes and problems.

Ishaan noted that he was looking for more to write about. He continued to read provided sources. He also searched for sources on Google, for example, "cosmetic testing on animals." He added information to his outline. Ishaan returned to Wikipedia to look for "other reasons" (to ban testing) and to read more about the topic. He added material from the sources, subordinate to his existing main points. Ishaan typed his notes himself; he once copied and pasted to them. The notes were organized by rhetorical category and by topic, for example, "reasons why it's bad." He noted that they were a "plan of what to do." As he read, Ishaan sometimes responded to content, typically in terms of paraphrasing, or how he felt about what he read. He once made an intertextual connection, in terms of the sources being generally not helpful. He evaluated sources according to relevance to his topic and conciseness. During his researching, Ishaan planned his immediate next steps, for example, that he would research or that he would consult a particular source.

Approximately 20 minutes into the session, Ishaan evaluated and planned his process: "Ok, so, right now, I kind of have a bit of information. So I think I'll just start writing the essay and then if I need more information, I'll just start doing that." He

drafted his text electronically, in a separate document, and in the sequence in which it appears in the final draft, beginning with the introduction. As he drafted the text, he occasionally thought through the wording. The introduction served as somewhat of an outline; after writing some of it, he commented that he now had “an outline.” The correspondence between the outline, introduction, and text, is neither exact nor perfectly clear, but reading through carefully, one can see that much of the content and sequence of the information does map from the notes to the essay.

After drafting most of the introduction, Ishaan returned to researching to find more information. He searched for sources using specific content search terms, for example, “cosmetic testing on animals in Canada.” He read these sources as well as provided sources. He added a considerable amount of information to his notes / outline; he added the information below the existing main points. Ishaan’s outline is presented in Figure 3. He then reread and drafted more of his introduction. During drafting, he planned his immediate next steps and sometimes evaluated the process he was using, in terms of what he had done or needed to do. He checked the assignment occasionally. For example, he asked if it should be like a letter and he reread the instructions.

I believe that animal testing should be banned.

Reasons why it is bad

- The tests have already been done for most chemicals and products being tested.
- Other places have already banned animal testing.
- Lots of animals are being harmed and killed in order to make the household products we use everyday.
- Depends on the species, so animal tested products may still be harmful.

What solutions are available

- Most existing materials and compounds in use have already been tested.
- Cosmetic products are not required to be tested on animals.
- Lots of companies have already stopped animal testing.
- Alternative processes are available to test product, e.g. using computer models and tissue cultures to test harmful effects.
- The general public should be made aware of what is going on, and this will cause them to change their opinions and buy products that are not tested on animals.

What are the problems/ loopholes

- The product may be labelled "not tested on animals" but the ingredients used may have been.

Canada needs to change

The current situation in Canada

- International Cooperation on Cosmetics Regulation (ICCR) on September 26-28, 2007, the ICCR recognized the importance of replacing, reducing, and refining (less pain and distress) animal testing.

Figure 3. Ishaan's outline.

Ishaan then had a period of apparent mental evaluating and planning:

Okay, so right now I've got kind of an introduction passage.

And I've talked about, like, uh, that it's still going on in Canada and it should be stopped. So I've already given my opinion on the topic. So right now, I'll think I'll just, to, uh, some supporting details, and more information about this.

So before I do that, I think I'll just go here [looks over outline], and, uh, I need a way to organize all the points I have here into a bunch of paragraphs to put here. So, that I know what I can write.

He continued to read through his outline. He thought: “Okay, so I have some information here, but I still want to get some more information.” He continued researching, to get information about the current policy in Canada.

Approximately 45 minutes into the session, Ishaan continued drafting his introduction. He drafted the text in the sequence that it appears in the final draft. He finished his introduction and began his first body paragraph. The paragraph was about the current state of animal testing in Canada. He garnered content from his outline. Ishaan very occasionally reread the existing draft. He reread a source perhaps once; he relied almost exclusively on the outline for content. He garnered structure from the outline and also planned the structure of the paragraphs as he read his notes and as he drafted. He edited his text as he wrote, often using the word-processing functions. As he drafted the first body paragraph, he planned his immediate next steps (e.g., to research, to write a section) and evaluated what he had completed.

Session 2. Ishaan began his second session by rereading his essay and evaluating what he had done thus far. Recall that he had written an introduction and first body paragraph. He then continued drafting his text electronically and in the sequence the text appears in the final draft. He wrote his second body paragraph, about the effects on animals, from approximately 5 to 25 minutes. He wrote his third body paragraph, about alternatives, from 25 to 50 minutes. He wrote his fourth body paragraph, about public concern and government regulation, from 50 to 60 minutes. He garnered content and structure from his outline. For example, he said, “‘K, so I’ll just go back to all the points I’ve made before, to find something else to write about.” At one point, he read through

his outline and bolded all the content that he had not yet included in his essay (see Figure 4). He also reread sources for content. Ishaan planned the essay structure while reading his research notes and sources, and while writing. He thought through his text while writing, especially while transitioning between paragraphs: “I’m trying to connect that back . . . I’m trying to think of a better word to use.”

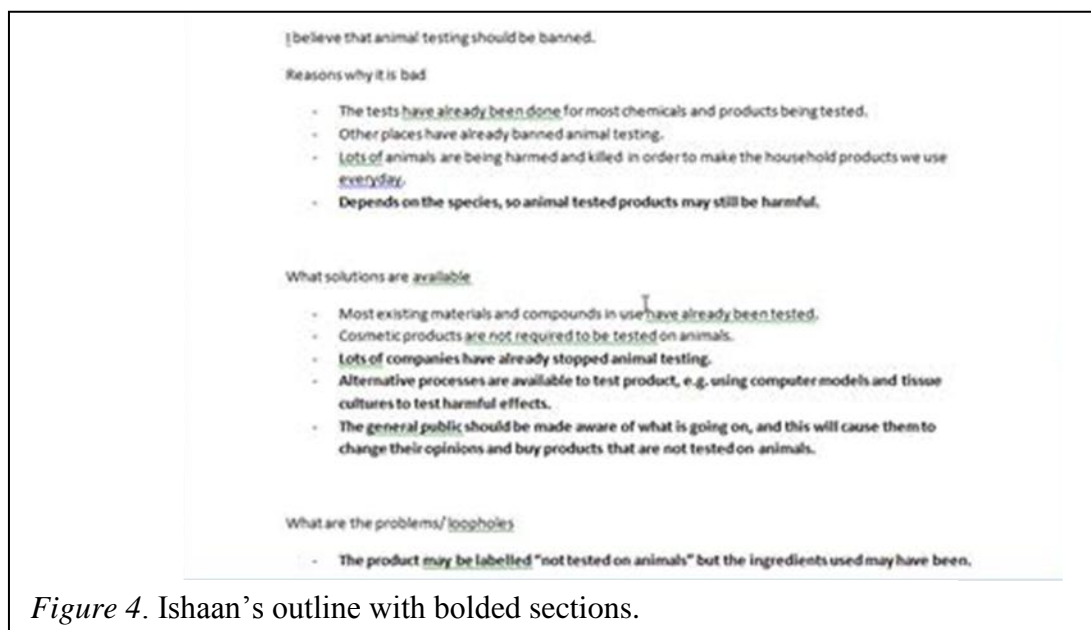


Figure 4. Ishaan’s outline with bolded sections.

Ishaan’s pattern was to write for a long time (often almost a whole paragraph), then read his outline or reread sources, and then write again for a long time. Ishaan was constantly wondering what else he had to say, particularly after each paragraph. He planned what went in the following paragraph after finishing each paragraph. He edited as he wrote, using word-processing functions. He occasionally made midlevel revisions, changing wording to alter the meaning of a sentence somewhat.

Throughout Ishaan’s drafting, he planned and evaluated the process in terms of his progress and what was left to do. For example, he evaluated and planned: “So looking at

all the stuff I have written down, it looks like I should make maybe two more paragraphs.” He made reference to the assignment: “Because it’s a persuasive essay, I’ll try to link it back to what should be done.” He very occasionally made a metacognitive statement, for example, that he had just remembered something he had wanted to look up.

Session 3. In the third session, Ishaan began by rereading the essay and summarizing the topic of each paragraph: “I have the introduction, then I have all the stuff about the current conditions, then I have, uh, like all the consequences, and I have, uh, alternatives .” He continued drafting electronically, finishing his fourth paragraph and then drafted and finished his conclusion. He thought through the text as he drafted, typically in terms of summarizing what he had just written. He edited, using the word-processing functions. He used www.thesaurus.com to look for an alternative to “harmlessness.” He evaluated his text in terms of what he had written thus far and planned his process in terms of what he had to write next.

In the last half hour, Ishaan evaluated and planned: “Okay, so I think that’s pretty much all I can do. So I think I’ll review the whole thing and see if there’s any changes or bad grammar and see if I can fix that. And I’ll see if I can fit that point [one remaining bolded point] somewhere else, ’cause it doesn’t fit that well in the conclusion.” He checked the assignment, in terms of whether his title was appropriate. Ishaan carefully reread his existing essay. He edited and made several midlevel revisions to it. These consisted of changes or additions to existing sentences. For example, he changed the sentence “Natural and pre-existing chemicals can be used instead of newer ones, hence guaranteeing the safety of animals everywhere” to “Natural and pre-existing chemicals

results can be used instead of newer *products*, hence guaranteeing the safety of animals everywhere *because there will no longer be a need to test products in the current way* [emphases added].” Ishaan evaluated the process in these last stages; he had “pretty much used all my points already, so yeah, I think I’m done.” His total writing time was 158 minutes. Ishaan’s essay is presented in Appendix E.

Ishaan’s interview. Ishaan noted that forming a position is usually the first thing you do when writing a persuasive piece. He read a couple of sources to see if animal testing was a good idea or not; “It seemed like it was wrong, so I just decided on, I’d write about banning it.” Ishaan had some emotional reaction to the topic; “There were some pictures that when you click on them, look pretty bad.”

Ishaan’s goal was “to learn more about the topic and write a good essay.” He said that he did not really have an overall strategy. He wanted to research, then write his essay, and then correct his essay. Ishaan selected good sources and the most significant points. He wanted to include points that added to the essay and gave a good impression. He asked for clarification about the term *connecting*. He reported that he connected by looking for the same point being repeated in different sources, and took this as an indication that the point was important. He organized his essay into an introduction, several points, what should be done, and a conclusion.

Ishaan’s process was to begin by finding some good sources and doing some research. He found the major points and organized them “in a certain pattern.” The order was not the same as the essay, but similar points were put together. This was done so that he could take points from there and put them in the essay. He wrote by referring to the

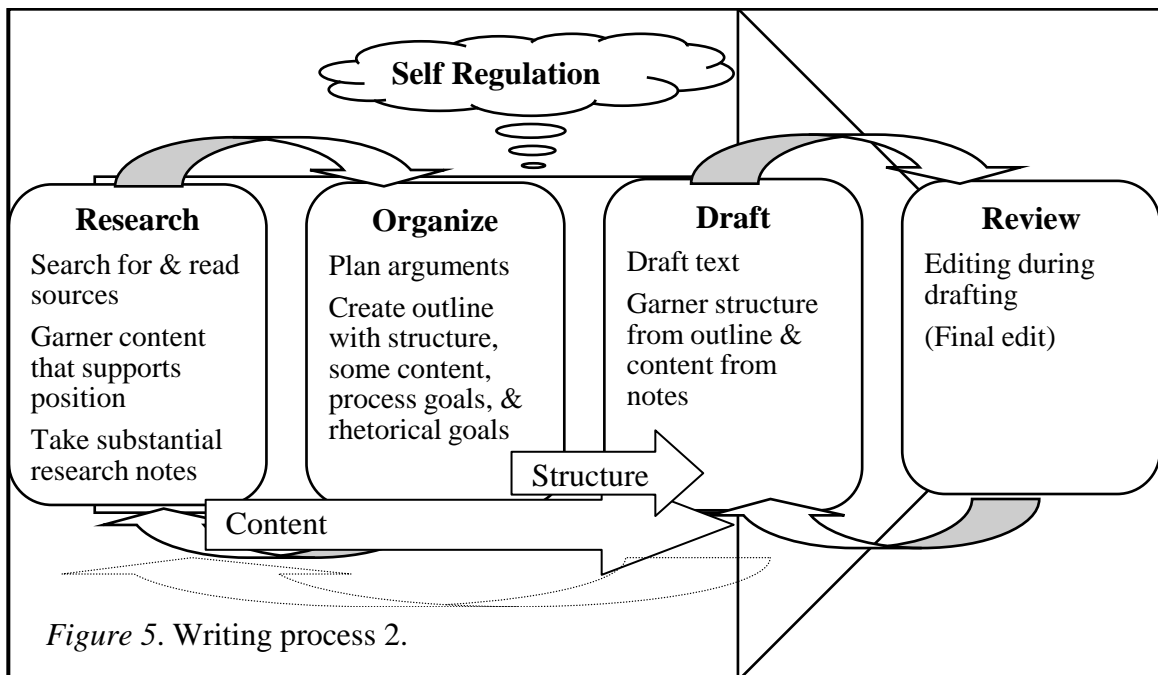
notes and other new sources. Then he reviewed and corrected the essay. He knew that he only had three hours, so he planned accordingly. He included all the important points, but not details. He had a general idea of the length of the essay, which he took into account in his planning.

If Ishaan were researching this for personal interest, he would just look at one source or something like Wikipedia “because it would be accurate enough.” He would not take notes or organize the information because “you would remember the most important points anyway.” There was no real difference between this and his usual approach to school assignments. He sometimes takes notes electronically, but often takes them in hard copy.

In terms of instruction, Ishaan has been taught about gathering resources. He’s been taught to use good, reputable sources, and use a variety of sources; if something is repeated in many sources, it’s probably true. He’s been taught not to use Wikipedia “and sources like that.” This instruction came from teachers, in most subjects.

Process 2. The most distinctive aspect of Process 2 is that participants created both a set of notes and an outline. They then based the content of their text on the notes and the structure of their texts on the outline. Joy and Abbey began by *researching*, to support an existing opinion. They took notes almost immediately, which were organized by source and/or by topic. Joy took hard-copy notes and Abbey took electronic notes. They then *organized* by creating a separate, and very brief, outline, which indicated the structure of the essay, process goals, and rhetorical goals. The participants then *drafted*, garnering global structure from the outline and content from the notes. That is, the

participants would look to the outline to see the topic of a paragraph, and then look to the notes for information about that topic. Joy and Abbey *reviewed* throughout drafting; in particular, they made low- and midlevel revisions, and occasionally a high-level revision. Joy did a final *review*; Abbey did not. A graphic representation of this process is presented in Figure 5. Narrative summaries for Joy and Abbey follow.



Joy's writing.

Session 1. Joy began with an antitesting position. She started by searching for Canada's current policy. She searched on Google "canadas policy on cosmetic testing on animals." Joy began taking electronic notes immediately. Joy then wanted a source that would give her an overall general understanding of animal testing in Canada. She commented that: "I like Wikipedia to give me a good understanding of the topic, and then I look for websites that are more legitimate." Joy read Wikipedia and immediately began

noting ideas that she wanted to look into further, for example, the European Union ban and alternatives to animal testing.

Joy continued researching to support her opinion and to investigate the ideas that were of interest to her (e.g., the EU ban, alternatives). She read and skim-read provided sources as well as a few sources returned by searches. As Joy researched, she wrote electronic and hard-copy notes. These were sometimes written and sometimes copied. They were organized by source and sometimes by topic. Joy's notes also sometimes contained notes to herself (e.g., "are animals adequate subjects for human products to be tested on?") and items that she noted she wanted to look up (e.g., "Canadian Council of Animal Care"). These imply process planning, in that she wanted to do further research on these issues.

As Joy read sources, she responded to source content and constantly planned how to use it in her arguments. For example, when reading about alternatives to animal testing she thought: "Those are good arguments for the theory that animal testing's not necessary." At another point, she read a Department of Justice site that outlined laws on animal cruelty. She then thought: "Under cruelty to animals, causing unnecessary suffering, I guess you could argue it's unnecessary suffering if there's alternatives to cosmetic testing, which would mean that anyone who did so was guilty under the law." Often, she would then do more research along that line of argument (i.e., alternatives, cruelty), by using those words as search terms or by looking for related content in open sources. As she researched, Joy retrieved pages within the same site and conducted internal searches. Joy once made an intertextual connection, noting that she had read a lot

(across sources) about a particular topic. Joy sometimes evaluated and selected or rejected sources, based primarily on relevance to the topic. She also rejected a source because it was written in French. Joy also consulted sources, for example, a blog, which she knew could be unreliable but which she felt could nonetheless provide interesting information.

Throughout researching, Joy consistently planned and evaluated the process and made metacognitive comments. Often, her planning was for immediate as well as later steps in the process; for example, that she would edit her notes later or that she would consult a particular site, but she would do so later, after she had addressed the topic which was her current focus. Joy's metacognitive comments had to do with her typical approaches to the assignment (e.g., "I usually like to . . ."); the impact of a strategy (e.g., "These [notes] are good for me just to remember important points"); and her understanding (e.g., "So far, I'm pretty comfortable with the information").

Close to the end of the first session, Joy organized her main ideas; "So, I think I have a good enough understanding to say that, for right now my main argument would be that . . ." She wrote brief statements at the top of her notes pages that outlined her main arguments. These arguments were that improvements could be made to our current policies and that animal testing is not necessary. Shortly thereafter, she read a source outlining Health Canada's position on product safety. Joy indicated that she was getting a better understanding and that perhaps animal testing is sometimes necessary. She thought through the ethical issues of the importance of human safety. She revised her main arguments on the back of the notes page; her main "argument" (claim) was now that

animal testing should be minimized whenever possible. A screen shot of Joy's electronic notes and hard-copy notes are presented in Figures 6 and 7, respectively.

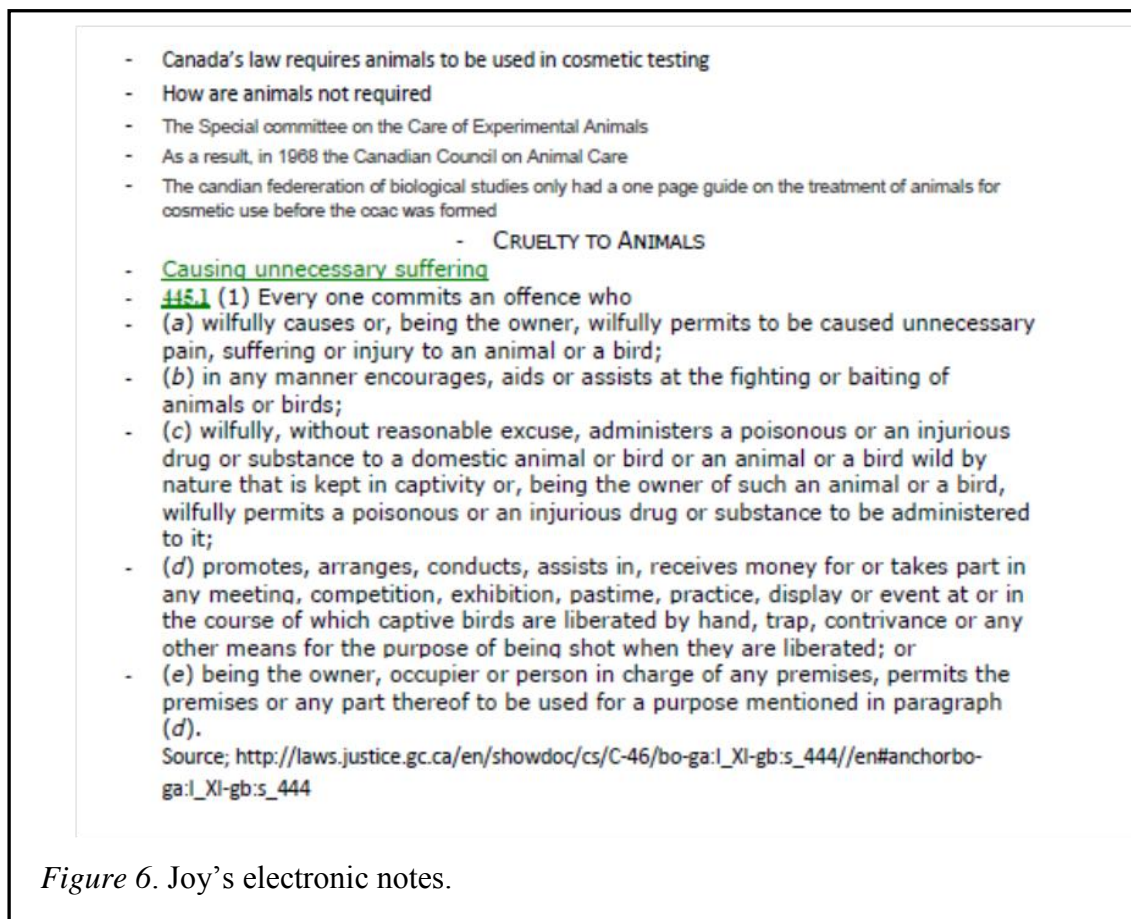


Figure 6. Joy's electronic notes.

P5

MAIN ARGUMENT: The Policies we have are better than nothing but improvements could be made.
 ↳ List specifically how and what improvements could be made.

main argument #2:

ALTERNATIVES ↳ animal testing for cosmetic use is not necessary ^{at all}.

- using natural synthetic ingredients which are known to be safe for people, because of previous testing on animals
- testing on human volunteers and clinical trials
- cell structures to simulate human tissue.
- Animal testing isn't necessary
- EFfci : guidelines, the european federation for cosmetic ingredients

- causing unnecessary suffering which would mean any one who did so was guilty under the law
- Europe; jump on the band wagon with europe.
- Canada: Leaping Bunny Organization / Program is administered in Canada, by
 - ① Coalition for Consumer Information on Cosmetics (CCIC) / European Coalition to
 - ② End Animal Experiments (ECEAE)

Economy Argument.

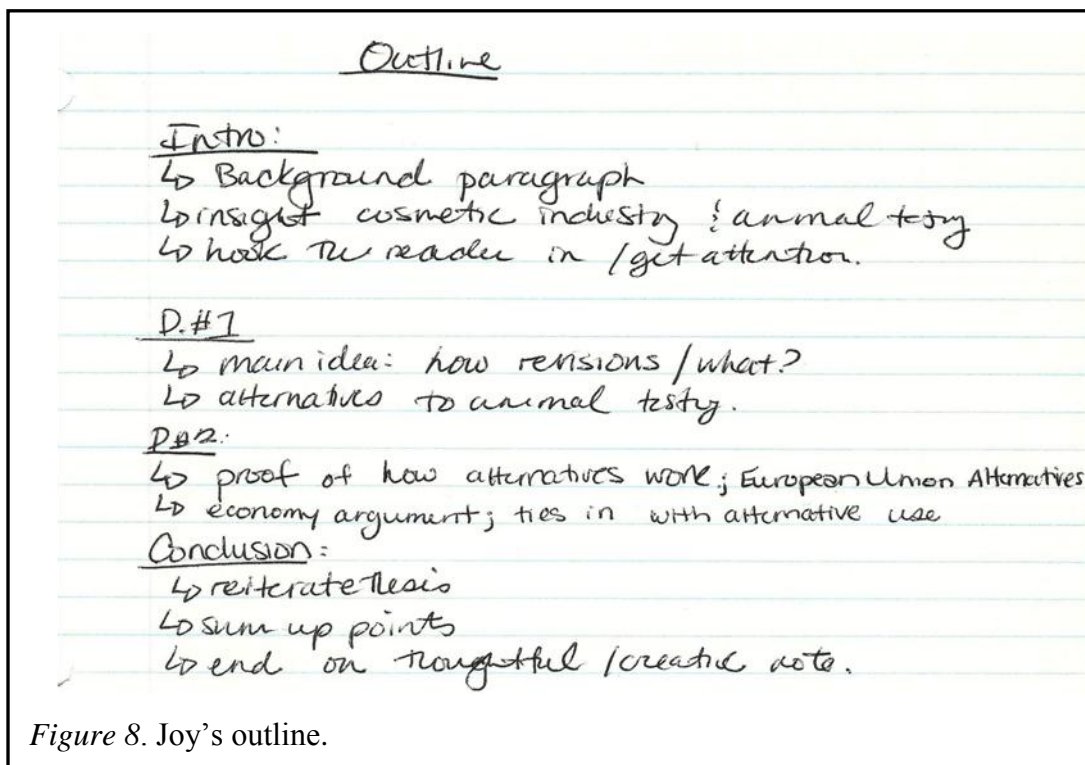
- EU Law
- Canada's economy depends on European Markets; since Europe is changing their laws on animal testing, Canada will feel more pressure to pursue non-animal alternatives for product testing
- use animals adequate subjects for human products to be tested on? Will they ensure the safety of humans?
- Canada's regulations \neq

Main Argument Revised: Canada's policy on animal testing ^{cosmetology} could work in accordance with Canada's ^{general} approach to animal testing; that is it should explore minimising animal use (maximise the use of alternatives) whenever possible.

Figure 7. Joy's hard-copy notes.

Session 2. Joy began her second session by planning and evaluating her process:

“K, I’m going to come up with my outline; I feel comfortable with the amount of research that I did.” She organized her content by writing a brief outline distinct from her notes. It contained a topic structure (e.g., “intro”) as well as content (e.g., “insight cosmetic industry & animal testing”) and process and rhetorical goals (e.g., “hook the reader in / get attention”). Joy’s outline is presented in Figure 8. She finished with a thought that evaluated the process and reflected metacognition: “K, so I think I know where I’m going with that.” She also made metacognitive comments about what she had learned.



A few minutes into her second session, Joy began drafting her introduction, which she labeled as such. She drafted in hard copy and in the sequence the text appears in the

final draft. She drafted on a separate page from her notes and outline. She used the notes and outline to garner content and structure, respectively. She also reread sources for content when she remembered content that she wanted to include but not in sufficient detail. For example, she said, “I remember reading something about there not being a law regarding cosmetics and animals, so I want to go back and try to find that. And I think that was the Humane Society. So I’m gonna check that out.” As she drafted, she thought through and responded to her own text carefully. For example, she said: “I know I want to tell the reader what cosmetics testing is” before she wrote a related few sentences. She often thought through the text in terms of what she “needed” next, for example, context for the essay. Joy also considered assignment demands: “K, so even though this is in my own words, I’m going to source that, ’cause I know universities like that.” Joy made edits and midlevel revisions as she wrote, by signaling word-order changes with arrows, crossing out material, and so on. At this stage, Joy’s metacognitive statements typically had to do with her own position. For example, she said, “I’m okay with, um, what am I okay with?” Joy planned the essay structure as she wrote, typically the next few sentences that she was going to write. For example, she said, “I want to end on a thesis-y note.”

After writing the introduction, Joy labeled its sections in the margins, for example, “topic sentence; context.” She also reread her notes, and noted an argument which she had liked and forgotten. She marked up her notes using underlines, circles, and numbers, to indicate where they would fit into the structure of her essay. She added an argument from her notes to her outline. Joy also revised her introduction based on the notes; she

found an idea that could serve as the thesis for her essay in her notes, so she added this to the end of her existing introduction.

Joy then began drafting her first body paragraph, about alternatives to animal testing, which she labeled as such. She drafted it in hard copy, in the sequence the text appears in the final draft. To draft, she drew content from her notes and structure from her outline. As she drafted, she thought through the text carefully and planned the structure in terms of what type of content she wanted to include next: “I should start with, with what I think.” She also reread the draft as she wrote. Joy wrote notes to herself on her hard-copy draft, for example, “wording,” and wrote subheadings and questions into the margins of the text (see Figure 9). She made edits and midlevel revisions using arrows, crossing out, and so on.

Introduction:

General Topic Sentence } The cosmetic industry is heavily reliant on animal testing. Cosmetic testing on animals entails the testing of the ingredients found in cosmetic products and their effects on parts of the body, like the skin. Cosmetic testing ~~does~~ not necessarily refer to the testing of the final product on the animal. Due to ^{this} common misconceptions, ~~the~~ cosmetic manufacturers are able to market their product ^{as if} as not having been tested on animals, even if the corporations ~~are~~ conducting the experiments are still testing the individual ingredients found in the final product on the animal.
 - (Canadian Federation of Humane Societies)
 - (www.cfhs.ca)

Context } ~~At~~ These practices, although unethical, are not prohibited by Canadian law. Although there are various federal laws regarding cosmetics, in general there are no laws concerning the use of animals in testing for cosmetic purposes. Although ^{the use of} animals are required for testing for medical purposes, under Canadian law, they are not required under Canadian law to be used in the testing of cosmetics. The use of non-animal alternatives would greatly reduce the # of animals harmed, as well as set a precedent for others in the cosmetic industry to look up to and follow.
 ↳ (Canadian Federation of Humane Societies)
 ↳ www.cfhs.ca

Context } use of animals in testing and experimentation for cosmetic purposes should be that it aims to explore minimising animal use while maximising the use of alternatives whenever possible.

Lead In } Headings

Figure 9. Joy's hard-copy draft of introduction.

As Joy wrote the first body paragraph, she planned immediate steps (e.g., rereading her notes) and later steps (e.g., that she would reword a section). As before, the metacognitive comments regarded her typical approach to writing (e.g., "I usually like to break it up into the specific sentences"; how strategies impact her writing (e.g., "I want to

start getting this typed up . . . 'cause that helps me organize"); or her knowledge or understanding on the topic (e.g., "I'm pretty sure that").

Approximately 40 minutes in, Joy typed the introduction and first body paragraphs. She drafted the text in the sequence it appears in the final draft, essentially copying the hard-copy drafts. As she drafted the text electronically, Joy frequently reread her text and continued to think about it; typically this had to do with its wording. She also reread her draft to generate new ideas and language. Joy once reread a source to ensure she was correct about an issue. Joy used subheadings to label parts of the paragraphs (e.g., "topic sentences; context; proof,") and then separated the paragraphs according to these (Figure 10). Joy used word-processing functions, such as bolding and coloured text, to remind herself of sections to which to return (Figure 10). She edited as she wrote, often using word-processing functions to correct spelling.

Joy's metacognitive comments while drafting the first body paragraph electronically again referred to what she usually likes to do (e.g., "I usually like to break it up") and how this helps her (e.g., "'cause then I can go back and see if it all makes sense and see if my sentences do what I want them to do"). Joy's planning and evaluating of text and process was less frequent now; she would sometimes comment on having finished a section and plan to draft the next. After Joy had written the introduction and first body paragraph, she reread the introduction, said that she liked it, and deleted all the subheadings. She went through the same process with the first body paragraph; she reread it, made some changes in wording, and then deleted most of the subheadings.

Body Paragraph 1:

Topic Sentence: The policy, which governs the testing of animals for cosmetic purposes in Canada, should be revised on the rational that there are available and effective alternatives.

Context: any experiments or testing which result in death, pain or malformations to the animal should be banned. Testing on animals should only be permitted on the condition that any ingredients being tested has been proven to be harmless to that animal, which is measurable by previous testing. Cosmetic manufacturers in Europe have banned all use of animals for testing purposes, and instead rely on using natural synthetic ingredients derived from human cell tissues, which have been proven to be safe for people.

Proof: using animals for the testing of cosmetics is not necessary, as to argue that something is necessary is to also argue that these are absolutely no other options or alternatives. Not only are there other options available, there are available options, which have been proven to be both effective and adequate substitutes.

Figure 10. Joy's in-progress essay.

Session 3. In the third session, Joy began by rereading her existing draft. She then reread sources and researched for new ones for her second body paragraph about alternatives. She researched for specific information using specific content search terms, for example, “alternatives to animal testing.” She selected and read Wikipedia. She also responded to source content, often noting that something was “cool” or paraphrasing something she had read. She made intertextual connections; for example, she copied information from Wikipedia—the name of a research centre—into a new search and consulted the sources returned.

Joy began drafting the second body paragraph in hard copy, directly from the sources she was reading. She drafted the text in hard copy and in the sequence it appears in the final draft. Although she drafted primarily from sources, she also garnered content and structure from her notes and outline. During this time, she sometimes planned and evaluated her immediate next steps, for example, what she would search for next. She made only one metacognitive and assignment-oriented comment, about how she likes to

include quotes because she thinks they lend credibility. As before, the hard-copy draft contained subheadings, which indicated sections of the paragraph; these included “topic sentence,” “context,” and “proof.”

Joy thought through and planned her conclusion at approximately 15 minutes: “Okay, so in my conclusion I want to reiterate my thesis, sum up my main points and end on a creative note [reading from outline]. So I should probably look at my thesis.” She skim-read her introduction and then began drafting her conclusion. She drafted the conclusion in hard copy and in the sequence the final draft appears. She reread her text and used its structure to help structure the conclusion. She thought through the text as she drafted: “I’m trying to think of the best way to word my points, to sum them up, so I don’t sound repetitive.” She once reread through her essay to ensure that one of the points she was about to make in her conclusion was true.

Joy planned that she would “work out any rough spots” while she typed these paragraphs. She briefly removed the remaining subheadings from the first body paragraph and began typing the second body paragraph. She drafted electronically and in the sequence the text appears in the final draft, essentially copying what she had in hard copy into electronic form. She colour-coded the word “invitro” and said that she would “check it out.” After typing the paragraph, she deleted all the subheadings.

Joy then typed the conclusion, electronically and in the sequence it appears in the final draft, essentially copying the hard copy. She included subheadings, for example, “intro; reiteration of points, point 1, point 2, conclusion.” She again colour-coded “invitro.” She responded to and evaluated her own text. For example, she said, “K, I

like that.” She then deleted all the subheadings and used the word-processing functions to edit her spelling. She checked the spelling of “in vitro” using Google, and made the changes in her document.

At about 40 minutes, Joy planned to reread her essay to make sure the essay was all grammatically correct, and then generate a title. She checked the assignment, in terms of whether the essay had to be double-spaced. She reread her essay, from beginning to end and made minor edits using the word-processing functions. Finally, she added a title to her essay: “Mice Aren’t Meant to Wear Lipstick.” Joy’s writing time totaled 170 minutes. Her essay is presented in Appendix E.

Joy’s interview. Joy’s position on this topic was “pretty clear.” She said she was “a huge animal lover, so I knew where I stood on this topic right when I got it.” She said, “I think that, this one I feel strongly about, but most research topics, I’d go with my gut instinct and see if things changed while I was researching ’cause sometimes that happens.” She noted that she had an emotional reaction when she first got the topic. She noted that she liked the topic.

Joy’s goal was “to stick to what the outline said and basically make a persuasive argument, whether I agreed with my side or not. Just make it as persuasive as possible. Luckily, I chose the side that I agreed with, so it was easier.” Joy also tried to make it professional and formal, apart from the title. Her overall strategy for this text was similar to that which she usually uses. She takes time to research and learn about the topic, without writing much down, and then once she has a good understanding, she can start to write. She likes to have everything really structured, and to have it in hard copy in front

of her. Joy selected information that she considered professional and legitimate. She likes to use Wikipedia to get a general overview or understanding of the topic. It also gives her good links to other sources. She went to those she considered reliable. She connected ideas by writing down points that jump out at her, and then it takes her a while to make the connections, but having them in front of her allows her to keep looking back and forth and then make the connections. She organized her paper according to what she's learned. She works paragraph by paragraph: intro, context, proof, and then analysis or conclusion.

In terms of her process, Joy took the first period to research and become more informed. In the second period, she sketched an outline that got her "thoughts out." She likes to write by hand, so she drafted each paragraph in hard copy. She noted that it helps her if she "sets out each paragraph structure, like—Topic Sentence, and then I'll write my topic sentence. And then—Context, and I'll do that. And then—Conclusion, and then I'll, write my conclusion. So I just structure it a lot. And then I type it up." Once it is typed up, the computer can show her some of her mistakes. She can read it better since it is neater and she can see what she has put together. Joy planned that she would do only research in the first session. She figured she would be able to write two paragraphs per day "and it worked out that way."

Joy's approach is typical to the approach she uses with other assignments. It would not change that much if she were researching this topic for personal interest. She may have read more in specific areas that interested her, for example, which companies tested on animals or whether there had been scandals about this. The approach that Joy

used was typical to that which she usually uses for school. The only difference was that she usually has her sister, an English major, edit her work. Sometimes she asks her peers or her Dad to edit her work, too, but not her teacher.

When asked if she had received instruction on writing from the Internet, Joy responded: “never by the Internet,” other than the preferred style (e.g., APA, MLA). In Grade 9, she looked up essay structure, but now she is comfortable with it.

Joy added that there was a new documentary coming out, *Earthlings*, that is about animal abuse. It is by the same people who made *The Cove*. She thinks: “It will be huge.”

Abbey’s writing.

Session 1. Abbey began with an antitesting position and indicated that she would find information to support that. She first scrolled through the list of provided sources. She read some of them and also searched for sources using specific content search terms on Google, for example, “Canada’s standpoint on animal testing for cosmetics.” Abbey began taking electronic research notes almost immediately; “I’m going to get some facts down, that I can use to argue with. I already know my personal opinion of this, so, I’m just going to go with this, and use the information to back up my personal opinion.”

While she read sources, Abbey planned her arguments. For example, she read about the existence of alternatives and noted that would be a good argument. While reading about Canada’s standpoint, she also read about Britain’s and later searched for more information about that. Both became sections in her notes. Similarly, Abbey read other sources and lines of argument and noted that they were “good”; for example, that

some companies had already stopped using testing. Abbey also formulated some arguments by combining ideas, for example, that scientists were currently developing tests on animals and could instead focus on developing alternatives. Likewise, after reading about the tests she thought that cruelty to animals must be illegal, and that this should qualify as cruelty.

Abbey then began to organize the structure of her essay as she read through her brief research notes. She started orally,

So I can talk about Canada's current standpoint, then I can go to its similarities to Britain, which is its sister country, besides the U.S. And then, I can go, lead that into cosmetic companies in general, their thoughts, and bring that right back to Canada. And how we have all these scientists who are using their knowledge to test on animals, and why can't they use that knowledge to test alternatives to test on. 'K, I'm going to write this down before I forget.

She then continued to think through her structure, and she wrote an outline, which was distinct from her research notes. It had a topical structure, with no content. It also contained some process / rhetorical goals. The topics were also rhetorically toned (e.g., if some companies can abolish animal testing, why can't all?). Abbey colour-coded it to indicate the paragraph in which each major topic would be discussed and so that she "would know the difference between these." She made one major revision to the outline, in which she combined two of the points. Abbey's outline is presented in Figure 11.

Outline of Essay:

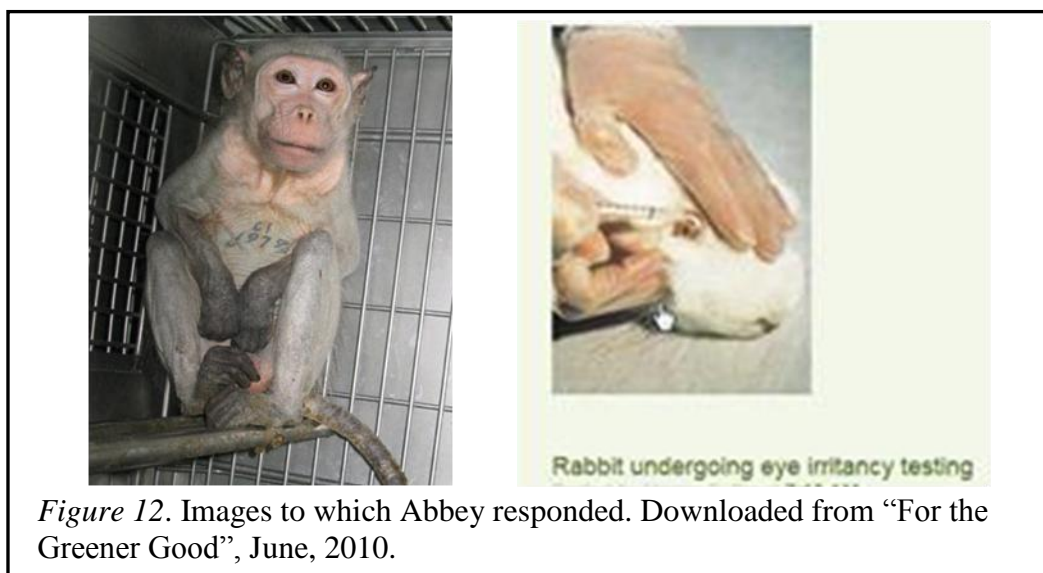
1. Introduce Topic
2. Canada's standpoint
3. Lead into similarity between sister country Britain's standpoint
4. Talk about cosmetic company standpoint in general – if some companies can abolish animal testing, why can't all of them?
5. Canada's openness alternatives...
6. Scientists should be using their knowledge to come up with alternatives for cosmetic testing- animals humans too
7. Conclude, restating WHY

Figure 11. Abbey's outline.

Abbey then continued researching for additional information. She looked for specific information relevant to her arguments, as well as general information about animal testing. As she researched, Abbey sometimes evaluated and selected sources and occasionally evaluated and rejected sources. She indicated that she wanted sources that were full of information and organized in a way that she could understand. She also selected sources that looked “good,” sometimes based on the URL (e.g., with .uk in the address). She rejected Wikipedia, because she'd been told it was a bad source. Later, she said she was “not going to use Wikipedia, too many teachers instilled in my brain not to do it.”

As she read and viewed sources, she constantly deliberated on the source content, often by responding with her opinion to something she had read in a source. She also planned the structure and content of her essay: “K, so I can use that, explain that even

though, it is the ultimate ideal to protect all Canadians from hazards, they should be protecting animals too. They're living beings." Much of her thinking regarding the ethics of animal testing coincided with viewing sources. When viewing a blog with images of animal testing (Figure 12), she thought: "That's sad," and "mhh, makes me uncomfortable." Abbey also referred to the assignment as she researched, either by restating that she had to write a persuasive essay or by evaluating potential content in terms of genre. For example, she said, "That would be good to argue."



As Abbey researched, she continued copying and pasting information into her original notes document (i.e., not her outline). Abbey took notes almost exclusively by copying and pasting source content into her notes document. It was organized in different ways: by source, rhetorical category, and topic; for example, "facts to back up argument; Britain's standpoint." Abbey's notes are presented in Figure 13; you can see her pasting in material. Abbey also started making some rhetorical comments in her notes, for example, "good idea for intro."

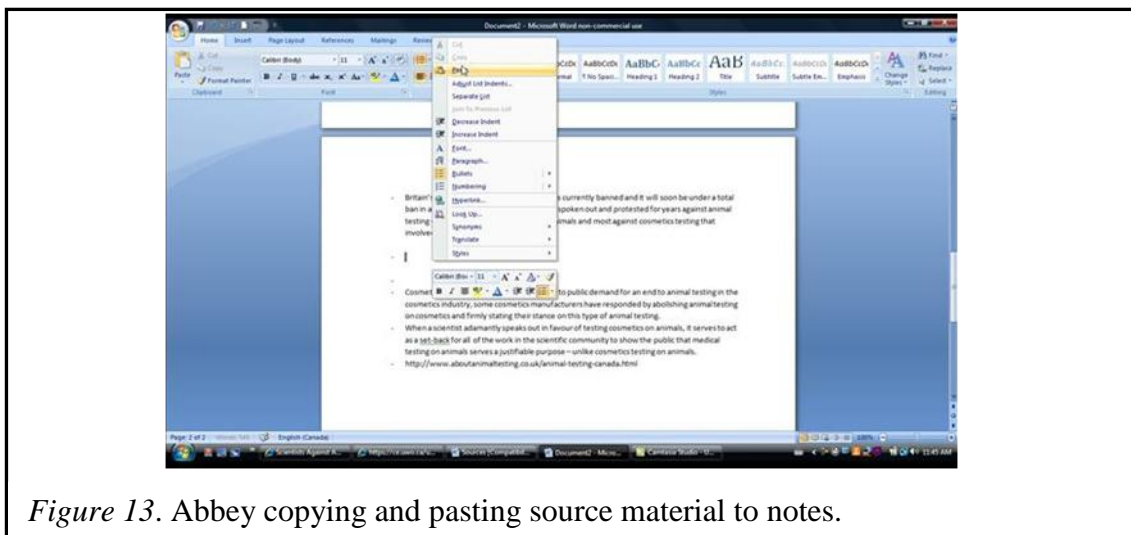


Figure 13. Abbey copying and pasting source material to notes.

Throughout Abbey's researching, she constantly planned and evaluated the process that she was using. She planned her immediate next steps, in terms of what she would do next or what information she would look for. She evaluated what she had and what she needed, or the effectiveness of her approach. For example, she said, "That's [search string] a bit long." Her metacognitive comments had to do with her own style as a writer. For example, she claimed: "I'm not that fast at writing these." She also frequently considered the ethical issues involved in animal testing. For example, she asked herself: "How can you justify cosmetic testing on animals when, all it does is put some colour on your lips? When, it kind of makes sense for medical stuff?" Sometimes this ethical problem solving was reiterating or extending what she read in sources, and sometimes it was purely her own speculation.

At the end of the session, she evaluated and planned:

I think I have a pretty good amount of stuff right now. I
 have my three points, or I have my points that I want to talk

about in my body paragraphs. I have stuff that I can think about, to talk, to introduce my whole topic. And I have a pretty good idea for my conclusion now. For tomorrow, I just have to remember to look up my citations. . . . Let's see, general information . . . (counting on her fingers). I have some scientific stuff that I can talk about in my third paragraph. . . . I should be pretty good to start writing it. Yup. Just got to come up with my thesis soon too. I might need to start writing my body paragraphs too, before I do that, it might help me solidify my thesis.

Session 2. Abbey began her second session by rereading her notes: "So I can remember what I've got to do." She researched for specific information to support her arguments, using specific content search terms, for example, "alternatives to animal testing in cosmetics." She read and viewed sources, again rejecting Wikipedia.

She began drafting her introduction a few minutes into the second session. She drafted the text electronically and exclusively in the sequence in which it appears in the final draft. She drafted it in the same document as her notes and outline, but on a separate page. She drafted her introduction for approximately 20 minutes and her first body paragraph, about Canada and Britain's policies, for approximately 20 minutes. She then drafted a paragraph which she afterwards combined with the first. She then began her second body paragraph, about the fact that some companies have banned testing and Canada's openness to alternatives, for 10 to 15 minutes.

Abbey garnered content from her notes (e.g., “I had an opening earlier, where did I put it?”) and structure from her outline (e.g., “Now I’m on to my other paragraph, so—talk about cosmetic company standpoint”). She sometimes generated local structure while reading through her notes. As she drafted, she constantly reread the text and thought through and reflected on the text. For example, she thought: “leading to Britain’s standpoint, so I just need a good lead in.” She thought through almost every sentence prior to writing it. She never reread sources or researched once she began drafting. She edited using word-processing functions, and made midlevel revisions. These involved changes in wording that affected local meaning. For example, she wrote: “If other leading countries can completely change their policy on cosmetic, testing on animals, why can’t Canada, a country which.” She said that she did not want that sentence and was going to change it. She deleted it and wrote: “There are so many other options when it comes to cosmetic testing and there are so many countries that know this and take advantage of it.”

At certain phases throughout drafting, Abbey planned and evaluated her process in terms of her immediate next steps, for example, what she needed to write. She also sometimes checked or considered the assignment. For example, she said: “I know what I want to say, I want to say like, say something along the lines of . . . yeah, make ’em [the audience] feel bad.” Abbey had partially written the second body paragraph when the session ended.

Session 3. In the third session, Abbey began by rereading her essay. She then continued drafting the text electronically and in the sequence in which it appears in the

final draft. She finished her second paragraph after approximately 10 minutes. She drafted her third body paragraph, about cruelty, for approximately 10 minutes and then drafted her conclusion for 5 or 10 minutes. As before, Abbey drafted from her notes and outline, and edited and made midlevel revisions as she wrote. The midlevel revisions consisted of revising her sentences to express her meaning more clearly. She sometimes planned the structure of her essay as she read her notes, in terms of the order of points within a paragraph. Abbey planned and evaluated the process as she drafted, in terms of her immediate next steps and what she needed to do. She once made a metacognitive statement, that she was not sure about a fact. She also thought about ethics, thinking that animal testing was “wrong in any sense.” Abbey’s total writing time was 145 minutes. Her essay is presented in Appendix E.

Abbey’s interview. Abbey based her position on her “own thoughts and feelings. I didn’t decide on what I’ve seen on, from the computer. I just decided what my own previous standpoint was, and it matched with what a lot of the websites said, so I figured that was the best way to go.” Abbey said that she had an emotional reaction to the topic. She is a huge animal lover, so it’s hard to see animals getting needles in their eyes and seeing the pictures that go along with the websites.”

Abbey’s goal was “to show, whoever’s reading this, I guess in this case the government, exactly why it’s wrong to do animal testing in the first place. And show them that, we are a leading country, so why don’t we lead? In the future.” She asked what I meant by an overall strategy; I told her that she could substitute the words “approach” or “plan.” She responded: “My overall plan, I guess, was my outline.” She

said that she wanted to introduce the topic, reiterate the current standpoint, explain why it should be different using examples, and conclude and restate that it needed to be changed. Abby selected information about Canada's policy because that is what she would talk about. She wanted to select information from someone who was completely against animal testing since she thought animal testing should be banned. Once she found that, "it's kind like a chain . . . once I found that out, now I want to find out, what is the testing?" and so on. She organized according to what "I know," beginning with an introduction. She did not mean to do a three-body-paragraph essay, necessarily, although she did. She left her strongest point to the end, "to really hit them with it." Then she concluded, to sum everything up. She connected different pieces of information by comparing them, for example, the standpoints.

Abbey began her process by getting "all of her information together"; she prefers this to going back to sources while she's writing. She came up with an outline, which gives her, as she said, "exactly what I need to be writing and gives me a lot of structure, 'cause I find structure helps the most." While writing, she kept all of her information in the same document so that she didn't have to keep switching. Abbey didn't plan how to use her time; she just wrote. When she felt that she had "said her piece," she knew she was done.

If Abbey were researching this for personal interest, she wouldn't do it in such a short period of time. She would take longer, to gather a lot of information. In most school assignments, she takes longer to write. She spaces out her writing and takes a lot

of breaks during the writing process. She always uses the computer for all writing activity (notes, outlines, drafts).

Abbey noted that all the teachers in whose classes she wrote had provided instruction and that the librarians had as well. She had been taught what sites not to use, including Wikipedia. She has also learned to cite information in the text.

Abbey added that she enjoyed the assignment and learning more about the topic.

Kieley's writing. Kieley lies somewhere in between the first and second processes. Her outline contained almost all content, as well as structure, like Mark and Ishaan. But she began with a detailed set of notes, and then wrote the outline, like Joy and Abbey. This outline was also noted orally before it was written down. She did reread sources too, although typically only those that she had read previously.

Session 1. Kieley began with the opinion that hurting animals through testing cosmetics is wrong. Her goals in researching were to learn more about the topic, to support her position by refuting counterarguments, and, sometimes, to learn more about a specific topic. Kieley started her research by reading several of the provided sources. When reading Wikipedia, she noted that she would not write information down since it is “not reliable . . . but it’s a good place to start off.” After reading some of the provided sources, Kieley searched on Google for additional sources. Kieley sometimes entered what she had learned in sources as new search terms. For example, she read on Wikipedia that there was a ban in Europe on cosmetics testing on animals and then entered into a new search, “europaean ban on cosmetics testing on animals.”

Kieley read the provided and searched-for sources very carefully. While reading, she constantly responded to the content. For example, she said: “So I can see that right now, animals have to be used [for some medical testing], but they don’t have to be used for cosmetic testing” and generated possible lines of argument; for example, “There’s alternatives to animal testing, so I guess that could help with the argument that’s saying that it shouldn’t be used.” Often, after noting a particular line of argument, Kieley would search for more information on that topic by, for example, clicking on the “alternatives” link on the Canadian Federation of Humane Societies website.

Kieley wrote hard-copy notes as she read (Figure 14). She wrote information in the order in which she read it; thus the notes were organized by source and formed a long, bulleted list. She made intertextual connections (e.g., noting that she will confirm information on one site by consulting another site) and used internal links to find additional sources. Kieley’s later searching was driven almost exclusively by the particular line of argument about which she was thinking. She would search using specific content words, for example, “europaean ban on cosmetics testing on animals.” One of her goals was to determine the arguments *for* animal testing, and then refute them. She searched using joint rhetorical and content search terms, for example, “arguments for cosmetic testing on animals.” Though she was searching for information relevant to a particular topic, she would also make note of information relevant to her other lines of argument.

As Kieley researched, she sometimes evaluated sources, selecting sources that were relevant (e.g., related to cosmetic testing, related to Canada) and in a useful format,

and information that was important and relevant. She used Wikipedia again to get an overview of a specific type of testing. She very often commented that particular content was important, and would always select that information by writing it into her notes. She continued to respond to content; for example, she noted the ideas of protecting technicians' jobs and consumer purchasing and thought: "That's hard to ask the government to fix though." She also planned arguments throughout researching. For example, she said, "So probably the best idea, is just avoiding testing altogether. I guess the argument would be, the element of technology, and the idea that if we can do tests on human genes, then what's the point of doing tests on animals because you're going to get better information from human tissues anyways."

As Kieley researched, she checked and/or considered assignment demands; for example, she tried "to think of . . . what exactly a persuasive essay should be about" and later, "I'm trying to think about, if we're looking at it from the perspective of writing to a government official, what's going to be the most effective argument?" Kieley also engaged in some ethical problem solving. For example, after reading about the degree of suffering animals may endure, she commented: "I guess it all goes back to the bigger question of do animals feel the same amount of pain and are we the same as animals. Which is a lot deeper philosophical question than's been asked." Kieley also continued to write in her notes, for example, "consumer; environment; political pressure + purchasing habits." Kieley also articulated her position as she wrote. For example, she said, "Well right now I'm thinking that my main argument would just be that it's not necessary, 'cause if there's an alternative then there's no reason to, except for just, it sounds like,

jobs and money.” Kieley sometimes made metacognitive comments, for example, that she often forgets to record sources.

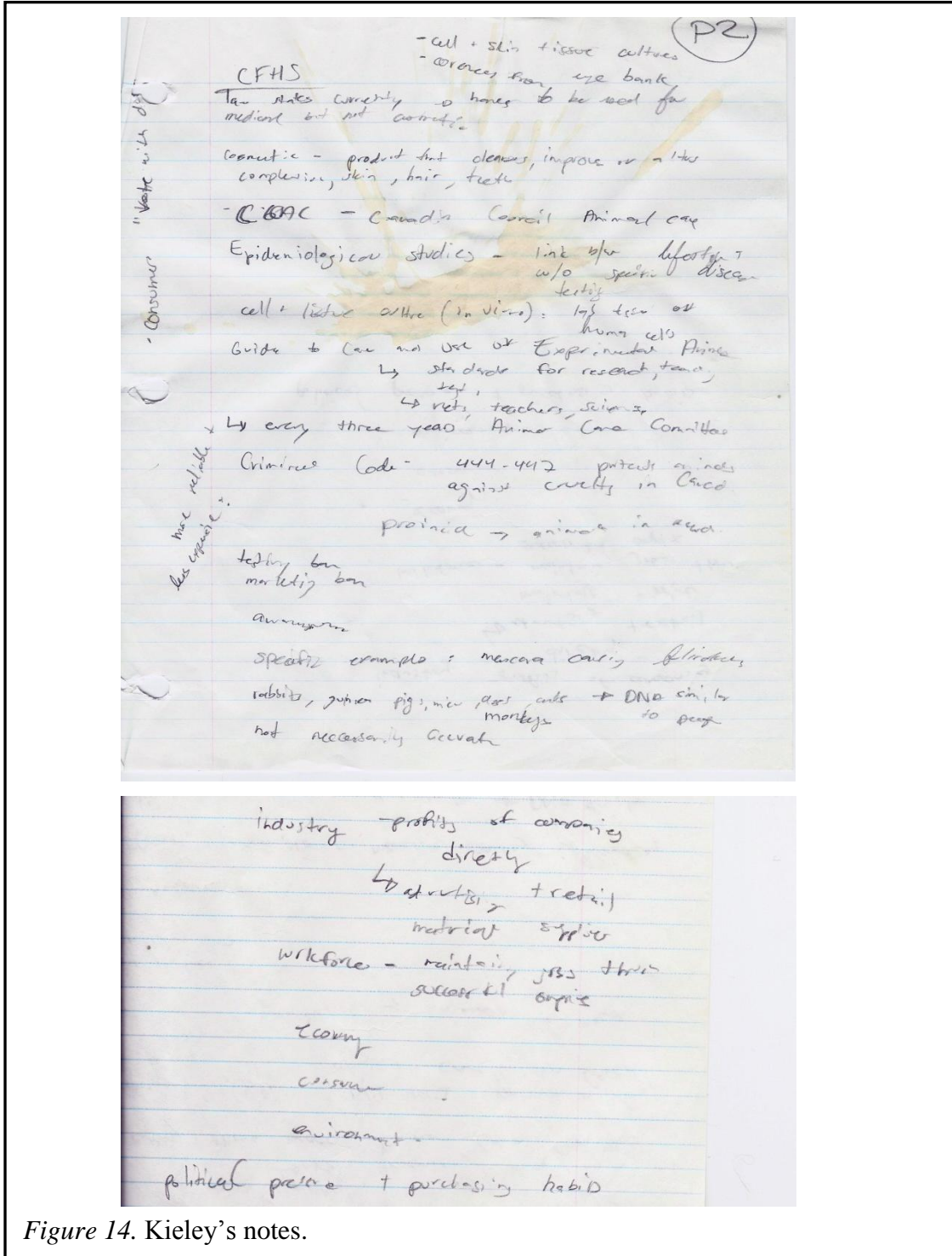


Figure 14. Kieley's notes.

Session 2. Kieley began her second session by planning to review her work. She did, and then began writing an outline, distinct from her research notes. She transferred content selectively, from the notes to her outline. She thought through her arguments and the structure of the essay as she read her notes and wrote her outline. For example, she thought: “If there are other options, why aren’t they being explored? What I found out yesterday was things to do with the economy. But the counterargument for the economy is that there are companies that are successful, who don’t test cosmetics on animals.” The outline contained significant content and also signaled main ideas and subpoints; the main ideas were those she had generated previously: necessity, ways to implement change, and so on (Figure 15).

The structure of the plan was organized by main arguments; Kieley generated most points in the sequence they appear though, from the top to the bottom of the page. She inserted details under the main, more abstract arguments; for example, “And then the next point is . . .” She also inserted jot notes around the outline and it would not be clear to a reader where these fit into the structure. Note that symbols were sometimes used to indicate relationships (e.g., “there are other options > not necessary”).

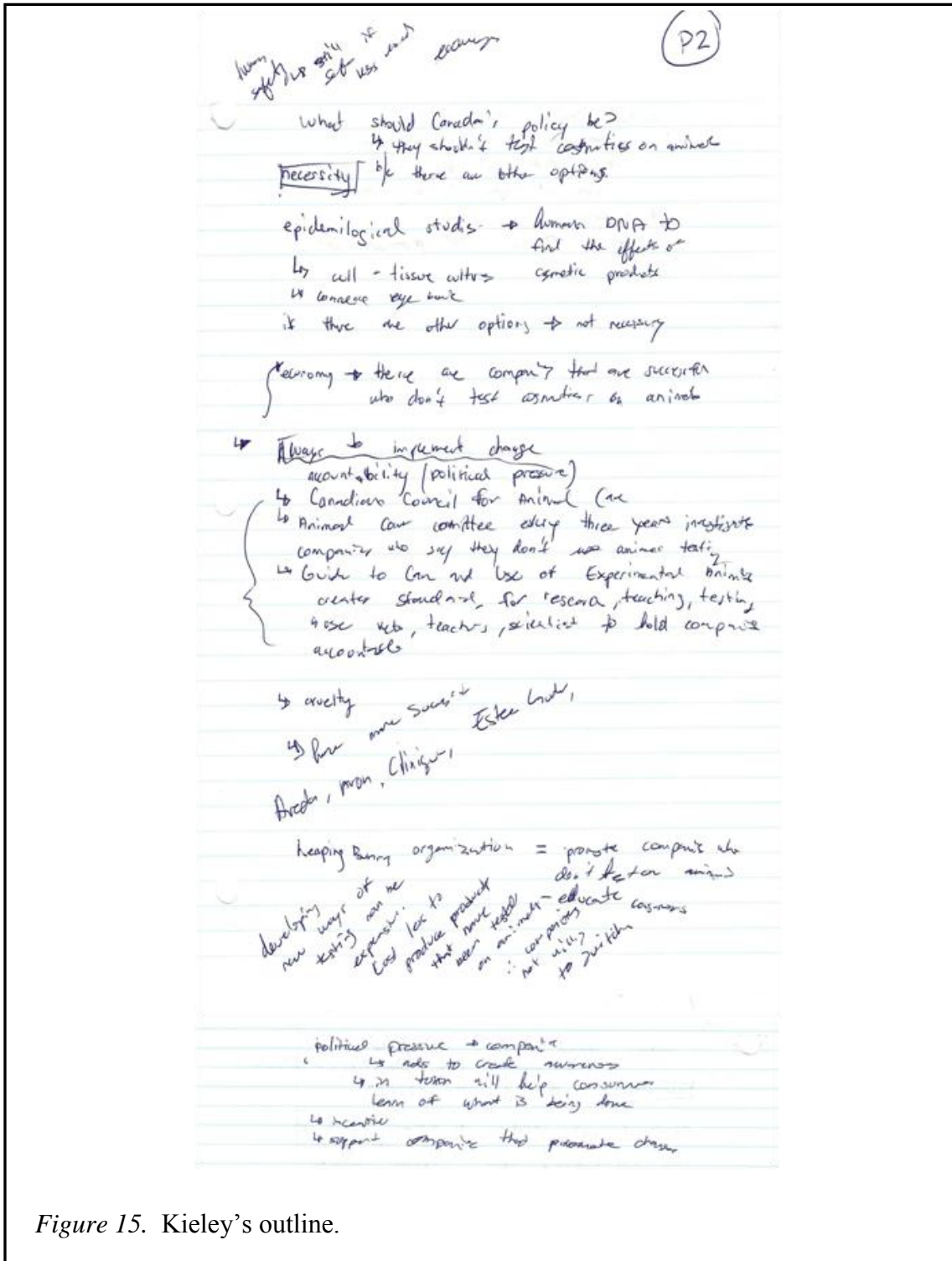


Figure 15. Kieley's outline.

Approximately 10 minutes in, Kieley planned the process: “I guess I’ll just start to put this stuff on paper and see what comes out.” She briefly researched and read sources, in order to get specific information for writing. Specifically, she wanted to know about Canada’s current policy. Kieley transcribed her essay electronically and largely in the sequence it appears in the final draft. The structure of her essay came from the outline. The content came from the outline and the notes; she looked back and forth between them as she wrote. She also sometimes reread sources or occasionally researched for sources, when she needed particular information. For example, she said, “I’m just going to look up other options again so I can put proof into the essay.” She repeatedly read sections of her notes, outline, or source, and wrote a few words. Her writing was characterized by frequent rereading of the existing draft and thinking through the text. For example, she asked herself: “What’s the right way to say that”? As she wrote, she edited, made midlevel revisions, and used the word-processing functions. She also planned the process as she wrote, typically in terms of her immediate next steps. For example, she planned: “I’m just going to read over what I have so far.”

Approximately halfway through the session, after writing her introduction and first body paragraph, Kieley had another organizing phase. She reread her essay. She evaluated: “I need to think of other examples, that I’m going to argue.” She then added a sentence to her introduction, about the existence of alternatives. This sentence reflected the emphasis of the first body paragraph. She evaluated her knowledge about counterarguments and planned her essay and rebuttal: “I need to think of the ways that, people think that it’s necessary. So one of the things is that, well, it’s necessary to ensure

human safety. But we can say that it can still be safe, even if animals are downsized.” Note that in that quote, Kieley is anticipating her audiences’ questions or objections, and responding to them. Kieley added material to the top of her outline, about human safety. Kieley thought: “And then people think it’s necessary, for the economy, so that’d be the second point.” Kieley wrote the word “economy” at the top of her outline. Kieley then added text to the end of her introduction, which reflected the emphasis on human safety. She also made midlevel revisions to the existing introduction text; she rewrote sentences in a way that shifted the emphasis somewhat. She thought: “I’m trying to think of what the other arguments would be best to go with. I think it’s easier to go the route of— companies”. Kieley added a sentence to her introduction to reflect this argument. Kieley thought: “What would another good point be”? She reviewed her notes and outline: “I’m just going to make my last point about alternatives.”

Kieley then made global revisions. She commented: “I need to make this [first body paragraph] more about human safety.” While she left much of the content unchanged, Kieley made revisions that shifted the emphasis of the paragraph toward human safety. Note that at this point, the arguments that are noted in the introduction and which become the major arguments of the essay were signaled in the outline, but they do not correspond directly. For example, the outline signals economy as an argument, and this is indeed one of the arguments in the essay. However, the essay argument about “alternatives” appears to come from both the outline arguments “necessity” and ways to “implement change.”

Kieley then continued drafting. Though she still relied on her outline for structure and content, this phase of drafting was also characterized by frequent rereading of and researching for sources. She searched for information relevant to the paragraph on which she was working, for example, “profits of companies who do not test on animals.” She was particularly focused on finding financial information on successful companies that do not test on animals; she wanted to prove that testing was not needed for success. She read sources carefully, responded to content, used internal links and searches, and added information to her outline and/or draft. She drafted the text electronically and in the sequence it appears in the final draft. She edited as she wrote. As she wrote, she also planned the process (e.g., “I’m going to search for companies that still use animal testing”) and evaluated the process (e.g., “K, I found a couple”).

Session 3. Kieley began her third session by rereading her essay. She then finished drafting her third paragraph. During this time, she planned her immediate next steps. For example, she said, “I’m just going to read over what I wrote last time.” After finishing the third paragraph, Kieley checked the assignment; specifically, she inquired about expected length. Then she planned the process: “I’m just going to review my arguments, so I can write a conclusion.” She edited and made midlevel revisions as she read. The midlevel revisions were typically those in which Kieley rewrote a sentence or two. Specifically, she maintained the gist of the sentences, but shifted the emphasis somewhat or changed the meaning slightly, in order to correspond with the meaning of the paragraph.

Kieley drafted her conclusion in the sequence in which it appears in the final draft. She thought through the text before writing. For example, she said, “I’m trying to think what I should put in the conclusion. What needs to be said again . . . restate my points.” She garnered content and structure from her outline. Kieley concluded the session by reviewing her existing essay for “mistakes.” She made minor edits and one midlevel revision. The midlevel revision was to add a sentence about governments supporting organizations that monitor animal testing. She had to briefly consult a previously read source in order to write this sentence. Her total writing time was 153 minutes. Her essay is presented in Appendix E.

Kieley’s interview. Kieley’s position on animal testing was based on her belief that “it is wrong to hurt animals”; so it was “mostly an instinct, and then just trying to find stuff to back it up.” Kieley said that she did not have enough of an emotional reaction to change the way she approached the assignment; “It was like, I know that’s wrong, so prove it!”

Kieley’s goal was to argue in line with her “instinct” and “look at an argument, that’s going to bend other people as well.” Kieley’s strategy was to first gather as much information as possible. She noted: “That also means looking at the opposite side of the argument too and see what other people have to say.” Kieley selected sources that she judged to be legitimate and helpful with her argument. Kieley connected sources by reading about something in a source, and then searching on the Internet for more, broader, information about it. She also tried to find “connecting ideas” among the content that she wrote down. In terms of organizing, she noted that the basic structure she has been taught

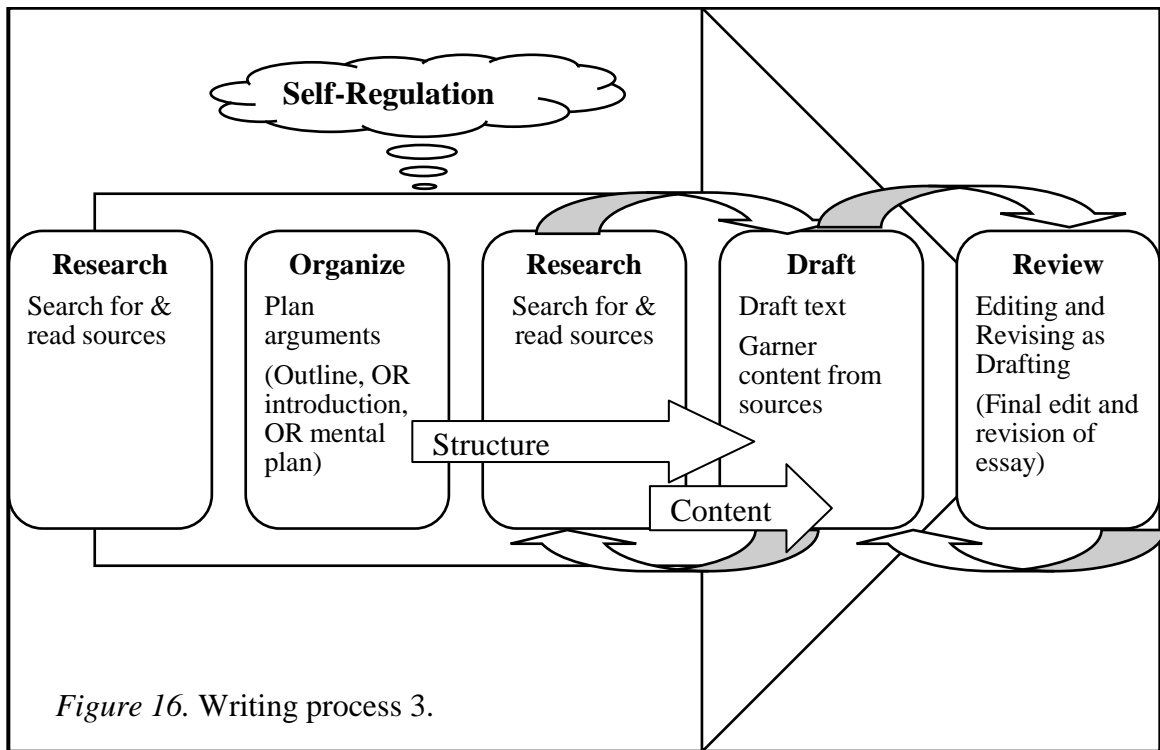
is the three-paragraph essay. Kieley said she did it somewhat differently in that she wrote two paragraphs that addressed the “perceived notion of why we can’t [stop animal testing]” and “why those aren’t necessarily true.” She then wrote a third paragraph to “explain how those can be changed.” She noted that providing alternatives supports a writer’s point.

When asked what her process for writing was, Kieley indicated that she tried to find as much information as possible; looked at the best argument to support what she was trying to do; made a plan; wrote; and then as she wrote, went back to her sources to find the details. Kieley tried not to think too much about the time. She noted that this was a much tighter time frame than that within which she would normally work. Once she had finished the first session, she decided that she would make a plan starting in the second session. Kieley knew she was finished when all the information she wanted to include was included.

In terms of differences between this and other assignments, Kieley indicated that her approach would not change significantly if she were researching for personal interest; her goal and strategy would be the same. She noted that interest in the topic would determine the amount of time she spent. Comparing this activity to other school-based assignments, she noted that she would typically spend more time and have more sources. Kieley said that her typical process is to begin by reading the Internet or books, and not write anything down. She then writes some ideas down on paper, about “where I think I can go.” She then goes back to researching to determine “what arguments I can pick apart and what will actually help me.”

When asked whether she had received any instruction on writing from the Internet, Kieley indicated that teachers “hit on it” but don’t spend “whole classes talking about it.” Teachers have taught her about credible sources, to look for credibility, and not to plagiarize. Kieley indicated that she had not received instruction on writing specifically, “like no strategies, or anything like that.”

Process 3. Sarah, Kristen, Aisha, and Rebecca began by briefly *researching*. They then *organized* in different ways, including writing an introduction that signaled the main arguments, planning the main arguments orally, and searching online for an organizational template from which to build the essay. The distinct aspect of this process was that participants embedded their *researching within drafting*. That is, they worked on, for example, one paragraph at a time, and did all the research for that paragraph while drafting it. All participants *reviewed* as they drafted; two did an additional *review* at the end, two did not. A graphic depiction of the process is presented in Figure 16. Narrative summaries for Sarah, Kristen, Aisha, and Rebecca follow.



Sarah's writing.

Session 1. Sarah began with the opinion that cosmetics should not be tested on animals and she researched to support that position. Sarah began by reading provided sources, including Wikipedia. As she read, she responded to source content, typically by verbally summarizing what she learned (or not) from the site. For example, after reading Wikipedia she said, “So this site [Wikipedia] gave me more of a definition and some countries who do it and some alternatives.” During this time, Sarah planned her immediate next steps. For example, she planned: “I’ll go back to the website again.”

Sarah began drafting the introduction of the essay in the first five minutes. She drafted electronically and in the sequence the text appears in the final draft. For example, she said, “So I guess my first sentence would be, what animal testing is.” She researched for sources using the specific content search terms “harm to animals,” and read and

viewed (i.e., images) those and existing sources. Sarah did not explicitly evaluate sources at this point. As she read and viewed sources, she determined her main arguments. For example, as she viewed a picture of a rabbit following an eye irritancy test (Figure 17), she read the caption and said, “Oh. And she will be killed afterwards. I think that’s one of the points I’m going to have—the dangers these animals are in.” The construction of her main arguments happened in under five minutes. She cycled between naming an argument aloud as she read / viewed a source and writing the line of argument into her introduction paragraph. In this way, her introduction served as an outline. She thought through the text as she wrote, often thinking words aloud before she wrote them. She also planned the process, in terms of coming back to correct text later or in terms of the next site she would visit. She made frequent use of word-processing functions, often to correct spelling. Sarah’s initial three arguments to support her antitesting position were the inhumane housing conditions, the discrepancy between human and animal reactions, and the harm to animals.



>> THIS RABBIT IS ONE OF MANY VICTIMS OF EYE IRRITANCY TESTS. ONCE HER INJURIES ARE RECORDED, SHE WILL BE KILLED.

Figure 17. Image to which Sarah responded.

Sarah then drafted her first body paragraph and later her second body paragraph. She wrote the harm / animals' reactions paragraph as the second, since she was finding a lot of information about it. She drafted electronically and in the order in which the text appears in the final draft. For each paragraph, Sarah wrote the topic sentence, and then returned to her sources. Throughout drafting, Sarah alternated quickly between reading or viewing a small section of a source, writing a small section of the essay, perhaps a few words, and repeating. She read and viewed both sources she had previously opened and sources for which she conducted new searches, using specific content search terms, for example, "conditions of animals in animal testing." She once retrieved and read a site previously known to her, www.peta.org.

Sarah evaluated sources and selected those that were relevant. She rejected sources based on lack of relevance and credibility. For example, she evaluated: "These sites talk more about the effects on the animals than on the conditions. And some of them I don't really trust." She also rejected sources that did not fit her opinion. "She actually says that the some of the conditions are pretty good. So, that's not really what I'm trying to prove."

As she read, Sarah sometimes made intertextual connections; she looked for the original source of an image for which she found a link and she referred to information being on "other sites." She responded to source content, often by summarizing the source. For example, she summarized: "This one talks about the moral issues, of cosmetic testing." She twice copied and pasted material from a source to the space below her essay. She then wrote from that material. For example, she said, "I'm just going to

copy this onto the word program, so I can look at it more as I look at different sites.” As she researched, she often planned her immediate next steps, for example, what site she would consult or the fact that she was going to reread her essay. Generally speaking, Sarah selected information relevant to the paragraph / argument on which she was focusing and added it to the paragraph in the order in which she found it.

Sarah’s drafting of the first and second body paragraphs (about inhumane conditions and animals’ reactions) was characterized by planning the structure and thinking through the content as she wrote. For example, she thought: “In this paragraph, I also wanted to talk about, not only are the animals hurt, but they’re usually killed after the testing.” She also thought through the wording: “I’m just trying to think of how to word this sentence.” Sarah also reread the existing draft: “So my first point is the inhumane conditions animals suffer, so I’m just going to read this point again (reads her introduction).” Sarah used the word-processing functions very frequently, typically to correct her spelling. She also continued to plan the process, typically in terms of her immediate next steps, for example, which site she would consult. She also evaluated the process. For example, she said, “I’m thinking about, whether I should find more examples [of the conditions in which animals are kept].”

Session 2. Sarah began the second session by planning to reread her essay. She made a major revision; “I think I’m going to change this one point [harm] ’cause it’s quite similar to my other one [reactions].” In the introduction, she deleted the reference to harm to animals and added in a clause about alternatives.

Sarah then continued to draft the first body paragraph, about inhumane conditions. She wrote as before: she worked on one paragraph at a time. She searched for information relevant to that paragraph (e.g., “conditions of animal testing,”) and/or reread sources (e.g., Wikipedia). She evaluated and selected or rejected them, based on relevance, type (e.g., she dismissed sample essays), and correspondence with her own argument. Her reading was characterized by responding to content, often describing the type of site or summarizing its content. Sarah again cycled between researching to generate content and writing the content into her essay. Her writing was electronic and she drafted in the sequence in which the text appears in the final draft. Her writing was characterized by using the word-processing functions to correct spelling, and editing. As she wrote, she planned her immediate next steps, for example, which source she would reread.

Approximately 10 minutes into the session, Sarah planned the strategy that she would use to organize her text: “So, I’m just going to write down the points that I do have, so that I know.” Sarah wrote an outline that contained the structure of the essay; specifically, it contained a few bulleted notes, as well as a numbered list that signaled the three main arguments. Each number was repeated below, with content supporting the corresponding argument. Much of this had already been written in the essay, but Sarah added content from an open source to the “3 - *alternatives*” section.

Sarah then began trying to find information about the differences in reactions between humans and animals (which was to be the topic of her second body paragraph); she searched “difference in reaction human vs animal.” Sarah did not find information,

so she decided to move on and focus on alternatives. She reread sources and researched for new sources using specific content search terms, for example, “alternatives to animal testing cosmetics.” She sometimes evaluated sources; when she did, it was typically to reject them, based on the earlier criteria. Her reading / viewing was characterized by responding to source content, typically by verbally summarizing the source or a point within the source. She sometimes skim-read sources, sometimes retrieved pages within the same site, and sometimes made intertextual connections, for example, “refinement, which is what a lot of other sites talked about.” As she researched, she planned her immediate next steps, for example, what information she was going to look for or the fact that she was going to leave a site open. She made one metacognitive comment: “I’m not sure what they mean by nonanimal research models.”

As she researched, Sarah now wrote hard-copy notes based on the sources. During this time, all the notes she wrote were related to alternatives, as that was what she was researching. These notes were organized by source and/or subtopic (e.g., 3-R model). She wrote content into the notes in the order in which she read it, but she typically read about one topic at a time, so the organization was topical.

Sarah began drafting the third body paragraph, about alternatives, approximately halfway through this second session. As Sarah began drafting, she orally planned the order of the points within the paragraph. For example, she said, “I’ll probably start off with, the different replacement things.” Her drafting was electronic and for the most part, she drafted the text in the order in which it appears in the final draft. She drafted text based on the information in her notes and she also reread open sources. She rejected

source content, a quote she had wanted to use, because it was not Canadian. She continued writing on the basis of her notes. She checked off material in her notes that she had already written into her essay and continued drafting. Sarah frequently used the word-processing functions to edit the spelling of her text.

Sarah then reread sources and researched to determine Canada's current activity in terms of animal testing [this became the focus of her conclusion]. She skim-read for that information and used internal links within the page to find additional information. She rejected sites that did not contain relevant information or which did not correspond to her opinion. She once read information about Canadian law on a site, and then searched to confirm the information. She evaluated the process. For example, she evaluated: "It's hard to find sites that are related to the cosmetic testing as well as Canadian." She sometimes planned immediate next steps, for example, what she would search for next. As she read, she responded to source content, often by verbally summarizing what she read. As Sarah researched Canada's policy, she wrote bulleted hard-copy notes about the policy.

As she continued to draft the text, Sarah planned her conclusion; "So for my conclusion, ish, I'm just going to see what I wrote in the first paragraph, again." She reread her introduction. She made a midlevel revision to the introduction. This reflected a global revision in the text; Sarah never did find information on the different reactions to products between animals and humans. The second paragraph had remained focused on animals' reactions alone. Thus in the introduction, she deleted the reference to differences, "cosmetic testing should be banned because of the difference in reaction to

the product between animals and humans,” and changed it to “cosmetic testing should be banned because of . . . the animal’s reactions to the product.”

Fifty minutes into the session, Sarah began drafting her conclusion. She drafted the topic sentence for her conclusion, planned the gist of her paragraph orally, and then relied on her notes to draft the conclusion. As noted, the conclusion focused on Canada’s current animal-testing policies and activities. She drafted her text electronically and in the sequence in which the text appears in the final draft. She used word-processing functions to edit the spelling of her text. At the end, Sarah orally summarized her conclusion and then indicated she was finished. Her total writing time was 127 minutes.

Sarah’s interview. Sarah has always had the position that animal testing was wrong. She reacted emotionally to the pictures on the Internet, those provided and those she found.

Sarah said her goal in writing was to try to “get her point across.” When asked about a strategy for writing, Sarah said that she used the basic structure of an essay: “paragraphs, thesis, and three points.” Sarah selected three main points, those on which there was a lot of information. She clarified what I meant by connecting. She responded that she connected different ideas, by seeing if “they both proved my point.” She organized her text following the structure that she had been taught in class: “your introductory paragraph, have your points in your thesis, and then body paragraphs, and then have a specific example to prove your point for each of them and then your conclusion statement.”

In terms of her process, Sarah indicated that she wrote as she researched for and found information. She noted that in retrospect, she would have gathered all of the information first and had “it all out front and then gone from that If you already have your information you kind of know what you want to say.” She indicated that she did not plan how to use her time, but that she probably should have. She would have done her research first, and then written. Sarah knew she was finished when she had nothing else to say.

Sarah was asked about differences between this and other assignments. If she were researching this topic for personal interest, Sarah would do more reading about more topics, because she would not have the writing component of the assignment. In typical school assignments, Sarah would have more time. She would print and highlight sources and/or take hard-copy notes.

In terms of instruction, Sarah has been taught to check her sources, not to plagiarize, and to make sure the information is accurate. English, History, and Science teachers were responsible for this instruction.

Sarah added that she did not realize how important it was to have to sift through so much information. She added that it could sometimes be quite frustrating.

Kristen’s writing.

Session 1. Kristen began by trying to “get a basic understanding”; she read Wikipedia first and noted that it is good for a general overview. She continued to research by reading and viewing some of the other provided sources. Kristen then wanted to gather specific information about the impact of animal testing. She searched using

specific content search terms, for example, “cosmetic testing on animals death.” She clicked on a link about animal-testing statistics and read part of the source. Kristen then wanted to understand why animal testing occurs; she searched using joint rhetorical and content search terms on Google: “reasons for animal testing.” She sometimes evaluated and selected sources, on the basis of credibility. As she read and viewed sources, she retrieved pages within sites using internal site links. Kristen frequently deliberated on content. For example, when she read that a rabbit would be killed after being experimented on, she wondered why. She considered and planned her arguments in her head as she read the sources; for example, “I would combine these points [from a source] into a paragraph.” Throughout this researching phase, Kristen also checked the assignment. For example, she asked: “Do I need a thesis”? She considered the assignment; for example, she noted that it is good to include an actual event to support a thesis. Kristen also considered the ethics of animal testing. For example, she commented: “The testing is gruesome.”

Approximately 20 minutes into her first session, Kristen began drafting her introduction. She wrote a thesis as her first sentence: “In my opinion, cosmetic testing on animals is justified for three reasons.” Kristen then read the definition of cosmetics on www.dictionary.com and as a result, changed her position to an antitesting one. She said that she could understand testing for vaccines, but not cosmetics. She made a global revision in her essay; her thesis was now: “In my opinion, cosmetic testing on animals is not justified.”

Kristen then continued researching to draft her introduction. She continued to read a source she opened earlier, the one she had retrieved after clicking on a link about animal-testing statistics. She said that she wanted to include statistics on animal testing. Specifically, she wanted to include the percentage of animals harmed by testing. She found the total numbers of animals used as well as the percentage of animals thought to experience pain. She responded to content and considered the assignment: “It doesn’t sound very good to say, to say in an argument, that’s fighting against the use of animals in cosmetics, to say that 6% suffer.” She searched for an online calculator; and determined the *number* of animals that would be hurt, rather than the percentage. She used the number, rather than the percentage, when she discussed the harm to animals. See Figure 18 for relevant screen shots; red circles have been added to illustrate the transformation of source information.

Figure 18 consists of three screenshots illustrating the transformation of source information. The top screenshot shows a list of statistics about animal testing, with red circles highlighting the number '17.22 million' and the percentage '6%'. The middle screenshot shows a Windows calculator window with the number '2200000' displayed, circled in red. The bottom screenshot shows a paragraph of text with a red circle around the sentence 'Each year, 1 320 000 animals are harmed'.

In my opinion, cosmetic testing on animals is not justified. The vanity of a human being cannot be more highly valued than the welfare of an animal. Each year, 1 320 000 animals are harmed.

Figure 18. Kristen transforming source information: the source read, the calculator used, and the resulting text.

She continued reading some of the open sources. She would read a source for a brief time, write for a while, perhaps several sentences, and repeat. Material was added into the relevant part of the essay, rather than in the order in which it was found. As she read and viewed sources, she retrieved pages within the site. Kristen very often responded to the source content; she asked questions after reading a source, about why procedures or policies were a certain way and/or commented that material was interesting. Kristen's introduction addressed the relationship between a person's vanity and the impact of testing on animals.

Kristen drafted her text electronically. She drafted the text in and out of the sequence in which it appears in the final draft. She used an Internet-based thesaurus and dictionary, used word-processing functions, and edited. At one point, Kristen noted that she always wants to include pictures and planned that she would have to figure out how to communicate the same information in writing. I indicated that she could include pictures if she wanted to.

Kristen then revised her introduction. The global meaning stayed the same, but she added more content and she fixed grammatical errors. She made midlevel revisions by adding, deleting, and reordering propositions. For example, she added a first sentence: "Last night when you applied your anti-wrinkle face cream, brushed your teeth, and washed your hands, did you stop to consider the fact that numerous animals may have been murdered to satisfy your own vanity?" Shortly thereafter, she changed it to "Last night when you applied your anti-wrinkle face cream, *perfume, or cologne*, did you stop to consider the fact that numerous animals may have been murdered *simply* satisfy your

own vanity [emphasis added]?” She thought through the text, for example, word choice, as she wrote. She consulted www.thesaurus.com to find an alternative to the word “vanity.” Instead, she deleted a somewhat repetitive second sentence about the role of human vanity in animal testing. She checked the assignment by inquiring about the length of the essay. She then searched in Google Images “[cosmetic animal testing](#),” in order to find pictures related to animal testing (see Figure 19). She copied and pasted two pictures into her essay with the text: “Below are some images that clearly depict the sufferings endured by animals subjected to cosmetic testing.”

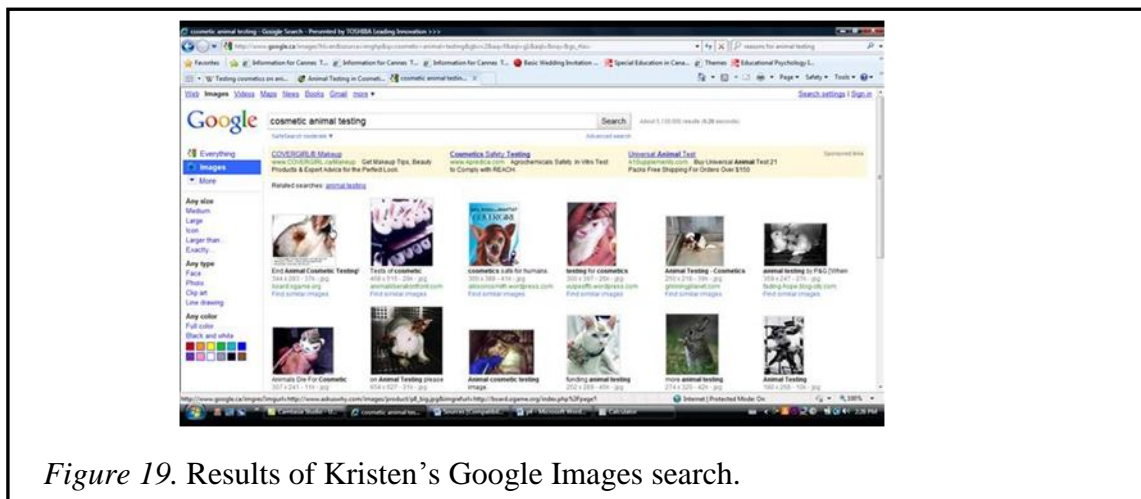


Figure 19. Results of Kristen’s Google Images search.

About 50 minutes into the first session, Kristen began drafting the first body paragraph. It focused on how cosmetic testing is unnecessary because new products are unnecessary. She drafted it electronically and in the sequence it appears in the final draft. She drafted the paragraph based on her memory of the source material. She had no notes and did not consult sources during this time. The content was based on Kristen’s own ideas as well as content she had read earlier. She made brief use of an Internet-based

thesaurus, www.thesaurus.com, and made minor edits. She then scrolled through her own text, apparently skim-reading the introduction and first body paragraph.

Kristen then searched for “[animal testing for cosmetics stories](#)” on Google. She skim-read and read one source, and retrieved pages within the site. Kristen responded to the content; her response was inaudible. The source was about the potential role of technology in providing alternatives to animal testing.

Kristen then began to draft another body paragraph, which would become the third. The paragraph’s focus was on new technologies, which allow for alternatives to animal testing. Kristen wrote only part of the introductory sentence and then returned to reading the source about the role of technology. There, she read about the European ban on cosmetics testing on animals. She then conducted a search on Google to learn more about the ban: “[europe banned cosmetic testing on animals](#).” She read and viewed sources, including Wikipedia. As she read, she used the sites’ internal links to find additional pages.

Session 2. When she began the second session, Kristen had written most of a first body paragraph and an introductory sentence for the third. Kristen began by evaluating her process: “I think I need to find some information on perhaps the conditions the animals have to suffer.” She researched for specific information by searching with specific content search terms, for example, “[cosmetic testing on animals conditions](#).” Once she looked for an animal rights site by searching “[animal rights](#).” She selected sources and read and skim-read them, looking for relevant information and selecting sources that “look good.” She sometimes rejected sources that were biased or irrelevant.

Kristen said that she was going to write based on what she had read yesterday. She began a second paragraph, ahead of the third, at approximately 10 minutes. It began with the number of animals used in testing, and included several reasons against animal testing (e.g., difference between animals' and humans' reaction, fundamental immorality of harming animals). Kristen wrote the majority of the paragraph without consulting sources. She occasionally planned the structure of her essay as she wrote. She thought through the text as she drafted. For example, she thought, "I should talk about what the testing entails." She also thought about wording. As she drafted, Kristen used word-processing functions and made edits. She also had periods of rereading, in which she made midlevel revisions. For example, she would add a proposition, but write, delete, and rewrite the proposition several times, each with a slightly different meaning.

After drafting much of the paragraph, Kristen thought: "I think it would be better if I had a product that was tested on animals and, um, showed to not be harmful, and then, or maybe, one that was harmful to animals and then it wasn't even harmful to humans." She then researched "products that harm animals." Kristen skim-read and read sources as before. She did not find the information she wanted, so she wrote that animal testing is wrong, even in the best-case scenario. She then researched in order to find a quote about animal testing: "cosmetic testing on animals quotes." She responded to one she found: "I like where she says . . ." and included the quote at the end of the paragraph. She edited to make the paragraph cohesive, and continued to think carefully through the text. For example, she said, "I'm trying to think of something impactful to say."

Approximately 35 minutes in to the second session, Kristen read the half-complete first sentence of her third paragraph: “New technology is making i. . .” She then researched for information for this paragraph. Kristen read sources she had open already; the sources were about technology and alternatives. She alternated between reading sources and drafting sentences. She drafted her text electronically and in the order in which it appears in the final draft. She researched to get more facts. For example, she searched on Google “animal testing alternatives cosmetics.” She rejected those sources that were irrelevant to her topic, for example, a source that addressed medical testing. As Kristen read and skim-read sources, she deliberated on the content. For example, she paraphrased difficult concepts. She also questioned concepts; for example, she questioned why a test that used a chicken egg was better than live-animal testing. She used Wikipedia for overviews of tests she read about elsewhere. Throughout this time, Kristen planned and evaluated her process, often in terms of whether or not she found information she wanted and what her immediate next steps would be. Kristen occasionally checked or considered the assignment. She occasionally planned her process, for example, noting that she would change some of the essay wording later.

Note that in this phase, Kristen cycled between a very few minutes of drafting, and then several minutes of researching. As she drafted, she thought through the content of her essay. For example, she said, “recycled human parts [reading her own text]. I don’t want to say that though. Sounds weird,” and then edited the wording. She used an Internet-based thesaurus and dictionary, word-processing functions, and edited. She evaluated the process as well; for example, she wondered if there was anything else she

wanted to talk about in this paragraph. She also wondered if it would be contradicting herself to talk about reduction and refinement (of the use of animals in cosmetic testing). She ultimately decided it was “good enough.”

Approximately 65 minutes in to the second session, Kristen decided to write the conclusion. She checked the assignment; she asked about formatting for the source citations. She briefly scanned her existing text. She noted that she didn’t want to say “in conclusion.” She began writing: “The testing of cosmetic products on animals is cruel and unnecessary, and should be stopped immediately.” She drafted electronically and in the sequence that the text appears in the final draft. She began to write about the ban in Europe and realized she had forgotten where she read about that. She returned to her open sources, skim-read them, and checked over the links she had copied. She could not find the source, so she searched “banning of cosmetic testing on animals.” She then wondered what the policy was in Canada, and noted: “Hmm. I wonder what it is in Canada. I should find out.” She searched “animal testing in Canada” and read returned sources. She rejected a source on the basis of irrelevance; the source did not address testing for cosmetics. She responded to content by orally paraphrasing. She then searched to find the American policy: “us animal cosmetic testing.” She read Wikipedia, which also mentioned the European ban. She then continued drafting her conclusion; she wrote about the ban in Europe and briefly compared that to Canadian and American policies. As Kristen wrote, she used word-processing functions to edit her text.

Session 3. In the third session, which was approximately two minutes long, Kristen began by planning the process. She said that she just had to finish the conclusion

paragraph: “just maybe ask people to send a letter or an email to their MP.” As she thought that, she wrote corresponding text into her essay. She drafted the text electronically and in the sequence in which it appears in the final draft. She edited as she wrote. Kristen’s total writing time was 139 minutes. Her essay is included in Appendix E.

Kristen’s interview. In terms of her opinion, Kristen initially thought the essay was about medical testing. Once she realized it was about cosmetic testing, she thought that we did not need animal testing because it is not a “life or death situation” for a human, but it could be for the animals. She said that her emotional reaction was mostly to pictures, because of the graphic display of animal suffering.

Kristen said her goal in writing was to convince a reader of her paper that testing was unnecessary. Her overall strategy was to make people see that it is “really silly” to continue testing. Kristen selected information that corresponded with her position, that had statistics or facts, and that could stand up to an opposing argument. She made connections by reading something, keeping the idea in mind, and then reading “something else that went back to it.” She might then return to the first source and see the connections. She organized using an introduction that “grabs attention” and introduces the essay, body paragraphs that give reasons, and a conclusion that “wraps it up” and says “something compelling.”

In terms of her process, Kristen first wanted a “general idea of the topic.” She researched to get an overview and then formed her own opinion. She thought about what would convince other people by thinking of what convinced her. Then she wrote an

introduction, her points, and a conclusion. Kristen decided she was finished when she had proven her point; she did not plan how to use her time.

If she were researching this for personal interest, Kristen would search on Google “anything that popped into my head” and view more photos and videos. Her approach would be less structured. She would not have a motive or a need to have an opinion, so she would be less selective.

Kristen noted that the Internet became popular when she was in Grade 3 and instruction started then. She is always taught to be careful about sources and to avoid Wikipedia, but teachers indicate that students can use it for a general understanding and then use other sources. She finds that Science teachers are more open to using the Internet; History or Politics teachers might prefer that students use books. She said that this may be because science has less bias than history or politics.

I later probed Kristen about images, as she had commented on them earlier. Kristen noted that many sites have images, rather than text. She said that she is a visual learner and is “impacted by images”. She said that using images is a great way to get a message across. She noted that she sometimes uses images or video online to help clarify concepts, particularly in Science. The Internet was more helpful than her sister’s university text, in this way. She also noted that she enjoyed the assignment.

Aisha’s writing.

Session 1. Aisha began by rereading the instructions. She then began researching. Aisha sometimes had the goal of determining specific information, and she would search by specific content search terms, for example, “canada policy animal testing cosmetics.”

Often, though, Aisha's goals were not explicit. Aisha had a very difficult time determining her position on the topic. It appeared that she may have been researching in order to determine her position, though she did not explicitly state this in her think-aloud. Aisha read and viewed several provided sources, as well as sources returned by searching, for example, "[alternatives for animal testing](#)." As she read, Aisha responded to source content, often by paraphrasing what she read. She evaluated sources only very occasionally. While opening Wikipedia, she thought: "It always has good stuff, even though we're not allowed to use it." Aisha read Wikipedia a few times during her search; she sometimes used it as the basis of a topical outline and further research.

Aisha spent a lot of time reading a site (Helium Inc., 2012) on which various people posted "yes" and "no" perspectives on cosmetic testing on animals. Aisha constantly considered ethical issues. For example, she said, "I'm kind of debating in my head right now whether I think, testing should be banned in Canada. But, I think, we've always used animals for, lots of things . . . and if we test on them, it's for humans' good." Aisha compared her evolving position to those presented online and answered rhetorical questions posed by the authors. For example, she answered "yes" to the question of whether we have the right to test on animals. As Aisha read through antitestings positions and reasons, including the European ban, the success of alternatives, and the effects on animals, she questioned her position. She also responded to the content; for example, she questioned whether the alternatives might be more expensive than animal testing.

As Aisha researched, she wrote very brief electronic notes. Each note was one or a few words, often noting a topic or line of argument (e.g., "cruelty"). She searched for

information related to the posts on the “yes” and “no” site (Helium Inc., 2012), for example, “alternatives for animal testing,” and also read provided sources. She thought: “It depends on the type of cosmetics, like beauty cosmetics, it’s not really life or death.” She wrote “medical vs. non medical” in her notes, and then “ok testing, but for medical reasons.” She continued reading and noting arguments, for example, that cosmetics could harm human skin, but that alternatives can predict skin’s reaction.

About halfway through the first session, Aisha asked how formal the essay should be. She searched on Google “persuasive essay structure” and read a description of the persuasive genre. She briefly continued researching and writing brief notes as she had previously. She later commented that she had not written a persuasive essay in a long time. She searched “persuasive essay sample essay.” She read an annotated sample and then copied the annotations to make an outline (Figure 20).

The image shows a screenshot of a web browser displaying a sample persuasive essay titled "To Drill or Not to Drill?". The browser's address bar shows "http://www.pathfinder...". The essay text is as follows:

To Drill or Not to Drill?

The Arctic National Wildlife Refuge is home to caribou, moose, musk oxen, wolves, foxes, grizzlies, polar bears and migratory birds. Leaders in the oil industry believe the refuge is the perfect site for the "environmentally sensitive exploration" of oil. Environmentalists are wondering: What will become of the wildlife?

President George W. Bush, oil-industry leaders and others believe that Americans will benefit from the oil that lies under the snow-filled surface of the refuge. In their opinion, the oil will help reduce high fuel prices and decrease our need for oil from other countries.

I believe the cost of such drilling is too high. I agree with environmentalists who fear that drilling will disturb the migration of more than 130,000 caribou. Each spring, the caribou travel 400 miles to give birth on the coastal plain. In this area of the refuge, there are fewer predators. In

Annotations with arrows point to various parts of the text:

- "The writer includes a title in the form of a question" points to the title "To Drill or Not to Drill?".
- "The writer sets up the issue." points to the first paragraph.
- "The writer briefly states the different opinions on the issue or topic." points to the second paragraph.
- "The writer explains the opposing viewpoint." points to the third paragraph.
- "The writer explains his or her opinion." points to the fourth paragraph.
- "The writer provides facts to support his or her..." points to the fourth paragraph.

Below the essay, a vertical list of writing steps is shown:

- Set up the issue
- State different opinions
- Explains opposing viewpoint
- Explain my opinion + facts

Figure 20. Annotated sample essay used by Aisha (Time for Kids, 2004)

Aisha then stated: "I need facts" and continued reading and viewing sources, and writing brief research notes / a brief topical outline. She also continued to respond to source content, often by paraphrasing, and deliberating on the ethics of animal testing. For example, she thought: "Yeah, saying here the same thing I was thinking. Makeup is not a necessity." Sometimes, she read questions in the sources (e.g., posed by authors on blogs) and answered these. She also planned that she would "find the facts later, I guess, after I've formed my opinion." Aisha often commented on the images; for example, after seeing an image of a baby rabbit, she thought: "No. This is so hard."

Throughout this phase, Aisha used the structural notes in combination with the sources to guide her brief content notes and her searching. For example, she read what she had written “state different opinions” and then wrote beside “human life is more sacred than animal life vs. the rights of both.” For another example, she said, “I should have the opposing opinion and attack it. So let’s look more at the opposing opinion,” and then searched “debates animal cosmetic testing.” She sometimes planned her process, for example, what she would look for next or what sources she would consult next. She noted that her notes could be messy and she could be eloquent in her essay. She made metacognitive comments; these had to do with her understanding or the fact that she was trying to think through and decide on her position.

Aisha read a source that said there were no alternatives [not accurate], and she said, “Oh, I’m so gullible,” presumably meaning that she had believed there were alternatives [accurate]. Aisha read her outline, “set up the issue,” and began writing electronically in point form. For example, she wrote: “animal testing does not have alternatives.” She commented that her points were contradictory.

Aisha said that the argument that animals’ reactions did not predict humans’ reactions made the essay irrelevant, so she decided to ignore it and deleted the reference to it from her notes. She finished the session by laughing and saying: “I will come back next time and start writing! I just need to organize my brain now. I think tonight I’ll go home and think about this. And have my opinion set! I’ve never actually thought about this before. So I need a moment of not thinking for the truth to descend upon me.”

Session 2. In the second session, Aisha began by planning and evaluating her process. She reread her structural notes and said, “I’m going to set up the issue . . . I need more information on the structure.” She then searched for more information about the persuasive genre “persuasive essay structure.” Aisha read a source returned by the search and typed a few brief sentences in point form. She then returned to Wikipedia, to read about testing, and consulted its links. She noted that she shouldn’t necessarily trust it. Throughout this time, Aisha sometimes planned her immediate next steps, for example, what she would search next.

Aisha then began drafting her essay. She drafted electronically, in the same document and on the same page as her notes / outline, but above them. She sometimes drafted in the sequence in which the text appears in the final draft and sometimes out of the sequence in which the text appears in the final draft. In general, she focused on one paragraph at a time, and did all the research and writing for that paragraph. The topics of the paragraph were determined by the rhetorical subgoals in the outline she had copied from the genre description. She would read a section of the outline and search according to that section. For example, she read her outline and thought: “State different opinions. Yeah I need to do that more,” and then searched using content and rhetorical search terms “debates animal cosmetic testing.” Her essay content came from any existing notes as well as the sources she reread and researched for. She alternated quickly between researching and writing. Aisha also sometimes researched in order to confirm information she was adding to her essay.

As Aisha read, she retrieved pages via links. She constantly responded to the source content, often by paraphrasing what she had read, and then sometimes responding with her own opinion or position. She read Wikipedia for a definition of cosmetics. While drafting, she often reread her draft and thought through or reflected on the text; for example: “It sounds like I’m preaching.” Twice, she copied material from sources directly into her draft. She garnered structure from her outline. She also planned the structure as she read her notes and as she drafted; for example: “I should leave that ’til the end, when I attack the cons.”

As she drafted, Aisha used word-processing functions to indicate areas to which she wanted to return (e.g., by creating an underlined space), and edited and made midlevel revisions. The midlevel revisions consisted of adding, deleting, and sometimes moving clauses and sentences, in order to improve the text in various ways. For example, she added a sentence that elaborated on why cosmetics testing should be banned. In another paragraph, she deleted a sentence about animals being used in medical, breeding, and defence research, because she did not need it. In yet another paragraph, she moved a sentence about Canada’s policy to the introduction, as she thought it fit the content there. Approximately halfway through the session, she moved a section of her text to a different place in the essay. This was done because both sections were about medical research.

Throughout the session, Aisha planned and evaluated the process; typically, she planned her immediate next steps, for example, to reread or what to search for next. She evaluated in terms of what type of information she needed. For example, she said, “I need facts, to back up my argument.” Aisha also evaluated the process as she read

through her outline; she would make a statement such as: “So, I’m done with that” and delete the relevant subheading in the outline. She sometimes considered the assignment (e.g., “They probably know, the government official . . .”) and made metacognitive statements (e.g., “What was that thing I wanted? It was in the back of my head.”).

Session 3. Aisha began the third session by rereading her essay. This morphed into a revision-and-drafting phase, in which she added a considerable amount of new text (perhaps two half-paragraphs). She reread her existing draft, reread sources, and researched and read new sources. She drafted electronically, composing text in and out of the sequence in which it appears in the final draft. She sometimes used the outline for content and structure, but just as often, it was not clear that she was relying on them. She searched for sources as she had previously, using content and rhetorical search terms. Though Aisha often worked on a paragraph at a time, she also added information to other paragraphs quite often, usually after reading it in a source.

As Aisha read, she responded to source content, by paraphrasing and/or restating her opinion in response. On Wikipedia, she read about the 3-R model (reduction, refinement, replacement, of animals as test subjects; Russell & Burch, 1958). She then attempted to follow Wikipedia’s resources and ultimately searched for more about the model using the search terms “debate animal testing three r/s”. The information she read appeared in her essay. As she drafted, she used an electronic thesaurus, edited, and made midlevel revisions. The midlevel revisions consisted of slight changes in wording, which altered the local meaning slightly.

Aisha spent the last twenty minutes revising her existing essay. She edited and used an electronic thesaurus. She made midlevel revisions, and also made two global revisions; these consisted of moving paragraphs to a different location within the text. She briefly returned to the online description of persuasive writing. She then summarized each paragraph, according to its rhetorical purpose: “Okay, so set up the issue.” Presumably, she was confirming that her essay fulfilled the rhetorical structure. Her total writing time was 170 minutes. Her essay is presented in Appendix E.

Aisha’s interview. Aisha tried to be as logical as possible in forming her opinion, and not let her emotions overcome her; she was quite affected by the images and pictures. She also consulted friends and family about the topic.

Aisha’s goal was to be as persuasive as possible, so she tried to include almost all of the information that she found on the Internet. Aisha said that she did not have an overall strategy. She normally does her “essays really messy: papers everywhere and random points.” She noted that she did write an introduction, and that the essay worked without really planning. Aisha selected information that made sense to her and supported her argument. Aisha asked for clarification about what I meant by connecting. Her response was inaudible, other than noting something about looking across sources. Aisha organized her essay by looking on websites for appropriate structure.

Aisha said that a large part of her process was trying to formulate her opinion. She read people’s opinions online and went home and discussed the topic with family and friends. After the first session, Aisha thought that she was limited in terms of time. She said that she therefore knew she had to write in the second and third sessions. When

Aisha thought she was finished her essay, she reread it “as though I was more passionate about the other opinion and asked, hmm, what’s she saying, and why?”

If Aisha was researching this for personal interest, she would have gone to more websites and would have looked at more images. She avoided images sometimes, because of the nature of the assignment. She found that images affected her, but that that was not appropriate to the assignment. When writing school assignments, she often writes points or thoughts on paper and writes more instructions to herself than she did here.

In terms of writing instruction, Aisha has been taught not to use Wikipedia. The remainder of her answer was inaudible. Aisha added that she really enjoyed the assignment.

Rebecca’s writing.

Session 1. Rebecca began by reading Wikipedia; it “isn’t good for actually sourcing in essays, but it’s good for a basic outline.” She made note of information and potential arguments while reading Wikipedia; these surfaced in later research and writing. Rebecca then wanted to learn about Canada’s policy, the current situation, and other people’s opinions. She continued reading provided sources and sources returned by searches. In her searches, she sometimes combined rhetorical and content search terms, for example, “why animal cosmetic testing should be legal.” She explicitly evaluated and selected sources as she researched, typically in terms of credibility. For example, when clicking on Health Canada’s site she said, “‘K, this is obviously a credible site, ’cause it’s our government one. I always try to stick to sites like this, ’cause you don’t want to be

sourcing sites that are made by some person in their basement.” In the first five minutes, she wrote some electronic research notes and copied and pasted some information into them. She did not use the notes further.

Rebecca was unsure of what she wanted to argue; thus her researching may have been to support the formation of an opinion. She searched for information to support each side, and indicated that the amount of information would determine her position. For a little while, she pursued an antitestng position, conducting searches such as “alternative cosmetic testing on animals.” She responded to content, typically in terms of paraphrasing what she read. She made metacognitive comments. For example, she said, “This is very confusing. I don’t understand what any of this is, so I’m going to look up why animal testing should be used, ’cause I feel like it’s easy to argue, and I might argue that.” She began to search “why animal testing should be (used)” but Google suggested “banned” rather than “used.” So she searched that: “Actually it’s suggesting it, so maybe it’s going to give me some more information. ’K, so this is kind of what I was looking for before.” She wanted a site where normal people gave their opinions. She read Yahoo! Answers: “It’s not a site that I would ever credit, because it’s not, they don’t seem to be people who are knowledgeable in the field, but it helps me get a grasp on what the different opinions are.” Rebecca continued researching; she remained extremely frustrated by the amount, type, and quality of sources.

As Rebecca researched, she constantly planned and evaluated the process, often in terms of what she needed to do next, for example, what she would look up, or that she had to form an opinion. She planned how she might use source content in her essay, and

made metacognitive statements. Her metacognitive statements had to do with her (lack of) understanding and the fact that she found the process somewhat difficult and frustrating.

Partway through, Rebecca planned: “I’m going to try to start writing potentially and I think I’m going to say animal testing should not be allowed in Canada. And I think it’s good to open with just some general statistics, or what’s going on now and then say why it shouldn’t happen.” Rebecca searched “cosmetic testing on animal stats in Canada.”

Rebecca began drafting her introduction: “I think I should just start writing, ’cause it’s a good way to get thoughts down. ’Cause right now, I feel very overwhelmed by all the information.” Rebecca drafted several introductory sentences, alternating between reading and writing. Rebecca planned that she wanted to form some basic arguments. She read a source and planned the argument: “Okay, so a basic argument is that it’s inhumane, obviously.” That became the topic of her first body paragraph.

Rebecca drafted her first body paragraph, and then began drafting her second paragraph, about the expense of animal testing. While working on these paragraphs, she alternated between researching and drafting. Rebecca essentially worked on one paragraph at a time, and drafted the text in the sequence it appears in the final draft, though she also added information into the appropriate paragraphs as she found it (i.e., she also drafted out of the order in which the text appears in the final draft).

She searched using specific content search terms (e.g., “how many animals a year die [Google suggests] from animal testing”) and joint rhetorical and content search terms

(e.g., “animal testing cons”). She selected sources according to relevance, credibility, and reputation (e.g., she noted that PETA is credible and well known). She rejected sites based on irrelevance, not being credible, and not providing sufficient depth of information. As she read and skim-read, she responded to source content, often in terms of paraphrasing or critiquing (e.g., for not providing a clear explanation), and planned arguments. She sometimes followed sources’ internal links.

At one point Rebecca thought: “This is the time in researching when I would probably go to the library and try to find books on it, ’cause I’m finding a lot of sites that are just kind of surface sites, and also sites that don’t seem to be, don’t have accurate information.” At another point, she noted she was going to use information, even though it was from a site she didn’t consider credible, because she didn’t feel like looking elsewhere. But she continued reading, and made the intertextual connection: “That’s the second or third site I’ve seen that says it’s [animal-testing numbers] not tracked.” She sometimes copied and pasted material into her essay.

Rebecca sometimes set goals for content before researching the relevant details. For example, prior to writing the second body paragraph, she read that animal testing was expensive. She noted that it would be nice to compare the cost of alternatives to the cost of animal testing, and then spent several minutes attempting to find relevant information via specific content. For example, she searched using the terms “cost to get animals for testing.”

As Rebecca drafted, she thought through text, for example, noting that she didn’t want to repeat things. She edited accordingly, making low- and midlevel revisions, and

occasionally used the word-processing functions. See Rebecca's in-progress essay in Figure 21. Note the first sentence, which is not yet connected to a paragraph, the partially completed paragraphs, and the material that has been copied and pasted (its type font is different).

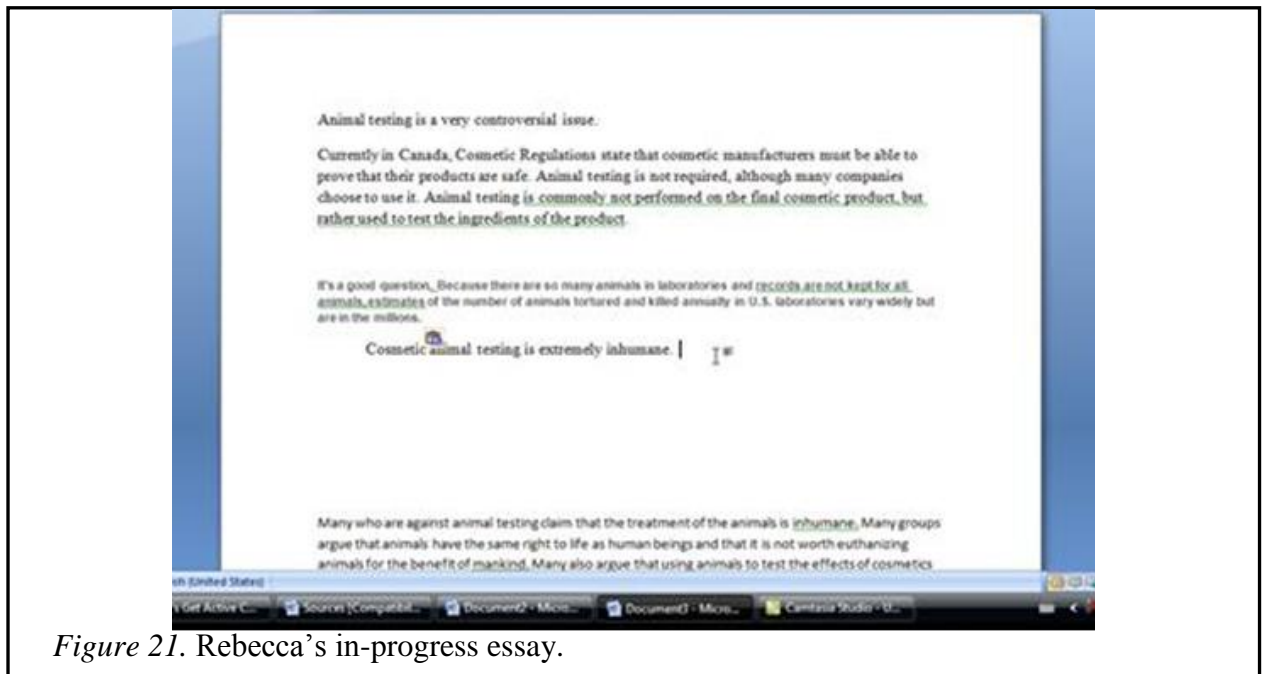


Figure 21. Rebecca's in-progress essay.

As Rebecca drafted, she constantly planned and evaluated the process, and made metacognitive statements. As during researching, her planning and evaluating had to do with what she needed to do next, or the fact that she was struggling. Her metacognitive statements had to do with her understanding of the topic and subtopics.

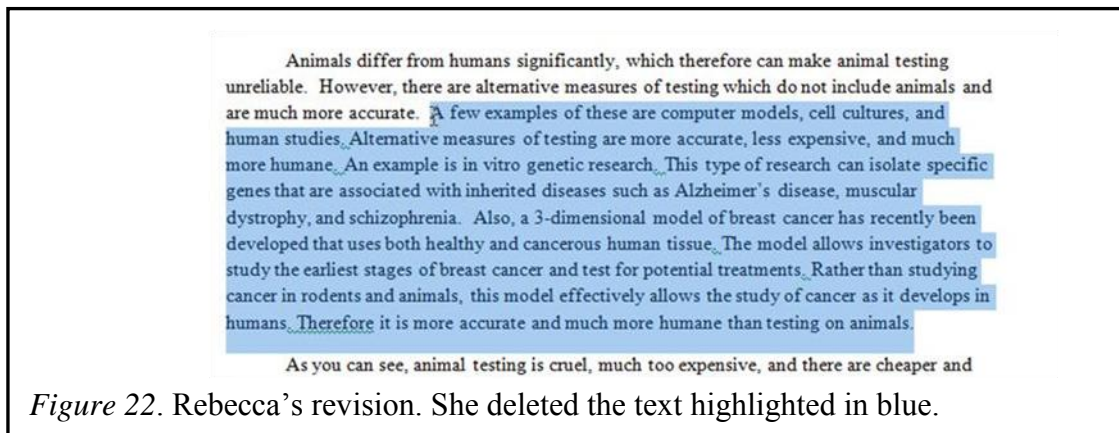
Session 2. Rebecca began her second session by rereading her essay, to refresh her memory of the text. She then continued drafting. She drafted electronically, working on one paragraph at a time, but not in the sequence the text appears in the final draft. She drafted more text in her first body paragraph (inhumane), then in the third (alternatives),

then in the introduction, then in the first, then in the third, and then in the second (expense). Although she focused on one paragraph at a time, she would add information to other paragraphs as appropriate.

Rebecca reread sources and researched in order to draft. She would search according to the paragraph on which she was focusing. She searched for sources using specific content search terms, for example, “percentage of people who disagree with animal testing in Canada,” and, occasionally, via links in sources or internal searches. She also went directly to a known site, that of Statistics Canada. She responded to source content, in terms of identifying the information she needed and/or paraphrasing and/or critiquing the site (e.g., for not explaining the reasons behind something). She explicitly evaluated and selected sites according to relevance and sometimes, credibility. She once made an intertextual connection, noting that information was common across websites.

As Rebecca drafted, she thought carefully through the text she was writing. She edited as she wrote, often using word-processing functions, and made some midlevel revisions. For example, she said, “I don’t want to sound like, I’m not sure what I’m talking about, so I want to take out ‘can be considered torture’ and put, ‘*is torture* [emphasis added]’ because if that’s what I’m arguing, I should make that clear.” She also made two global revisions, one in which she combined paragraphs and one in which she deleted almost an entire paragraph “‘cause I feel like what I said really doesn’t relate to cosmetic testing, the example I gave” (Figure 22). Rebecca replaced the material with information about the 3-R model, about which she had just read (see her final essay in

Appendix E). As Rebecca drafted and revised, she planned and evaluated her process, in terms of her writing progress and the effectiveness of her searching.



Finally, Rebecca thought she would “read this thing over and make sure it flows.” She read it and made minor edits. Rebecca’s total writing time was 111 minutes.

Rebecca’s interview. In terms of her position before this activity, Rebecca “wasn’t too informed about animal testing; but [she] kind of didn’t really agree with it.” She thought “why is that?” and had to look it up. She found that there were many more sites about why we should not test on animals, so she decided to take that position. She would have argued in favour of animal testing if she found more information to support that position. She did not have a strong emotional reaction to the topic, although the descriptions of the tests were “gross.”

Rebecca’s goal was to “show that animal testing is not the best way to, it’s not good. Like Canada shouldn’t have animal testing, and prove why, instead of just saying it’s bad.” She said that she did not have an overall plan or strategy. She tried to select information from sites that were credible, and information that was included on two or more sites. She connected information by including information that was the same, and

by deciding which of different information was better. She organized her text according to the structure she had been taught in school for essays: an introduction with the last two sentences indicating arguments, paragraphs, and a conclusion.

Rebecca reported that her process was to first determine what Canada's current policy was, and what different viewpoints were, so that she could figure out what she wanted to argue. She then researched for proof for her arguments and wrote as she researched. Whenever she found information, she would include it in her essay. She edited the essay afterwards. She did not plan how to use her time.

If Rebecca were researching this for personal interest, she said that she would just research and maybe make some notes, but would not write an essay. Her sources would be the same. For most school assignments, Rebecca goes to the library and consults books, as she finds books easier than the Internet. That is because all the information can be in one place. When I prompted her, she reiterated that books have tables of contents and indices to facilitate information retrieval.

Rebecca noted that she has received some instruction from the librarians, in terms of determining which sites are credible. The librarians also provided databases. This occurred as part of scheduled visits during English, History, and Politics courses. She noted that that was "about it."

Writing Instruction at the Participants' School

Recall that I interviewed the English Department Head, "Paul," about the school's writing instruction. I began by asking Paul to describe this school's English program.

Paul noted that what they read in all English courses is “literature”; however, they focus on literacy skills in their program, rather than the particular content of what they read.

We discussed Grade 12 University Preparation English, which all participants took. In the class, there is almost daily writing in some form. They practice formal and informal note taking and writing. A typical and informal in-class assignment would be to respond to the prompt: “write me two paragraphs on” More formally, they write critical literary essays, in response to questions such as: “Why do you think Hamlet treats Ophelia this way?” They write their answers in class and use them as the basis of discussion. Daily writing is assessed informally, in terms of who is writing and who is not. Students often share ideas, and the teacher is circulating. These in-class writings are sometimes handed in for feedback.

The students in Grade 12 University Preparation English also have one or two more major, ongoing, culminating assignments. These consist of major seminars and a major research project. Students can use primary sources and sometimes a summary source if need be. Paul noted that they need to use “books *and* their brain.” In these assignments, they start to move towards an appreciation of the intrinsic value of content. With the major assignments, students use sources but do not receive marks for using sources. They can use a library database or consult the librarians for help with selecting good sources.

All of the writing that is done in Grade 12 University Preparation English has a persuasive component, in that students have to have and support a thesis. In English, the evidence would usually come from the primary source, for example, the novel that they

are studying. The students also do a lot of persuasive writing in courses such as History and Politics, Paul noted. Across the curriculum, they write persuasively from a single source and from multiple sources. Paul said that they are considering restructuring the major English assignment next year, to something other than a literary essay. This is to meet the growing interest in the school in more science- and math-focused career paths. Paul noted this is in part due to changing cultural demographics within the school.

In Grade 12, Paul notes that they are trying to “un-teach” the five-paragraph essay. He noted that it is as though it becomes its own genre, and students “immediately go there.” In Grade 12, they try to experiment with, and branch out from, this structure. The teachers are also more flexible about length, emphasizing that essays should be as long as they need to be “to do their job.” The teachers also become more “picky” about proof, and insist that students demonstrate *why* their thesis statements are true. Another strategy teachers begin to develop in the students is to consider how an essay will be received by a “hostile audience”; any loose thread could be discovered.

Some of the student participants also completed a course in The Writer’s Craft. Paul noted that this is a more idiosyncratic course. There is a focus in the course on creative modes, for example, poetry, short fiction, monologues / dialogues, children’s fiction, and satire. In The Writer’s Craft, they sometimes retrieve a poem from the Internet, and critique it. In the major research project, each student focuses on a body of work by one author. This can be sourced in print or electronically. One of the goals of the course is to understand literary criticism and to begin to be able to apply it to one’s

own work. Another goal is to understand the value of a variety of research forms, for example, talking to your grandmother about her experiences.

Summary of Results

To summarize, participants used one of three overall writing processes. The first was a process in which participants gathered and structured content into an outline, and then drafted the text from the outline. The second was a process in which participants gathered content into notes, structured it with a brief outline, and then drafted the text from both documents. The third was a process in which participants focused on one paragraph at a time, and interwove the researching, drafting, and review of that paragraph.

Certain elements of participants' processes will be particularly important to keep in mind, in order to understand the discussion. In each of the three processes, participants developed a claim about what Canada's policy on cosmetics testing on animals should be. What participants read on the Internet influenced their claims and supporting reasons, and participants' claims and reasons influenced their subsequent Internet research. While researching, participants searched using very specific search terms as well as terms that combined content terms with rhetorical terms. Participants consulted a wide range of sources that represented a variety of perspectives on the topic. They evaluated and selected material carefully, and often considered content in terms of its relation to their essays.

Participants organized in a variety of ways, including the use of notes, outlines, mental plans, or introductions. Sometimes they created documents electronically and

sometimes they created them in hard copy. Participants could also print electronic documents. Participants sometimes commented on the value of the particular strategies that they used.

When drafting, participants drew content and structure from a particular combination of notes, outlines, mental outlines, introductions, previously read Internet source texts, and/or newly read Internet source texts. Some participants drafted the text in the order it appears in the final draft and others drafted it out of the order in which it appears in the final draft. Several participants used electronic functions (e.g., bolding, colouring, underlining) while drafting. Participants often thought through their text carefully, both as they drafted and as they reviewed. Reviewing occurred during drafting and following drafting.

All participants had significant exposure to genre-based writing instruction in school, as well as significant instruction on how to find and evaluate Internet sources. They indicated that they had less instruction on how to write from the Internet, in terms of processes or strategies. The head of the English Department indicated that the school's writing program emphasized influenced literacy skills over particular content and that students often wrote in the persuasive genre.

Discussion

The purpose of this study was to address the question, *What are students' processes, strategies, and operations for writing arguments from online sources of information?* The Discussion will focus on two distinctive contributions of this study. First, the strategies of participants were similar in that they demonstrated translation between content and rhetorical problem-solving spaces (cf. Bereiter & Scardamalia, 1987). Often, this translation occurred during researching and it was apparent through students' Internet activity. Second, participants constructed unique task environments, which supported different processes (cf. Hayes & Flower, 1980). It will be argued that the task environments and the strategies used maximized the affordances and minimized the constraints of the Internet, the electronic writing medium, and human cognition. Within the discussion of each contribution, I will consider how it connects to and extends prior research. Following the discussion of these two contributions are sections on the educational implications of the study, analysis of method, and future directions.

Translations between Content and Rhetorical Problem Spaces

Recall the crucial element of Bereiter and Scardamalia's (1987) knowledge-transforming model; in expert writing there is a problem translation from the content problem space to the rhetorical problem space and vice versa. The current research extends Bereiter and Scardamalia's (1987) and subsequent research (e.g., Spivey, 1997), by demonstrating that this translation occurred during participants' *researching*, as well as during drafting and reviewing phases. The translation was seen in participants' Internet activity.

Translations between content and rhetorical problem spaces, during researching.

Construction of a claim.

In this project, participants developed a claim about what Canada should do in terms of its policy on testing cosmetic products on animals. Participants' high-level goals contained both rhetorical and content elements (cf. Bereiter & Scardamalia, 1987).

Participants began with a rhetorical goal—to develop and persuade the reader of a claim. They drew this rhetorical goal from the assignment. A cognitive interpretation is that the assignment triggered a scheme for persuasive writing, focused on making a claim. This was evidenced by the fact that participants immediately referenced their existing claim or the fact that they needed to develop one; when they referred to it explicitly, they called their claim an “opinion” (Ishaan, Abbey, Aisha), “thesis” (Mark), “standpoint” (Abbey), or “argument” (Joy). In their interviews, many participants indicated in passing that their knowledge of the genre, their schema, had been learned in school (Kieley, Sarah, Rebecca). For Aisha, who was unfamiliar with the genre, the Internet provided a means to develop a template for persuasive writing.

Recall the idea that when writing from sources, a writer must sometimes reconcile differing or even contradictory positions and formulate a new macroproposition representing the writer's opinion or position (Segev-Miller, 2004, 2007). These participants had the rhetorical goal of developing a claim (genre-specific macroproposition), as discussed above. In order to do so, many participants began by researching on the Internet. That is, their rhetorical goal to develop a claim drove the

search for content; they wanted content that would allow them to explore the topic and other people's opinions on it. Mark, Kieley, Kristen, Aisha, Abbey, and Rebecca all explicitly did this. They read sources that would provide a general overview (e.g., Wikipedia) or they searched for content that would outline different perspectives. For example, Aisha searched "debate animal testing" and was able to read a site (Helium Inc., 2012) on which people posted opinions on either side of the animal-testing issue. Recall Nussbaum's (2005) finding that "exploring an issue" was linked to more extensive reflection than simply "persuading" the reader. Thus, one possible interpretation is that the Internet facilitates the exploration of different perspectives and suggests that it may have a positive effect on students' thinking.

Participants drew the rhetorical element of their goal from the assignment, but they *constructed* the content element of their goal—what Canada's policy on cosmetics testing on animals should be. Some participants constructed it based on existing beliefs about the topic ("My opinion on it would be that I don't agree that animals should be tested on, cosmetics, so that's kind of the viewpoint I'm going to look in to," Sarah). Others constructed it from Internet content ("That kind of provided an overview of the whole topic. And immediately I think that it's, that it should be banned," Ishaan). Still others constructed it based on both existing beliefs and on Internet content ("This website's kind of giving me more information and a better understanding, that, I'm starting to rethink, that, perhaps, animals may be, I don't know, do need to be used and tested on, but maybe in combination with other alternatives, since, Health Canada states that . . .", Joy).

As they developed and fine-tuned their positions, in keeping with their rhetorical goal, students sometimes came across content that changed their positions quite significantly. That is, in attempting to meet their rhetorical goal, participants worked in the content space, and sometimes had to rework their own beliefs and knowledge (cf. Bereiter & Scardamalia, 1987). Aisha realized that cosmetics denoted only beauty / hygiene products, and developed a much stronger antitesting position. Likewise, Kristen changed her newly developed pro-testing position to an antitesting position, when she looked up the meaning of cosmetics. Joy modified her initial antitesting position based on what she read about human safety. These changes happened during the planning of the text (Aisha, Joy), or very early in the drafting of the text (e.g., 30 seconds, Kristen). Here, again, is the interplay between source material and one's own ideas and opinion.

In meeting the rhetorical goal of developing a claim, participants used the synthesizing strategies identified by Nussbaum (2008): synthesizing existing arguments into a new argument, weighing arguments, and refuting counterarguments. They synthesized existing arguments by placing conditions on their claims, such as the condition that their antitesting position applied only to cosmetics testing (Abbey). Based on what they read in sources, participants weighed arguments in terms of the rights of animals versus the rights of humans (Aisha) and/or the value of their lives and safety (Abbey, Kieley). Again based on what they read in sources, participants (e.g., Aisha) sometimes also considered issues such as the fact that many people eat meat, wear leather, and so on. In addition to an ethical weighing, participants (Mark, Rebecca) determined their position in part on the basis of how *much* information there was

supporting each position. Some also used the strategy of refuting the counterarguments, by providing an alternative solution. For example, Kieley refuted the counterargument that animal testing is needed to ensure human safety, by suggesting the use of alternatives instead. This suggests a hybrid genre, in which problem-solution is used to support argumentation. Within each of these three synthesis strategies, there is a dynamic interplay between material across sources, and students' own ideas and ethics. Note that one student (Sarah) used the strategy that Nussbaum (2008) called a nonintegration strategy, in that she chose a side and supported it, without reference to the counterargument. Note that in developing their claims, participants were working in the content problem space.

Other ways of developing claims were also observed. Sometimes the development of the claim was idiosyncratic. For example, recall that Kristen was going to search for arguments in favour of animal testing, but Google (Google Inc., 2009) suggested "banned" rather than "used" as a search term. She accepted the suggestion, found information to support its ban, and made her claim an antitestng one. In this instance, the Internet search engine seems to prompt a direction for research that actually shaped the participant's claim.

Once participants had developed the content of their claim, this was translated back into the rhetorical problem space, in that participants tried to prove that claim. For example, recall that Rebecca said her goal was "to show that animal testing is not the best way to, it's not good. Like Canada shouldn't have animal testing, and prove why, instead of just saying it's bad." Rhetorical elements included "to show," "to prove," and not "just

saying.” Content elements included “animal testing is not the best way” and “it’s bad.” Based on their Internet research and on their own opinions and ideas, all students ultimately constructed a claim arguing that Canada’s policy should be to reduce or ban animal testing; some had conditions on this claim.

To reiterate then, participants began with the rhetorical goal of developing a claim. This goal led them to search for content, reflect on content, sometimes modify their claims, and synthesize existing arguments into a new claim; such activity occurred in the content problem-solving space. Once they had developed their claim, participants moved back into the rhetorical domain, in that they wanted to prove that claim. This research extends Bereiter and Scardamalia’s (1987) research, in that participants’ rhetorical goals led them to explore and synthesize *Internet* content. These findings also confirm the identity of these students as expert writers, as they did not seem to struggle with integrating information as was the case for writers in other studies (Mateos et al., 2007; van Meter & Firetto, 2008).

What is of particular importance is the fact that for all students, the development and refinement of claims appeared to depend on the affordances of the Internet. In particular, the amount and variety of information on the Internet allowed students to first explore perspectives and content from a variety of individuals, groups, and geographic regions, and then to develop or modify their claims based on what they read. For example, one of the most influential findings for students was the fact that Europe had recently and successfully instituted a ban on cosmetics testing on animals (Canadian Federation of Humane Societies, 2011; Leaping Bunny, 2009). The Internet allowed

students to search for and read European documents to learn more about the ban.

Information on another country's cosmetic-testing policies would not likely be available in hard copy in a typical school library. Thus, the variety and scope of students' claims were facilitated by Internet access.

Generation of the macrostructure. Participants were similar in that once they had developed their claim in the content problem space, their rhetorical goal was to develop reasons to support the claim. Together, the claim and reasons formed the macrostructure of their texts. Most participants indicated their desire to develop reasons early in their think-alouds (reasons were also referred to as "arguments" or "points"). For example, Ishaan thought: "Okay, so to start off, I think I'll just, start off by writing a brief summary of like some of the points why I think it should be banned." Later on, participants would focus on developing an introduction and a conclusion.

A cognitive interpretation is that participants drew a genre template from long-term memory; this template consisted of an introduction with their claim, (three) supporting reasons, and a conclusion (cf. Fulkerson, 1996, in Nussbaum, 2008). This interpretation is supported by the fact that participants reiterated their goals for the macrostructure and explained the macrostructure more clearly in their interviews. For example, Rebecca said:

I've always been taught, an introduction, that kind of grabs your attention. And then, um, at least introduce what you're going to be saying, in your introduction. And then, um, give reasons for that, so the body paragraphs. And then, the

conclusion, just kind of wrap it all up. And then add something to the end, that would kind of compel the person to do something about it.

Note that the inclusion of three supporting reasons is a rhetorical goal, as are the goals to introduce the topic, grab a reader's attention, and say something compelling in the conclusion. Participants' genre schemas shaped the macrostructure of their texts, in that the "introduction" became an introductory paragraph, each "reason" became a body paragraph, and the "conclusion" became the final paragraph in the text (cf. Fulkerson, 1996, in Nussbaum, 2008).

To meet the rhetorical goal of having a text consisting of an introduction, supporting reasons, and a conclusion, participants turned to Internet content (e.g., Mark wanted to go "back to sources that I had, and get some major points that I can use"). They worked in the content problem space, as they read and responded to Internet sources. Participants developed the content of their main reasons in a variety of ways. Most often, participants read sources with an eye to content's rhetorical potential (e.g., "Those [the existence of alternatives, as read on Wikipedia] are good arguments for the theory that animal testing's not necessary," Joy). At other times, participants constructed their own arguments by synthesizing information from different sources. For example, Joy read about the existence of alternatives and later read about Canada's laws on animal cruelty. She then constructed a potential argument: "Under cruelty to animals, causing unnecessary suffering, I guess you could argue it's unnecessary suffering if there's alternatives to cosmetic testing, which would mean that anyone who did so was guilty under the law" (Joy). In each case, participants' rhetorical goal of supporting their claim

was leading to subgoals related to the selection or transformation of content (cf. Bereiter & Scardamalia, 1987). That is, they selected content that fulfilled the rhetorical goals of proving their point and persuading their audience, by having supporting reasons.

Most notably, because the Internet is so different from print, participants could also search it to locate *existing* reasons to support their claim. That is, they could search using terms that combined content terms with rhetorical terms (e.g., “animal testing cons.” Rebecca). These searches returned content that was already framed rhetorically and could easily be used as a reason to support their claim. In Aisha’s case, her macrostructure initially contained rhetorical goals (e.g., “set up issue”; “state different opinions”), but not content. As she began each paragraph, she used the rhetorical goal (e.g., “state different opinions”) as a guide, and then searched using terms that combined rhetorical terms with content terms (e.g., “debates animal testing cosmetics”). These searches returned content that supported the rhetorical goals of her outline.

In addition to being able to search the Internet to locate content that supported their claims, participants could use the content-rhetoric search potential of the Internet to support their refuting of counterarguments. For example, Kieley searched for pro-testing reasons (e.g., “arguments for cosmetic testing on animals”) in order to refute those arguments (“If I can find pros, then it’s easier to find, like a way to argue against it”). That is, she wrote her paragraphs around “perceived notions of why we can’t [stop animal testing]” and then “why those aren’t necessarily true” (Kieley, interview). The addressing of counterarguments is a feature of more sophisticated argumentation, used by older and more expert writers (Crammond, 1998). The amount of information available on the

Internet, combined with search engines' (e.g., Bing, Microsoft Corporation, 2012; Google, Google Inc., 2009) ability to search using terms that combine content with rhetoric, appeared to facilitate this approach.

The fact that one can search using content and rhetorical terms and find existing arguments on the Internet has the potential to affect students' learning and thinking. Despite the potential to borrow existing arguments, *these* participants still constructed their own. It is possible, though, that other writers might exploit the possibility of borrowing a ready-made argument and that this might negatively affect their thinking and learning.

Though researchers have noted that students' genre schemes can influence prewriting activities (e.g., Spivey, 1997), such a relationship between writing genre, rhetorical goals, and Internet searching has not previously been demonstrated. Nor has the strategy of searching by content terms and rhetorical terms been demonstrated previously, to my knowledge. The fact that rhetorical goals and text schemes affect searching to such a degree suggest that future research on students' search strategies ought to focus on search strategies for particular tasks.

Generation of the microstructure. Once participants had constructed their claims and main reasons, they conducted more fine-grained searches for content in order to fulfill the rhetorical elements of the microstructure. That is, participants had the rhetorical goals of including such elements as “subpoints and proofs” (Mark), “supporting details” (Ishaan), “proof” (Joy), “examples” (Sarah), “facts” (Aisha), and “facts to back up argument” (Abbey). These rhetorical goals then drove content subgoals, in that

participants had to search for and locate content that satisfied the rhetorical goals (cf. Bereiter & Scardamalia, 1987). The degree to which participants planned these in advance of, as opposed to during, drafting, was a significant difference. It will be discussed in the next section. Here, the discussion will focus on strategies that were similar across processes.

In order to generate the microstructure of their texts (determined by rhetorical goals such as “I need facts,” Aisha), participants often searched using terms that corresponded to the content of their main reasons (e.g., “conditions of animals during cosmetic testing,” Sarah). Participants would then retrieve and read content, and include relevant content in the paragraph focused on that reason (“So, here’s an example [of inhumane conditions] of three rabbits, in ½ foot by 1 foot cage,” Sarah). Occasionally, participants also searched for particular *types* of microstructure content, using search terms that combined content and the type of content (e.g., “cosmetic testing on animals quotes,” Kristen).

Sometimes, participants were able to determine in advance what microstructure content would support their arguments, and search specifically for that. Their goal then would be to confirm what they already knew to be true or to provide more detailed information. For example, recall that Kieley constructed a macrostructure based on refuting counter pro-testing arguments. One of the pro-testing arguments was that it is economically beneficial to test on animals. Kieley read about companies that do not test on animals, and knew from previous experiences that these companies were very

successful. So she searched in order to determine their profits, and used that information to refute the argument that animal testing is necessary for financial success.

When *selecting* content from searched-for sources, participants also adhered to rhetorical goals such as convincing their audience. For example, Kristen said in her interview that she selected content that convinced her of her opinion, thinking that would also convince her audience. Kieley thought: “I’m trying to think about, if we’re looking at it from the perspective of writing to a government official, what’s going to be the most effective argument?” That is, participants tried to select content that they believed would be convincing to the particular audience at hand.

Participants did not just select existing content. Rather, they transformed source content which they read into the type of microstructure content that would support their reasons and thus their claims (i.e., to meet rhetorical goals). For example, in one of her body paragraphs, Kristen changed the percentage-based statistic on animal testing to a number, as she thought the number better supported her antitesting claim.

It was not just the content that was searched for and selected according to rhetorical goals. Participants also selected *sources* that a reader would find credible. This was evident when participants (all except for Abbey) used sources themselves (e.g., Wikipedia), but wouldn’t cite them because they would not *appear* credible.

The fact that students’ macrostructure could drive their researching for microstructure content depended on Internet affordances. Specifically, it depended on the sheer amount of information available (Adair & Vohra, 2003; Duff, 2001); participants could trust that the Internet would have information relevant to almost any content search.

This meant that students (Ishaan, Sarah) could form arguments on the basis of fewer or less credible sources, and then turn to more credible sources for supporting details. In fact, students could have a position prior to ever researching the topic online (Joy, Abbey, Kieley, Sarah) and search to find supporting information effectively.

In print-based writing from sources, writers are restricted in that they often have access to a fairly limited pool of resources. This has especially been the case in writing-from-sources research (e.g., Kellogg, 1988, 1990; Kirkpatrick & Klein, 2009; Risemberg, 1996; Spivey, 1997). It thus makes sense to base arguments on material the writer knows is available. Put another way, in print-based writing from sources, it is prudent to construct the macrostructure based on microstructure content the writer knows is available. For even with an unlimited pool of print sources, one could not search efficiently for the proverbial “needle in the haystack,” as is at least possible with the Internet.

In sum, then, this research extends Bereiter and Scardamalia’s (1987) knowledge-transforming model, by demonstrating the translation between content and rhetorical problem spaces during researching on the Internet. Participants’ rhetorical goal to develop their claim drove the search for and interaction with Internet content, in the content problem space. Once a claim was developed in the content space, participants’ rhetorical goal was to prove the claim, by having a macrostructure that included supporting reasons. This led back to the content space, in that participants searched for, read, and transformed content, in keeping with the rhetorical goal of developing reasons. Finally, the rhetorical goal of having appropriate microstructure content drove further

Internet research; participants searched for content that met the rhetorical goals regarding the microstructure. The research also extends writing-from-sources literature, in that it demonstrates how the Internet affords new possibilities in terms of writing strategies. Theoretically, the Internet *affords* these options, through the amount and variety of information available.

Translations between content and rhetorical problem spaces during drafting.

During the drafting of their texts, participants' rhetorical goals often influenced the inclusion of particular content. Sometimes, participants explicitly stated the rhetorical goal that would drive the drafting of content. For example, Joy's outline stated that she wanted to "end on thoughtful / creative note." The last line of her text read: "The use of non-animal alternatives would greatly reduce the number of animals harmed, promote the healthy development of other alternatives, as well as aid in advancing technological developments while still complying with society's morals and ethics." As another example, Joy included subheadings such as "context" and "proof" in her draft, to ensure that the text content filled the rhetorical elements she believed necessary for a persuasive piece. She deleted these once she was sure she had met the genre expectations. As a third example, Abbey stated: "I know what I want to say, I want to say like, say something along the lines of . . . yeah, make 'em [the audience] feel bad." She wrote: "If animal testing in cosmetics continues, this form of animal cruelty will only continue, ending the lives of thousands or even millions of animals everywhere."

Many participants also appeared to have rhetorical goals regarding clarity and accuracy. For participants who used one of the first processes, they sometimes needed

more detail in order to turn the ideas in their outlines into sentences in their texts. They would comment on the need for more information about a particular topic and then briefly return to searching to confirm the details (e.g., “in vitro animal testing,” Mark).

Though much less frequent, participants’ content also sometimes influenced their rhetorical goals. For example, recall that Kristen wrote a paragraph about the fact that animal reactions to products may not predict human reactions that well. She reread the content of that paragraph and then said, “I think it would be better if I had a product that was tested on animals and, um, showed to not be harmful, and then, or maybe, one that was harmful to animals and then it wasn’t even harmful to humans.” That is, reading the content of the paragraph led to the creation of a new rhetorical goal: to find an example which supported her assertion. She returned to researching in order to do so.

In sum, then, as indicated in Bereiter and Scardamalia’s (1987) knowledge-transforming model, there were translations between the content and rhetorical problem spaces during drafting. These consisted primarily of translations from the rhetorical space to the content space, but also from the content space to the rhetorical space. In this respect, this study simply confirms the model, and demonstrates its continued applicability in this new environment. These results also confirm the status of these writers as experts.

Translations between content and rhetorical problem spaces, during reviewing. There were also translations between the content and rhetorical problem spaces during reviewing. Participants’ rhetorical goals very frequently guided content review and revision. At a most superficial level, all participants had the apparent

rhetorical goal of writing with correct spelling and grammar. Participants automatically made low-level revisions to spelling as they wrote. This is consistent with contemporary empirical work (e.g., Myhill & Jones, 2007).

At a slightly higher level, participants often reread to correct grammar (e.g., “I’m going to start from the beginning and look over more for a bit of grammar,” Mark). They did so themselves, or sometimes used the automatic grammar checker. Students (Ishaan, Kristen, Aisha) also used Internet sites (www.dictionary.com and www.thesaurus.com) to confirm the meaning of words or to look up alternatives to words. Such strategies reflected rhetorical goals such as using language appropriately or avoiding repetition. The use of such technology in writing has been discussed by other writers (e.g., MacArthur, 2006), and the interested reader is directed there.

Participants also had higher level rhetorical goals, which guided review. Sometimes participants stated these in advance and then reread to make sure that the content of the text met those goals. For example, Aisha wanted to have an argument that was resistant to criticism, so she reread her text from the opposing perspective and revised any areas that she felt were weak. That is, the text content was changed to meet her rhetorical goal. At other times, participants reread text without a stated goal, and responded in a way that indicated an implicit rhetorical goal. These goals included appropriate academic tone (e.g., Rebecca changed wording that sounded “weird”), relevance of content to claim and argument (e.g., Rebecca deleted a large section of irrelevant text), coherence of paragraphs (e.g., Aisha moved related material together), and sounding authoritative (e.g., Rebecca changed “can be considered torture” to “is

torture”). In each case, participants made changes to the content of their text in order that it met their rhetorical goal.

Though less frequent, participants’ content also sometimes changed their rhetorical goals during reviewing. For example, Kieley reread the part of her introduction that dealt with her claim and supporting reasons. One of her antitestifying reasons was that alternatives exist. As she thought through this reason, that is, as she deliberated in the content problem space, she decided that alternatives actually address the issue of human safety (i.e., they help ensure it). So she decided: “I need to make this [first body paragraph] more about human safety.” Her content problem solving about the role of alternatives in human safety changed her rhetorical goals regarding what the main point of her paragraph should be. Given the ease of electronic revision, Kieley was able to change a few keywords in the paragraph and thus shift the emphasis towards safety.

The translation between content and rhetorical problem spaces during revision is consistent with Bereiter and Scardamalia’s (1987) model. Participants’ a priori and developing rhetorical goals frequently led to changes in content and their own content sometimes led to changes in their rhetorical goals. This research extends Bereiter and Scardamalia’s work only by demonstrating how the electronic medium can facilitate this translation.

Implications. During participants’ researching, there was a translation between content and rhetorical problem spaces. This occurred in the development of a claim and in the generation of a macrostructure and a microstructure. This research extends Bereiter and Scardamalia’s (1987) model to a new environment. It extends their model in that the

Internet: (1) Provided access to challenging information, beyond what was available in long-term memory; (2) Provided information beyond what would typically be available in books; and (3) Allowed strategies for content-rhetoric translations, which would not be possible with print. Specifically, the Internet allowed participants to easily and efficiently search for content to meet their rhetorical goals, allowed users to use search terms that combined content and rhetoric, and allowed users to search using terms that combined content and type of content (e.g., quote). The translation between content and rhetoric problem spaces in participants' drafting and reviewing confirms Bereiter and Scardamalia's (1987) model and extends it in terms of the affordances of the Internet and electronic writing medium.

The Construction of a Task Environment and the Use of Strategies

In this section, a theoretical interpretation of participants' cognitive strategies is presented. Specifically, I argue that each participant constructed a task environment in which to work, which consisted of elements such as a hard copy of the assignment, Web pages, links, notes, an outline, an essay, and other elements. The environments and the strategies used within these environments differed for writers who used the three processes described above, but they all maximized the affordances and minimized the constraints of the Internet, electronic writing medium, and internal cognition. The writers' strategies and their environment were also adapted to one another.

Recall that Hayes and Flower (e.g., 1980) originally introduced the concept of the task environment. They argued that writing is influenced by the writer's task environment, including the writing assignment (topic and audience) and the text produced

thus far. Later, Hayes (1990, 1996) noted that consideration should also be given to the Internet and the electronic writing medium as elements of writers' task environments.

In this study, some elements of the writers' environment were provided for them. Many participants kept the hard copy of the assignment close at hand during writing and referred to it throughout the writing process. The laptop, Internet access, and the electronic writing medium were also provided; the option to work in hard copy was implied with the provision of paper, pencils, and pens.

As in Hayes and Flower's (1980) model, writers also constructed elements of the task environment themselves. Hayes and Flower noted the text produced as an example of a writer-constructed environment. Here, there were several other elements of the task environment that were also constructed by the writers. All participants constructed Web environments consisting of multiple windows or tabs; these were different for each participant. Note that these represented intertextual and interauthor connections, between the student writers and their texts and the writers and texts available online. Participants (Mark, Ishaan) who used the first process constructed an environment that also consisted of a detailed electronic outline as well as an electronic text. Mark also printed four sources in hard copy. Participants who used the second process constructed an environment that also consisted of notes (hard copy or electronic); an outline (hard copy or electronic); in Joy's case, a hard-copy draft of the text; and a final electronic text. Participants who used the third process constructed an environment that also consisted of an electronic text and sometimes minimal notes (Sarah, Aisha).

Students in this study used a variety of strategies, as have been outlined in the Results and preceding Discussion. Here, the emphasis is on how those strategies were adapted to the task environments in which writers worked. Specifically, the strategies writers chose to use were a fit between the affordances and constraints of cognition and the affordances and constraints of the Internet and electronic writing medium. The use of task environments and strategies is described for researching and then for organizing and drafting.

Researching. During researching, the writers constructed task environments and used strategies that capitalized on the affordances of the Internet in a way that also minimized the constraints of internal cognition. For example, all of the participants spent much of their researching time doing targeted searches. That is, rather than simply browsing or exploring the topic, participants conducted searches with very specific search terms, with the goal of locating very specific content. Participants also searched by content and rhetorical search terms. Both types of searches capitalized on the Internet's affordances, in terms of the amount and variety of information available and in terms of the search capabilities of the search engines (e.g., Bing, Microsoft Corporation, 2012; Google, Google Inc., 2009).

Researching on the Internet in those ways also offset the constraints of human cognition. In terms of content, participants had limited knowledge of the topic prior to beginning the task. Their own knowledge was supplemented exponentially by all of the information available on the Internet. The drawing of content from external sources was noted in some classic cognitive models of writing (e.g., Hayes & Flower, 1980; Flower et

al., 1990). This idea became the focus in later models of writing from sources (e.g., Segev-Miller, 2007; Spivey, 1997). However, the drawing of content from the Internet for writing has not been the focus of previous research. Thus, this is an entirely new contribution of this study.

The Internet could also be used to supplement rhetorical knowledge, as was the case with Aisha. Classic models of writing (e.g., Hayes & Flower, 1980), as well as more current descriptions of writing experts (e.g., Meyer, 2001), frame genre knowledge as existing within the mind of the writer. Some emphasize the fact that these genres are socially constructed and socially shared (e.g., Nelson, 2008). What Aisha's approach suggests, though, is that rhetorical knowledge can also exist externally, and be accessed via the Internet.

The fact that participants drew content and rhetorical information from the Internet raises the provoking idea of the Internet as a metaphorical long-term memory. Both have vast information-storage capabilities. The information is outside conscious awareness, and can be retrieved using content probes; retrieved information can then be used to generate additional probes. The Internet, however, comprises vastly more information than a single human mind would realistically possess. Moreover, one of the limitations of human cognition is that stored knowledge is not stored rhetorically and thus cannot be searched rhetorically (Bereiter & Scardamalia, 1987). Rather, content must be retrieved by topical probes, and then evaluated against or transformed to meet rhetorical goals. The affordances of the Internet, in terms of content-rhetoric search capabilities, offset this constraint.

Participants' targeted Internet searching may also have reduced internal cognition's constraints in terms of working memory load. The fact that the Internet contains so much information is a benefit; however, it may also overwhelm users (Jankowska, 2004). Participants in this study used targeted searches in order to find "enough" (Mark, Ishaan) information; they were not trying to read a comprehensive set of information. Thus, they did not become overwhelmed.

Participants who used the third process capitalized on the Internet's ability to immediately retrieve relevant information, following a targeted search. This depended on the amount and type of information available online, as well as on search engines' ability to locate such information. Such on-demand search and retrieval offset limitations in participants' own topic knowledge. It may also have reduced working memory load, in that participants focused on just one paragraph at a time and thus distributed the process over time.

During researching, participants who used Process 2 created research notes. These mediated researching and planning. The notes reduced working memory load in that participants did not have to hold relevant information in mind as they researched. It was stored externally, in the notes ("These [notes] are good for me, just to remember the important points," Joy). When participants planned, via an outline, they had only to attend to the information in the notes, rather than all of the information available on the Internet.

Organizing and drafting. During the organizing and drafting of their texts, participants created a task environment and used strategies that maximized the

affordances and minimized the constraints of the electronic writing medium and of cognition. To organize their texts, many participants (Mark, Ishaan, Abbey, Kieley) created electronic outlines. The electronic outlines afforded possibilities not possible (or at least, not easy) with print. In particular, information can be added in any order into an electronic outline. In some prior work, students have shown great difficulty with integrating information from across sources (Mateos et al., 2008; van Meter & Firetto, 2008). With the electronic medium however, it may be easier to integrate. That is because information can easily be added to the relevant location in the outline, rather than added in the order in which it is read (e.g., a subpoint can be read late in the process, and added to the first point in an almost-complete outline; the remainder of the outline will bump down on the page to accommodate it).

An electronic medium also allows for major revisions to the outline. Thus, participants can experiment with and revise the structure of their text prior to beginning drafting their text. This may explain why participants who used one of the first two processes did less major revision than those who used the third process; they were able to test various structures during planning and select that which they preferred. This would be consistent with the work of Kellogg (1988), who found that participants who outlined their text prior to writing their text spent less time reviewing their text.

Joy created a hard-copy rather than electronic outline. Though hard-copy documents do not offer some of the affordances of the electronic media, they do avoid some of its challenges for human cognition. Specifically, one of the challenges of electronic writing environments is the need to switch between screens; this imposes a

high load on working memory and affects writing (Olive et al., 2008), and can frustrate a writer (Attfield et al., 2009). By creating a hard-copy outline, Joy could view the outline and the essay in full while drafting her text. Likewise, by printing his sources prior to adding information from them to his outline and by printing his outline prior to drafting, Mark always had a full view of the documents with which he was working. Thus, these participants may have used these hard-copy documents to eliminate the need to switch between screens and thus reduce working memory load. This may also explain why participants sometimes cut and pasted information from sources into their notes (Ishaan, Abbey; cf. Igo et al., 2006), or into a space below their text and wrote from that (Sarah; cf. Attfield et al., 2009).

The creation of outlines may have offset the working memory constraints of cognition in other ways as well. When drafting, participants had only to attend to the information in these outlines, rather than all of the information available on the Internet. Outlining also meant that planning was done initially, freeing cognitive resources for drafting later on (e.g., “It’s just really easy for me to turn it into sentences [in the draft] from there [the outline],” Mark). That is, the different writing phases were distributed across time; thus participants had to attend to just one phase at a time. This is a classic explanation for the effectiveness of planning prior to writing (e.g., Kellogg, 1988, 1990), but application to this environment is new.

During drafting, participants also capitalized on the affordances of the electronic media. Participants who used the third process often added material to the text out of the order in which it was read. As with doing so in outlines, this likely facilitated the

integration of source information. Participants also cut and pasted sections of text within their essays; thus the electronic medium facilitated revision (cf. Haas, 1996).

The electronic medium also helped to offset the constraints of human cognition during drafting. Automatic spelling and grammar checkers were used to offset lack of knowledge regarding accurate spelling and grammar (as well as simple errors in typing). In one participant's case, this was very pronounced. She remarked that she was "bad at spelling" and that the computer helped her. Likewise, Joy remarked prior to reviewing that "the computer can show me some of the mistakes I make." The Internet also helped in this regard, in terms of the use of www.dictionary.com and www.thesaurus.com. Such uses of technology have been expanded upon in previous literature (e.g., MacArthur, 2006); the interested reader is directed there.

Other word-processing functions were used to reduce working memory load during drafting. Participants (Ishaan, Joy, Aisha) bolded, underlined, or coloured sections of text that they wanted to return to and revise. This meant that students could continue drafting without having to hold the revisions in mind. Similarly, participants used the electronic medium to track their progress. Aisha deleted each section of her outline as she completed the corresponding section of text. Ishaan bolded everything in his outline that he had not yet included in his text. This meant that participants could continue working on their texts with an external source to help them monitor their progress.

Finally, the electronic writing medium, combined with the Internet, allowed participants to use the strategy of embedding research within drafting. This was especially the case for participants who used Process 3. It afforded this approach because

of the ability to add material out of order and because of the ability to easily revise electronic text. This clearly shows the interaction between participants' choice of strategies and the medium at hand.

Implications. At a theoretical level, this discussion argues that the task environments that these expert writers created and the strategies that they chose were a compromise between the affordances and constraints of the media and the affordances and constraints of human cognition. This notion has been implicit in classic models of writing (e.g., Hayes & Flower, 1980), and elements of it have been addressed in more recent empirical work (e.g., Haas, 1996; O'Hara et al., 2002). This study expands on prior theoretical work by outlining precisely how the balance between these affordances and constraints is achieved in this Internet and electronic environment, over the entire writing process. At an empirical and a practical level, this study expands prior work by demonstrating skills and strategies that are important to literacy in a digital environment.

Educational Implications of the Study

One of the long-term goals of this research program is to develop and assess instruction on writing from the Internet. It is too early for many definitive statements in this regard; indeed, further research is needed to clarify many instructional issues. That said, some possible educational implications can be drawn from the findings and are discussed below.

Students' evaluation of Internet sources. The evaluation of websites is an issue that has received a lot of attention in the literature (e.g., Kiili et al., 2008; Kuiper & Volman, 2008; Leu et al., 2004; Luke, 1997, 2003; The New London Group, 2000).

Students in this study unanimously indicated that they had received information on how to evaluate and select online information. This instruction came from Science, English, History, and Politics teachers and from librarians.

All of the participants in this study did some evaluating and selecting of sources and some evaluating and rejecting of sources. Students varied in terms of how consistent they were in their evaluation. Mark was the only student who came close to explicitly evaluating every source he considered using. Recall that he was the student who very deliberately selected four main sources from which to write, and he evaluated these very clearly. He assessed sources on a variety of criteria such as neutrality, balance, lack of bias, amount of information, provision of additional resources, currency, relevance, and so on. In his interview, he noted that he selects on the basis of *source* first. Other participants evaluated only some of the sources and/or content. These results are similar to Gray et al. (2005), in that participants were largely aware of potential problems with Internet sites. However, they were also similar to Kiili et al. (2008), in that participants did not actually assess credibility that often (at least, not explicitly).

One of the most interesting findings, in terms of source credibility and evaluation, was students' use of Wikipedia (Wikimedia Foundation Incorporated, n.d.). Eight of the nine participants in this study consulted Wikipedia during their writing process, often more than once. Wikipedia was typically used near the beginning of the process, in order to gain a general understanding of the topic. It would also be used later in the process, to clarify information from another source or to provide an overview of another issue. The fact that students used Wikipedia is not particularly surprising. What was striking was

that so many participants noted that they would never cite Wikipedia in an essay, and that their teachers had given them clear instructions not to use it. This was also why Abbey did not consult it. These results are in keeping with Menchen-Trevino and Hargittai's (2011) results; they found that 77% of university students accessed Wikipedia at least once during a provided task and that a significant portion also expressed concerns about its credibility.

Despite potential troubles with Wikipedia, participants in this study made very good use of it. It did provide them with the overview that they sought. Students often picked up threads on Wikipedia (e.g., the existence of alternatives, the existence of the European ban) that they were able to search for and read more about in other sources. Conversely, when students read about unfamiliar topics in other sources (e.g., in vitro testing), briefly consulting Wikipedia allowed them to continue reading the original source with greater comprehension. Aisha also used Wikipedia's resources; that is, she clicked on its provided links to retrieve additional sources. Joy noted that she, too, often does this. It is somewhat troubling then, that students seem to be receiving such a negative message about using Wikipedia. Perhaps it would be better to continue instructing students about Wikipedia's potential problems, but also indicate how it may be used effectively. Kristen noted that this was in fact what teachers had suggested doing.

Writing processes and strategies. Seven of the nine participants credited their knowledge of persuasive writing, particularly structure, to school-based writing instruction. The English Department Head also noted that this genre was emphasized in

the mandatory Grade 12 English course. Each of the nine participants indicated that he or she had not received information on the *process* of writing from online sources or on *strategies* for doing so. Although the Department Head provided some examples of how online sources have been used, it did not appear that there was specific instruction on *how* to write from online sources.

What this project provides is a starting point. It is too early to take a prescriptive approach to writing from online sources, but an awareness of process and strategy options may nonetheless be quite beneficial for students. From this project, teachers can become familiar with a variety of potential processes and strategies. The strategies of these students might provide models in the sense that they are skilled at writing from the Internet, but they are young enough that their writing skills might comprise a realistic model for other students. Their processes and strategies could perhaps be shared with students, and students could have the option of choosing from among them. Effective strategy instruction in writing (e.g., Harris & Graham, 1996) has worked in this way. Effective strategies, used by expert writers, are taught to more novice or struggling writers, with a positive effect on their writing. It is important for teachers to recall the influence of rhetorical goals, claims, and macrostructures on researching. Thus, searching should not be taught as a discrete skill, but should be taught as *searching for* _____.

When developing a claim in argumentation, students can create a claim based on both their own values or opinions, and sources. They can use new information or ideas retrieved from the Internet to revise their claims. When searching, writers can search

using content keywords but also rhetorical keywords. This can help them retrieve rhetorically relevant information and even existing reasons.

In terms of the overall writing process, recall how different participants' processes were. Thus, it appears that it would be a mistake to prescribe one particular process for writing from online sources. Rather, teachers could outline the different possibilities. (1) Students can research for and read sources, identify potential lines of argument, and create an outline with these lines of argument as the highest hierarchical level. They can then continue reading and researching and fill in more detailed information and support below each line of argument in the outline. They can then draft from the outline. Students can return to searching to confirm details or expand on information, when necessary. (2) Students can research for and read sources, and take fairly comprehensive notes, perhaps focusing on some potential lines of argument. They can then create an outline that plans the structure of the essay. The notes and the outline can then be used to draft the essay, probably in the order in which it appears. Students can return to searching to confirm details or expand on information, when necessary. Given the detailed structural planning in both of these processes, major revision may not be necessary. (3) Students can research and read sources, identify potential lines of argument, and then note these verbally, in writing, or in an introduction. They can then research for and read sources, and add information from the sources directly into the appropriate place in the essay. More ongoing and final revision may be needed with this process.

In terms of strategies, there are a variety of strategies that could be taught for each phase of the writing process. For researching, teachers could show students how to set

clear goals for researching ahead of searching. These goals can be based on students' rhetorical knowledge (e.g., the need to address counterarguments) as well as their content knowledge (e.g., they may need more information about a particular topic or subtopic). Students should have a variety of strategies for retrieving websites: these include searching using content keywords or content and rhetorical keywords; consulting a provided list; clicking on a link listed on another site; or retrieving a site, or site of an organization, previously known to the student. Searches can also be based on information retrieved. For example, students can search using terms relevant to a topic about which they have just read. Students should be taught that information about, and samples of, different writing genres are available online and can be used as a template for their own writing. While on a site, students should know that they can read, skim-read, or view a site; that they can search it internally using an internal keyword search (sometimes CTRL F); and that they can use the resources listed on a site. While on a site, students could be encouraged to critically evaluate the source and content, to respond to the source content, and to make connections to content in other sources.

Note taking is something with which many students will already be familiar. In the context of writing from online sources, teachers could encourage students to reflect on the relative affordances of electronic versus hard-copy notes. For example, electronic notes can be organized using word-processing functions (e.g., bullets), added out of order, pasted in directly from sources, easily manipulated, highlighted / bolded to indicate what has been used in an essay, and printed if a student wants a hard copy. Hard-copy notes,

on the other hand, allow a student to have both an electronic document (i.e., source or essay) and the notes document fully visible at the same time.

Organization is something fundamentally important to writing, but something with which students may struggle. Students should be aware of the need to plan and organize content while reading sources, while reading over research notes, and during writing. A particular benefit of organizing early in the process is that the organization can help guide and limit searching (e.g., one must only search for information relevant to his or her main arguments).

Teachers could also make students aware of a number of strategies for actually drafting the text. As in outlining, teachers could have students reflect on the relative affordances of drafting electronically or in hard copy. The ability to draft out of the sequence in which the text appears, to paste from sources, and to rearrange material easily are some of the particular benefits of drafting electronically. Moreover, students may make use of some of the word-processing functions. For example, students can bold, highlight, or differentially colour text or sections to which they want to return. Students can also insert subheadings or other organizational features that can be deleted in the final draft. Automatic spelling and grammar corrections and checking may also be of benefit. Some students may still be more comfortable with drafting in hard copy, however. If students are eventually planning to draft electronically, then they may still mark up their texts prior to the final draft. However, the ability to easily rearrange, copy to the text, or write out of the order in which it appears is more limited. Having the Internet available

during drafting allows students to use online thesauri and dictionaries and to clarify or supplement information about which they are writing, using additional searches.

Teachers could discuss different reviewing strategies with their students. For basic editing, one can often use automatic spell checking and correction while writing. Likewise, minor changes in wording can often be done during writing. Midlevel changes can be made during writing, but these typically require a student to stop writing for a moment and reflect on the text, as opposed to the more automatic lower level revisions. Global / deep revisions were relatively infrequent in this project; perhaps students need to be encouraged to consider whether they are necessary in their writing. Students can be reminded that electronic drafting facilitates global revisions, as paragraphs can be easily moved, combined, or separated, for example.

As noted at the beginning of this section, teachers must keep in mind that this work is very preliminary and that more research is needed to determine whether, for example, all of these strategies would be beneficial for all students. At the present time, exposing students to the variety of processes and strategies used in this study could be beneficial; individual decisions about effectiveness for each student could then be made.

Analysis of Method

The use of Camtasia Studio. Today, much of students' writing takes place on computers and with the Internet. Just as writing electronically affords different options than writing in print, computer-based technology provides research opportunities not available or easy with previous types of data sources. Moreover, traditional data sources

may actually be *unable* to capture writing phenomena, as they take place in this new digital environment.

The main function of Camtasia Studio 6 (TechSmith, 2009) is to record and play back audio, webcam, and computer-screen recordings. If students are already working on a computer, recording via Camtasia may be a much tidier and less intrusive method of collecting data compared to, for example, a video-recording device in the background. The fact that the data play back simultaneously and in linked time allows the researcher to clearly see connections between the data sets (e.g., what a participant was doing online during a particular utterance). This makes analysis itself easier and better and also lessens the need for field notes about such co-occurrences.

The computer-screen recording is perhaps the most beneficial aspect of the software. The ability to capture computer activity easily and efficiently is itself a benefit. What we also noted, however, was how much of the process data would not have been apparent without this ongoing recording. In terms of websites, they are constantly changing and sometimes disappearing. Having a Web address does not ensure being able to review the same site at a later date. Likewise with Google (Google Inc., 2009) searches, the same keywords may return different sources at different times. Having the pages and results recorded *as participants saw them* has the potential to be tremendously beneficial. In terms of word processing, recording the process provides access to all the writing processes that are not evident in the final artifacts. This includes the order in which notes and texts are written, any copying and pasting that occurs, revisions to

outlines or texts, annotations that are later removed, and prewriting material that is deleted as it is addressed in the final text.

Collecting data using Camtasia Studio 6 (Techsmith, 2009) can also dispense with the need for transcriptions. Indeed, I did attempt transcription and corresponding notation of activities, and found it far more cumbersome and too far removed from the data itself. One option for analysis is to assign Camtasia files to Atlas.ti (Scientific Software Development GmbH), where they can be coded.

Finally, collecting data using Camtasia Studio 6 has the potential to enhance presentations of the research. Recordings can be easily converted to a wide variety of formats, allowing for presentation in a variety of mediums (e.g., Web, Youtube, Microsoft PowerPoint, and so on).

There are, of course, some potential difficulties with using such a program. The first is that a laptop-based stationary webcam cannot capture any hard-copy writing that participants do. It may be possible to use an external webcam to do so. Second, it is necessary to ensure that the audio quality of the built-in microphone on the computer is sufficient. In this study, a headset microphone was needed to achieve sufficient audio quality in the recordings. Finally, it, of course, takes time to become accustomed to the software and its applications.

In sum, the software was easy to use and the support team was very easily available when necessary. As with any analysis, though, time and care are needed to ensure the viability of the data.

Limitations of the study. Limitations are discussed in terms of task, participants, and analysis. The task, to write a persuasive essay based on information on the Internet, was intended to be of interest to participants and to represent topics debated on the Internet. In these ways, it was successful. Participants were interested; they found a wide variety of information on the Internet; and they were, for the most part, familiar and comfortable with the persuasive genre. The provision of sources aided participants in their searching, but did not prove necessary from a research perspective. The only issue raised consistently by participants in terms of the task was the fact that they had less time than would typically be available in school. Participants seemed to condense their typical approach into the allotted time, however, so it likely did not change the strategies observed. The time allotment helped to keep the amount of data manageable, so it seems a worthwhile tradeoff.

A second limitation is that only one subset of writers were included as participants. This was done very intentionally in order to elucidate effective strategies for writing from online sources of information. It is also consistent with much research on writing, when the goal is to identify strategies and/or approaches (e.g., Bereiter & Scardamalia, 1987; Harwood, 2009; Hayes & Flower, 1980; O'Hara et al., 2002). What this means is that the results are not intended to represent typical or even common strategies for writing online. But because they were used by high-achieving secondary school students, they might be strategies that could realistically be taught to and used by lower achieving secondary school students.

Another limitation was significant difficulties in analysis, specifically in balancing breadth and depth. In order to investigate participants' overall writing processes, it was necessary to have a somewhat coarse and comprehensive analysis. The narrative summaries allowed for such a comprehensive level of analysis; they captured the complexity and dynamic nature of the data. However, they were also subjective interpretations.

Coding and interrater reliability were used to correct for this. That coding, though more objective, did not account for the complexity of the data. In particular, the codes did not adequately capture participants' intentions; the hierarchical, embedded, and dynamic nature of students' strategies; or participants' overall processes. There were also necessarily a lot of codes, which reduces reliability.

Future Directions

In the future, I hope to address these limitations. This project is the first in an intended program of research, focused on students' strategies and processes for writing from online sources of information. In order to develop an empirically based understanding of writing from the Internet and in order to use that for educational purposes, much additional research is needed. Specifically, research should extend this work to students of different ages, different ability levels, and to writing in other genres.

Extending the research across ages and ability levels (e.g., in expert / novice paradigms) would allow for a greater understanding of the development of expertise in writing from online sources; it would also help to distinguish which strategies and processes observed in this study are due to students being high achieving, and which are

due to the electronic writing medium. Moreover, it could reveal whether some of the strategies used by these participants can be used effectively by a wider range of students, or whether they were only effective because of the strength of these students.

Extending the research across genres would demonstrate the degree to which strategies observed in this study are a function of the persuasive genre, specifically, as opposed to core writing-from-sources processes and strategies. It would also demonstrate whether some of the strategies observed in this study (e.g., searching by rhetorical terms as well as content terms) can be used effectively when writing in other genres.

My ultimate goal from such a research program is to develop a comprehensive theory or model of writing from online sources of information. This would ideally explain the development of skills, as well as differences in these skills. Such a model could then be used as the basis for assessment and instruction and thereby improve all students' ability to write well from online sources.

Conclusion

The purpose of this study was to address the question, *What are students' processes, strategies, and operations for writing arguments from online sources of information?* In the Theoretical Perspectives chapter, perspectives related to writing, writing from sources, and the Internet and electronic writing medium were reviewed. In the Literature Review chapter, empirical work related to writing, writing from sources, the Internet, and the electronic writing medium was reviewed. Though related work has been done prior to this study, a comprehensive examination of the process of writing from online sources of information had not been conducted.

In the Method chapter, detailed information on the methodology was provided. High-achieving Grade 12 students were recorded as they researched on the Internet and wrote arguments regarding Canada's policy on testing cosmetic products on animals. Data included think-aloud protocols, computer-screen recordings, video recordings, written products, and postwriting interviews. Data was analyzed and presented through narrative summaries and cross-case comparisons. A hierarchical coding scheme was used to establish interrater reliability.

In the Results chapter, an overview of three writing processes, and corresponding strategies, was provided. In the first process, writers alternated between researching online and structuring content into an outline, and then drafted a text. In the second process, writers researched online, writing notes and a separate outline, and then drafted a text, drawing on both documents. In the third process, writers drafted the text and did almost all research while drafting.

In the Discussion chapter, it was argued that there were translations between participants' content and rhetorical spaces throughout the writing process (cf. Bereiter & Scardamalia, 1987). The unique contribution of this study was demonstrating how this occurred during researching and on the Internet. Participants used their rhetorical goals to determine their searching for, selection of, and transformation of, source content. The content sometimes changed participants' rhetorical goals, in that they modified their claims or reasons based on the content that they read. The Internet facilitated such translation through the potential for very specific searches, content-rhetoric searches, and the amount and variety of information available. In drafting and reviewing, rhetorical goals influenced the inclusion and revision of content. Writing and reflecting on content sometimes also changed participants' rhetorical goals. This is consistent with Bereiter and Scardamalia's (1987) model.

In the Discussion chapter, it was also argued that these expert writers constructed a task environment and devised strategies that capitalized on the affordances of the Internet and electronic writing medium, and minimized the constraints of the human cognition (cf. Hayes & Flower, 1980). Participants constructed their environment in terms of the tabs, windows, and sources that they made available; the mediating documents that they created and used; and the medium in which they created these documents. Their strategies capitalized on Internet affordances, in terms of its ability to supplement content and rhetorical knowledge and its on-demand retrieval. Such affordances also reduced restraints of cognition, in terms of limited knowledge and effortful and topic-limited searches. Participants' strategies capitalized on the electronic

medium, in terms of the ability to add material in any order to the outline or text, to easily move text within documents, and to highlight and colour-code material for later attention.

The educational implications were then addressed. In the school where this research took place, students were receiving substantial instruction about the writing process, the persuasive genre, and how to evaluate Internet sources. All students were able to use Wikipedia in a thoughtful and effective manner, despite cautions against using it. The students were not receiving instruction on processes or strategies for writing from the Internet.

Camtasia Studio 6 (Techsmith, 2009) was an invaluable tool in this research. An evaluation of its use is provided in the Discussion. An evaluation of the study's limitations is also provided. These include a limited time frame in which participants worked, the inclusion of only high-achieving students, and difficulties in balancing the level of analysis.

This study was the first in an intended program of research examining writing from the Internet. Future research will examine the processes and strategies of students across ages, achievement levels, and writing genres.

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Appendix A

Ethical Approval

	THE UNIVERSITY OF WESTERN ONTARIO FACULTY OF EDUCATION
Western Education USE OF HUMAN SUBJECTS - ETHICS APPROVAL NOTICE	
<hr/>	
Review Number: 1002-2 Principal Investigator: Perry Klein Student Name: Lori Kirkpatrick Title: <i>Students' strategies for writing arguments from online sources of information.</i> Expiry Date: May 31, 2011 Type: PhD Thesis Ethics Approval Date: February 23, 2010 Revision #: Documents Reviewed & Approved: UWO Protocol, Letter of Information & Consent	
<hr/>	
<p>This is to notify you that the Faculty of Education Sub-Research Ethics Board (REB), which operates under the authority of The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects, according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario has granted approval to the above named research study on the date noted above. The approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the REB's periodic requests for surveillance and monitoring information.</p> <p>During the course of the research, no deviations from, or changes to, the study or information/consent documents may be initiated without prior written approval from the REB, except for minor administrative aspects. Participants must receive a copy of the signed information/consent documentation. Investigators must promptly report to the Chair of the Faculty Sub-REB any adverse or unexpected experiences or events that are both serious and unexpected, and any new information which may adversely affect the safety of the subjects or the conduct of the study. In the event that any changes require a change in the information/consent documentation and/or recruitment advertisement, newly revised documents must be submitted to the Sub-REB for approval.</p>	
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Dr. Jason Brown (Chair)	
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<i>2009-2010 Faculty of Education Sub-Research Ethics Board</i>	
Dr. Jason Brown Faculty (Chair) Dr. Elizabeth Nowicki Faculty Dr. Jacqueline Specht Faculty Dr. Farahnaz Faez Faculty Dr. Wayne Martino Faculty Dr. George Gadanidis Faculty Dr. Robert Macmillan Assoc Dean, Graduate Programs & Research (<i>ex officio</i>) Dr. Jerry Paquette UWO Non-Medical Research Ethics Board (<i>ex officio</i>)	
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The Faculty of Education Karen Kueneman, Research Officer	
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Appendix B

Ethical Approval - Revision

 <p>THE UNIVERSITY OF WESTERN ONTARIO FACULTY OF EDUCATION</p> <p>Western <i>Education</i></p>	<p>USE OF HUMAN SUBJECTS - ETHICS APPROVAL NOTICE</p>																
<hr/> <p>Review Number: 1002-2 Principal Investigator: Perry Klein Student Name: Lori Kirkpatrick Title: <i>Students' strategies for writing arguments from online sources of information.</i> Expiry Date: May 31, 2011 Type: PhD Thesis Ethics Approval Date: April 13, 2010 Revision #: 1 Documents Reviewed & Approved: Revised Interview Questions.</p> <hr/>																	
<p>This is to notify you that the Faculty of Education Sub-Research Ethics Board (REB), which operates under the authority of The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects, according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario has granted approval to the above named research study on the date noted above. The approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the REB's periodic requests for surveillance and monitoring information.</p> <p>During the course of the research, no deviations from, or changes to, the study or information/consent documents may be initiated without prior written approval from the REB, except for minor administrative aspects. Participants must receive a copy of the signed information/consent documentation. Investigators must promptly report to the Chair of the Faculty Sub-REB any adverse or unexpected experiences or events that are both serious and unexpected, and any new information which may adversely affect the safety of the subjects or the conduct of the study. In the event that any changes require a change in the information/consent documentation and/or recruitment advertisement, newly revised documents must be submitted to the Sub-REB for approval.</p>																	
<div style="border: 1px solid black; width: 200px; height: 20px; margin: 0 auto;"></div> <p>Dr. Jason Brown (Chair)</p>																	
<hr/> <p><i>2009-2010 Faculty of Education Sub-Research Ethics Board</i></p> <table border="0"> <tr> <td>Dr. Jason Brown</td> <td>Faculty (Chair)</td> </tr> <tr> <td>Dr. Elizabeth Nowicki</td> <td>Faculty</td> </tr> <tr> <td>Dr. Jacqueline Specht</td> <td>Faculty</td> </tr> <tr> <td>Dr. Farahnaz Faez</td> <td>Faculty</td> </tr> <tr> <td>Dr. Wayne Martino</td> <td>Faculty</td> </tr> <tr> <td>Dr. George Gadanidis</td> <td>Faculty</td> </tr> <tr> <td>Dr. Robert Macmillan</td> <td>Assoc Dean, Graduate Programs & Research (<i>ex officio</i>)</td> </tr> <tr> <td>Dr. Jerry Paquette</td> <td>UWO Non-Medical Research Ethics Board (<i>ex officio</i>)</td> </tr> </table>		Dr. Jason Brown	Faculty (Chair)	Dr. Elizabeth Nowicki	Faculty	Dr. Jacqueline Specht	Faculty	Dr. Farahnaz Faez	Faculty	Dr. Wayne Martino	Faculty	Dr. George Gadanidis	Faculty	Dr. Robert Macmillan	Assoc Dean, Graduate Programs & Research (<i>ex officio</i>)	Dr. Jerry Paquette	UWO Non-Medical Research Ethics Board (<i>ex officio</i>)
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<hr/> <p>The Faculty of Education Karen Kueneman, Research Officer</p> <div style="border: 1px solid black; width: 400px; height: 40px; margin: 0 auto;"></div>																	
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Appendix C

Sources Provided to Students

Wikipedia

http://en.wikipedia.org/wiki/Testing_cosmetics_on_animals

The European Federation for Cosmetic Ingredients

<http://www.effci.org/index.php?id=12>

Canadian Federation of Humane Societies

http://cfhs.ca/research/cosmetic_testing

Animal Alliance letter to Jean Chrétien

<http://www.animalalliance.ca/article.phtml?article=cpt&dir=urgentalert&title=Urgent+Alert+Archive%3A+Call+for+Cruelty+Free+Cosmetics+in+Canada>

Leaping Bunny. org

<http://www.leapingbunny.org/press6.php>

Picture of rabbit following eye irritancy test

http://images.google.ca/imgres?imgurl=http://www.askuswhy.com/images/product/p8_big.jpg&imgrefurl=http://board.ogame.org/index.php%3Fpage%3DThread%26threadID%3D477637&usq=__0Eue3vidQLIDEuvdo_EiETABsqY=&h=283&w=344&sz=37&hl=en&start=3&sig2=SI4DqiI2SF4VXrkERbTySw&tbnid=XwhD2DJIHCMzuM:&tbnh=99&tbnw=120&prev=/images%3Fq%3Dcosmetic%2Btesting%2Bon%2Banimals%26gbv%3D2%26hl%3Den&ei=A5jGSsCkGpO6lAeFw7ySAw

Blow up of same picture (eye irritancy)

http://www.askuswhy.com/images/product/p8_big.jpg

Cartoon

<http://www.cartoonstock.com/lowres/amc0726l.jpg>

National Academies Press

http://images.google.ca/imgres?imgurl=http://books.nap.edu/books/0309088941/xhtml/images/p2000b1fcg21001.jpg&imgrefurl=http://books.nap.edu/openbook.php%3Frecord_id%3D10733%26page%3D21&usq=__pAdrw0RpMp_QwTtRWXIPtnGcUWA=&h=275&w=272&sz=49&hl=en&start=17&sig2=desnvAdofEBRuzUIS_sPUQ&tbnid=fHtrCiHeLNAbfM:&tbnh=114&tbnw=113&prev=/images%3Fq%3Dcosmetic%2Btesting%2Bon%2Banimals%26gbv%3D2%26hl%3Den%26sa%3DG&ei=mpnGStiBEZTb1AeyprGSAw

For the Greener Good (blog)

http://images.google.ca/imgres?imgurl=http://upload.wikimedia.org/wikipedia/en/6/6d/AnimaltestingMonkeyCovance2.jpg&imgrefurl=http://forthegreenergood.blogspot.com/2007/11/your-cosmetics-are-torturing-animals.html&usq=__1Y_Ccldf8lgjuUoq-vk0Oe2vV7c=&h=454&w=348&sz=52&hl=en&start=16&sig2=XfnwXS6qNhFUPydaqw3Z0tw&tbnid=qtusv19riTPRPM:&tbnh=128&tbnw=98&prev=/images%3Fq%3Dcosmetic%2Btesting%2Bon%2Banimals%26gbv%3D2%26hl%3Den%26sa%3DG&ei=mpnGStiBEZTbIAeyprGSAw

Mail Online

http://images.google.ca/imgres?imgurl=http://img.dailymail.co.uk/i/pix/2007/07_02/girls_kin2507_228x372.jpg&imgrefurl=http://www.dailymail.co.uk/news/article-470857/Human-skin-testing-cosmetics-grown-lab.html&usq=__ck42WqTazsIANZU5OReYk2my20g=&h=372&w=228&sz=18&hl=en&start=18&sig2=LIWMJcLLnYSbprJqO5g-RA&tbnid=OUepTaf0Fzyh2M:&tbnh=122&tbnw=75&prev=/images%3Fq%3Dcosmetic%2Btesting%2Bon%2Banimals%26gbv%3D2%26hl%3Den%26sa%3DG&ei=mpnGStiBEZTbIAeyprGSAw

New York Fashion

<http://nymag.com/daily/fashion/2009/03/12/>

Sodahead

<http://www.sodahead.com/entertainment/are-you-against-animal-testing/question-150633/?link=ibaf>

Animal Voice: A Short History of Animal Testing

http://images.google.ca/imgres?imgurl=http://3.bp.blogspot.com/_JsdnzvIBL9E/RtAuRYSPbWI/AAAAAAAAAic/B1XdBpxNrfE/s400/evil%2Bpeople.jpg&imgrefurl=http://theanimalvoice.blogspot.com/2007/08/short-history-of-animal-tests.html&usq=__tKla0vUvIPQxvVZ-7fl3eREmKxo=&h=320&w=400&sz=31&hl=en&start=21&sig2=Do4Bizs9XBOjONXj9lv4Fg&tbnid=by9xZPNoyRwlPM:&tbnh=99&tbnw=124&prev=/images%3Fq%3Dcosmetic%2Btesting%2Bon%2Banimals%26gbv%3D2%26ndsp%3D18%26hl%3Den%26sa%3DN%26start%3D18&ei=JZzGSuqbEJHnIAfkyYmSAw

The Beauty Brains

http://images.google.ca/imgres?imgurl=http://thebeautybrains.com/wp-content/uploads/2009/01/catwithlipstick-300x289.jpg&imgrefurl=http://thebeautybrains.com/2009/01/19/scientists-speak-about-cosmetic-animal-testing/&usq=__qeH5HIT6GX7TnFfwx4wvZIFVRx4=&h=289&w=300&sz=25&hl=en&start=28&sig2=gYw8RUENguGUDBmF9OQ8NQ&tbnid=FhYdFYEKi34AdM:&tbnh=112&tbnw=116&prev=/images%3Fq%3Dcosmetic%2Btesting%2Bon%2Banimals%26

[gbv%3D2%26ndsp%3D18%26hl%3Den%26sa%3DN%26start%3D18&ei=JZzGSuqbEJHnlAfkyYmSAw](http://www.google.ca/imgres?imgurl=http://www.tranism.com/weblog/images/grass%2520rabbit.jpg&imgrefurl=http://www.tranism.com/weblog/2008/02/robots-replacin.html&h=300&w=400&sz=80&tbnid=ihBqGUDmfEDdrM:&tbnh=93&tbnw=124&prev=/images%3Fq%3Drabbits&hl=en&usq=_mMqAVS24ndQnx_oRc9TrIVz5ris=&ei=053GStfbCIGrIAfByKmSAw&sa=X&oi=image_result&resnum=1&ct=image)

Health Canada: Cosmetics FAQs

<http://www.hc-sc.gc.ca/cps-spc/person/cosmet/faq-eng.php>

Health Canada: Framework for International Cooperation on Alternative Test Methods (ICATM)

http://www.hc-sc.gc.ca/cps-spc/person/cosmet/info-ind-prof/iccr_test-eng.php

Image of baby rabbit

http://www.google.ca/imgres?imgurl=http://www.tranism.com/weblog/images/grass%2520rabbit.jpg&imgrefurl=http://www.tranism.com/weblog/2008/02/robots-replacin.html&h=300&w=400&sz=80&tbnid=ihBqGUDmfEDdrM:&tbnh=93&tbnw=124&prev=/images%3Fq%3Drabbits&hl=en&usq=_mMqAVS24ndQnx_oRc9TrIVz5ris=&ei=053GStfbCIGrIAfByKmSAw&sa=X&oi=image_result&resnum=1&ct=image

Wikipedia

<http://en.wikipedia.org/wiki/Rabbit>

House Rabbit Society

<http://www.rabbit.org/>

Google image results

http://images.google.ca/images?hl=en&source=hp&q=rabbits&um=1&ie=UTF-8&ei=053GStfbCIGrIAfByKmSAw&sa=X&oi=image_result_group&ct=title&resnum=1

Ontario Rabbit Education Organization

<http://www.ontariorabbits.org/>

Appendix D

Research Codes

Goal	Strategy	Operation / Characteristic of Strategy	Description of Operation (example)
Self Regulation Participants' goal is to understand and complete the task	Self Regulation	Plan the process	Plan to do (e.g., "First I will read the sources, then I will draft the text")
		Evaluate the process	Evaluate an aspect of the process (e.g., "I have not found enough sources yet")
		Check / Consider Task Demands	Clarify or consider an aspect of the task (e.g., read the instructions; ask researcher about task; make reference to the audience)
		Meta-Cognition	Make comments about one's thinking or understanding (e.g., "I don't understand this")
		Ethical problem solving	Understand / form an opinion on ethical issues or arguments (e.g., "I guess this relates to the bigger question, which is, do animals have the same rights as humans?")

Research Participants’ goal is to gather information and generate content for the essay	Set research goals	Research to form position	Begin without a position > state that will research to help determine position (e.g., “Let’s see if any of these (sources) have more specific views, or any sort of arguments to back them up and see which way seems more sort of logical”)
		Research to support position	Begin with a position > state that will research to support that position (e.g., “. . . that’s the view that I’m going to, look into”)
		Research for overview	State that will research to get an overview of the topic (e.g., “. . . to see what the general ideas are . . . on animal testing”).
		Research for specific information	State that will research to get specific information (e.g., “I want to know more about . . .”)
		Research for information about genre	State that will research to understand genre / get information about genre
	Retrieve websites	Retrieve websites provided	Retrieve sites from list provided (e.g., open list; click on CFHS)
		Search for websites using general-content keywords	Search (retrieve) by general topic/content (e.g., search, <u>cosmetics</u> , <u>animal testing</u> , on Google)

		Search for websites using specific content keywords	Search (retrieve) by specific topic/content (e.g., search, <u>Canada's policy on animal testing</u> on Google)
		Search for websites using joint rhetorical & content keywords	Search (retrieve) sites by rhetorical categories plus topic/content (e.g., search, <u>reasons for animal testing</u> on Bing) *rhetorical kws*: reasons, proof, evidence, arguments, etc.
		Search for websites using rhetorical / genre words	Search (retrieve) sites by genre keywords (e.g., search <u>persuasive essay structure</u> on Google)
		Search for websites via links	Search (retrieve) <i>new</i> sites using the sites have been retrieved (e.g., click on "Resources" on Wikipedia)
		Retrieve known website	Search for, or go directly to, a website previously known to the student (e.g., type <u>www.knowmore.org</u> into address bar)
Read/view websites	Read source	Careful reading of source (e.g., read source, or a section of source, line by line)	
	Skim-read source	Skim reading (e.g., read quickly over source; read headings)	
	View source	View a source (e.g., view video, picture, cartoon) *must click or comment on image; it cannot just be alongside text*	

		Search site using keywords	Once on a site/source, use internal search engine (e.g., <u>animals</u> on Health Canada site)
		Retrieve pages within site	Search (retrieve) new pages within same site (e.g., click on tab in table of contents)
		Search for/make inter-textual connections	Explicitly connect what has been read to something that was/will be read in another source (e.g., “I’m going to look this up elsewhere”; “This says it too”)
		Content problem solving	Respond to source content; ask questions about source content (e.g., “Why do they do that?”)
	Evaluate websites	Explicitly evaluate and select	Explicitly evaluate source and explicitly select it for reading/viewing or referencing, (e.g., “Something from the UK, that could be applied to Canada”; “This looks credible because it’s a government site”)
		Explicitly evaluate and reject	Explicitly evaluate source and explicitly reject it for reading/viewing or referencing (e.g., “That doesn’t really have to do with cosmetics”; “I can tell right away it’s biased”)

Take notes: medium	Take electronic research notes	Take electronic research/ jot notes (e.g., “Depends on the species, so animal tested products may still be harmful,” in Word).
	Take hard-copy research notes	Take hard-copy research/jot notes (e.g., “cell & tissue culture (in vitro),” on paper)
	Print research notes	Print research/jot notes (e.g., “I’m going to print these”)
Take notes: source	Write/type notes	Cyclically retrieve source, read it, write jot notes (e.g., read Wikipedia, write notes; read Health Canada, write notes)
	Copy and paste notes	Copy / copy and paste text (i.e., content) directly from sources into research notes (e.g., copy “Today, we are on the threshold of having viable alternatives for laboratory procedures that kill millions of animals each year . . .”; paste it into Word notes)
	Resemiotization	Read/view content in one modality and take note in another (e.g., view image, write note)
Take notes: organization	Organize notes by source	As notes are created, they are organized by source (e.g., underline CHFS; write notes underneath heading)

		Organize notes by rhetorical category	As notes are created, they are organized by rhetorical categories (e.g., “reasons why it is bad”) *can be implicit*
		Organize notes by topic	As notes are created, they are organized by topic (e.g., “the negative effects on animals”)
Organize Participants’ goal is to organize the essay	Plan Structure	Plan structure / generate arguments while reading sources	Explicitly plan how to use source content in terms of essay structure/arguments (e.g., this could help with the argument that . . .)
		Plan structure / generate arguments while reading research notes	Explicitly plan how to use information in notes in terms of essay structure / arguments (e.g., “Ok, so I could do an argument on . . .”)
		Plan structure / generate arguments by DRAFTING	Explicitly plan structure / generate arguments by drafting a skeleton of the text (e.g., draft an introduction which indicates arguments)
		Plan structure/ generate arguments while writing	Explicitly plan essay structure / arguments while writing (e.g., “Ok, so it seems like I have a paragraph on . . .”)
	Outline	Organize research notes like an outline	Research notes are already organized in such a way as to signal the writing plan; e.g., organized by topic

		Create outline with topical structure only	Create a brief outline distinct from research notes; outline contains topical headings only (e.g., “1. Intro; 2. Britain’s Standpoint . . .”)
		Create outline with template only	Create outline with rhetorical template only (e.g., “set up issue; state your opinion”)
		Create outline with structure and content	Create an outline distinct from research notes; with information from research notes copied into outline (e.g., add in headings, and re-order notes, on separate paper / document)
		Create outline with rhetorical / process goals	Create an outline distinct from research notes which contains rhetorical and/or process goals (e.g., “proof for alternatives”)
		Revise Outline	Revise structure of outline (e.g., cut and paste section of notes/outline to a different location)
Draft Participants’ goal is to draft their	Draft sentences	Draft electronically	Draft in word-processing program (e.g., type sentence(s) in Microsoft Word, “Cosmetic testing on animals is extremely inhumane”)
		Draft hard-copy	Draft with pen & paper (e.g., write sentence(s) on paper, “Using animals for the testing of cosmetics is not necessary”)

essay		Draft in sequence	Draft the text in the sequence in which it appears (e.g., draft the introduction, then the body, then the conclusion)
		Draft out of sequence	Draft the text out of the sequence in which it appears in text (e.g., draft introduction last).
Garner content		Draft within notes/outline	Expand jot notes or outline to form text sentences (e.g., add text before and after jot note)
		Draft separately from notes/outline	Refer to notes/outline while writing; write in separate page/area (e.g., begin new page, before or after notes)
		Re-read existing draft to draft	Read what has been written, in order to draft additional text (e.g., read prior sentences in paragraph; then continue writing paragraph)
		Think through text before drafting	Explicitly think through text before actually drafting (e.g., say sentence out loud prior to writing; “I’m trying to think of the word”)
		Re-read sources to draft	During drafting, to generate content, reread sources that were retrieved earlier during research (e.g., click back to Internet Explorer; click on an open tab; click on saved link; read printed sources)

		Research to draft	During drafting, to generate content, search/retrieve additional sites to generate content (e.g., search <u>conditions of animals in animal testing</u> on Google)
		Copy and paste to draft	During drafting, copy and paste content from source into essay
		Resemiotization	Read/view content in one modality and write in another (e.g., view image, write sentence)
	Garner structure	Outline to structure draft	Use outline to structure the draft (e.g., same headings, or same sequence, or same content headings; refer to outline while writing)
		Draft to structure draft	Use drafted structural elements to structure draft (e.g., read introduction, begin paragraph indicated in introduction)
	Use electronic drafting functions	Thesaurus / Dictionary	Use electronic thesaurus / dictionary as writing aid (e.g., use www.thesaurus.com)
		Word-processing functions	Use word-processing functions to aid writing (e.g., bolding sections to which to return; automatic spelling)
Revise Participants?	Re-read text	Re-read existing essay	Re-read existing text; do not re-write entire new draft (e.g., read through paragraph or essay)

goal is to evaluate and possibly change their texts, in order to improve them		Re-read essay from another perspective	Re-read what has been written, explicitly from a different perspective (e.g., “I’m going to read through, as though I’m . . .”)
		Read and re-write entirely new draft	Write a new draft (e.g., copy hard copy to electronic)
	Revise text	Edit only	Evaluate & revise with respect to surface/local features of the text (spelling, minor changes in wording that do not affect meaning significantly, grammar, formatting)
		Edit / revise at mid-level	Evaluate & revise with respect to local meaning (e.g., changes in word choice that affect local meaning, inserting and deleting propositions of content)
		Revise globally / deeply	Evaluate with respect to global structure and/or gist of text; and / or major rhetorical move; Revise with respect to these (e.g., inserting, re-ordering, or deleting propositions of content)

Appendix E

Participants' Essays

Mark's Essay

It is in my opinion that the Canadian Government's policy regarding cosmetic testing on animals should be reformed to not allow for the testing on animals in any situation in which the animal may be harmed in the case that there is no other available option. In the cases in which there are viable alternatives for animal testing, the alternatives should be used for the animals' protection. Animal testing is currently not required in the U.S. by the FDA nor the Consumer Product Safety Commission and is also not required in Canada for cosmetic testing but only for the testing of medical products before they reach the human population. Although cosmetic testing is not needed, it is also not disallowed. The CCAC has already developed guidelines for the care and use of experimental animals but more specific rules as to what is allowed and what is not needs to be implemented.

Many of the tests that unnecessarily performed on animals cause many serious negative effects. Not only should these effects not be tolerated, but when many alternatives are readily available and the tests may not be completely applicable to a human population there is no reason for continuing with the tests. For example, the Draize Test (an irritancy test) is used as a measure of the harmfulness of individual ingredients of products. The product is dripped in the eye of a rabbit (which is chosen due to its lack of tear ducts) and the animal is confined in a cage for the duration of the

experiment which can be anywhere from 3-20 days. Toxicity tests involve animals being force fed, injected, or forced to inhale toxic substances to monitor the amount of a substance required to kill a specific quantity of cells. The animals eventually die as their organs eventually become blocked or ruptured due to the toxic substances. Specifically in the cosmetic industry where it is possible to avoid testing on animals at all, it should not be acceptable for companies in Canada to subject animals to such conditions or situations. Canada should not allow any cosmetic testing on animals unless there would possibly be a medical effect, but only in the situation that all alternatives to animal testing had previously been exhausted.

Canada should require the use of alternatives to animal testing as opposed to immediately using animals before there would even be consideration of allowing the testing to occur on animals. Computer simulations can use the previously identified results of a toxicity test to predict the outcome of ingredients in a new product. By doing this, the harm that was previously done to animals does not go unnoticed and also does not have to be repeated, even a case in which the possibility of medical peril may exist. Cell cultures are another alternative, which actually consist of human epidermis that is applied to human volunteers. The test subjects are monitored for 24-48 hours and the end results are often more representative of humans than would be the tests done to an animal counterpart. Many alternatives share this advantage, as it is not just the physical structure of the animal that is different. Rabbits for example are kept in conditions that include psychological stress that can stimulate physiological changes in the rabbits, possibly altering the experiment's outcome. By using these alternatives, Canada would be

protecting the lives of animals while at the same time possibly bettering their research results, and therefore the final product, putting everyone, including the animals in a better situation.

Currently, companies are able to designate their products as “cruelty free” or “not tested on animals” just because their final product is not tested on animals, and not necessarily the individual ingredients that go into making the product. Canada should ensure that companies must disclose the presence of any testing of ingredients whether it be by themselves or another independent company if the ingredient is going to be a component of their final product. It is necessary that Canadian consumers have the knowledge of what really makes up the products they are going to buy because they themselves have no means of determining if the product is in fact animal-friendly. Canada could also make initiatives such as the “Leaping Bunny Logo” more prevalent in the consumer society or follow in suit with a national mandate that allows for all cosmetic products to be judged on the same basis. Only after there is some means for consumers to actually know if their cosmetic products will they be able to really judge what they want to buy.

Although Canada has some guidelines already in place for the care and use of experimental animals, much more initiative has to be taken to completely abolish cosmetic testing on animals with the only possible exception being in some sort of extreme situation where many lives would be at risk of harm. The very nature of animal testing is extremely negative for the animals and in the case of cosmetic testing where Canada already has no requirements for testing on animals prior to a product’s release to

the public, alternatives should be taken. There are many possible alternatives and if Canada were to require that all of the alternatives be exhausted before even considering testing on live animals, the lives of many animals would be bettered and possibly even saved, such as in the case of toxicity testing. These alternatives also show promise for being more representative of the human species because some of the obvious differences between the physiological nature of an animal such as a rabbit and a human. Initiative also has to be taken to increase consumer awareness and give the general public an easier way of ensuring that what they are buying is in fact animal friendly. Canada should do all that it can to prevent any and all avoidable animal testing.

Ishaan's Essay

Persuasive essay on Animal Testing

Animal testing is a highly controversial topic because common products that we use everyday are tested on animals to make sure that they are not harmful to us. These products are tested on animals to observe any detrimental health effects. Once they have been successfully approved to be harmless, the government allows the product to be sold to the public. This brings about some serious questions about what happens to the animals that all of these products are tested on. Millions of animals are seriously harmed, injured or killed during the production of new cosmetic products. Another alarming part of all this is the fact that animal testing is still carried out in Canada. Many other countries have already taken strong action against this cruelty to animals. The real question is why is Canada still allowing this to continue? It is time to stop animal testing in Canada especially since there are much simpler alternatives.

Animal testing has been going on for a long time behind closed doors. Cosmetic products are the largest contributor to animal testing. Cosmetics do not even need to be tested on animals to be considered safe by the government. Animal testing is still allowed in Canada, although it is only necessary for the testing of Medical products. Canada has recently recognized the need to stop animal testing, and through The International Cooperation on Cosmetics Regulation, they have shown an interest in limiting the types of tests that can be carried out. However, this cruelty still continues with little restriction. Some products are labelled “not tested on animals,” although the ingredients used in them

were. This is what needs to change, animal testing should be banned worldwide in order to ensure that animals are not unnecessarily harmed. The European Union has already implemented a ban on all animal tested products. Canada should lead by example and ban animal testing. This will then pressure other countries to make stricter laws so that multinational corporations have to comply with laws and stop animal testing once and for all. Canada needs to change

One of the most terrible things about animal testing is that the majority, up to ninety four percent of testing takes place due to the manufacture of cosmetic products. These products do not require testing on animals to be certified by the government but it is still done as an extra step. Because of the large market for cosmetic products, these companies continue to use animal testing as a cheap way to prove that their products are not harmful. Thousands of animals are tortured and abused for the production of these goods. Tests like the LD50, test the toxicity of a substance by exposing test animals to vastly unrealistic concentrations of the chemical in order to see what is necessary to kill fifty percent of the test subjects. Other horrors include testing irritancy on rabbits. This is done by placing the chemical on the rabbits eyes and skin in order to test how irritating the product may be, causing unbearable pain to the animal. Even though products are tested, there are still problems. Vast recalls of harmful products are not uncommon and animal rights groups attribute this to the fact that chemicals tested on an individual animal or species may not have the same results when tested on another. Hereby proving that animal testing is neither necessary; because of all the alternatives available, and may not always be safe.

People have been against animal testing for a long time and finally it seems as though the battle may be over. There are very many alternatives to testing on animals, not to mention that most 'ingredients' have already been thoroughly researched and tested. Once again animal testing seems like the most pointless and barbaric option but yet it is still being practised on a very large scale. In today's modern world, there are many new options that are far more humane than animal testing because they still provide accurate results and do so without harming animals. The various new options include using computer models and pre-existing test results to determine a product's safety factor. These results are available for chemicals that already exist. Newly made compounds, still need to be tested and companies may try to resort to animals, however, there is yet another option. Lab tests involving animal tissue and cell cultures may be the way forward. The biggest problem standing in the way of progress is cost and large corporations will generally opt to test on animals because it is the cheaper alternative.

This is where public concern and government regulation come in. The only reason this terrible injustice continues is because the general public remains oblivious. If this issue were to become more public, there would be a greater outcry for a stop to this cruelty. Since animal testing became a major issue, a lot of companies have decided to make products that are not animal tested. Now, it is the government's turn to act. Canada has already set up councils to monitor the safety of animals that are used for cosmetic testing by making sure that all tests are carried out ethically. However, more can be done since animals still lose their lives due to this industry. It is time for a ban on all animal testing. Natural and pre-existing chemicals results can be used instead of newer products,

hence guaranteeing the safety of animals everywhere because there will no longer be a need to test products in the current way. Other alternatives are far more reliable and humane compared to using animals as test subjects.

The cosmetics industry is the largest contributor of animal testing currently and it is fed by the demand for these products. Millions of animals are put through great suffering and pain using unnecessary tests in order to prove their safety. The only reason that animal testing is still prevalent is because of the relatively cheap cost and the fact that there is no opposition. Public awareness and protest has begun to change attitudes of companies towards this issue. Alternative methods are available and can easily be implemented. A ban placed by governments worldwide will put an end to this issue for the last time. Now is the time to for Canada to ban all animal testing for cosmetic products. This is not something new since it has already been implemented in Europe with great success. Now is the time to end the suffering of all animals worldwide and banning animal testing in Canada is a good first step towards a cruelty free world, where animals are respected and not abused for our benefit and profit.

Joy's Essay

Mice Aren't Meant to Wear Lipstick

The cosmetic industry is heavily reliant on animal testing. Cosmetic testing on animals entails the testing of the ingredients found in cosmetic products and their effects on parts of the body, like the skin. Cosmetic testing does not necessarily refer to the testing of the final product on the animal. Due to this common misconception, cosmetic manufacturers are able to market the product itself as not tested on animals, even if the corporations conducting the experiments are still testing the individual ingredients found in the product (CFHS). These practices, although unethical, are not prohibited under Canadian law. Although there are various federal laws concerning cosmetic practices, there are no Canadian laws regarding the use of animals in testing for cosmetic purposes. Although the use of animals is a requirement for testing in the medical field, they are not required to be used in the testing of cosmetics. The use of non-animal alternatives would greatly reduce the number of animals harmed, as well as set a precedent for others in the cosmetic industry to look up to and follow (CFHS). Canada's policy, regarding the use of animals in testing and experimentation for cosmetic purposes, should be that it aims to explore minimizing animal use while maximizing the use of alternatives whenever possible.

The policy, which governs the testing of animals for cosmetic purposes in Canada, should be revised on the rational that there are available and effective alternatives. Any experiments or testing which result in death, pain or malformations to the animal should be banned. Testing on animals should only be permitted on the condition that any

ingredients being tested have proven previously to be harmless. Cosmetic manufacturers in Europe have banned all use of animals for testing purposes and instead rely on using natural synthetic ingredients derived from human cell tissues. This alternative is just one of the many safe and effective methods that can be used as a substitute for animal experimentation (CFHS). Using animals for the testing of cosmetics is not necessary, as to argue that something is necessary is to also argue that these are no other options or alternatives. Not only are there other options available, there are options available that have proven to be both effective and adequate substitutes.

The European Union has banned the testing of “finished cosmetic products” on animals since 2004, and in 2009 adopted a ban against the testing of the specific ingredients found in cosmetic products as well (ec.europa.eu). The European Union instead relies on the use of non-animal alternatives such as in vitro and stem cell research when testing both the ingredients and the final cosmetic product. Dr. Amit Gefen, a professor at Tel Aviv University, and member of the University’s Engineering Faculty, has discovered what he calls a breakthrough that will provide many beneficial applications in the medical and cosmetic world. While studying fat cells Dr. Gefen discovered a new means of testing products, using rat stem cells, which can be simulated to: “Create skin, bone, fat and muscle tissue [. . .] His new approach no longer requires the sacrifice of large numbers of animals. When an experiment is over, not one animal life is lost” (John Hopkins Bloomberg Institute).

While recognizing that the use of animals, in fields of research such as medicine, is often beneficial and necessary, the use of animals for the purpose of cosmetic testing is

unnecessary, cruel and avoidable. The testing of cosmetic products by cosmetic manufacturers is essential in proving the product's safety. This being said, the testing of cosmetic products to prove the product's safety is not necessary through the use of animals. Thus, the use of alternative methods such as in vitro and stem cell tissue growth are suitable and effective substitutes that prove both safe for the animal and human. The use of animals for cosmetic testing purposes is not required under Canadian law, nor necessary in general. The use of non-animal alternatives would greatly reduce the number of animals harmed, promote the healthy development of other alternatives, as well as aid in advancing technological developments while still complying with society's morals and ethics.

Abbey's Essay

May 26th, 2010

Canada's Standpoint: Cosmetic Testing on Animals

Each year, thousands of animals are put under the microscope-for the wrong reasons. Animals are forced to undergo numerous tests for everyday household products and they are suffering because of this. One major product, cosmetics, uses animal testing, which has been under great debate for years in the government system. Cosmetic companies around the world are putting animals at risk by completing tests on these animals, causing most to suffer or even die. This is why Canada, a country known to be peaceful and environmentally friendly, should completely abolish all animal testing in the field of cosmetics. If animal testing in cosmetics continues, this form of animal cruelty will only continue, ending the lives of thousands or even millions of animals everywhere.

Presently, Canada has changed their policy on animal testing in regards to cosmetics. Having completely allowed it in the past, Canada now regulates the amount of animal testing its cosmetic companies use. Canada's policy now asks that whenever possible, non-animal models are not to be used, and only if experimental aims are met and are successful that animals may be tested on. Health Canada has stated that its ultimate goal is to protect Canadian citizens from any hazardous material that could be a health and safety risk, and that it is okay for animals to be used on occasion while completing this goal. But why do animals have to be used at all? If an ingredient or product is already known to be safe for public use, it is not necessary to do more testing on it . . . especially on animals. There are so many other options when it comes to

cosmetic testing, and there are so many countries that know this and take advantage of it. Britain is one of the few countries in the world which has completely discontinued cosmetic testing on animals. The general public there had protested for years, and finally the government complied. Now, Britain sees any scientist who tries to bring up the image of animal testing as useless. As a country, they have decided their policy to make their people happy, and they are not going back on it. Because of Britain's lead in banning all cosmetics, Europe has decided that in the year 2009, all animal testing in Europe will be banned. So why not follow suit, for even cosmetic companies are starting to listen to its buyers, and are starting to ban animal testing in their facilities.

Many cosmetic companies have begun to eradicate the use of animals during testing procedures. Scientists within the companies have worked hard to find alternatives to animal testing, and are finally pleasing their customers. However, not all cosmetic companies have followed this example, and still to this day practice cruel tests on animals just to get the perfect "new lipstick." Therefore, it is up to not just the people to change these companies and countries policy . . . but ultimately the government. Canadian government has stated that they are open to any alternatives that would save animals from undergoing these tests and suffering the consequences. However, if they are open to alternatives, why is the government not taking action? They should be doing everything they can to stop animal testing. Instead, they are still paying scientists to conduct these horrific tests.

These tests, both cruel and unsafe can cause major suffering and even death to the animals undergoing them. One test, which is still used by some companies today is the

Lethal Dose 50 test. This test forces the animals to ingest or inhale a substance until half of the test group dies. Besides death, common symptoms of complete suffering include paralysis, convulsions, and bleeding from the mouths, noses, and anuses. The results of this test, along with all the other tests set upon the animals only give more reason to why Canada should completely abolish cosmetic testing on animals. Canada should instead be paying scientists to come up with even more alternatives to animal testing, because tests like the LD50 test are wrong, cruel, and destructive.

Animal cruelty is a crime, so how is this any different? Every life is important, and every animal should have a chance to live a cruelty free life. Thousands of animals around in Canada are being tested in cosmetic laboratories at this moment. There are alternatives out there, for scientists have proved it, and it is now up to the Canadian government to change their standpoint, not only to make the citizens of Canada happy, but to be a leading country in humane sciences. Let's face it, every life deserves to be lived.

Kieley's Essay

Canada's current laws state that for medical developments testing must be done on animals before products can be used on humans. This is obviously important in that a new medicine must be proved to be safe in case of harmful effects on humans. While animal testing may be necessary to ensure human safety when it comes to medicines, the law does not require that the testing of cosmetics must be done on animals. It can be assumed that animal testing is necessary in order to ensure human safety and the success of cosmetic companies, but these ideas are not true. If the public can be educated on the ways to stop cosmetic testing on animals, then a change can be made.

While it is extremely important that cosmetic products sold are safe for human use, there are other means of testing besides on animals. Development in technology has produced ways to simulate effects of products on humans through computers. If we can continue to develop this technology we could limit the use of animals even further. The use of human cell and tissue to test cosmetic substances is another alternative. Not only is this inexpensive, but it also allows for testing on actual human DNA instead of the substitution of similar animals. Although animal testing cannot currently be removed entirely, these are ways to reduce the number of animals used.

Companies can still be successful without testing on animals. There are many prominent companies in the cosmetic field that do not use animal testing on their products without loss of profit. Such brands as Aveda, Avon, Estee Lauder and Clinique have moved away from animal testing. These are household brands whose successes have not changed despite their beliefs in the welfare of animals. While these companies are good

examples of success, there are still many companies who continue to test their products on animals. There are ways to change this.

These alternative methods and their successes are not widely known. That is where the Canadian government can help. If political pressure were to be put on cosmetic companies to change their habits of cosmetic testing, change could be implemented. This does not have to be extreme action. It could be as simple as placing advertisements on the television depicting the harm that is done to animals and the ways that the public can make it stop. It is very important for consumers to know what goes into making the products that they buy and if they are well educated on the issue then they can choose to only buy from companies who use minimal animal testing. This in turn will pressure companies who continue to use animal testing to stop, as consumers would be less inclined to buy their product. Another thing that the government can do is support organizations that are working to limit cosmetic testing on animals such as the Leaping Bunny organization. With government advertisement and funding, small organizations such as Leaping Bunny could make a huge difference.

The testing of cosmetics on animals is a cruel practice and one that we are able to limit. If the Canadian government were to help educate its public on the issue and the fallacies associated with the issue, people would be more able to help create change. If the Canadian public were made aware of the alternatives to animal testing and chose to cease spending on unethical companies, change would happen.

Sarah's Essay

Animal testing involves the testing of cosmetic products, either the finished product or individual ingredients, on animals. Many oppose the testing of cosmetic products on animals because of the risk of harm the animals undergo. Cosmetic testing in Canada should be banned because of the inhumane conditions the animals are kept in, the animal's reactions to the products and the possible alternatives to animal testing.

The inhumane conditions the animals endure during the period of testing demonstrates the need for this practise to be banned in Canada. Often times the animals are placed in cramped areas, for example three rabbits may be living within a half foot by one-foot cage and living in their own excrement. The animals receive poor nutrition and are not cared for in a responsible manner. Many believe animals receive the same rights to life as humans and deserve to be treated with respect.

Many animals suffer reactions to the products of animal testing. The animals are shaved and chemicals poured onto their skin. The chemicals cause burns, swollen eyes and other painful skin irritations. The treatment of the animals is viewed as torturous. The Draize Eye Irritancy Test is used to determine the amount of damage the product causes the eye. A test includes six to nine rabbits. Clips are used to keep the eyes open by the cosmetic substance is being applied. They usually receive no anaesthesia during these tests. After the tests are completed, the animals are either killed or "recycled" into further tests, for example, dermal toxicity tests. Common reactions to the products include swollen eyelids, inflamed irises, ulceration, bleeding, massive deterioration and blindness.

There are several alternatives to using animals for cosmetic testing. Many of these methods are more reliable and less expensive. Replacement methods include using skin and cell tissue cultures and corneas from eye banks in place of entire organism. Many computer and mathematic models are also available. Companies are also able to avoid testing all together by using non-toxic natural products or those that have already been safety approved by cosmetic companies.

Canada is currently working to minimize animal suffering as a result of animals testing in cosmetic products. The Canadian Council of Animal care (CCAC) works to oversee the conditions of animals during testing and to ensure they are treated with respect. The CCAC works to minimize the amount of animal suffering by using all possible alternatives were applicable and using refining, replacing and reducing techniques. Although the Canadian government works to decrease the suffering from animal testing in the cosmetic industry, many animal rights advocates believe all forms of cosmetic testing on animals in Canada should be eliminated.

Kristen's Essay

Yesterday, when you applied your anti-wrinkle face cream, perfume, or cologne, did you stop to consider the fact that numerous animals may have been murdered simply satisfy your own vanity? Each year, 1 320 000 animals endure pain inflicted by cosmetic companies. Such cruelty could have been easily prevented. An animal should not have to sacrifice its life for the sake of humankind's egotism. Below are some images that clearly depict the sufferings endured by animals subject to cosmetic testing:



Not only is the victimization of these animals cruel, it is unnecessary. As humans, we have all we need in terms of cosmetics, no new products are necessary. The only reason these cosmetic products continue to be manufactured is the desire for monetary growth possessed by the world's largest cosmetic companies. The injustices suffered by more than one million animals each year should be enough to stop the cosmetic consumer's mindset and end this avoidable animal massacre.

Each year, 17 to 22 million animals are subject to experimentation for the testing of cosmetic products. Products such as creams and lotions are placed directly on the mucous membranes of the animal test subjects in order to determine the safety of the

product. However, this method of safety testing is, in itself, flawed. This is because what may harm a rabbit or a mouse may not have the same effect on a human, and what appears harmless on animal test subjects may in fact result in devastating outcomes for human users. In a scenario such as the former, the murder of an animal is all for naught. Yet, even when the testing of a product on an animal is proven to spare the well-being of hundreds of potential human buyers, the notion of cosmetic animal testing is still fundamentally wrong. In the words of Elizabeth Goudge, “Nothing living should ever be treated with contempt. Whatever it is that lives, a man, a tree, or a bird, should be touched gently, because the time is short. Civilization is another word for respect for life . . .” . Certainly, Elizabeth’s concept can be applied to the testing of animals subject by cosmetic industries. If we, as humans, want to call ourselves “civilized,” we must put an end to the unnecessary and degrading experimentation on animals, and look towards alternatives for cosmetic testing.

New and more animal-friendly alternatives to traditional cosmetic product testing are continually being discovered. For instance, when testing a chemical for eye irritancy, donated human retinas are viable substitute for live animal subjects, and often indicate how a human might respond to a product more accurately than an animal test subject would. Furthermore, a synthetic ‘skin’ has been manufactured, called Corrositex, that imitates human skin, thus eliminating the need for cosmetic product testing on the skin of animal subjects. Various in vitro methods, such as the bovine corneal opacity and permeability test, the HET-CAM, and the model using human corneal epithelial cells have all been used to successfully detect irritation causing chemicals in various cosmetic

products. Clearly, the sacrifice of animals in the name of cosmetic testing is unnecessary, as science has provided testing methods that do not require the participation of animal subjects.

The testing of cosmetic products on animals is cruel and unnecessary, and should be stopped immediately. The European Union, as of 2009, has banned the use of animals in the testing of cosmetic products, yet in Canada and the United States, animal testing for cosmetic purposes has not been outlawed. Write a letter or email to your MP representative, and ask them to ban the use of animal subjects in cosmetic testing today, and help put a stop to this cruel and unnecessary injustice.

Aisha's Essay

Canada's Policy on Cosmetic Testing on Animals

Cosmetic testing on animals is a controversial issue that is being heavily debated all around the world. In Europe, a ban on most of the animal testing methods – especially cosmetics- has been put to effect in March 2009. Unlike Europe, America has no standard policy on such practices. However, some American companies refuse to rely on animal testing for marketing purposes. Canadian law has no specific regulations or a set policy for animal testing on cosmetics.

Health Canada focuses on the safety of cosmetic and medical products provided to Canadians, and therefore has set rules about testing them before they are available to the public. This leaves no alternative for companies but to rely on animal testing for the most accurate results. Canada's policy should not have a rule that contradicts what Health Canada's regulations are (i.e. a complete ban on cosmetic animal testing), but should have a say on the issue of non-medical animal testing: cosmetic animal testing.

There are different types of animal testing. These include pure research such as genetics, developmental biology, behavioural studies, as well as applied research such as biomedical research, xenotransplantation, drug testing and toxicology tests, including cosmetics testing.

Supporters of animal testing, such as the British Royal Society, argue that animal testing was necessary to the advancement of medical research. Even though some might argue that animals could never react the same way humans do, animals provide the most

accurate test results. There are no other reliable alternatives to get the same results. This makes animal testing necessary in the progress of medical research, which Canada proves to lead at. However, while medical testing on animals is necessary for human survival, cosmetic testing on animals is not. Animals should not have to suffer for the vanity of humans.

According to Canadian law, a cosmetic is defined as “a product which cleanses, improves or alters the complexion, skin, hair or teeth.” Canada’s policy should start by partially banning cosmetic testing on animals. This ban should include only beauty products that are used to enhance the appearance of humans, such as nail polish, powders, perfumes, and all types of facial make-up that are not used for medical purposes. The ban on producing such products would set an example for medical labs on how to deal with alternatives for animal testing in the future.

Some argue that animals have the same rights as humans and that it is cruel to increase animal suffering for the sake of humans. While this is true, humans have always depended on animals for surviving, whether that be for food, clothing etc. Since the non-medical group of cosmetics is not essential for living, the ban is valid and would decrease the number of suffering animals, also known as “reduction.” Reduction is one of the three R’s of alternatives for animal testing. It stresses that the number of animals used should be the minimum so that it is consistent with the nature the test. The limit placed on the number of animals used should accommodate with the requirements of the test, so as to ensure an accurate statistical result is obtained.

I propose that Canada's policy for cosmetic animal testing should be a complete ban on beauty product testing and a partial reduction for other natural cosmetics. Canada should promote the usage of previous animal experiments and attempt to reduce the number of animals used for testing.

Rebecca's Essay

Animal testing is a very controversial issue. Canada's current policy states that cosmetic manufacturers must be able to prove that their products are safe. This does not mean that animal testing is required, as there are alternative ways to test products, although many companies still choose to use animals to test their products. L'Oreal, Cover Girl, MAC, Revlon, Clinique, and many other popular cosmetic brands test their products on rabbits, rats, dogs, cats, monkeys and other animals. Animal testing is expensive, inhumane, and Canada should not allow companies to test their products, or ingredients for their products, on animals.

Cosmetic animal testing is extremely inhumane. It is estimated that 50-100 million animals worldwide are used annually for cosmetic testing or are killed during experiments or euthanized afterwards. Many cosmetic companies pump the products into the animal's stomachs, rub them onto their skin, squirt them into their eyes, or force animals to inhale them as aerosol sprays. These methods harm the animals and is torture. A specific example of animal testing is when it is used to find out what skin care products are safe for humans. These tests involve shaving the animals and placing the chemicals on their bare skin, then covering the skin with adhesive plaster. The animals are then placed in restraining devices to prevent them from struggling. No animal should have to undergo these tests in order for human benefit.

In addition, animal testing is extremely expensive. The cost of housing, storing, and caring for animals is very high. Animal testing costs the American public more than

\$136 billion every year. Many expenses must be factored in when planning to test on animals. First, a company must pay for a lab, which includes equipment costs. Then they must pay for the test subjects (the animals). This cost can vary depending on the test material and the animal. Lastly, a company must also have the Food and Drug Administration's approval.

Animals differ from humans significantly, which therefore can make animal testing unreliable. However, there are simple alternatives and limitations to testing on animals, some of which are:

Reduction - this refers to methods that allow researchers to obtain comparable levels of information from fewer animals, or to obtain more information from the same number of animals.

Replacement - this means that non-animal methods are preferred as to animal methods wherever it is possible.

Refinement - methods that get rid of or minimize the pain, suffering, and distress an animal goes through and enhances animal welfare for the animals still used.

As you can see, animal testing is cruel, much too expensive, and there are cheaper and humane alternative measures. In 2002 the European Union (EU) agreed to implement a close to total ban on the sale of animal testing cosmetics in the EU. They also chose to ban all cosmetics-related animal testing. The European Union has proven that it is completely possible to ban animal testing on cosmetics and use alternative measures. Canada should follow the European Union's lead and ban animal testing.

LORI CATHERINE KIRKPATRICK

Curriculum Vitae

Education

Doctor of Philosophy: Educational Studies: Educational Psychology & Special Education (2012). The University of Western Ontario, Faculty of Education. Dissertation title: *Students' strategies for writing arguments from online sources of information*. Supervisor: Perry Klein, Ph.D.

Master of Education: Educational Psychology & Special Education (2007). The University of Western Ontario, Faculty of Education. Thesis title: *Instruction to improve grade seven and eight students' compare-contrast reports when writing from sources*. Supervisor: Perry Klein, Ph.D.

Honours Bachelor of Science: Psychology Specialist & English Minor (2004). University of Toronto, Faculty of Arts and Science.

Awards and Achievements

University of Western Ontario (Ph.D.)

- 2012 Nominated for Graduate Student Teaching Award
- 2012 Graduate Thesis Research Award \$750
- 2011 Ontario Graduate Scholarship \$15 000
- 2011 Social Sciences & Humanities Research Council Doctoral Fellowship \$20 000
- 2010 Western Graduate Research Scholarship ~ \$8000
- 2009 Social Sciences & Humanities Research Council Doctoral Fellowship \$20 000
- 2009 Ontario Graduate Scholarship \$15 000 (declined)
- 2009 Attended the APA Division 15 Graduate Student Seminar (competitive entry)
- 2009 Western Graduate Research Scholarship ~ \$8000
- 2008 Ontario Graduate Scholarship \$15 000
- 2008 Western Graduate Research Scholarship ~ \$8000
- 2007 Western Graduate Research Scholarship ~ \$8000

University of Western Ontario (M.Ed.)

- 2007 W.A. Townsend Gold Medal in Education for highest graduating average
- 2006 Western Graduate Research Scholarship ~ \$5000
- 2005 Western Graduate Research Scholarship ~ \$5000

University of Toronto (B.Sc. (Hons.))

- 2004 Graduated with high distinction
- 2004 Dean's List inclusion
- 2003 Genevieve Logan Scholarship (English scholarship) \$1000
- 2003 Torno Prize in Victorian Studies (English prize)
- 2003 Dean's List inclusion
- 2002 Golden Key International Honour Society membership awarded

Related Work Experience

Research

Research Assistant (2008 - 2009) to Julia O'Sullivan, Ph.D., Dean, Faculty of Education at Western.

(1) *Key Factors Supporting Literacy Success in School-Aged Populations*, report written for the Canadian Education Statistics Council and funded by the Society for the Advancement of Excellence in Education.

(2) *Aboriginal students and early literacy*, review of existing research.

(3) *International special education policies*, review of policy documents.

Research Assistant (2007 - 2008) to Perry Klein, Ph.D., Associate Professor, Faculty of Education at Western. *Writing to Learn Across the Curriculum*, funded by SSHRC.

Research Assistant (2005 - 2007) to Robert Sandieson, Ph.D., Associate Professor, Faculty of Education at Western. *Exploring the Range of Bibliographic Data in Special Education: Development of the Pearl Harvesting Information Retrieval Method*.

Research Assistant (2006) to Cheryl Forchuk, Ph.D., Research Scientist, Lawson Health Research Institute. *Collaborative Inter-Professional Healthcare Education and Research*, funded by Health Canada.

Lab assistant (2001 - 2002) to Charles Helwig, Ph.D., Associate Professor, Department of Psychology, University of Toronto. *Children's and Adults' Social and Moral Reasoning*, funded by the Canadian International Development Agency.

University Teaching

Instructor for *Educational Psychology & Special Education* (2011 - 2012): Bachelor of Education course at The University of Western Ontario, Faculty of Education.

Instructor for *Educational Psychology & Special Education* (2010 - 2011). As above.

Instructor for *Educational Psychology & Special Education* (2009 - 2010). As above.

Volunteer Teaching

Tutor with the Learning Disabilities Association of Ontario (2006).

Assistant at Tecumseth South Central Public School, Grade 1/2 and 7/8 (2004 - 2005).

Tutor with the South Simcoe Literacy Council's Turning Pages Program (2004 - 2005).

Publications

Papers in Journals (Refereed)

- Klein, P.D., & **Kirkpatrick, L.C.** (2010). A framework for content area writing: Mediators and moderators. *Journal of Writing Research*, 2 (1), 1-46.
- Klein, P.D., & **Kirkpatrick, L.C.** (2010). Multimodal literacies in science: Currency, coherence and focus. *Research in Science Education*, 40, 87-92. doi:10.1007/s11165-009-9159-4.
- Kirkpatrick, L.C.**, & Klein, P.D. (2009). Planning text structure as a way to improve students' writing from sources in the compare-contrast genre. *Learning and Instruction*, 19, 309-321. doi:10.1016/j.learninstruc.2008.06.001
- Sandieson, R.W., **Kirkpatrick, L.C.**, Sandieson, R.M., & Zimmerman, W. (2010). Harnessing the power of education research databases with the pearl-harvesting methodological framework for information retrieval. *The Journal of Special Education*, 44, 161-175. doi: 10.1177/0022466909349144

Published Academic Conference Proceedings (Refereed)

- O'Sullivan, J., & **Kirkpatrick, L.C.** (2009). On top of the world: Language, culture, and learning to read in northern Canada. In B. Culligan (Ed.), *The Changing Landscapes of Literacy – Building Best Practice* (pp. 114-124). Dublin, Ireland: Reading Association of Ireland.

Papers Presented at Academic Conferences (Refereed)

- Kirkpatrick, L.C.**, & Klein, P.D. (2011, February). *The process of writing arguments from online sources of information*. Paper presented at the tri-annual international conference of Writing Research Across Borders, Washington, D.C.
- Kirkpatrick, L.C.**, & Klein, P.D. (2010, May). *Students' strategies for writing from online sources of information*. Paper presented at the annual conference of the Canadian Society for the Study of Education, Montreal, Quebec.
- Kirkpatrick, L.C.** (2009, May). *Research proposal: Writing from information and communication technologies (e.g., Internet)*. Paper presented at the annual conference of the Canadian Society for the Study of Education, Ottawa, Ontario.
- Kirkpatrick, L.C.**, Klein, P.D., Brown, H. (2009, April). *Who benefits from content-area writing instruction?* Paper presented at the annual meeting of the American Educational Research Association, San Diego, California.
- O'Sullivan, J., & **Kirkpatrick, L.C.** (2008, September). *On top of the world: Language, culture and learning to read in northern Canada*. Paper presented at the annual conference of the Reading Association of Ireland: The Changing Landscapes of Literacy – Building Best Practice, Dublin, Ireland.

- Klein, P.D., Samuels, B., & **Kirkpatrick, L.C.** (2008, June). *Teaching junior students to use writing as a tool for learning*. Paper presented at the annual conference of the Canadian Society for the Study of Education, Vancouver, British Columbia.
- Sandieson, R., **Kirkpatrick, L.C.**, & Boyd, S. (2008, May). *The Pearl Harvesting Information Retrieval Procedure: Addressing the complexities of conducting a comprehensive literature review*. Paper presented at the annual conference of the Canadian Society for the Study of Education, Vancouver, British Columbia.
- Kirkpatrick, L.C.** (2008, February). *Writing instruction to improve students' compare-contrast reports*. Paper presented at the tri-annual international conference of Writing Research Across Borders, Santa Barbara, California.

Posters Presented at Academic Conferences (Refereed)

- Kirkpatrick, L.C.**, & Klein, P.D. (2011, May). *Writing from Internet-based sources of information: How well does the data fit with the Knowledge Transforming Model (Bereiter and Scardamalia, 1987)?* Poster to be presented at the annual conference of the Canadian Society for Studies in Education, Fredericton, New Brunswick.
- Kirkpatrick, L.C.**, & Klein, P.D. (2010, April). *What do students with different levels of writing ability gain from the same writing instruction?* Poster presented at the annual meeting of the American Educational Research Association, Denver, Colorado.
- Sandieson, R. & **Kirkpatrick, L.C.** (2007, April). *The Rosetta keyword project: Locating evidence-based information in the special education field*. Poster presented at the annual international conference of the Council for Exceptional Children, Louisville, Kentucky.

Other Research Presentations and Posters (Non-refereed)

- Kirkpatrick, L.C.** & Klein, P.D. (2011, March/April). *Digital natives as writers*. Interactive poster presented at the inter-faculty Research Day and the graduate-student Research in Education Symposium, London, Ontario.
- Kirkpatrick, L.C.** (2011, February). *Processes and strategies for writing arguments from Internet-based sources*. Presentation to the staff of the school at which I conducted my dissertation research (name of school withheld to protect anonymity). London, Ontario.
- Klein, P.D. & **Kirkpatrick, L.C.** (2008, November). *Content-area writing education: Is it effective for boys and low-achieving writers?* Presentation at the Centre for Inclusive Education Research Hour, London, Ontario.
- Sandieson, R. & **Kirkpatrick, L.C.** (2008, April). *The Pearl Harvesting Information Retrieval Model: A lexical probability approach for doing superior literature reviews*. Poster presented at the Faculty of Education Research Day, The University of Western Ontario, London.

- Kirkpatrick, L.C.** (2008, January). *Writing instruction to improve students' compare-contrast reports: The results*. Presentation at the Centre for Inclusive Education Research Hour, London, Ontario.
- Kirkpatrick, L.C.** (2006, November). *Research proposal: The effects of writing instruction on students' compare-contrast reports*. Paper presented at The Centre for Inclusive Education Research Hour, London, Ontario.
- Kirkpatrick, L.C.** & Yeung, E., with the supervision of Dr. C.C. Helwig (2002, May). *The development of conceptions of fair decision making and government in China*. Poster presented at the Research Opportunities Fair, University of Toronto, Ontario.

University Workshops and Invited Presentations

- Kirkpatrick, L.C.** (2011, March). *The methods maze: Finding your way*. Invited presentation to the Research Methods in Education course at the Faculty of Education, The University of Western Ontario, London.
- Panel, including **Kirkpatrick, L.C.** (2010, October). *SSHRC & OGS panel discussion with successful applicants*. Invited presentation to the Ph.D. Study Group at the Faculty of Education, The University of Western Ontario, London.
- Panel, including **Kirkpatrick, L.C.** (2009, December). *The Ph.D. journey*. Invited presentation to the Doctoral Seminar at the Faculty of Education, The University of Western Ontario, London.
- Panel, including **Kirkpatrick, L.C.** (2008, November). *Applying to Ph.D. programs in education or psychology: Perspectives from professors, graduate staff, and successful students*. Invited presentation to the M.Ed. Study Group at the Faculty of Education, The University of Western Ontario, London.
- Sandieson, R., Horoky, D., & **Kirkpatrick, L.C.** (2008, October). *Information retrieval and management: Library resources and strategies*. Workshop conducted at the Faculty of Education, The University of Western Ontario, London.
- Panel, including **Kirkpatrick, L.C.** (2007, December). *What to do with a Master of Education degree*. Invited presentation to Issues in Special Education course at the Faculty of Education, The University of Western Ontario, London.