Research Article

# Writing Analytics and Program Assessment: How Novice Writers Use Rubric Terminology in Reflective Essays

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## Structured Abstract

- **Background:** In an effort to expand programmatic writing assessment to incorporate data being collected through the ePortfolio process, this study applied textual analytics methods to examine a large corpus of reflective essays collected from the students in a general education writing program after completing three of the five writing-intensive courses in the program's sequence. This study sought to understand how students use language in their ePortfolio reflections, how that aligns with the writing construct and terminology of the program, and how our outcomes and pedagogy can support transfer and deeper learning through reflective writing opportunities.
- **Literature Review:** This project is informed by intersections of research around reflective practice in the context of electronic portfolios, teaching for transfer, and deep learning. Much research has explored reflection in the classroom as pedagogical practice, reflection as a means of self-assessment, and reflection as metacognitive work in the fostering of transfer. Reflective essays are a stable and recognized element of the writing portfolio and play a role in traditional portfolio assessment as a pedagogical tool, but there has been limited use of these texts in writing program assessment. ePortfolio collection generates a large corpus of data that can be examined through

textual analytics that make use of reflective texts that describe students' experiences across a series of courses in a writing program. Textual analytic research provides the means and methods to study the language practices of student writers.

- **Research Questions:** Our research questions included the following:
  - Do students use terminology from the writing program rubric to describe their writing?
  - If so, how do they use that terminology in their reflective essays?
- **Methodology:** In this study, we employed a combination of quantitative and qualitative textual analysis to examine a corpus of 2,562 reflective portfolio essays from the midpoint in a writing-across-the-curriculum program to learn how students use the key terms of a writing rubric in their articulations of their writing development.
- **Results:** Frequency counts showed that students used terms from the program rubric to describe their writing, and that they used terminology from all areas of the rubric. Additional machine-assisted textual analysis of three terms from different areas of the rubric showed that students also used other terms in describing and explaining their writing, either in conjunction with or as alternatives to this rubric terminology. This textual analysis also showed that these uses sometimes appeared in identifiable patterns that indicated their ability to explore concepts across multiple sentences and paragraphs, to connect and relate concepts from different areas of the rubric, and to narrate their acquisition of new knowledge and skills.
- **Discussion:** Quantitative analysis of the data shows the extent to which students use the terminology of our writing program to describe their writing. The addition of qualitative analysis indicates how they use it. Students' use of alternate terminology raises questions about whether students are adopting the language of the rubric or if they find other terms more useful, both of which have implications for the rubric and how it is used in instruction and assessment. The extent to which the syntactical and discursive patterns found in students' reflective essays is indicative of sustained examination and abstract thinking suggests the potential for this kind of machine-assisted reading to understand how reflection can document transfer of knowledge and deeper learning.
- **Conclusion:** In the larger work of writing analytics, this study shows how writing analytics methodologies offer writing programs the ability to examine large corpora of digitally-collected data that can enhance assessment practices

by unlocking the content of student writing at the linguistic level, where writing constructs and terminology are practiced and reflected back to us.

- **Directions for Further Research:** Future research will include examination of additional key terms and intersections of key terms from the writing rubric, as well as further understanding of how the terminology of our rubric might be developed to support pedagogical practices that support transfer and deeper learning within our writing program.

*Keywords:* corpus analysis, ePortfolios, lexical analysis, program assessment, reflection, rubric, textual analysis, writing analytics

## 1.0 Background

In an effort to expand programmatic writing assessment to incorporate data being collected through the ePortfolio process, this study applied textual analytics methods to examine a large corpus of reflective essays collected from the students in a general education writing program after completing three of the five writing-intensive courses in the program's sequence.

The site of research for this study was a private midwestern university with a heavy emphasis on STEM disciplines. The core of its general education curriculum, shared across its four undergraduate schools, is the Seminar Approach to General Education and Scholarship (SAGES) program, which requires all undergraduate students to complete a sequence of five writing-intensive courses over the course of their time at the university. In their first semester, all students take a First Seminar, a small discussion-based, writing-intensive course designed to provide students with an introduction to writing in college. During their second and third years, students take two University Seminars, which provide students with experience in research-based writing within a particular discipline, around a specific topic area that serves as the core content for the course. After they have declared majors, students take a departmental seminar attached to that major, conceived of as an introduction to writing and communication within their major disciplinary area, followed by a capstone course, which provides an opportunity for students to engage in independent research and writing around a specific topic within their disciplinary major.

The SAGES program collects ePortfolios from students after they have completed the first three courses in the sequence: a First Seminar and two University Seminars. As a graduation requirement, students are encouraged to submit portfolios immediately following the completion of their third course, which should be by the end of their junior year, but some do not submit until their final semester of college. Students are provided the following instruction:

The portfolio must contain the following:

1. A 2-3 page reflective essay.

> 2. One essay from your First Seminar.
>
> 3. A research essay from one of your University Seminars. This essay is typically 10-12 pages; at a minimum, it must contain 8 pages of prose (not counting the bibliography). The research essay must integrate and cite primary and/or secondary source material and include a properly formatted bibliography page or bibliographic footnotes (see additional details below).
>
> 4. One essay from your other University Seminar. This paper may be a research essay, but it does not have to be. (*How to submit a SAGES writing portfolio,* 2020, April 29)

Students are given the following prompt for the reflective essay:

> Reflecting on the essays included in your portfolio, discuss how your writing has developed across your First-year and University SAGES seminars. Provide evidence and examples from your essays and/or your writing process to demonstrate your development. (2-3 pages)
>
> Portfolio readers are genuinely interested in your own thinking about the writing you did in SAGES as well as the writing you do or plan to do outside of SAGES. They are most interested in what you have learned about the relation of writing to ideas and to your own critical thinking. (*How to submit a SAGES writing portfolio,* 2020, April 29)

This constructed-response task is open-ended, but specifically cues students to describe their writing development through the use of evidence from their essays and experiences, reflecting the program's writing construct of argument, source-based text production. It also cues students into writing for a "portfolio reader" with a specific "interest" in the students' thinking about their writing, both inside and outside the program. Finally, the prompt specifically invokes the terms "ideas" and "critical thinking" as connected to writing and of special interest to readers. The reflective essay prompt is constructed rhetorically, with a defined audience and purpose, and recalls the language of the program's learning outcomes and writing rubric. Students submit their portfolios electronically to CampusGroups, where the program's administrators verify their contents, confirm completion of the requirement, and conduct portfolio review and assessment through a committee of faculty who read and rate the portfolios submitted each year.

This study focused on students' use of the terminology from the program's writing rubric, which represents the program's writing construct. The SAGES Writing Rubric is based largely on the Association of American Colleges and Universities' (AAC&U, 2009) VALUE rubrics, which set forth means of assessing students using "Essential Learning Outcomes that all students need for success in work, citizenship, and life." It provides teachers and students with a detailed lexicon that describes and promotes a concept of academic writing that is rhetorically-situated, argumentative, and source-based.

**Table 1**

*The SAGES Writing Rubric*

| | | Proficient | Acceptable | Developing | Unacceptable |
|---|---|---|---|---|---|
| **Engagement** | **Content/Ideas** | Thoroughly engages a relevant and focused question or problem to reveal significant—perhaps even highly original—insight(s) | Thoroughly engages a relevant and mostly focused question or problem to reveal somewhat important insight(s) | Partially engages a relevant and somewhat focused question or problem to reveal some insight(s) | Inadequately engages a question or problem or merely reports what is already known |
| | **Purpose, Context, and Audience** | Thorough and nuanced attention to purpose, context, and audience | Attends to purpose, context, and audience, though sometimes inconsistently or partially | Attends to purpose, context, and audience, though often inconsistently or partially | Little or no attention to purpose, context, and/or audience |
| **Argument** | **Thesis Statement** | Articulates argument through clear, focused, and precise thesis statement | Articulates argument through clear thesis statement, though it may be somewhat imprecise or broad in focus | Thesis statement only partially articulates argument or is too general | No thesis statement or thesis statement unrelated to the argument |
| | **Reasoning/ Development** | All parts of the argument (major and sub-claims) are developed thoroughly, deeply, and logically | Claims mostly developed, though contains one or two partially developed claims, or minor logical inconsistencies that do not seriously affect overall argument | Many claims are only moderately developed, or argument contains several minor—or one major—logical inconsistencies | Develops all claims superficially, repeats ideas, or wanders from the argument |
| **Evidence** | **Quality** | Always uses relevant evidence from reliable and properly documented sources | Mostly uses relevant evidence from reliable and properly documented sources | Uses evidence from somewhat reliable sources documented to ensure retrievability | Evidence is missing, irrelevant, unreliable, or undocumented |
| | **Use** | Consistently integrates and fully explains evidence to support all claims thoroughly and carefully | Mostly integrates and explains evidence to support the primary claim(s) | Uses some evidence, but may struggle to integrate it logically or smoothly into the argument, or to explain it fully | Does not use evidence, merely reports it without explanation, or plagiarizes |
| **Readability** | **Arrangement** | Consistently uses sophisticated transitions to enhance the coherence of sentences and paragraphs | Mostly uses effective transitions to enhance the coherence of sentences and paragraphs | Simple transitions limit the coherence and/or complexity of sentences and paragraphs | Does not use transitions, or sentence and paragraph arrangement interferes with logical coherence |
| | **Sentence Level Correctness and Style** | Sentences always mechanically correct and stylistically sophisticated; reader comprehension never impeded | Sentences almost always mechanically correct and stylistically clear; reader comprehension rarely and minimally impeded | Sentences usually mechanically correct and clear; reader comprehension occasionally impeded, though not critically | Mechanically incorrect or stylistically unclear sentences critically impede reader comprehension |

The SAGES Writing Rubric is designed to serve the needs of many disciplines and levels of writing instruction in the program; thus, it identifies four large "bands," each with two sub-categories:

- **Engagement**: Content/Ideas and Purpose, Context, Audience
- **Argument**: Thesis Statement and Reasoning/Development
- **Evidence**: Quality and Use
- **Readability**: Arrangement and Sentence-Level Correctness/Style

Across each band, the rubric describes proficient, developing, acceptable, and unacceptable categories. These descriptions contain the language that we use as administrators and teachers to describe the writing practices and products that support our student learning outcomes. Instructors are encouraged to use the rubric and its terminology, and our program-level portfolio reviewers use the terminology and categories of the rubric to assess portfolios each year. Thus, the rubric serves as a pedagogical tool in the classroom, and it is connected to learning outcomes in the program, tying instruction and assessment together around our construct of writing.

This study builds on previous research that has employed writing analytics descriptively (Lang et al., 2019), but it focuses specifically on how students use the language of the writing rubric in their ePortfolio reflections. The study compares the "expert" lexicon of our program-wide writing rubric to the "novice" lexicon employed by our students in order to describe how students employ lexical terms to reflect on their understanding of their writing knowledge and skill at the midpoint of our program. Following the lead of studies that have examined the textual features of novice writing in comparison to those of expert writers, and applying a lexicon to a corpus for analysis (Anson & Anson, 2017; Aull, 2017; Lang, 2018; Moxley & Eubanks, 2015), we (1) translated our writing rubric into a lexicon that represents the terminology that experts (teachers) in the program use to describe and analyze writing and (2) used textual and writing analytics to compare that lexicon to the language used by students in their reflective essays submitted as part of their general education/writing program portfolios.

## 2.0 Literature Review

### 2.1 Reflective Essays in Portfolios

Reflective essays are a familiar component of writing folders and portfolios and are widely used across higher education institutions for both pedagogical purposes and programmatic assessment. Pedagogically, reflection asks students to self-assess, to examine their work in ways that engage them thoughtfully in what it means for them to be a writer. Asking students to reflect provides them with the opportunity to practice this skill and, hopefully, to carry that skill to other writing situations, in other words, to make them more reflective (Yancey, 1998). Yancey (1998) argues that reflection allows students "to participate with us, not as objects of our study, but as agents in

their own learning" (p. 5), heralding a shift in the ways reflection can be used in writing instruction: away from asking students to describe their composing processes and toward asking them to use writing as a process of thinking about what they know about writing and themselves as writers.

More recently, reflection has been demonstrated to be a key element of writing transfer, the ability of student writers to carry writing skills and knowledge from one context to another (Yancey et al., 2014). The process of reflection prompts students to theorize about their writing strategies and applications, and to use writing as a way of making that tacit knowledge explicit and, thus, transferable. Specifically, in the context of the portfolio, the reflective essay, at the most basic level, provides "some meta-commentary, some introduction, some cohering threads" (Yancey, 1998, p. 146) to the pieces a student has collected in a portfolio. But in our traditional review of the portfolio, the reflection is performance to be assessed: a demonstration of writing skill and a demonstration of self-assessment skills (Yancey, 1998).

Student writers of these reflective essays are important stakeholders in writing program management and development, and their reflective writing can provide programs with invaluable information about the ways they conceive of their writing and themselves as writers, the ways they write about themselves and their writing, and the ways the teaching and learning of writing occur within the parameters of a writing program. In lauding the value of the portfolio as an assessment measure, Condon (2012) explains that portfolios "allow us to see performance across multiple genres; to judge a writer's ability to revise; to see, via an introductory reflective essay, a writer's metacognitive knowledge about writing, even to make judgments about the quality of the curriculum a writer has come through" (p. 240). This is particularly so in ePortfolios, which afford the opportunity to collect work over a longer period of time, across more genres and context, and facilitate a richer reflection (Condon, 2012; Yancey, 2012).

This type of reflection—outside the classroom, retrospective, and across several courses and facets of education (writing and critical thinking)—enables developing writers, as Clark (2016) describes it, "to engage with ambiguity and meaning-making over time" (p. 152). Clark studied reflections as a part of the ePortfolio, conducted over time during students' progress through a writing program, culminating in a capstone project. Through processes of integration and introspection across time and projects, Clark notes students are able to "see a clear narrative" of where they have been and where they might go next" (p. 163). As Yancey (2009) describes the ePortfolio, "e-portfolio models are designed to document learning not just inside a course but across courses and across experiences in college and beyond," noting that "[i]n using this matrix to organize work from multiple domains, students 'translate' their experience from one context into a larger context."

### 2.2 Teaching for Transfer: The Use of Key Terms

Yancey's (2016) work demonstrates that reflection is both product and process, both meaning-making and rhetorical. These qualities of reflective writing have made it a seminal feature of the

teaching for transfer curriculum developed by Yancey et al. (2014.) In their book, *Writing Across Contexts,* Yancey et al. (2014) import a notion of what transfer is into the context of writing instruction and development. Their teaching for transfer (TFT) model curriculum includes sustained reflective practice, a "set of key terms" that students can use to write about their writing, and a theory of writing assignment. The "set of key terms" that they describe provides students with a lexicon of rhetorical and writing concepts, such as audience and genre, terms "that build on and expand the process terms that have dominated the field, and that provide vocabulary for a framework students can use to facilitate transfer" (Yancey et al., 2014, pp. 134-135). Yancey et al. (2014) argue that the combination of the lexicon, regular reflection on their writing, and a culminating creation of a theory of writing enables students' ability to take their writing knowledge and skills into new rhetorical scenarios where they can adapt and remix them.

In their most recent iteration of the project, Yancey et al. take up the concept of "cueing" transfer, raised by Hayes et al. (2016) in their exploration of a writing program-wide approach to transfer. Hayes et al. (2016) theorized that

> a writing program with consistent, explicit, and intentional transfer-oriented learning objectives in both FYC and advanced composition courses provides a curricular setting that facilitates the transfer of writing skills across contexts. Such a setting fosters the development of discipline-based rhetorical awareness. (p. 182)

And, indeed, their study did demonstrate that

> comprehension of the abstract writing concepts will continue to grow as students engage in the variety of writing situations across the university. This time in the university environment gives students opportunities to reflect on how abstract writing concepts inform practical writing tasks. (p. 209)

Yancey et al. (2019) take up the question of "how much and what kind of cueing of prior knowledge writers in a new situation need to signal to them that transfer is possible" (p. 274). Their study of ways in which students transfer writing knowledge to non-academic contexts asserts that "high-road" transfer, which "requires mindful abstraction of principles to apply them in new situations" ( Perkins & Saloman, 2013, as cited in *Elon Statement on Writing Transfer*), is enabled by cueing students to "the idea that transfer is possible" (p. 291) along with a set of key terms "helping them articulate a capacious view of writing" and the opportunity to develop reflective practices around their writing (Yancey et al., 2019).

In their introduction to *Critical Transitions: Writing and the Question of Transfer*, Anson and Moore (2016) take up the task of defining transfer for writing studies by identifying practices that enable writing transfer, among them "enabl[ing] students to analyze expectations for writing and learning within specific contexts," including "rhetorically-based concepts (such as genre, purpose, and audience)" (p. 9).

Among the various tools writing instruction uses to teach and assess rhetorically-based concepts, rubrics can figure prominently in offering students terms and qualifiers for describing and evaluating writing. Born out of an impulse to standardize writing assessment, rubrics historically were developed and implemented outside of local contexts and imposed on faculty and students, amounting to little more than writing scales "constructed to provide an objective numerical measurement of student writing in order to allow comparisons among students, teachers, classes, schools, cities, and so on" (Turley & Gallagher, 2008, p. 89). While debate continues about the inherently problematic nature of this type of assessment (Andrade, 2006; Kohn, 2006; Wilson, 2007), writing instructors have continued to view and use rubrics as tools of assessment, finding value in their ability to encapsulate writing concepts, to provide faculty and students with terminology to describe writing, and to clarify expectations for growth and development of writing skills—"to create writing communities in which we develop a shared vocabulary for talking about—and rendering judgments about—writing" (Turley & Gallagher, 2008, p. 89). The AAC&U's VALUE Institute developed its rubrics not for grading purposes, but for institutional assessment, though the rubrics are adaptable to individual classrooms, to faculty and students, that can describe and demonstrate "progressively more advanced and integrative learning" ("What is VALUE?"). The rubric for "Written Communication"— one of the 16 Essential Learning Outcomes identified in the larger project—focuses on "how specific written work samples or collections of work respond to specific contexts" by answering the "central question" of "How well does writing respond to the needs of audience(s) for the work?" ("Written Communication VALUE Rubric"). As such, the rubric contains a variety of key terms involved in the rhetorical analysis of writing situations for both student writers and teacher assessors.

### 2.3 Assessing for Transfer & Deep Learning

The use of key rhetorical terms in the description of writing across contexts is a central element of transfer and reflection study. This work is consistent with the companion body of scholarship around deep learning, which is

> the process through which a person becomes capable of taking what was learned in one situation and applying it to new situations—in other words, learning for transfer. Through deeper learning, individuals acquire expertise in a discipline or subject area that goes beyond the rote memorization of facts or procedures; they understand when, how, and why to apply what they have learned. They recognize when a new problem or situation is related to what they have previously learned, and they can apply their knowledge and skills to solve them. (Harris et al., 2019, p. 53)

Deeper learning emphasizes competencies developed through experience and interaction rather than just content knowledge obtained through memorization (Hewlett Foundation, 2013).

The National Research Council's (NRC, 2012) *Education for Life and Work: Developing Transferable Knowledge and Skills in the 21st Century* explains the connections among competencies, transfer, and deeper learning:

> The link between deeper learning and 21st century competencies lies in the classic concept of transfer—the ability to use prior learning to support new learning or problem solving in culturally relevant contexts. We define deeper learning not as a product but as processing—both within individual minds and through social interactions in a community—and 21st century competencies as the learning outcomes of this processing in the form of transferable knowledge and skills that result. The transferable knowledge and skills encompass all three domains of competency: cognitive, intrapersonal, and interpersonal, in part reflecting the sociocultural perspective of learning as a process grounded in social relationships. (p. 74)

In reviewing the research on transfer and deeper learning, the NRC asserts that transfer is possible within specific knowledge domains and "that deeper learning involves the development of well-organized knowledge in a domain that can be readily retrieved to apply (transfer) to new problems in that domain" (2012, p. 82). Thus, pedagogy and assessment can support and enhance students' experience of deeper learning and development of transferable skills, as well as educators' understanding and implementation of strategies for teaching for transfer.

### 2.4 Applying Textual Analytics to Student Writing

In *Very Like a Whale: The Assessment of Writing Programs*, White et al. (2015) call for constructive alignment: "an integrated instructional and assessment framework used to map learning activities to outcomes" that "can link learning activities at the level of the institutional mission to the syllabus at the level of the course" (p. 54). Central to such a framework is the use of writing portfolios, particularly ePortfolios, which not only serve teaching and assessment purposes for the individual student writer and the program, but also as "the vehicle of constructive alignment—students can demonstrate their engagement with program-level objectives across time and circumstance" (White et al., 2015, p. 54). Likewise, an ePortfolio—a constructed-response task, involving collection, review, and reflection upon writing from across time, contexts, and genres—can serve to enable transfer for the individual student, even as it provides evidence of how learning outcomes promote or do not promote transfer and deep learning in the larger program. In this sense, a portfolio reflective essay can be both the act and the evidence of transfer and deep learning. It is important that portfolio reflective tasks "cue" students appropriately to engage in the metacognitive work of evaluating their own writing, identifying how they have applied and remixed prior knowledge across writing situations, and modeling the language and writing constructs that are central to the program's concept of writing.

The ePortfolio, as the most progressive form of program assessment, seems to be a natural place for studying transfer and deep learning in the context of writing development. The use of ePortfolios—individual assignments or course curricula—could advance the project of writing transfer by providing students with time, opportunity, and practice with different challenges across contexts where they could apply prior knowledge, develop and use a vocabulary around writing strategies and constructs, and use reflection for the purpose of metacognition and theorizing about those constructs. In the typical portfolio assessment scenario, reflections serve largely as guides to the contents of the portfolio for reviewers seeking to verify that the student's narrative is based on the work that they have collected.

Despite their ubiquity, reflective portfolio letters have rarely been explored as a genre in their own right with textual features worthy of analysis. Breaking from this trend, Inoue and Richmond (2016) performed a textual analysis of forty-two portfolio reflective letters written by Hmong students at the end of a three-week summer bridge (pre-college) course in order to describe what students articulated in these texts. Their method involved two human readers and three readings. Similarly, Donahue and Foster-Johnson (2018) employed textual analysis by human readers in a longitudinal study to examine the rhetorical and linguistic features in student writing across a sequence of courses over three years in order to specifically investigate transfer. By examining transfer through textual and rhetorical features, Donahue and Foster-Johnson (2018) found that students' texts were "marked . . . by both reuse/adaptation and nonreuse, at different points and for different possible reasons," establishing that "reuse occurred across contexts and types of work" and positing that "reuse is always already some form of adaptation" (p. 375). This work sets the stage for the use of textual analytics to study students' reflective and other texts as data that can inform our understanding of transfer, deeper learning, and the role key terms of a rubric play in these processes of writing development.

Both of these studies, however, are limited in scope by the use of human readers. Writing analytics that employ machine reading, however, enable researchers to examine large corpora of student writing, across multiple contexts and times, and to examine student writing in very different ways than human readers are capable of reading. Adding these quantitative methods to the qualitative study of student writing reveals rhetorical features, linguistic patterns, and themes that occur across large numbers of the texts within a genre—or a writing program—that human readers are unable to identify alone. Indeed, the literature demonstrates the validity and utility of applying machine-reading not for purposes of standardization, but in the search for meaning and evidence of developing writing skill and knowledge in the word- and sentence-level language of student texts: placement essays (Gere et al., 2013), peer responses (Anson & Anson, 2017), and graduate student feedback (Lang, 2018). In particular, researchers have had success examining corpora for the use of lexical items, as well as comparing the use of lexical items between different levels of writers (novice and expert) in a variety of student-produced genres (Anson & Anson, 2017; Aull, 2017; Lang, 2018; Moxley & Eubanks, 2015).

We have yet to see the methods of writing analytics combined with traditional qualitative study of the reflective portfolio essay genre for the purposes of examining student writing within the larger context of writing programs' use of rubric terminology in the study of transfer and deeper learning.

## 3.0 Research Questions

In this study, we sought to answer several questions about the language our students employ in their reflective essays. As a starting point, we used our program-wide writing rubric as a representation of how we talk about and teach writing in the SAGES program. This rubric is used for program assessment and for classroom evaluation. As such, it is the closest thing we have to a concrete textual embodiment of the writing skills students are expected to learn beyond the student learning outcome for persuasive writing: "Student will be able to use researched evidence and discipline-appropriate forms to write a clear and persuasive argument" (*Mission and Student Learning Outcomes,* 2019). Instructors are encouraged to use the rubric for communicating feedback to students and for designing relevant instructional activities and assignments. For those reasons, we expected that students would at least be aware of the writing terminology embodied by this lexicon and, at most, would use it themselves when talking about their own writing. Unable to answer our questions satisfactorily through the work of our portfolio review committee, we turned to writing analytics, which gave us the ability to zoom out to see the large corpus of reflective essays across years, courses, and students, as well as to zoom in to see students' language usage at the lexical and syntactic levels.

This study sought answers to two questions:

1. Do students use terminology from the SAGES writing rubric to describe their writing?
2. If so, how do they use that terminology in their reflective essays?

## 4.0 Methodology

This study involved building a corpus of reflective essays that accompanied students' writing portfolios and analyzing the language of these reflective essays against a dictionary based on the writing program's grading rubric. The data was then examined to explore the frequency with which students use terminology from the dictionary to describe their writing, the frequency with which they use alternate terms, and any patterns in these uses that might inform how students understand and apply concepts as they are defined and used in the program, especially patterns indicative of knowledge transfer and deeper learning.

### 4.1 Corpus Data

The data for the corpus was obtained from the reflective essays that accompanied writing portfolios submitted by undergraduate students at Case Western Reserve. The portfolios were submitted between January 2017 and October 2019. Essays written by students who were still

enrolled at the university at the time of the study were removed. Essays were then stripped of their headers and converted to text files. The final dataset consists of 2,562 essays and 2,026,314 words (tokens) in the corpus.

### 4.2 Dictionary Development

To construct the dictionary, two researchers used the writing program's grading rubric, which is the most consistently used articulation of what the program considers to be important characteristics of good writing. This rubric consists of four criteria, each containing two sub-criteria. For each of these eight sub-criteria, there are short descriptions of four performance standards. Based on the words used in the labels and descriptors for these criteria and sub-criteria, 53 relevant terms were identified, for example, "engage," "argument," "documented," and "transition," as well as 130 inflected forms of these terms (e.g., "engagement," "arguing," "undocumented," "transitions"). This dictionary of 183 terms covered 2.9 percent of the corpus.

### 4.3 Selection of Terms for Analysis

Qualitative analysis using QDA Miner of a random sampling of 100 essays revealed the need for refinement and coding before frequency counts of dictionary terms could be used as an indicator of knowledge transfer.

One issue is that some high-frequency terms also have non-writing-related meanings. For example, while writers' use of the term "thesis" was almost always in reference to writing, a term like "support" might sometimes refer to "support from the Writing Resource Center," rather than "using evidence to support a claim." This problem was especially evident with respect to the term "use" and its inflected forms, as in "using evidence" or "source use." The rubric refers to "use of evidence" to indicate how writers deploy and integrate evidence in argumentation, as opposed to the relevance and reliability of the evidence itself. While this distinction is relevant in the context of the rubric, student writers are far more likely to use the term "use" in a variety of other, non-evidence-related ways, for example, "I used a dictionary" or "I am used to writing shorter papers." Counting all hits of the term "use" produced an inflated frequency count for writers' attention to evidence.

Another issue is that some lexicon items appear in more than one rubric sub-criterion, making it difficult to use frequency counts as an indicator of the specific writing concept or skill students were discussing. One example of this phenomenon is the term "clear," which the rubric uses to describe both a "clear thesis statement" and "stylistically clear sentences." This ambiguity in the rubric is further compounded by the variety of other ways students use the term and its inflections, including, for example, "having a clear picture of my audience" and "proving my argument clearly," as well as as an intensifier (e.g., "my writing clearly improved").

These initial findings revealed the need for a more involved recursive process of quantitative and qualitative analysis. While a more accurate count of all 53 items would provide a clearer

picture of how students deployed rubric terms, it was determined that a more focused analysis of a smaller number of terms would provide a good test case of this methodology.

Based on these initial frequency counts, three higher-frequency key terms from the rubric were selected for further analysis. In addition to being high-frequency terms, they also represented three of the four criteria from the rubric: engagement, argument, and evidence.

**Table 2**

*Development of Codes for Audience, Claim, and Evidence*

| **Lexical item** | audience | claim | evidence |
|---|---|---|---|
| **Inflections** | audiences | claims, claimed, claiming | evidences, evidenced |
| **Synonyms/Alternatives** | reader, readers | point, points, pointed, pointing | source, sources, research, quote, quotes, quotation, quotations, data, proof |
| **Coded as** | AUDIENCE | CLAIM | EVIDENCE |

The first term, "audience," seemed to be overrepresented in the initial frequency count. Previous program assessment suggested that instructors focused less on audience than on argumentation and readability (especially organization and sentence mechanics). And yet, "audience" appeared in the top 30 most frequently used lexical items and was the most frequently used term from the "engagement" band of the rubric.

The second term, "claim," belongs to the rubric's argumentation criterion. Of the writing concepts associated with each of the four main criteria, students wrote most frequently about argumentation in their reflective essays. The terms "idea," "argument," and "thesis" were among the ten most frequently used. In contrast, "claim," another term from this category, barely made the top 40. Were students thinking about argument only in broad or superficial ways, rather than breaking the act down into smaller components? Was "claim" too much a term of art for novice writers to use? Were they using some other term to express the same idea?

The third choice for additional analysis, "evidence," was selected not only based on its high frequency, but also because it is the focus of the current cycle of program assessment as determined by the annual portfolio review committee.

### 4.4 Coding and Machine-Assisted Analysis

For each of the three lexical terms and their inflections, QDA Miner was used to retrieve all hits. Non-relevant hits were coded to be eliminated from further analysis. Relevant hits were then used as exemplars for additional queries. For example, making a query based on hits that included phrases such as "persuasive evidence" produced hits with conceptually related sentences even though they did not contain lexicon terms. Through this process, we were able to

identify alternatives such as "reliable sources" or "vivid examples." These hits were then coded and added to our frequency counts for "evidence."

In addition to this iterative process of using a machine to identify and count terms, combined with qualitative human analysis to eliminate non-relevant uses and to expand our list of lexical synonyms, additional human reading was used to identify lexical patterns of interest surfaced by machine-assisted analysis. The keyword-in-context tool in WordStat 8 was used to group and count common syntactical formulations, revealing, for example, that when students wrote about audience, they tended to do so either to identify a particular type of audience (e.g., "general," "technical," "skeptical") or to articulate an action they took in relation to that audience (e.g., "know," "appeal to," "tailor for").

Based on this additional analysis and refinement, the following codes and subcodes were then applied to the corpus:

**Table 3**

*Refined Codes and Descriptions*

| Category | Refined codes | Descriptions |
|---|---|---|
| ENGAGEMENT | audience identification | Describes, observes presence of a (particular) audience or reader of a text and/or quality of an audience or reader |
| | audience action | Describes processes or features of text that take audience into account |
| | audience engagement | Explains how considerations of audience affect writer's choices about topic, argument, evidence, and other features of writing |
| | audience NA | Non-relevant use of the term "audience" or synonyms/alternates |
| ARGUMENT | claim making | Describes or re-states claim made |
| | claim quality | Describes features or qualities of claims made in writing, including effectiveness |
| | claim development | Explains how claims are developed through the use of evidence, argument, and/or in reference to audience |
| | claim NA | Non-relevant use of the term "claim" or synonyms/alternates |

| Category (cont'd.) | Refined codes (cont'd.) | Descriptions (cont'd.) |
|---|---|---|
| EVIDENCE | source find/retrieve | Describes research processes, using library or other resources to identify source material |
| | source use | Describes, observes use of a source in text |
| | source quality | Describes types and qualities of particular sources |
| | evidence integration | Explains how source(s) is/are used in the context of writing and/or making argument, other sources and/or audience |
| | evidence NA | Non-relevant use of the term "evidence" or synonyms/alternates |

Through machine-assisted analysis, we could then quantify uses of the lexical term of interest, as well as instances of synonyms and other terms that are not part of the program's lexicon as defined by the rubric. By analyzing large sets of lexically similar hits, we were also able to identify syntactic patterns that indicated how students think about their writing and themselves as writers.

## 5.0 Results

### 5.1 Use of Rubric Terminology: Examples (RQ1)

*RQ1: Do students use terminology from the SAGES writing rubric to describe their writing?*

Frequency counts showed that students used terms from the program rubric to describe their writing, and that they used terminology from all areas of the rubric. Machine-assisted analysis shows that rubric lexicon terms (including their inflected forms) account for 2.96 percent of the 2,026,314 words in the entire corpus of 2,562 reflective essays.

Students used terminology from across all four of the conceptual bands of the rubric, though to differing degrees: engagement (.26%), argument (1.34%), evidence (.82%), and readability (.54%). Within those four categories, frequency counts of the rubric key terms and their inflections within those four categories revealed the most frequently used lexical items as follows (a full list of terms may be found in the Appendix):

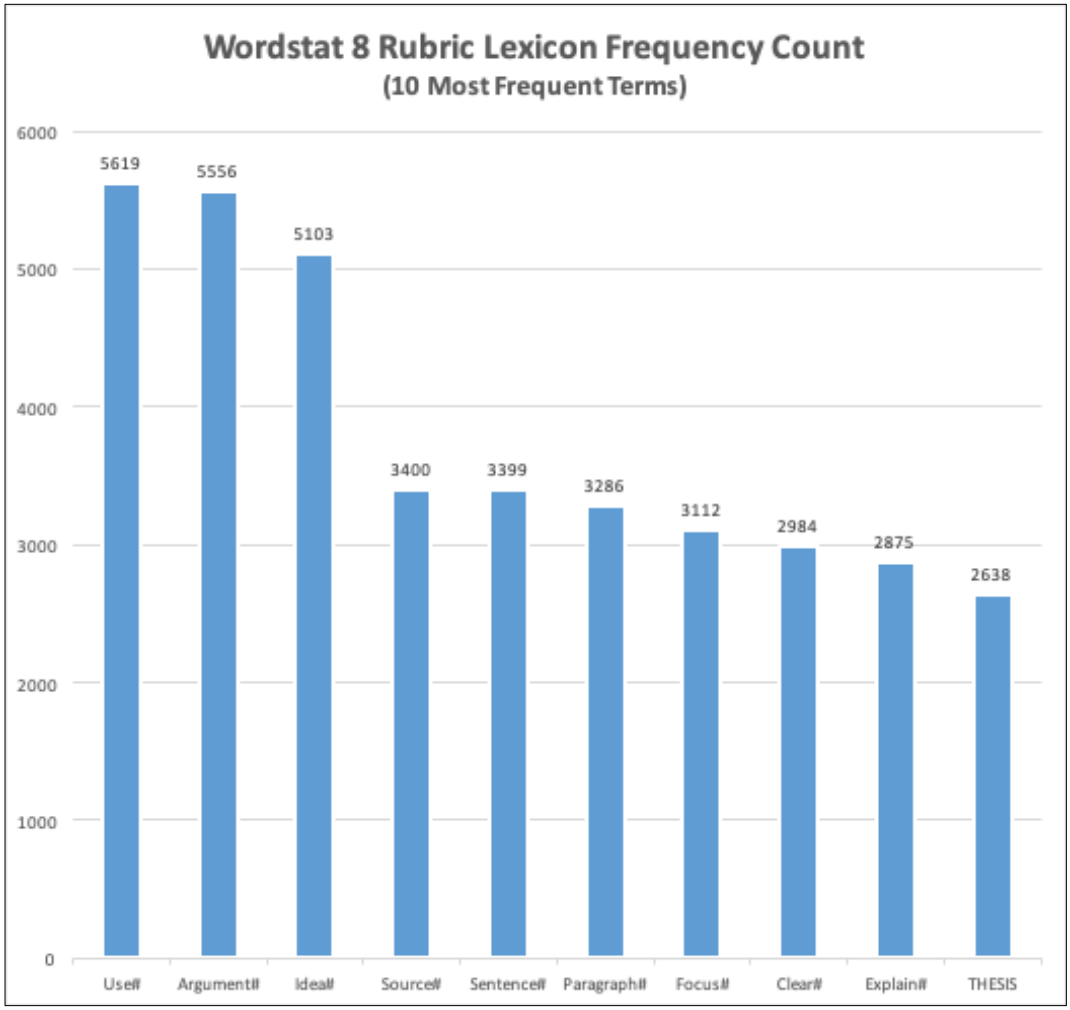


**Figure 2**

*Frequency Counts of Lexical Terms (WordStat 8)*

From among the most frequently used key terms, we focused our attention on "audience," "claim," and "evidence." Quantitative analysis of the three lexicon terms selected for further analysis shows that they were among the more common topics, even when adjusted to eliminate non-relevant uses.

The term "audience" and its inflected form "audiences" occur 835 times in the corpus across 490 cases. Of these hits, 75 were determined to be non-relevant, for example, when writers referred to a paper in which they discussed the audience for Shakespeare's plays. These instances were coded NA and removed from further analysis.

The term "claim" and its inflected forms "claimed," "claiming," and "claims" occur 823 times across 528 cases. Of these hits, 111 were determined to be non-relevant, for example, when writers referred to claims made by one of their sources, rather than claims they themselves made.

The term "evidence" and its inflected forms "evidenced" and "evidences" occur 1,851 times across 831 cases. Of these hits, 300 were determined to be non-relevant, for example, when writers wrote that one of their papers was evidence of their growth as a writer.

### 5.2 Use of Rubric Terminology: Alternates (RQ1)

*RQ1: Do students use terminology from the SAGES writing rubric to describe their writing?*

Additional machine-assisted textual analysis of three terms from different areas of the rubric showed that students also used other terms in describing and explaining their writing, either in conjunction with or as alternatives to this rubric terminology. The qualitative analysis used to eliminate non-relevant instances of students' use of our three key lexical terms revealed that, in addition to using the specific lexicon of the rubric, students also used synonyms to employ the rubric's concepts. For example, they used "reader" in ways conceptually similar to "audience." A second round of qualitative analysis to find these alternate terms, coupled with another round of frequency counts, provided a fuller picture of how students used a combination of rubric and non-rubric terminology.

Additional analysis revealed that writers often used "reader" or "readers" as a synonym for "audience." A frequency count showed 2,044 hits for "reader" and its inflections. Non-relevant uses, for example, references to the writers themselves as "critical readers" or to the "reader of this portfolio," were identified and coded as such. With respect to the rubric term "claim," writers sometimes used "point" as an alternative. A frequency count showed 1,313 hits for "point" and its inflected forms. Non-relevant uses, for example, references to "a point in time" or to a source's "point of view" were identified and coded as such. With respect to the rubric term "evidence," students used a variety of alternate terms, including "source," "research," "proof," "data," and "quotations." A frequency count showed over 13,500 hits for these alternate terms and their inflections across. Of these, hits for "source," "data," and "quotations" were determined to be mostly synonymous with "evidence" and were retained for further analysis. Hits for "research" and "proof" were mostly non-relevant (e.g., "the research paper," "I always proof my paper") and were not coded or included for additional analysis.

### 5.3 Use of Rubric Terminology: Key Terms in Context (RQ2)

*RQ2: How do students use terminology from the SAGES writing rubric to describe their writing?*

Additional machine-assisted analysis in the refined coding process revealed more specific ways students used the rubric terminology and its alternates for "audience," "claim," and "evidence." When applied to each of the three key terms and their alternates, coding revealed that students used terminology for three different purposes: (1) to describe or make observations about their writing (audience identification, claim making, source use); (2) to explain or evaluate operations in their writing (audience action, claim quality, source quality); and/or (3) to analyze in a more abstract way how different writing features interact with other one another, as well as

how they operate across texts and even courses (audience engagement, claim development, source integration).

Initial frequency counts of categories and codes by word count and case revealed trends across the entire corpus as well as within particular students' cases, allowing us to access and analyze this particular data in more detail as human readers.

**Table 4**

*Frequency Count of Categories and Codes by Word Count and by Case (Student Reflective Essay)*

| Category | Code | Count | % Codes | Cases | % Cases |
|---|---|---|---|---|---|
| ENGAGEMENT | audience identification | 485 | 6.80% | 272 | 10.60% |
| | audience action | 2,373 | 33.10% | 1,074 | 41.90% |
| | audience engagement | 822 | 11.50% | 514 | 20.10% |
| | audience NA | 243 | 3.40% | 186 | 7.30% |
| ARGUMENT | claim making | 643 | 8.80% | 352 | 13.70% |
| | claim quality | 96 | 1.30% | 70 | 2.70% |
| | claim development | 25 | 0.30% | 16 | 0.60% |
| | claim NA | 137 | 1.90% | 113 | 4.40% |
| EVIDENCE | source find/retrieve | 142 | 1.90% | 110 | 4.30% |
| | source use | 1379 | 18.90% | 652 | 25.40% |
| | source quality | 558 | 7.77% | 374 | 14.60% |
| | evidence integration | 75 | 1.0% | 50 | 2.00% |
| | evidence NA | 309 | 4.20% | 237 | 9.30% |

The most frequently occurring codes were audience action, source use, and audience engagement. The least frequently occurring codes were claim development, evidence integration, and claim quality.

With respect to students' reflections on audience, an analysis of coded segments showed that students most often wrote about the actions they had taken with an audience in mind. These explanations used two different types of verbs. One signaled awareness of the audience and its

needs, for example, “consider the reader’s perspective” and “assume readers know.” The other indicated the actions students took with their audience in mind, for example, “hooking an audience,” “leading the reader,” “convincing readers,” “tailoring for the reader,” and “confusing the audience.” These references to actions toward an audience occurred 2,372 times in 1,074 cases (41.90% of all cases). Within this code category, a smaller but still significant number of hits explained how the awareness of an audience and its needs led the writer to choose topics that would appeal to its interests, select evidence with an awareness of its prior knowledge, and use language that would motivate agreement or action, for example, “incorporate scientific data and discussion without alienating the reader” and “explaining why the topic of the paper was relevant to the interests of the reader.” These references to audience/reader engagement occurred 822 times in 514 cases (20.10% of all cases). Students also simply described or identified their readers, though much less frequently. In these instances, writers frequently used a modifying adjective to indicate awareness of an imagined reader only in a general way (e.g., “intended audience,” “my readers”) or to specify the expertise of an audience (e.g., “general reader,” “technical audiences,” “non-engineering audiences”). Instances of audience identification appeared 485 times in 272 cases (10.60% of all cases).

With respect to their reflections about argumentative claims in their writing, students more frequently observed or described the making of them. Most references used vague verbs, such as “made claims” or “state a claim,” although sometimes they used more specific verbs such as “supporting,” “proving,” “backing up,” and “justifying.” References to claim making appeared 643 times in 352 cases (13.70% of all cases). Far less frequently, students evaluated or explained their claims and claim making, for example, “construct more complex claims” and “My final paper made fewer broad claims and substantiated the claims that it did make.” Many of these instances used modifying adjectives to describe the quality of claims: “strong,” “persuasive,” “weak,” “vague,” “controversial,” or “novel.” Coding for claim quality appeared 96 times in 70 cases (2.70% of all cases). Even more rarely, students explained or analyzed the process of developing a claim, for example, “I use evidence to not only validate my claim but I also did so in a way that allowed the flow of the paragraph to go uninterrupted.” There were only 25 instances that were coded for claim development in 16 cases (.60% of all cases).

With respect to their reflections about evidence in their writing, students most frequently observed or described how they used it. Most references used vague verbs, such as “used evidence” or “provide evidence,” although they also used more specific verbs, such as “incorporated,” “explain,” and “synthesize information from sources.” References to source use appeared 1,379 times in 652 cases (25.40% of all cases). Students also identified the kind or quality of the sources they used, for example, “reliable evidence,” “secondary sources,” and “empirical data.” References to source quality appeared 558 times in 374 cases (14.60% of all cases). With less frequency, students explained two other kinds of actions that involved their use of evidence in their writing: how they found and retrieved sources of evidence and how they integrated it into their writing. References to source finding and retrieval, for example, “collect

evidence," "find sources," and "gather data," appeared 142 times in 110 cases (4.30% of all cases). There were even fewer explanations of how evidence was integrated into a piece of writing with an awareness of audience, the claims being made, or other aspects of writing, for example, "prove the significance of the evidence to the bigger picture," "determine if evidence was truly relevant to my central argument," and "connecting pieces of evidence and evaluating them with the main idea." References to evidence integration appeared 75 times in 50 cases (2.00% of all cases).

The relative frequencies of all of the refined codes across the three key terms/concepts (audience, claim, evidence) revealed the following:

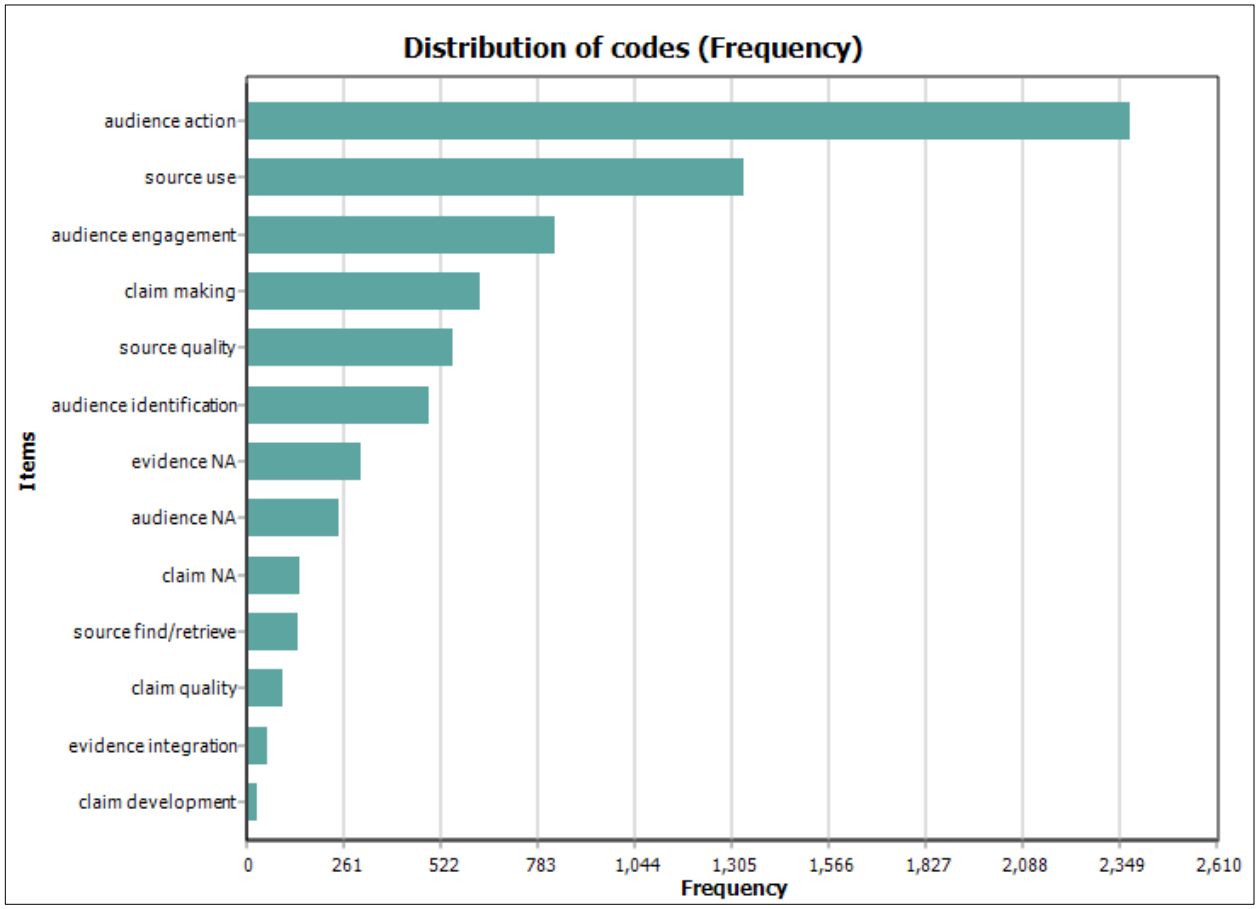


**Figure 3**

*Frequency Distribution of Qualitative Codes*

### 5.4 Use of Rubric Terminology: Syntactical Patterns (RQ2)

*RQ2: How do students use terminology from the SAGES writing rubric to describe their writing?*

The second phenomenon surfaced by the machine-assisted process of isolating and analyzing references to key terms in context was the presence of patterns indicating that students were not

only describing and explaining their writing, but also reflecting on what they had learned about writing in sustained and meaningful ways. Textual analysis of these patterns indicates students' ability to explore concepts across multiple sentences and paragraphs, to connect and relate concepts from different areas of the rubric, and to narrate their acquisition of new knowledge and skills. These patterns can be characterized as conceptual overlap, cognitive dwelling, and narration of learning.

### *5.4.1 Conceptual Overlap*

The process of coding uses of rubric terminology and their synonyms revealed that, in a small percentage of cases, students wrote about two or more rubric concepts simultaneously, such that a sentence might be coded both for "audience identification" and "evidence quality." In one instance of such conceptual overlap, a writer devoted an entire paragraph to theorize how audience and evidence interact, beginning with the observation that "The best way I've found to construct an argument with solid roots is to start not by considering the facts from my own perspective, but from the audience's perspective." After providing an extended example from one of their papers, the student explains, "Even if I am writing an essay where I have no idea who will end up reading it, it is still useful for me to imagine a model audience so that I can build the foundation of evidence upon a consistent body of common knowledge" (Case #1117). In this example, it is impossible to separate the writer's comments about what constitutes good evidence from a consideration of one's imagined audience. Though this does not parrot the language of the evidence band of the rubric, it connects ideas across the engagement and evidence bands and reflects the rubric's constructs of integrating and explaining source material to support all claims. The language captures the concepts in a way that extends beyond identification and explanation of past writing acts.

### *5.4.2 Cognitive Dwelling*

As this example suggests, instances of conceptual overlap can also be associated with multiple uses of a term over the course of several sentences, a kind of cognitive dwelling on a topic. Such instances were relatively rare, but still constituted a noticeable pattern and a rich opportunity for additional analysis. For example, of the 514 cases in which writers referred to audience engagement, almost 90 percent contained only one or two hits. Many of these instances tend toward description or general observation, as in "it is important to think about your audience before writing a paper." However, 61 of these 514 cases had three or more hits for audience engagement, and 16 (3.1%) had five or more. In one case, a writer dwelled on the lack of audience awareness evident in one of their papers and then returned to the same idea later in their reflection:

> Throughout the essay, it is clear to me that I did not write this for my professors but rather for my hypothetical readers that might not extensively know the topic that I am writing about. I explain what the Treaty of Guadalupe Hidalgo caused,

> how naturalization laws worked during the 19th century in the United States, how and why school districts often shortchange schools in low-income neighborhoods, and so on. I learned to take my readers into account instead of assuming they knew everything and just writing something for a grade. (Excerpt from Case #1347)
>
> I mentioned earlier on initially not focusing on why the reader should care, and that's probably one of the main takeaways I took from my SAGES classes. One of my University seminar professors stated that whenever we write, we should imagine the reader saying "Why should I care?" Subsequently, our writing should answer their hypothetical question. It is something that has stuck with me and something I continue to utilize in my writings today. It does not matter if the topic is relatively dry, or if its [sic] seems unimportant, I always strive to try to make the reader care about what I am writing. (Excerpt from Case #1347)

This kind of multi-sentence (even multi-paragraph) dwelling illustrates how students sometimes think about writing not as a set of disparate skills neatly organized into rubric boxes, but rather as interrelated and interdependent concepts that inform one another. In the excerpts above, the writer observes how they have learned to be aware of the needs of the reading audience (who "might not extensively know the topic that I'm writing about"), as well as the actions taken to address that need, providing historical context for unfamiliar readers.

### *5.4.3 Narration of Learning*

Embedded in these sentences are references that constitute a kind of learning narrative—not merely a description or explanation of the student's writing, but a history of their growth as a writer. Writing about their essays affords this writer an opportunity to identify a "main takeaway" that has "stuck with" them, something they "continue to utilize in my writings today." In recounting these narratives, writers use examples from their essays not merely as evidence of improvement, but as opportunities to expound on the principles of good writing. In one example, the writer described across multiple sentences and paragraphs what they had learned about how to develop argumentative claims, including observations about how claims and evidence worked together. An early paragraph switches between descriptions of a paper the student had written and the lesson or principle that it exemplified:

> I was taught to write a strong claim. A claim does not necessarily have to be one sentence. I implemented three sentences to create a claim in my mid- term paper. A claim must explain the primary purpose of your paper and how you will argue this purpose. I also learned how to more effectively use evidence from readings to support my argument. (Excerpt from Case #727).

In addition to switching between description and abstract conceptualization, this writer also identifies the acquisition of new ways of thinking about writing and skills. Subsequent paragraphs describe how the writer "transitioned away from using so much textual evidence to support claims and started implementing my own critical analysis in my essays," as well as the ability "to not only weave the ideas together but confront an opposing argument and negate it by further proving the strength of my own claim" (Excerpts from Case #727).

Overall, this study revealed that students do employ the lexicon of the program-wide writing rubric in a small percentage (2.9%) of the entire corpus. Raw frequency counts provided information about the relative frequency of key terms from the rubric that enabled qualitative coding of specific moments in the corpus where those terms were found. The combination of quantitative and qualitative coding of the corpus provided insight into the ways in which students used the key rubric terms in their reflections. An initial process of coding showed that students employed the key rubric terms of "audience/reader," "claim," and "evidence" 1) to describe or make observations about their writing (audience identification, claim making, source use); (2) to explain or evaluate operations in their writing (audience action, claim quality, source quality); and/or (3) to analyze in a more abstract way how different writing features interact with one another, as well as how they operate across texts and even courses (audience engagement, claim development, source integration). A second process of coding demonstrated students' ability to explore concepts across multiple sentences and paragraphs, to connect and relate concepts from different areas of the rubric, and to narrate their acquisition of new knowledge and skills, which we identified as conceptual overlap, cognitive dwelling, and narration of learning.

## 6.0 Discussion

This study demonstrates that students do use the terminology of our program-wide writing rubric when they reflect on their writing, and that they sometimes use that in ways we anticipated and intended. They also use other terminology, which demonstrates an understanding of our program's writing construct in various ways that may be indicative of transfer and deeper learning as it is articulated in our program's reflective portfolio essay.

Our quantitative analysis of the frequency of terms from our writing rubric confirmed that students do learn and use that terminology, as well as terminology of their own making, to describe writing concepts in ways that are consistent with the writing construct of our program that is embodied in our writing rubric. Our analysis of a small subset of key terms suggests further that students' alternative terms can be as meaningful and precise as our program's lexicon. And, it is unclear if these counts indicate that students could or should be using the rubric lexicon more in their reflections, or that faculty could or should be teaching the rubric lexicon more in their teaching, or something else entirely.

In applying qualitative coding to this frequency data and the keywords in context, we discovered textual patterns in the ways students use our rubric terms and their alternate and synonymous terms that may be indicative of meaningfully distinct levels of understanding and

application of these concepts. In identifying and naming conceptual overlap, cognitive dwelling, and narration of learning, we see promise in exploring how these different uses of terminology demonstrate different kinds of engagement with our rubric terminology for different purposes in students' reflective writing: describing features of writing, making connections among several concepts, and narrating their own growth as writers.

While we observed the traditional narrative of improvement that is seen in portfolio reflections—"I got better at x, y, and z as evidenced by a, b, and c"— we also observed narratives in which students expressed their understanding of writing terms, concepts, and applications as they recounted and described their performances across courses and writing projects. In the process of telling their stories, students used key terms to describe and explain writing constructs, and those descriptions were often situated in their observations about previous writing situations and changes and adaptations they had made to attend to new writing scenarios. In the process of telling a story about a concept and/or the interrelatedness of concepts, they construct knowledge and meaning for themselves, as well as offer readers evidence of their learning. Narration in this sense is an act that engages students in both the cognitive and intrapersonal domains of deeper learning, providing them with the means to practice and theorize in ways that support transfer and projection of competencies into new writing situations.

The picture is a complicated one that requires further rounds of recursive exploration using quantitative and qualitative methods beyond the three key terms that we have explored here ("audience," "evidence," "claim") in order to develop a better understanding of how what we see in student reflection might be indicative of transfer and/or deeper learning. While textual analytics has provided us a way into this corpus of reflective writing through the examination of specific terms, the process needs to be repeated to examine more rubric terms, as well as intersections of terms across the rubric. Similarly, our qualitative examination of these three specific rubric terms has demonstrated that students employ them in different ways for different purposes, the rarest of which—by frequency count—seems to be at a conceptual level, but it remains to be demonstrated that this is indicative of transfer or deeper learning. We believe that our methodology has potential to more fully explore this corpus and other corpora of student reflections in order to illuminate the role that writing terminology plays in students' ability to transfer and gain deeper learning of writing constructs through the production of reflections across writing course sequences in their writing ePortfolios. Regardless of the limitations of our current study and the need for additional exploration, we believe our findings suggest that we should be supporting reflection through pedagogical and programmatic practices that cue students to connect concepts, dwell deeply on their meaning, and construct meaning for themselves through the process of narration.

## 7.0 Conclusions

This study demonstrates that a reflective essay offers us more than a guide to a portfolio. In his study of student reflections over the course of a single writing project, Dan Fraizer (2018) had faculty review and reflect on their students' written reflections about the writing process. His work demonstrated that "both instructors and students need to find a common language to talk about writing assignment expectations and reflect on the writing produced in response to these assignments. Instructors then need to reflect on the implications of this discussion/reflection in order to act on what they have learned" (n.p.). In working toward that goal, "[t]he first step is for faculty to be aware of how students attempt to adapt to our expectations. We then need to assist faculty members as they reflect on that awareness in order to take actions that lead to meaningful student transitions" (Fraizer, 2018, n.p.). While Fraizer was examining reflection in the classroom context, his observations hold true in the context of reflective portfolio essays in a writing program. Rather than the expectations of a singular assignment, students are prompted to describe the process of adapting to the expectations of our programs; but it remains true that faculty and administrators who design and enact expectations need to understand how students articulate an understanding of those expectations, and how that translates to the transfer and deeper learning that we seek to foster.

Fraizer (2018) calls for awareness, and the tools and methods of writing analytics can provide a very robust awareness by showing us not only *what* students write about in their reflections on learning to write within a program, but also *how* they write those experiences (the key terms they use, the sentences they construct, the frequency with which they use terms, and the stances they take in relationship to those terms). In this study, these tools helped us to access the key terms of our rubric as used by our students, reflecting back to us what the experience of our writing program, its outcomes and practices, *is* for students. It is a limited look, from a particular perspective, but no less limited than the human reading performed by a committee of faculty readers asked to interpret reflective essays as guides to portfolio contents. The more perspectives we can have in our assessment practices, the better our picture and our understanding of the program as it is experienced.

This study contributes to the larger conversations around the role of key terms and reflective practices in promoting transfer and deeper learning for students in writing programs.

Our findings, although limited to three key terms from our rubric, suggest that while key terms and reflection can be vehicles that support transfer and deeper learning, they are not inherently effective in doing so. While we found students performing some of the work of reflection as prompted by our ePortfolio instructions (making observations about their past work, making comparisons between essays and course experiences, citing evidence from their collected texts in support of those observations and comparisons), not all of them did so. We cannot assume that the type of reflection that we value for transfer and deeper learning is the type of reflection students perform without instruction, experience, and prompting.

Once we recognize this fact, we can begin to use the kind of assessment modeled in this study to identify what can be done to foster the meta-awareness characteristics of deeper learning*: synthesis*, *analysis*, *narration*, and *meaning-making.* From there, we can focus attention on finding more effective, frequent, and consistent ways to teach the concepts and methods of reflection, for example, meta-awareness and projection. We can provide more opportunities for students to engage in meaningful reflection, as well as improve how we prompt them toward it. We can also make them aware of the ways that reflection and transfer support their development as effective writers. For example, as part of our ongoing professional development for instructional staff, we could discuss the value of reflection as a tool for metacognition. Similarly, we could share these findings with writing administrators and faculty to demonstrate instances of reflection and develop a shared understanding of meaningful reflective practice. Working with faculty, we can promote models and strategies for incorporating reflection into writing processes and projects. Finally, we can use the ePortfolio prompt itself to provide examples and explanations that better cue students to take full advantage of reflection as a tool of deeper learning.

In other words, if we as writing professionals believe in the importance of students' ability to reflect on what they have learned, to explain how these concepts and skills work, and to project how they will use this knowledge in the future, then we should teach them how to do these things well.

## 8.0 Directions for Further Research

This project is a small step into a large corpus and a burgeoning area of scholarship that intersect at a moment of reflection, where the act of thinking coincides with the demonstration of that thinking, where pedagogy and program design coexist in concrete ways that writing programs have not yet been able to access through traditional portfolio assessment practices. Many programs have a rich pool of data to explore. In future iterations of this project, we see writing analytics helping us to explore more key terms from our rubric, and more intersections of terms, for a better sense—and perhaps redevelopment—of the terminology that defines our programmatic construct of writing. We then hope to translate our results into pedagogical recommendations for our faculty in order to develop practices that support transfer and deeper learning. Finally, this application of writing analytics can help our program to re-see our programmatic assessment agenda as having room for progressive methods of inquiry that employ both quantitative and qualitative methodologies.

The theorization of reflective writing, the development of ePortfolios, and advancement of principles and practices of writing analytics provide us with a new perspective on our programs. Using writing analytics, we are able to review a large corpus for concepts, key terms, and reflective practices across students, course, and years of writing development. That corpus offers us a look at our program through the words of our students, and reconciling that description with

administrative program descriptions is an important way of honoring all of the stakeholders in a writing program (White et al., 2015).

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## Appendix

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| ARGUING | 119 | 0.20% | 0.01% | 0.01% | 107 | 4.18% | 164.1 |
| ARGUMENT | 3,431 | 5.90% | 0.17% | 0.17% | 1,184 | 46.21% | 1,150.2 |
| ARGUMENTATION | 35 | 0.06% | 0.00% | 0.00% | 26 | 1.01% | 69.8 |
| ARGUMENTATIONS | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| ARGUMENTATIVE | 286 | 0.49% | 0.01% | 0.01% | 188 | 7.34% | 324.4 |
| ARGUMENTATIVELY | 12 | 0.02% | 0.00% | 0.00% | 9 | 0.35% | 29.5 |
| ARGUMENTS | 1,609 | 2.77% | 0.08% | 0.08% | 833 | 32.51% | 785.1 |
| ARGUMENTÂ | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| COUNTERARGUMENT | 20 | 0.03% | 0.00% | 0.00% | 15 | 0.59% | 44.6 |
| COUNTERARGUMENTS | 40 | 0.07% | 0.00% | 0.00% | 22 | 0.86% | 82.6 |
| Argument# | 5,556 | | | | | | |
| ARRANGEMENT | 10 | 0.02% | 0.00% | 0.00% | 7 | 0.27% | 25.6 |
| ARRANGING | 5 | 0.01% | 0.00% | 0.00% | 5 | 0.20% | 13.5 |
| Arrange# | 15 | | | | | | |
| ARTICULATE | 142 | 0.24% | 0.01% | 0.01% | 122 | 4.76% | 187.8 |
| ARTICULATED | 21 | 0.04% | 0.00% | 0.00% | 20 | 0.78% | 44.3 |
| ARTICULATES | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| ARTICULATING | 34 | 0.06% | 0.00% | 0.00% | 29 | 1.13% | 66.2 |
| ARTICULATION | 19 | 0.03% | 0.00% | 0.00% | 16 | 0.62% | 41.9 |
| Articulate# | 249 | | | | | | |
| ATTENTION | 394 | 0.68% | 0.02% | 0.02% | 311 | 12.14% | 360.8 |
| AUDIENCE | 693 | 1.19% | 0.03% | 0.03% | 397 | 15.50% | 561.2 |
| AUDIENCES | 140 | 0.24% | 0.01% | 0.01% | 92 | 3.59% | 202.3 |
| Audience# | 1,227 | | | | | | |
| BROAD | 255 | 0.44% | 0.01% | 0.01% | 210 | 8.20% | 277 |
| BROADEN | 57 | 0.10% | 0.00% | 0.00% | 54 | 2.11% | 95.5 |
| BROADENED | 49 | 0.08% | 0.00% | 0.00% | 47 | 1.83% | 85.1 |
| BROADENING | 13 | 0.02% | 0.00% | 0.00% | 13 | 0.51% | 29.8 |
| BROADENS | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| BROADER | 76 | 0.13% | 0.00% | 0.00% | 66 | 2.58% | 120.8 |
| BROADEST | 2 | 0.00% | 0.00% | 0.00% | 2 | 0.08% | 6.2 |
| BROADLY | 17 | 0.03% | 0.00% | 0.00% | 17 | 0.66% | 37 |
| BROADNESS | 5 | 0.01% | 0.00% | 0.00% | 5 | 0.20% | 13.5 |
| Broad# | 477 | | | | | | |
| CLAIM | 399 | 0.69% | 0.02% | 0.02% | 233 | 9.09% | 415.4 |
| CLAIMED | 22 | 0.04% | 0.00% | 0.00% | 20 | 0.78% | 46.4 |
| CLAIMING | 15 | 0.03% | 0.00% | 0.00% | 15 | 0.59% | 33.5 |
| CLAIMS | 387 | 0.67% | 0.02% | 0.02% | 260 | 10.15% | 384.5 |
| Claim# | 823 | | | | | | |
| CLARITY | 357 | 0.61% | 0.02% | 0.02% | 232 | 9.06% | 372.4 |
| CLEAR | 1,512 | 2.60% | 0.07% | 0.07% | 897 | 35.01% | 689.1 |
| CLEARER | 211 | 0.36% | 0.01% | 0.01% | 187 | 7.30% | 239.9 |
| CLEAREST | 16 | 0.03% | 0.00% | 0.00% | 15 | 0.59% | 35.7 |
| CLEARLY | 885 | 1.52% | 0.04% | 0.04% | 648 | 25.29% | 528.3 |
| CLEARNESS | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| Clear# | 2,984 | | | | | | |
| COHERENCE | 16 | 0.03% | 0.00% | 0.00% | 14 | 0.55% | 36.2 |
| COHERENT | 209 | 0.36% | 0.01% | 0.01% | 170 | 6.64% | 246.2 |
| COHERENTLY | 30 | 0.05% | 0.00% | 0.00% | 28 | 1.09% | 58.8 |
| Coherent# | 255 | | | | | | |
| COMPREHENSION | 67 | 0.12% | 0.00% | 0.00% | 54 | 2.11% | 112.3 |
| CONTEXT | 382 | 0.66% | 0.02% | 0.02% | 280 | 10.93% | 367.3 |
| CONTEXTS | 47 | 0.08% | 0.00% | 0.00% | 42 | 1.64% | 83.9 |

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| CONTEXTUAL | 14 | 0.02% | 0.00% | 0.00% | 14 | 0.55% | 31.7 |
| CONTEXTUALIZATIO N | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| CONTEXTUALIZE | 9 | 0.02% | 0.00% | 0.00% | 8 | 0.31% | 22.5 |
| CONTEXTUALIZED | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| CONTEXTUALIZING | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| Context# | 531 | | | | | | |
| CORRECTNESS | 13 | 0.02% | 0.00% | 0.00% | 12 | 0.47% | 30.3 |
| INCORRECT | 59 | 0.10% | 0.00% | 0.00% | 53 | 2.07% | 99.4 |
| INCORRECTLY | 13 | 0.02% | 0.00% | 0.00% | 12 | 0.47% | 30.3 |
| Correctness# | 85 | | | | | | |
| DEEPLY | 121 | 0.21% | 0.01% | 0.01% | 109 | 4.25% | 165.9 |
| DEVELOPMENT | 1,118 | 1.92% | 0.06% | 0.06% | 683 | 26.66% | 641.9 |
| DOCUMENT | 162 | 0.28% | 0.01% | 0.01% | 108 | 4.22% | 222.8 |
| DOCUMENTED | 15 | 0.03% | 0.00% | 0.00% | 13 | 0.51% | 34.4 |
| DOCUMENTING | 15 | 0.03% | 0.00% | 0.00% | 14 | 0.55% | 33.9 |
| DOCUMENTS | 184 | 0.32% | 0.01% | 0.01% | 134 | 5.23% | 235.8 |
| UNDOCUMENTED | 5 | 0.01% | 0.00% | 0.00% | 2 | 0.08% | 15.5 |
| Document# | 381 | | | | | | |
| ENGAGE | 179 | 0.31% | 0.01% | 0.01% | 141 | 5.50% | 225.4 |
| ENGAGED | 166 | 0.29% | 0.01% | 0.01% | 138 | 5.39% | 210.6 |
| ENGAGEMENT | 67 | 0.12% | 0.00% | 0.00% | 54 | 2.11% | 112.3 |
| ENGAGES | 8 | 0.01% | 0.00% | 0.00% | 8 | 0.31% | 20 |
| ENGAGING | 296 | 0.51% | 0.01% | 0.01% | 235 | 9.17% | 307.1 |
| ENGAGINGLY | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| Engage# | 717 | | | | | | |
| EVIDENCE | 1,851 | 3.18% | 0.09% | 0.09% | 771 | 30.09% | 965.3 |
| EXPLAIN | 539 | 0.93% | 0.03% | 0.03% | 402 | 15.69% | 433.5 |
| EXPLAINED | 196 | 0.34% | 0.01% | 0.01% | 166 | 6.48% | 232.9 |
| EXPLAINING | 243 | 0.42% | 0.01% | 0.01% | 200 | 7.81% | 269.1 |
| EXPLAINS | 46 | 0.08% | 0.00% | 0.00% | 44 | 1.72% | 81.2 |
| Explain# | 2,875 | | | | | | |
| FOCUS | 1230 | 2.12% | 0.06% | 0.06% | 791 | 30.87% | 627.8 |
| FOCUSED | 1513 | 2.60% | 0.07% | 0.07% | 920 | 35.91% | 673 |
| FOCUSES | 117 | 0.20% | 0.01% | 0.01% | 106 | 4.14% | 161.8 |
| FOCUSING | 246 | 0.42% | 0.01% | 0.01% | 222 | 8.67% | 261.3 |

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| FOCUSSED | 5 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 14 |
| FOCUSSES | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| Focus# | 3,112 | | | | | | |
| GENERAL | 796 | 1.37% | 0.04% | 0.04% | 586 | 22.87% | 510 |
| IDEA | 1,322 | 2.27% | 0.07% | 0.07% | 803 | 31.34% | 666.1 |
| IDEAS | 2,985 | 5.13% | 0.15% | 0.15% | 1,288 | 50.27% | 891.5 |
| Idea# | 5,103 | | | | | | |
| INCONSISTENCIES | 16 | 0.03% | 0.00% | 0.00% | 14 | 0.55% | 36.2 |
| INCONSISTENCY | 12 | 0.02% | 0.00% | 0.00% | 11 | 0.43% | 28.4 |
| INCONSISTENT | 32 | 0.06% | 0.00% | 0.00% | 29 | 1.13% | 62.3 |
| Inconsistent# | 60 | | | | | | |
| INSIGHT | 180 | 0.31% | 0.01% | 0.01% | 150 | 5.85% | 221.8 |
| INSIGHTFUL | 75 | 0.13% | 0.00% | 0.00% | 64 | 2.50% | 120.2 |
| INSIGHTFULNESS | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| INSIGHTS | 56 | 0.10% | 0.00% | 0.00% | 49 | 1.91% | 96.2 |
| Insight# | 312 | | | | | | |
| INTEGRATE | 155 | 0.27% | 0.01% | 0.01% | 124 | 4.84% | 203.8 |
| INTEGRATED | 97 | 0.17% | 0.00% | 0.00% | 89 | 3.47% | 141.5 |
| INTEGRATES | 6 | 0.01% | 0.00% | 0.00% | 6 | 0.23% | 15.8 |
| INTEGRATING | 67 | 0.12% | 0.00% | 0.00% | 61 | 2.38% | 108.8 |
| Integrate# | 325 | | | | | | |
| INTERFERE | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| INTERFERENCE | 2 | 0.00% | 0.00% | 0.00% | 2 | 0.08% | 6.2 |
| INTERFERES | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| INTERFERING | 2 | 0.00% | 0.00% | 0.00% | 2 | 0.08% | 6.2 |
| Interfere# | 8 | | | | | | |
| LOGICAL | 343 | 0.59% | 0.02% | 0.02% | 249 | 9.72% | 347.2 |
| LOGICALLY | 74 | 0.13% | 0.00% | 0.00% | 66 | 2.58% | 117.6 |
| ILLOGICALLY | 2 | 0.00% | 0.00% | 0.00% | 2 | 0.08% | 6.2 |
| Logic# | 419 | | | | | | |
| MECHANICAL | 88 | 0.15% | 0.00% | 0.00% | 77 | 3.01% | 133.9 |
| MECHANICALLY | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| Mechanical# | 92 | | | | | | |
| MISSING | 85 | 0.15% | 0.00% | 0.00% | 74 | 2.89% | 130.8 |
| ORIGINAL | 307 | 0.53% | 0.02% | 0.02% | 238 | 9.29% | 316.8 |
| ORIGINALITY | 12 | 0.02% | 0.00% | 0.00% | 12 | 0.47% | 28 |

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| UNORIGINAL | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| Original# | 323 | | | | | | |
| PARAGRAPH | 2,161 | 3.72% | 0.11% | 0.11% | 910 | 35.52% | 971.5 |
| PARAGRAPHING | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| PARAGRAPHS | 1,122 | 1.93% | 0.06% | 0.06% | 632 | 24.67% | 682 |
| Paragraph# | 3,286 | | | | | | |
| PARTIAL | 6 | 0.01% | 0.00% | 0.00% | 6 | 0.23% | 15.8 |
| PARTIALLY | 56 | 0.10% | 0.00% | 0.00% | 49 | 1.91% | 96.2 |
| Partial# | 62 | | | | | | |
| PRECISE | 69 | 0.12% | 0.00% | 0.00% | 61 | 2.38% | 112 |
| PRECISELY | 33 | 0.06% | 0.00% | 0.00% | 32 | 1.25% | 62.8 |
| PRECISION | 14 | 0.02% | 0.00% | 0.00% | 12 | 0.47% | 32.6 |
| IMPRECISE | 7 | 0.01% | 0.00% | 0.00% | 7 | 0.27% | 17.9 |
| Precise# | 123 | | | | | | |
| PROBLEM | 662 | 1.14% | 0.03% | 0.03% | 455 | 17.76% | 496.9 |
| PROBLEMATIC | 33 | 0.06% | 0.00% | 0.00% | 31 | 1.21% | 63.3 |
| PROBLEMATICALLY | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| PROBLEMS | 437 | 0.75% | 0.02% | 0.02% | 327 | 12.76% | 390.7 |
| Problem# | 1,133 | | | | | | |
| QUALITY | 724 | 1.25% | 0.04% | 0.04% | 476 | 18.58% | 529.2 |
| QUESTION | 415 | 0.71% | 0.02% | 0.02% | 294 | 11.48% | 390.2 |
| QUESTIONS | 411 | 0.71% | 0.02% | 0.02% | 302 | 11.79% | 381.6 |
| Question# | 826 | | | | | | |
| READABILITY | 59 | 0.10% | 0.00% | 0.00% | 44 | 1.72% | 104.1 |
| REASONING | 152 | 0.26% | 0.01% | 0.01% | 120 | 4.68% | 202.1 |
| RELEVANCE | 88 | 0.15% | 0.00% | 0.00% | 76 | 2.97% | 134.4 |
| RELEVANCY | 8 | 0.01% | 0.00% | 0.00% | 8 | 0.31% | 20 |
| RELEVANT | 547 | 0.94% | 0.03% | 0.03% | 415 | 16.20% | 432.4 |
| RELEVANTLY | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| IRRELEVANCE | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| IRRELEVANCY | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| IRRELEVANT | 44 | 0.08% | 0.00% | 0.00% | 40 | 1.56% | 79.5 |
| Relevance# | 693 | | | | | | |
| RELIABILITY | 20 | 0.03% | 0.00% | 0.00% | 17 | 0.66% | 43.6 |
| RELIABLE | 101 | 0.17% | 0.00% | 0.00% | 70 | 2.73% | 157.9 |
| RELIABLY | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| UNRELIABLE | 4 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 11.2 |
| Reliable# | 126 | | | | | | |
| REPEAT | 46 | 0.08% | 0.00% | 0.00% | 44 | 1.72% | 81.2 |
| REPEATED | 60 | 0.10% | 0.00% | 0.00% | 55 | 2.15% | 100.1 |
| REPEATING | 50 | 0.09% | 0.00% | 0.00% | 46 | 1.80% | 87.3 |
| REPEATS | 5 | 0.01% | 0.00% | 0.00% | 5 | 0.20% | 13.5 |
| Repeat# | 161 | | | | | | |
| REPORT | 225 | 0.39% | 0.01% | 0.01% | 160 | 6.25% | 271 |
| REPORTED | 14 | 0.02% | 0.00% | 0.00% | 14 | 0.55% | 31.7 |
| REPORTING | 43 | 0.07% | 0.00% | 0.00% | 34 | 1.33% | 80.7 |
| REPORTS | 344 | 0.59% | 0.02% | 0.02% | 262 | 10.23% | 340.7 |
| Report# | 626 | | | | | | |
| SENTENCE | 1,803 | 3.10% | 0.09% | 0.09% | 803 | 31.34% | 908.5 |
| SENTENCES | 1,596 | 2.75% | 0.08% | 0.08% | 783 | 30.56% | 821.6 |
| Sentence# | 3,399 | | | | | | |
| SMOOTH | 85 | 0.15% | 0.00% | 0.00% | 76 | 2.97% | 129.9 |
| SMOOTHER | 60 | 0.10% | 0.00% | 0.00% | 56 | 2.19% | 99.6 |
| SMOOTHEST | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| SMOOTHLY | 102 | 0.18% | 0.01% | 0.01% | 88 | 3.43% | 149.3 |
| SMOOTHNESS | 5 | 0.01% | 0.00% | 0.00% | 4 | 0.16% | 14 |
| Smooth# | 253 | | | | | | |
| SOPHISTICATED | 89 | 0.15% | 0.00% | 0.00% | 76 | 2.97% | 136 |
| SOPHISTICATEDLY | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| SOPHISTICATION | 15 | 0.03% | 0.00% | 0.00% | 13 | 0.51% | 34.4 |
| Sophisticated# | 105 | | | | | | |
| SOURCE | 590 | 1.01% | 0.03% | 0.03% | 393 | 15.34% | 480.4 |
| SOURCES | 2,810 | 4.83% | 0.14% | 0.14% | 1086 | 42.39% | 1,047.4 |
| Source# | 3,400 | | | | | | |
| STATEMENT | 904 | 1.56% | 0.04% | 0.04% | 495 | 19.32% | 645.4 |
| STATEMENTS | 415 | 0.71% | 0.02% | 0.02% | 289 | 11.28% | 393.3 |
| Statement# | 1,319 | | | | | | |
| STYLE | 2,524 | 4.34% | 0.12% | 0.12% | 1157 | 45.16% | 871.4 |
| SUPERFICIALLY | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| SUPPORT | 1,287 | 2.21% | 0.06% | 0.06% | 768 | 29.98% | 673.4 |
| SUPPORTABLE | 1 | 0.00% | 0.00% | 0.00% | 1 | 0.04% | 3.4 |
| SUPPORTED | 304 | 0.52% | 0.02% | 0.02% | 251 | 9.80% | 306.7 |

| | FREQU-ENCY | % SHOWN | % PROCES-SED | % TOTAL | NO. CASES | % CASES | TF • IDF |
|---|---|---|---|---|---|---|---|
| SUPPORTING | 410 | 0.71% | 0.02% | 0.02% | 292 | 11.40% | 386.7 |
| SUPPORTIVE | 41 | 0.07% | 0.00% | 0.00% | 36 | 1.41% | 75.9 |
| SUPPORTS | 60 | 0.10% | 0.00% | 0.00% | 57 | 2.22% | 99.2 |
| Support# | 2,103 | | | | | | |
| THESIS | 2,638 | 4.54% | 0.13% | 0.13% | 905 | 35.32% | 1,192.2 |
| THOROUGH | 168 | 0.29% | 0.01% | 0.01% | 145 | 5.66% | 209.5 |
| THOROUGHLY | 244 | 0.42% | 0.01% | 0.01% | 208 | 8.12% | 266.1 |
| THOROUGHNESS | 2 | 0.00% | 0.00% | 0.00% | 2 | 0.08% | 6.2 |
| Thorough# | 414 | | | | | | |
| TRANSITION | 492 | 0.85% | 0.02% | 0.02% | 326 | 12.72% | 440.5 |
| TRANSITIONAL | 31 | 0.05% | 0.00% | 0.00% | 25 | 0.98% | 62.3 |
| TRANSITIONING | 82 | 0.14% | 0.00% | 0.00% | 76 | 2.97% | 125.3 |
| TRANSITIONS | 462 | 0.79% | 0.02% | 0.02% | 262 | 10.23% | 457.5 |
| Transition# | 1,067 | | | | | | |
| UNRELATED | 71 | 0.12% | 0.00% | 0.00% | 63 | 2.46% | 114.3 |
| USE | 3,160 | 5.44% | 0.16% | 0.16% | 1516 | 59.17% | 720.1 |
| USED | 2,289 | 3.94% | 0.11% | 0.11% | 1318 | 51.44% | 660.8 |
| USES | 170 | 0.29% | 0.01% | 0.01% | 150 | 5.85% | 209.5 |
| Use# | 5,619 | | | | | | |
| WANDER | 10 | 0.02% | 0.00% | 0.00% | 10 | 0.39% | 24.1 |
| WANDERED | 2 | 0.00% | 0.00% | 0.00% | 2 | 0.08% | 6.2 |
| WANDERING | 7 | 0.01% | 0.00% | 0.00% | 6 | 0.23% | 18.4 |
| WANDERS | 3 | 0.01% | 0.00% | 0.00% | 3 | 0.12% | 8.8 |
| Wander# | 22 | | | | | | |