

Articulating a Sociocognitive Construct of Writing Expertise for the Digital Age

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Structured Abstract

- **Background:** In this article, we articulate an updated construct describing domains of expertise in writing, one that meets the contemporary needs of those who research, teach, and assess writing—particularly in a digital age. This article appears in a collection published as a special issue of *The Journal of Writing Analytics* that explores both the challenges and the opportunities involved in integrating digitally delivered formative assessments into classroom instruction, illustrated by the example of Workplace English Communication (WEC). Each article in this special issue addresses different aspects of the challenges involved in developing assessments of complex tasks. The three framework articles that lead this special issue all highlight the importance of robust construct models as a foundation for assessment design. In this article, we present an integrated sociocognitive-oriented construct model for expertise in writing that informs the assessment design work discussed in this special issue.
- **Research Questions:** With the overarching purpose of developing a contemporary, integrated construct, we conducted a critical review of journal articles focused on expertise in writing ability, exploring the following research questions:
 - RQ1: What knowledge domains necessary for writing expertise are described in research articles from 1971 to 2020?

- RQ2: How do these domains coalesce to describe a construct of writing expertise for the digital age?
- RQ3: How can this broad construct be extrapolated to an idiographic model that describes the expertise required for writing in workplace contexts assessed by the WEC modules?
- **Methodology:** We conducted a critical review of writing scholarship from the past 50 years. The purpose of a critical review is to synthesize the significant scholarship in the field in order to advance theory. We chose 1971 as our starting date, which was the year in which Emig published her seminal study examining writing processes, as opposed to products. Our search parameters included the following: the articles were to address writing constructs or theories in their title or abstract, be peer reviewed, written in English, and written between 1971 and the present (spring 2020). We consulted the databases of ERIC (Educational Resource Information Center), Academic Search Complete, and ProQuest. Then, we conducted a second round of searching via a hand search of the top five ranked journals in writing research. From our initial screening, we eliminated any articles that were either duplicates or irrelevant during a close read of the texts. Articles were eliminated if they were not explicitly focused on construct/theory development and/or made little contribution to construct development; also, some were eliminated if they did not contribute anything new to construct development due to saturation. Once we arrived at our final list of texts, we read the texts and coded them using NVivo over two rounds including provisional coding and pattern coding.
- **Results:** Our critical review of 109 texts revealed that the following writing knowledge domains have predominated the literature: metacognitive, critical discourse, discourse, rhetorical aim, genre, communication task process, and substantive knowledge. We bring these domains together to form a sociocognitive construct of writing expertise, which describes the knowledge domains necessary to develop expertise in the digital age.
- **Discussion and Conclusion:** After discussing the knowledge domains revealed by our critical review of the literature, we then describe how we take our construct from the nomothetic level and apply it at the idiographic level in the context of the WEC modules that are the focus of this special issue. We conclude by elucidating the implications this construct has for writing curriculum, instruction, and assessment.

Keywords: construct, sociocognitive, new literacies, Workplace English Communication (WEC), writing assessment, writing theory, writing analytics

1.0 Background

This special issue of *The Journal of Writing Analytics* is focused on the application of multidisciplinary research to the design and development of hard-to-assess 21st century knowledge, skills, and attitudes. Our contribution to the development of Workplace English Communication (WEC)—defined as a form of sophisticated discourse in which organizational and disciplinary norms for framing and communicating information are used for a variety of aims—is the design of a robust construct that informs the design of the WEC curriculum and its component tasks, scoring guides, and score reports. In advancing a sociocognitive approach to educational measurement, Mislavy (2018) highlights the importance of well-articulated constructs that can be used to help reason through and provide the backing for the inferences to be made from assessment data. Our experience collaborating on the WEC modules has reinforced for us the importance of that insight.

Each of the frameworks—Evidence Centered Design (ECD), Integrated Design and Appraisal Framework (IDAF), Sociocognitive—used to guide the development of the WEC modules reported on in this special issue emphasize the importance of construct modeling to the design of assessment programs. They draw on a long tradition of research in educational and psychological testing that began with Chronbach and Meehl’s (1955) introduction of the concept of construct validity. In this seminal paper, constructs are defined as “some postulated attribute of people, assumed to be reflected in test performance” (p. 283). Construct development and validation, they observed, is a never-ending process as the nomological network—which is often quite limited in early stages of research—is more fully defined and elaborated over time. More recently, Mislavy (2018) describes this process:

[M]odeling is not a single effort, expressing only what one knows and believes before seeing data. It is a dialectic among parts and perspectives: theory and assessment, experience and observation, patterns in models and patterns in data. We can, and often should, loop back to improve our model, our tasks, our thinking, or all three. (p. 189)

The more complex the construct, the more challenging the process of defining and refining the models that provide the foundation for assessment design and use.

By the 1990s, the concept of construct validity became central to validity theory itself when Messick (1989) argued that all forms of validity evidence were dependent on construct-related evidence. At the same time, Messick also emphasized the evidentiary nature of validity. Validation, within a unified theory, required the collection of multiple forms, classes, or types of evidence. This unified theory of validity continues to inform contemporary models of validation (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014; Kane, 2006, 2013; Zumbo & Chan, 2014).

A clear problem for the field of writing assessment, however, is that the construct of writing ability remains ill-defined (Sainsbury, 2009; Shermis et al., 2016; White et al., 2015). As a

consequence, no cognitive or developmental scale used to *directly* measure writing ability has been developed to date (Burdick et al., 2013). Instead, writing assessment programs have depended on the evaluation of narrowly defined written products, indirect measures of writing ability from which a writer's cognitive or metacognitive capacity for writing is extrapolated.

Our goal for this current study is to develop a more complete model of expertise that underpins writing ability, so that this can be applied to the development of assessment programs that more directly measure this construct.

1.1 The Need for an Integrated Construct of Writing Expertise

Over the past 60 years, valuable contributions to writing theory have been generated from across paradigmatic and research traditions—which have gradually shifted focus over the ensuing decades from product (1900-1960s), to process (1970s-1980s), to the sociocultural (1980s-present), to post-process and beyond (late 1990s-present; Behizadeh & Engelhard, 2011).

Extant writing theories have importantly shaped, and will continue to shape, all current and future conceptualizations of the construct of writing ability, even as we redefine them in light of 21st century realities. Problematically, this research for the most part has remained siloed and has yet to be integrated into a more holistic model (Abbott & Berninger, 1993; Hacker et al., 2009). In recent years, there have been increasing calls to integrate the insights into writing ability that come to us from across related but distinct lines of research (Beach & O'Brien, 2018; McNamara & Allen, 2018). In this article, we respond to this call, synthesizing over 100 studies from both cognitive and sociocultural perspectives over the last 50 years, beginning with Emig's (1971) seminal study.

We report this synthesis in the form of an integrated construct describing domains of expertise germane to writing expertise. Aligned with a sociocognitive view of language (see Oliveri, Mislevy, & Slomp, 2021, this issue), the construct we propose is a generalized model that can be applied to teaching, assessment, and instructional design across a broad range of contexts, from K-12 to post-secondary, from academic to workplace, from creative to technical writing.

We present a generalized construct (nomothetic model) in the first half of this paper, then we demonstrate the application of this construct to the teaching and assessment of WEC, drawing down an idiographic model from the nomothetic. (For more on idiographic and nomothetic modeling, see Oliveri, Slomp, Elliot, et al., 2021, this issue, and Slomp et al., 2021, this issue.)

1.2 Situating an Integrated Construct of Writing Expertise

An important element of construct development is the process of situating the construct under investigation within its nomothetic span (web of associated constructs). As we initiated our work on developing this construct, we began with three orienting perspectives: writing ability should be understood through the lens of problem solving; writing ability should be understood through both cognitive and sociocultural perspectives; and, in the 21st century, writing ability necessarily

includes the knowledge, skills, dispositions, and social practices required for writing in a digital world.

1.2.1 Situating Writing Ability as a Form of Problem-Solving

We view expert writers as those who have at their disposal a range of knowledge, practices, strategies, and schemas to solve a range of writing-related problems (e.g., What is my purpose in writing? What are the norms and values of the audience for whom I'm writing?). This premise builds on the work of Flower and Hayes (1980), which recognized that writing is a problem-solving process wherein writers solve the problems they represent for themselves. Stated another way, even if a group of writers was given the same assignment, it is they—not the assignment—who define the problem. Bereiter and Scardamalia (1987) identify two modes of problem-solving that differentiate expert and novice writers: knowledge telling and knowledge transforming. They discovered that while novice writers tend to think of what to say and how to say it (knowledge telling), expert writers engage in a more complex process considering not only the content, but also their rhetorical goals (knowledge transforming). Kellogg (2008) later speculated that a third model might exist, called knowledge crafting, wherein expert writers shape “what to say and how to say it with the potential reader fully in mind” (p. 7).

1.2.2 Situating Writing Ability Through Cognitive and Sociocultural Perspectives

Historically, research into writing constructs has fallen into either cognitive or sociocultural camps. While it stands to reason that both cognitive and sociocultural practices are integral to writing expertise, for the most part, this research has remained siloed and few attempts have been made at an integrated model (Abbott & Berninger, 1993; Graham et al., 2013; Hacker et al., 2009). Research in the cognitive camp attempts to understand writers and their cognitive processes (e.g., planning, developing an argument), while research in the sociocultural camp attempts to understand how social context shapes the demands and expectations placed on writers. Graham and Harris (2013) point out that this bifurcation of the field is a mistake, as writing development and instruction will never be adequately understood without considering both perspectives. Ivanič's (2004) discourses of writing and learning to write is one of the few exceptions because integrated into his framework are both cognitive and sociocultural approaches to understanding writing. By articulating an integrated construct, we are attempting to articulate how cognitive processes and sociocultural forces shape writing knowledge, thereby providing a more complete account of the range of factors that contribute to expertise.

Mislevy's (2018) recent advances in measurement theory have helped provide a framework to support this integration. Advancing a sociocognitive model of human functioning, he illustrates that an individual's neural activity within a given situation is mediated by linguistic, cultural, and substantive (i.e., knowledge about how the world works; LCS) patterns that are established over time and across contexts. These LCS patterns shape our perceptions, interpretations, emotions, and actions relative to the events and moments of everyday life.

A sociocognitive perspective on communication recognizes that these linguistic, cultural and substantive patterns shape how we approach communicative situations, how we understand or interpret those situations, and how we act within those situations (for an elaboration on this, see Oliveri, Mislevy, & Slomp, 2021, this issue). For each individual, layers of LCS patterns differentially shape our understanding of each communicative situation. On the one hand, LCS patterns determine underlying understandings and expectations of what is appropriate within each communicative situation that are common to people sharing similar cultural, social, linguistic, and temporal contexts. On the other hand, subgroups within these broad contexts establish their own set of LCS patterns that shape, in unique ways, underlying understandings and expectations of what is appropriate within each communicative situation common to these groups. Additionally, each individual's unique experiences shape their access to both broader LCS and subgroup LCS patterns, and to the expectations and understandings that accompany them. Key to developing writing expertise is developing the metacognitive ability to experience and analyze LCS patterns, extrapolating from them principles for action in new situations.

A sociocognitive model of writing advances insights on writing expertise developed within cognitive and sociocultural research by compelling us to examine expertise in writing as the application of socially configured mental models and culturally shaped abstractions (Geisler, 1991).

1.2.3 Situating Writing Expertise in a Digital Age

As we engage in the work of articulating an integrated construct of writing ability, we also begin by recognizing that the digital age, and in particular the advent of the internet, has changed the skills, strategies, social practices, and dispositions required for writing (Leu et al., 2016). For example, while historically, penmanship was a relevant skill, writers now require skills to use multiple, rapidly evolving information communication technologies (ICTs). While once it was sufficient to possess strategies for writing texts that were static, linear, and (mostly) monomodal, writers now require strategies for writing text that is hypertextual, a-linear, and multimodal. The internet has also changed the social practices associated with writing. For example, where once writing was a much more solitary activity, the internet enabled technologies and applications that have greatly facilitated the potential for collaborative writing. These changes in both the nature and social practices of writing require that writers take on an adaptable disposition as they respond to technologies, genres, and rhetorical moves that are constantly in flux.

Currently, there exist theories that describe the centrality of the internet to literacy, but none are specific to writing. These theories are known as digital literacy (Gilster, 1997) or digital literacies (Lankshear & Knobel, 2008), multiliteracies (Cope & Kalantzis, 2009; New London Group, 1996), new literacy studies (Gee, 1990; Street, 1995), multiple literacies theory (Masny, 2011), and new literacies (Coiro et al., 2008).

There are also important theories that describe the construct of writing—for example, semiotic (Kress, 2003; Kress & van Leeuwen, 1996), cognitive (Bereiter & Scardamalia, 1987;

Flower & Hayes, 1981; Hayes, 2012; Leijten et al., 2014; MacArthur & Graham, 2016), metacognitive (Hacker et al., 2009), sociocultural (Bazerman, 2016; Prior, 2006; Vygotsky, 1997), genre (Derrida, 1980; Halliday, 1978), rhetorical (Berlin & Inkster, 1980), and process (Emig, 1971; Flower & Hayes, 1981; van den Bergh et al., 2016) theories of writing—though none account for the profound ways in which the internet has revolutionized it.

We recognize, then, that in addition to understanding writing expertise through problem-solving and sociocognitive lenses, this integrated construct model needs to also account for the skills, strategies, dispositions, and social practices necessary to write in a digital age.

2.0 Research Methodology

In writing this critical review, we took a dialectic stance, respecting paradigmatic differences, juxtaposing these and the tensions and paradoxes they produce to generate fresh insights and novel understandings (Greene, 2007). By critical review, we mean a literature review that aims to synthesize the significant scholarship in the field in order to advance theory (Grant & Booth, 2009).

With the overarching purpose of developing a contemporary, integrated construct, we conducted this critical review exploring the following research question:

RQ1: What knowledge domains necessary for writing expertise are described in research articles from 1971 to 2020?

As we analyzed the literature we reviewed for this study, we addressed two further questions:

RQ2: How do these domains coalesce to describe a construct of writing expertise for the digital age?

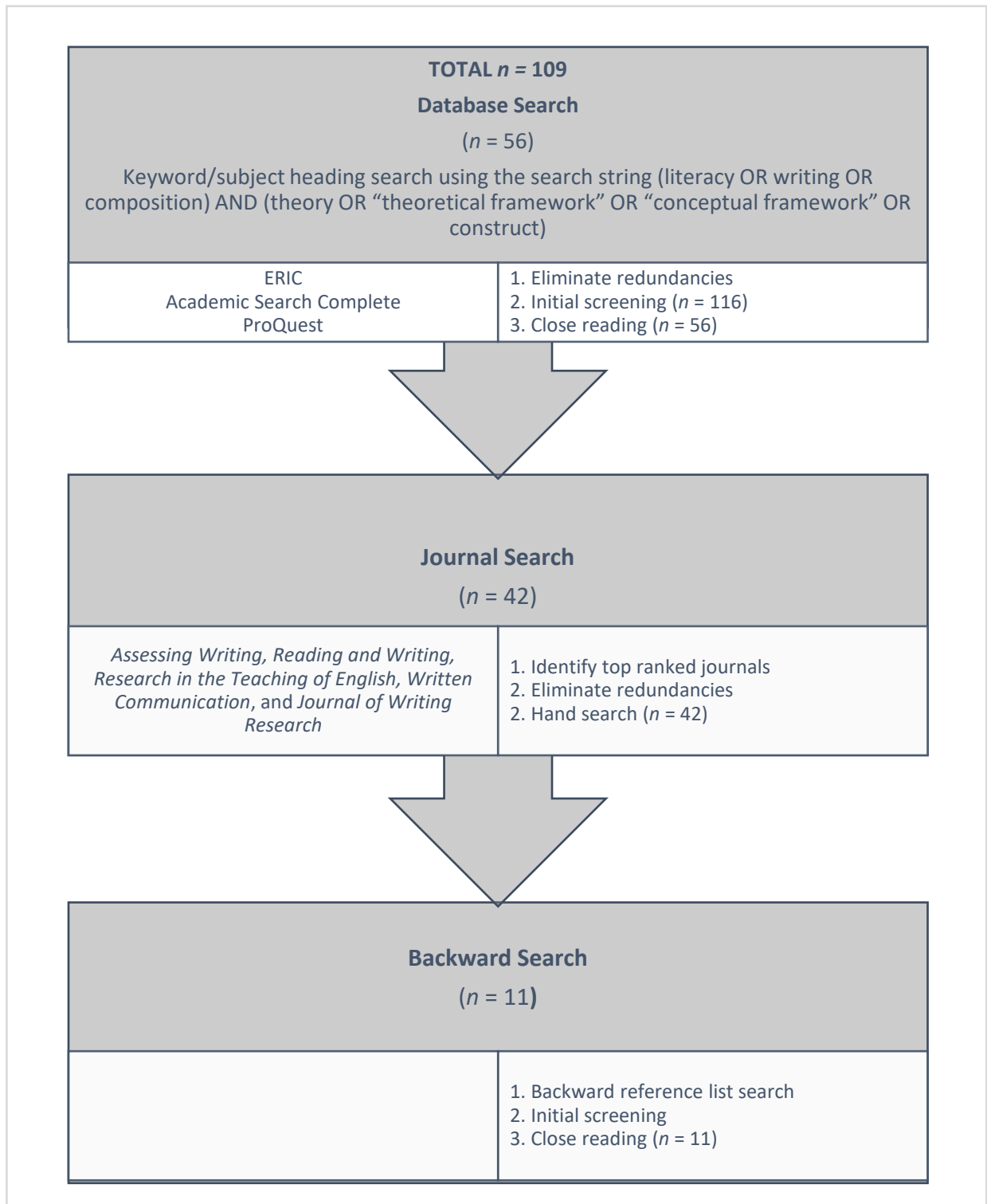
RQ3: How can this broad construct be extrapolated to an idiographic model that describes the expertise required for writing in workplace contexts assessed by the WEC modules?

2.1 Sources of Data

The data for this critical review was a corpus of studies on writing theory and constructs assembled through a search of two major sources: databases and journals. A flowchart illustrating our process is included in Figure 1.

Figure 1

Flowchart of Literature Review Process



We began with our database search delimited by the following inclusion criteria: the articles were to address writing constructs or theories in their title or abstract, be peer reviewed, written in English, and written between 1971 and the present (spring 2020). We chose 1971 as our starting date because that was the year during which Emig (1971) wrote her seminal work in which, for the first time ever, writing processes (as opposed to products) were examined (Voss, 1983). The following is a list of the search engines we consulted as well as the number of hits that met our inclusion criteria following an initial screening (i.e., reading of titles and abstracts) from these respective sources.

Beginning with ERIC (i.e., Educational Resource Information Center), we located 81 sources. From there, we searched Academic Search Complete and ProQuest, further identifying 12 and 9 sources respectively, after eliminating redundancies. For our database search, we performed a keyword/subject heading search using the search string (literacy OR writing OR composition) AND (theory OR “theoretical framework” OR “conceptual framework” OR construct). In total, 116 sources were included after our initial screening, which was narrowed to 56 sources following a close reading of the texts.

A number of the sources did not have an abstract, so a close reading was needed to determine if the sources were indeed relevant. Sources were eliminated following a close reading if they were not explicitly focused on construct/theory development (e.g., if they were focussed on a classroom writing intervention, but made little contribution to construct development). Also, some were eliminated if they did not contribute anything new to theory/construct development due to saturation, operationalized as the point during which the collection of more data appears to have no additional interpretive worth (Sandelowski, 2008). For example, an empirical study using Hayes’ theoretical framework would not be included unless it added something new to this framework.

Next, we conducted a second round of searching via a hand search of the top five ranked journals in writing research. This process included three phases. The first phase involved identifying the top ranked journals in the field of writing research. To do this, we began with a search for all electronically available journal titles in the library database at the first author’s institution. In the library’s E-Journal search engine, we stipulated that the words “writing” or “composition” or “communication” needed to be in the journal’s title. From this search, we included all journals which met the inclusion criteria of being peer reviewed, written in English, and focused on writing research or theory (thus, for example, practitioner journals or creative writing journals were excluded).

Nineteen journals meeting these inclusion criteria were included at this juncture, and we added the journal *Research in the Teaching of English* because it is a journal known to focus on writing research that also carries a relatively high impact factor (Parsons & Gallagher, 2016). Next, we ranked those journals by CiteScore (Scopus®, 2016) and Impact Factor (*Journal Citation Reports*®, 2015) and selected the top five ranked journals for our hand search. Both rating procedures arrived at the same list of the top five journals, although their order differed

(Table 1). Those journals included *Assessing Writing*, *Reading and Writing*, *Research in the Teaching of English*, *Written Communication*, and *Journal of Writing Research*.

Table 1

Writing Journals Identified for Hand Search and Their Ratings

Journal	CiteScore (Scopus, 2016)	Impact Factor (Journal Citation Reports®, 2015)
<i>Assessing Writing</i>	2.23	1.095
<i>Reading and Writing</i>	1.96	1.308
<i>Research in the Teaching of English</i>	1.77	1.297
<i>Written Communication</i>	1.75	2.2
<i>Journal of Writing Research</i>	1.09	n/a

Phase two involved reading the abstracts of every article published by those journals between 1971 and the spring of 2020. From there, we used the aforementioned inclusion criteria to narrow the results. This phase resulted in the discovery of 42 new sources after eliminating redundancies from the first round. In phase 3, we read the entire text of the sources and coded them. Finally, in addition to our database and journal searches, we conducted a backward (reference list) search wherein we added sources ($n = 11$) that that we deemed as making substantial contribution to the development of the construct of writing. To conclude, following our database, journal, and backward search, we identified 109 (see Appendix A) sources for analysis.

2.2 Analysis

Once all relevant texts were identified, we used NVivo and Microsoft Excel to complete three coding cycles. During the first coding cycle, two coders (the authors) read through all 109 texts and applied provisional codes, which refers to the process of beginning with researcher-generated codes based on preliminary research and revising, modifying, deleting, and expanding the codes as necessary (Miles et al., 2014; Saldaña, 2013).

We began with a list of codes based on Beaufort's (2007) conceptual model derived from a longitudinal, ethnographic study because it describes domains of metacognitive knowledge utilized by expert writers that are grounded in a sociocultural perspective. Her model is comprised of five knowledge domains—discourse community, subject matter, rhetorical, genre, and writing process knowledge—all of which overlap and interact to describe the bodies of knowledge inherent to expert writers.



In the model, the domain of discourse community knowledge encompasses the other four domains; this is one of the great strengths of the model, for it places emphasis on the situatedness of writing, accentuating the important role discourses play in shaping the domains subsumed within. Each of the other four domains—subject matter, rhetorical, genre, and writing process knowledge—is not a static form of knowledge; rather, a successful writer will transform these knowledges in ways that are appropriate to a given discursive context. As Beaufort (2007) points out, the literature shows that expert writers not only have deep awareness of their discursive contexts, but they also possess mental schema, or heuristics, that they can draw upon in new contexts. Consistent with our goal in this article, Beaufort’s model does not set out to identify a model that is context specific, but rather mental schema that are transferable across writing contexts.

While Beaufort’s model is certainly robust, our analysis of the literature suggested ways in which the model could be expanded. Thus, in first-cycle coding, we used Beaufort’s five knowledge domains as our initial codes and expanded this list as new codes emerged. Our analysis revealed three additional codes (i.e., knowledge domains): metacognitive, critical discourse, and digital literacies knowledge. Provisional coding works well with exploratory studies such as ours (Saldaña, 2013) and aligns with our first research question (RQ1) by aiding us in identifying the knowledge domains described in the literature.

Second-cycle coding involved pattern coding, defined as developing a construct (or meta-code) that represents the corpus of codes generated in first-cycle coding; furthermore, pattern coding serves to “attribute meaning to that organization” (Saldaña, 2013, p. 209). This coding cycle aligns with our second research question (RQ2) by describing how the domains coalesce to describe the construct of writing.

Our analysis of the literature confirmed Beaufort’s (2007) model in which the domain of discourse community knowledge subsumes the domains of rhetorical, genre, writing process, and subject matter knowledge. We confirmed this by noting how discourse knowledge acted as a parent code (i.e., had a hierarchical relationship) to the previously mentioned codes. Pattern coding enabled us to extend Beaufort’s model by revealing that two new domains—critical discourse knowledge and metacognitive knowledge—subsume Beaufort’s original model.

We noted that critical discourse knowledge often acted as a grandparent code and metacognitive knowledge a great grandparent code (i.e., it subsumed all other codes). Meanwhile, digital literacies knowledge was frequently double coded with all other knowledge domains; thus, in our construct, digital literacies knowledge is inherent to every knowledge domain and not a domain of its own. In our results section, we describe the nature of the relationship among these codes. In lieu of calculating inter-rater reliability statistics, we opted for coder consensus wherein any coding discrepancies were debated and clarified until we mutually agreed on the appropriate use of the code. Finally, in third-cycle coding, we used operational diagramming to visualize and display the voluminous data generated from coding into a coherent and intelligible image (Miles et al., 2013).

2.3 Extrapolation from Nomothetic to Idiographic

The final stage of analysis in this study was for us to extrapolate an idiographic model of writing expertise from the nomothetic model developed in response to RQ1 and RQ2 as it has been captured by the WEC modules that are the focus of this special issue. The purpose of RQ1 and RQ2 is to guide the development of a generalized construct describing domains of expertise in writing that could then be drawn down into specific areas of writing, such as workplace writing. To develop an idiographic model of WEC expertise, we followed the following procedures. First, the nomothetic level construct was used to guide the design of the WEC modules that are the focus of this special issue. Each task designed for WEC modules was mapped to construct domains. Those tasks were then subjected to multiple rounds of review, revision, and refinement (see Oliveri, Slomp, Elliot, et al., 2021, this issue). Once the tasks were refined, they were administered to a potential sample of test takers. After test taker responses were collected, two experts in writing and workplace communications collaboratively reviewed each task and test taker responses, examining what specific expertise was required to successfully complete the task. For each task, these lists of expertise were then coded by domain. Results from each task's analysis were then combined to create lists of specific expertise for each domain as they have been captured by the WEC modules.

2.4 Limitations

While we believe that our review of the literature was comprehensive, it was certainly not intended to be exhaustive. Construct articulation is meant to be an iterative process through which patterns of relationships and associations are refined and elaborated. We chose to examine empirically focused research articles for the first iteration of this process. Particularly, we acknowledge the following biases that we employed in order to keep our review of the literature manageable: an emphasis on English, North American texts; an emphasis on more recent texts because we only reviewed texts from within the last 50 years; and, finally, we limited ourselves mainly to peer-reviewed journal articles, thus ignoring other potential media formats (e.g., grey literature, websites, books). Additionally, we delimited our search to articles focussed on the domains of writing expertise, thus ignoring other important issues related to writing instruction such as, for example, motivation or transcription.

We provide a clear audit trail of our searches and coding processes to provide a transparent foundation for future iterations of this work. Other researchers may make different choices regarding how they might focus or delimit such a search based on the purpose or contexts they are working within and toward. The construct model we present here provides a high-level overview of expertise needed to problem-solve and successfully complete writing tasks in a digital age. The idiographic model extrapolated from this generalized construct is an initial attempt to demonstrate the process and power of drawing down from the nomothetic level to the idiographic. It provides a foundation for rubric and score report design (Zapata-Rivera et al., 2021, this issue). Because construct development is an ongoing process, more work needs to be

done to further refine both the nomothetic and idiographic models presented. We have proposed a series of expert-novice studies to further test and refine this construct model, and to provide fine-grain insights into the knowledge, skills, and dispositions captured within each domain and their relationships to each other.

3.0 Results

Here, we examine the results of our first two research questions wherein we identify the knowledge domains of writing expertise described in the literature (RQ1) and describe how these domains might coalesce to describe the construct of writing expertise (RQ2).

The construct model (Figure 2) we present below (see Table 2 for an overview of each knowledge domain) provides a macro-level view of expertise in writing. It describes seven interrelated domains of knowledge that contribute to expertise in writing: metacognitive knowledge, critical discourse knowledge, discourse community knowledge, rhetorical aim knowledge, genre knowledge, communication task processes knowledge, and substantive knowledge. Two of these domains—metacognitive and critical discourse—are super-ordinate to the other five. Rhetorical aim and discourse community knowledge function in tension with one another and are super-ordinate to the remaining three domains—genre, communications task process, and substantive. In section 3.1, we elaborate each of the domains described in this construct. In section 3.2, we discuss the idiographic model derived from application of the nomothetic model to the WEC modules (RQ3) that are the focus of this special issue.

Figure 2

Sociocognitive Construct Model of Writing Expertise

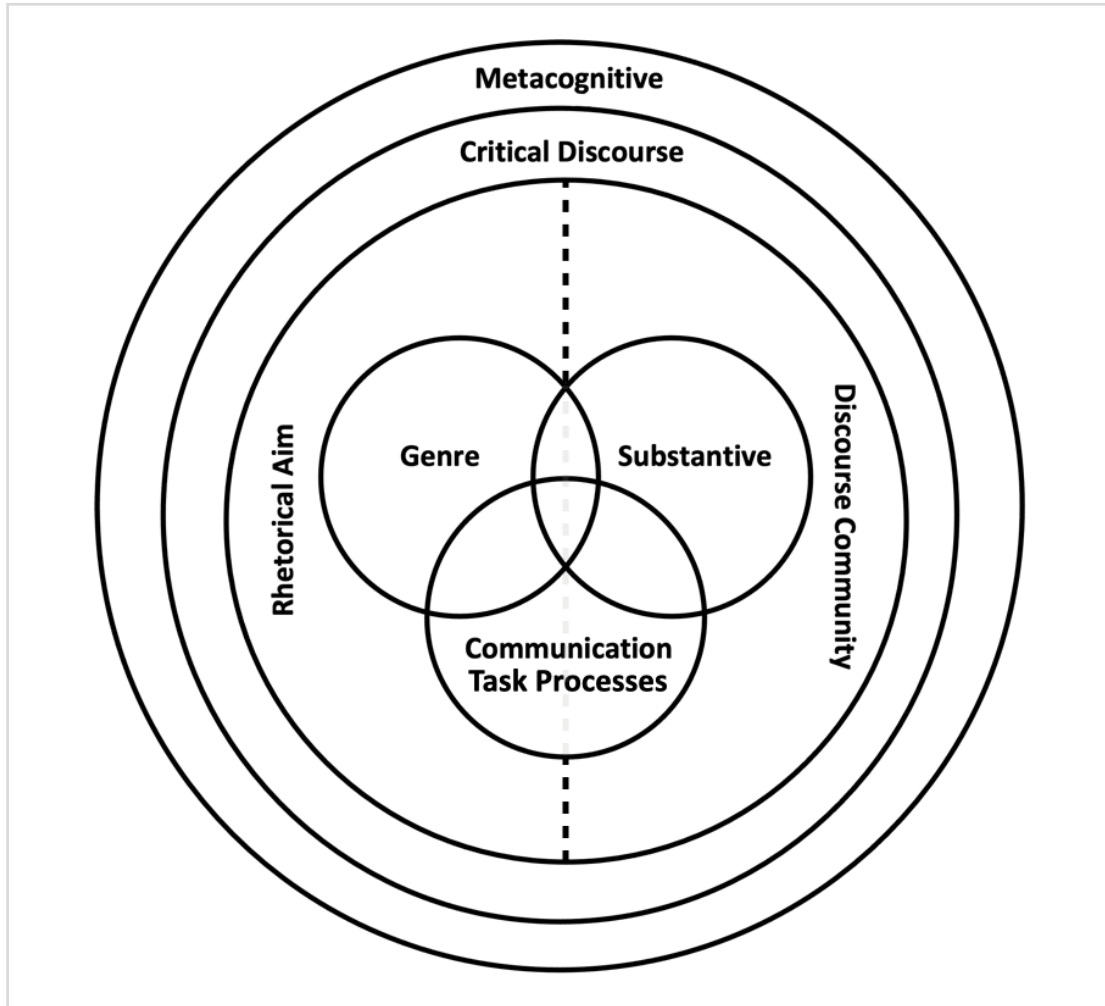


Table 2

Overview of Domains of Expertise

Knowledge domain	Description
Metacognitive	The ability to manage one's composition process through analysis, problem-posing, planning, monitoring, and evaluating one's execution of a writing task.
Critical discourse	The ability to understand that language is constructed both historically and socially within evolving power relations, to recognize that these dynamics shape social conventions of language use at both the macro level (society and culture) and at the micro level (within local communities), and the ability to use this knowledge to achieve one's rhetorical aims within the contexts in which one is writing.
Discourse community	The ability to identify and apply the purposes, values, and expectations of a social network to achieve one's rhetorical aims when crafting text for that community.
Rhetorical aim	The ability to identify one's intention for a text one is crafting; to recognize how the values, purposes, and expectations of a discourse community determine the effectiveness of rhetorical moves within that community; and the capacity to use that knowledge to enact rhetorical moves that support achieving one's intentions for a text one is crafting for that community.
Genre	The ability to identify textual forms, organizational structures of texts, and textual conventions; to recognize how these patterns are shaped by discourse communities to both reflect the values of that community and to serve the purpose of that community; and the capacity to draw on these understandings to craft texts that achieve the writer's rhetorical aims.
Communications task processes	The ability to utilize and manage the processes necessary to complete a writing task in a manner that addresses the goals, constraints, exigencies, and social circumstances germane to that task.
Substantive	The ability to understand how the world works, to recognize relationships between bodies of knowledge, and the capacity to utilize these understandings to achieve one's rhetorical aims within the constraints of the writing task one is completing.

3.1 The Nomothetic Model

3.1.1 Discourse Community Knowledge

We begin with discourse community knowledge because this is the domain central to Beaufort's construct, and one which we build from in our own. We define the domain of discourse knowledge as knowing the socially accepted association among ways of thinking, feeling, believing, valuing, and using language (Beaufort, 2007; Gee, 1990) or signs (Kress, 2003; Kress & van Leeuwen, 1996; Witte, 1992) that can be used to identify oneself as a member of a social network.

All humans have the biological endowment to acquire language, which begins in early childhood (Gee, 2014). This socially accepted language use among family and the immediate community constitutes one's vernacular, and the acquisition of all future non-vernacular social

languages (e.g., the language of nuclear physics, bird watching, or even that of a street gang) builds upon this foundational vernacular grammar. According to Gee (2014), learning a non-vernacular social language is a sociocultural process (we will argue later that it is also a sociocognitive process) that involves recognizing new ways to pattern together one's lexical and grammatical resources to match the norms and values upheld by that discourse community.

Thus, learning language is much more than learning English or any specific language; rather, it is learning to speak and write in ways that are appropriate for the discourse community within which one is communicating. Discourse communities can similarly be classified as primary versus secondary. Primary discourses are vernacular social languages (i.e., those learned through family and community), while secondary discourses are those learned "in order to interact with groups outside of our immediate community," which are typically institutional discourses, or "ones that [are learned] at school and other institutions" (Wood, 2002, p. 4).

Expanding on the first part of our definition, we take Gee's (1989) position that knowing the grammar of a language is not the same as knowing how to use that language. In other words, according to Gee (1989), "[i]t is not just what you say, but how you say it" (p. 5). For example, while it would be appropriate to use proper grammar and esoteric jargon in a job interview for a position as an investment banker, it would be inappropriate to do so while meeting an old friend at the local pub. While the language is correct in the latter, it is inappropriate for the situation.

Moreover, as Gee (1989) has argued, Discourse¹ is about more than language use; rather, it is the saying-writing-doing-believing-valuing combinations that matter. For example, an appropriate saying-doing combination would be to wear a designer suit to the above-mentioned interview, while this same saying-doing combination would make a person look like an outsider at the local pub. Similarly, Beaufort (2007) describes college students who struggle to adapt to the ever-changing discourse communities presented to them as they transition among disciplines, professors, and from high school to disciplinary to professional discourses as they graduate and enter into the world of work. The constellation of textual features that got a student an "A" in first-year writing simply does not work while writing a report in an engineering class on thermodynamics nor after graduation in an engineering firm.

While we blend Gee's and Beaufort's conceptualizations of Discourse and discourse community into our own definition of discourse community knowledge, we broaden this concept to include not only the appropriate use of language and its configurations (of writing-saying-doing-believing-valuing), but also the use of signs (Kress, 2003; Kress & van Leeuwen, 1996). In an age where writing has predominantly moved from the page to screen, the affordances of text go beyond linguistic design to include multimodal sign making via visual, audio, gestural, and spatial design features (New London Group, 1996).

¹ Gee (1990) differentiates between upper-case Discourse and lower-case discourse. The former refers to the saying-writing-doing-believing-valuing combinations mentioned above. Gee describes the latter as language-in-use, providing examples such as conversations, stories, reports, arguments, and essays; we describe the latter as genre knowledge, which will be discussed in the ensuing pages.

The second part of our definition describes identifying oneself as a member of a socially meaningful group. These groups take many forms such as disciplinary (Lea & Street, 2006), professional (Beaufort, 2007), academic (Ivanič, 2004), linguistic and/or cultural (New London Group, 1996), local (New London Group, 1996), online versus offline (Lankshear & Knobel, 2008), and the hybridity or heteroglossia of discourses ensuing from the combinations thereof (Ivanič, 2004; New London Group, 1996). It is not uncommon for a writer/speaker to simultaneously represent multiple discourse communities, which can either meet with resistance or in transformed practice or both; for example, Jesse Jackson mixed the discourse of politics with the discourse of African American religion in order to transform political discourse (Brady, 1993; New London Group, 1996).

Each discourse community possesses multiple layers, and gaining access to one layer does not guarantee access to the next. Those who have access to the innermost layer of a discourse community have insider status, while those on the outer layers are colonized or subjugated and serve to reinforce the dominance of those on the inside (Berlin, 1992; Van Heertum & Share, 2006; Wood, 2002). The colonized are the language users who have just enough access to a discourse community to signal that they are not full members (Wood, 2002). Discourse knowledge is important because by signaling group affiliation, people gain the social capital necessary to be active participants in their personal, professional, and civic lives (Swales, 2017).

3.1.2 Critical Discourse Knowledge

We define the domain of critical discourse knowledge as knowing how writing is socially and historically constructed (Berlin, 1992; Ivanič, 2004) within specific power relations (Luke, 2012; Street, 2003), and knowledge of how writing reinforces discourses of both dominance and marginalization (Berlin, 1992). Because discourses are both social and historical constructions, what constitutes their correct usage and conventions is completely arbitrary.

With critical discourse knowledge, the writer recognizes the fluidity of language and that no one particular group should be able to discern and prescribe correct usage over another (New London Group, 1996). The writer also recognizes that when hegemonic views regarding discourse use become entrenched, “asymmetries of power, access, and opportunity along the lines of gender, race, class, and sexuality” are maintained (Van Heertum & Share, 2006, p. 263).

With regards to writing being historically constructed, Bakhtin (1981) and his peers emphasized that “a text is shaped by discourses or voices that exist prior to it” (Brady, 1993). This can be seen in the way certain discourse communities have been systematically silenced and marginalized throughout history, at least until something happens on a revolutionary scale (e.g., the Civil Rights Movement) that challenges the hegemonic thinking that marginalized those voices in the first place. To be able to situate a discourse chronologically (i.e., understand its history) is consequential because understanding the root causes behind a discourse’s marginalization is an essential step in producing counter-hegemonic texts (Van Heertum & Share, 2006), for it is important to understand the past in order to challenge the present.

Implicit in the notion that writing reinforces discourses of both dominance and marginalization (Berlin, 1992) is knowing that certain discourses tend to be privileged over others—such as monomodal versus multimodal (Hull & Nelson, 2005; Jewitt, 2008; Mills, 2013), the lingua franca (e.g., English) over other (e.g., indigenous) languages (Battiste, 1998; Lyons, 2000), and standard registers over local dialects (New London Group, 1996)—particularly in the institutionalized settings of secondary discourses (e.g., legal, corporate, and higher education). With critical discourse knowledge, the writer recognizes the wealth and diversity created by a heteroglossia of voices, languages, and modalities, particularly in an increasingly globalized and digitized society.

Mills' (2010) review of the digital turn in New Literacy Studies, for example, highlights the changing emphasis from “print-based reading and writing practices to include new textual practices that are mediated by digital technologies” (p. 247). With the shift from page to pixel, the multimodal affordances of texts have increasingly expanded. Still, many institutional discourses rely on monomodal texts (e.g., legal documents, equity policies, fiscal documents, accountability processes) where the image is conspicuously absent, thereby establishing “positions and ideologies that constrain readers not to view such discourse as either trivial or open to contestation” (Mills, 2013, p. 9).

Additionally, privileging print-centric over multimodal representations limits the availability of sign systems for English language learners and/or low-literacy groups to translate. Concerning the privileging of one language over another, Battiste (1998) maintains that languages “provide a direct and powerful means of understanding the legacy of tribal knowledge” (p. 18). In addition to the privileging of a dominant language, Indigenous writers also face a privileging of modalities, with print-centric curricula serving as another colonial instrument to deprive Indigenous peoples of their oral traditions (Battiste, 1998).

Lyons (2000) cautions against oral-print binaries (as though there exist no prolific Indigenous prose and verse), instead encouraging rhetorical sovereignty, the “inherent right and ability of peoples to determine their own communicative needs [be it oral or print] and desires in the pursuit of self-determination” (p. 462). Thus, the domain of critical discourse knowledge involves the ability of writers to discern the most appropriate means to convey their text—in the modality, language, and register of their choosing.

The major difference between discourse community knowledge and critical discourse community knowledge is being able to make visible and respond to the inequities among discourse communities that have been rendered invisible: “Whether the literacies user is aware or not, every literate act is either reinforcing or dismantling the hegemony present within the society in which it is produced and interpreted” (Wood, 2002, p. 2). In other words, critical discourse knowledge is the process of seeing beyond the “hegemonic sheen” (Van Heertum & Share, 2006, p. 258), recognizing and understanding one’s own experiences of being Othered and also those of other groups.

This is no easy task for the writer because accepted standards of the hegemonic group's language are monolithic, ingrained, and rarely challenged. Unlike discourse knowledge, critical discourse knowledge goes a step further, challenging the writer to understand the “appropriate and effective uses of literacy as more complex, dynamic, nuanced, situated, and involving both epistemological issues and social processes, including power relations among people, institutions, and social identities” (Lea & Street, 2006, p. 369).

3.1.3 Metacognitive Knowledge

As originally coined by Flavell (1979), metacognition refers to the knowledge about and regulation of one's cognitive activities in learning processes (Veenman et al., 2006). From a Vygotskian perspective, metacognition is understood as inner speech—the internal monologue that shapes intelligence and guides performance. While cognition and metacognition are closely linked, much of the construct we have thus far developed describes the cognitive domains that contribute to excellence in writing. Metacognition is understood to be a higher-order function, and our analysis has revealed that metacognition in writing encompasses analysis of the rhetorical situation (Flower & Hayes, 1980; Huot, 1990), problem posing (Bereiter et al., 1988; Rice, 2015), planning (De La Paz & Graham, 1997; Flower & Hayes, 1981; Stotsky, 1990), execution of the plan, and an evaluation of the plan and its execution (Hayes, 2012; Hayes & Flower, 1980). Not all of these processes are evident in every writing situation nor do they always look the same; for example, revision may not be used when sending a text message to a friend, nor would there necessarily be much planning, at least not in a formal sense (Hayes, 2012).

Research comparing novice and expert writers has demonstrated that metacognition is foundational to the development of expertise. Expert writers analyze the rhetorical situation they are writing in, they define the writing problem that needs to be solved, and they establish long-term and short-term goals related to solving this problem. They are more cognitively aware of what they are writing, more active in planning and monitoring their thinking and progress as they write, and more likely to evaluate their writing than are novice writers (Stolarek, 1994). Similarly, another study found that weaker writers demonstrated relative weakness with writing self-regulation and metacognition (Wakely et al., 2006).

3.1.4 Rhetorical Aim Knowledge

All writing is intentional. Therefore, knowledge of rhetorical aim is the ability of a writer to choose from a set of rhetorical strategies to deliver on the intention that motivates the text. Rhetorical aim knowledge requires developing an understanding of the rhetorical situation (i.e., the needs of a specific audience and the specific purpose[s] for a text; Beaufort, 2007; Flower & Hayes, 1981; Ronald & Volkmer, 2015), and knowing how to address those needs in the appropriate discursive context (Brady, 1993; Mailloux, 1989) in order to achieve the author's intention for that text (the purpose for which it was created).

While discourse community knowledge focuses on identifying the needs and interests of the audience, rhetorical aim knowledge is focused on identifying the author's intention for the text being created. When an author draws upon both these domains of knowledge, a creative tension emerges as the author tries to navigate (and possibly balance) his or her personal needs and intentions with the needs of the intended audience and the intended purpose of the text.

Traditionally, rhetoric has been defined as the art of persuasion (Rapp, 2010), though as Moore (1997) has argued, not all texts serve this purpose. Technical writing, for example, generally serves the purpose of describing how to perform a procedure or task (Moore, 1997). Thus, our definition goes beyond persuasion to include wide-ranging purposes for a given text (e.g., to describe, entertain, motivate, sell, narrate, argue, sympathize, advocate, proselytize), also acknowledging that any given text may serve a multiplicity of purposes.

In addition to knowing the purpose(s) of a text, knowledge of the rhetorical situation importantly includes knowing the needs of a specific audience. If writers wish a text to serve a particular purpose, they had better be aware of the needs of their audience (i.e., discourse community). As Mitchell and Taylor (1979) aptly remarked, the importance of rhetorical awareness changes the dictum from “know your grammar” to “know your audience,” for “[c]orrectness has its place only when the audience you are addressing values it” (p. 264). While English teachers rightly value grammar, other discourse communities value a range of ideas from the scientific process to the lyrical quality of a song to the balanced reporting of a current event.

Finally, our definition includes addressing the rhetorical situation by selecting the appropriate context. Even within a discourse community, there exist a variety of contexts. Take, for example, academia, where an academic might engage in rhetorical contexts such as monomodal (e.g., writing a journal article) vs. multimodal (e.g., communicating research via a blog), formal (e.g., writing a white paper) vs. informal (e.g., discussing research with a colleague), or disciplinary (e.g., presenting a symposium at an academic conference) vs. general audience (e.g., communicating with stakeholders).

Traditionally, rhetorical aim knowledge has been taught and assessed in relation to monomodal texts, as an element of linguistic design (New London Group, 1996), which is complex in its own right. One contested aspect of rhetorical knowledge is that of traditional grammar because several robust meta-analyses have found no evidence to support the role of grammar instruction (Hudson, 2016; Jones et al., 2013).

We see grammar as something beyond the correct usage of language and instead as a series of rhetorical choices to identify and select from the representational resources that are available “the various meanings these resources will have if drawn upon in a particular context, and the innovative potential for reshaping these resources in relation to social intentions or aims” (New London Group, 1996, p. 79). The New London Group (1996) uses two sentences to illustrate this point: “Lung cancer death rates are clearly associated with increased smoking” and “Smoking causes cancer” (p. 79). Depending on the discourse community reading these sentences, what they connote and denote could vary considerably. Connotatively, the general public would read

the latter sentence as making a stronger statement, while the former sentence seems more tentative. Denotatively, while the media and the general public would likely read these sentences as having the same meaning, statisticians understand that correlation does not equal causation. By contrast, statisticians would view the former sentence as an investigation of the size and relationship between two or more variables; the latter sentence, on the other hand, would point to a controlled study wherein a sample is split in two, with both groups being comparable in as much as possible—with the exception of the independent variable (i.e., smoker vs. non-smoker status). Thus, these sentences illustrate rhetorical knowledge by means of how grammar has been recruited to design different purposes for different discourse communities.

In addition to the rhetorical knowledge required for writing monomodal texts, another layer of complexity is added when considering the design of multimodal texts (Kress, 2003; New London Group, 1996). Expanding on the conceptualization of grammar hitherto mentioned, we draw on Kress' (2003) use of the term *grammar* as an “overarching term that can describe the regularities of a particular mode which culture has produced, be it writing, image, gesture, music or others” (p. 66). Knowledge of these new grammars is becoming increasingly important in a digital world. Where once only alphabetic text could be (somewhat easily) reproduced, now text, sound, image, and moving image are translated into 1s and 0s and disseminated around the world by anyone with a smart phone with one click. As Kress (2003) argued, each mode has distinct affordances and their potential for representing are only partial; thus, rhetorical knowledge includes the selection of the appropriate mode(s) through which to most appropriately and completely represent the writer's intentions. If McLuhan's (1964) dictum that “the medium is the message” (p. 7) is correct, then the act of writing and the technologies inherent to that mode are inseparable.

Rhetorical aim knowledge is embedded not only within discourse knowledge, but within critical discourse knowledge and finally, metacognitive knowledge as well. Building pedagogy around critical rhetorical knowledge would follow a model whereby students would be presented with a gradual yet deliberate unfolding of texts revealing multiple and sometimes incongruous ideas so as to become conscientious of the “subtle and often dramatic rhetorical choices made by writers, which in turn affect them as readers” (Salibrici, 1999, p. 632). Once writers are able to deconstruct a text in order to understand the subtle ways it works on its readers, they may then appropriate those rhetorical strategies into constructing texts of their own to produce the same effect. The empirical evidence demonstrates that when students improve writing, reading follows; the reverse is also true (Graham & Harris, 2013). There is a reciprocity in using rhetorical knowledge critically, where students learn to view language both in terms of production and consumption: “On the one hand, rhetoric allows us to acknowledge how we as writers manage to develop a text, and on the other hand, rhetoric allows us to acknowledge how a text can then be understood and believed or not by its readers” (Salibrici, 1999, p. 629). As Salibrici (1999) argues, increasing rhetorical awareness leads to greater critical thinking.

With critical rhetorical knowledge, writers go beyond radically simplifying the rhetorical situation (e.g., write another theme for English class; Flower & Hayes, 1981) to looking in, around, over, under, and through the problem in order to produce critical insights for themselves and their audience. It is not enough to understand the rhetorical choices as a matter of the writer's individual style or intention, but more so, as "inherently connected to different discourses with their wider interests and relationships of power" (New London Group, 1996, p. 79).

Finally, rhetorical aim knowledge is subsumed under metacognitive knowledge. This metacognitive aspect of rhetorical knowledge is, according to research, partly what separates expert from novice writers (Flower & Hayes, 1981). While expert writers have developed heuristics over time that enable them to juggle many cognitive demands (Beaufort, 2007), including solving the rhetorical problem (Flower & Hayes, 1981), novice writers frequently reduce the complexity of the rhetorical situation by oversimplifying it. According to Flower and Hayes (1981), writers "only solve the problems they define for themselves. If a writer's representation of her rhetorical problem is inaccurate or simply underdeveloped, then she is unlikely to 'solve' or attend to the missing aspects of the problem" (p. 369). Therefore, while novice writers oversimplify the rhetorical problem, addressing it only partly or perhaps inaccurately, expert writers not only apply prior knowledge to solving the problem, they develop and refine the rhetorical problem to meet their own motivations for writing (Flower & Hayes, 1981) and those of their audience, while learning how to transfer their problem-solving strategies to contexts near and far (Brent, 2011).

3.1.5 Genre Knowledge

Simply put, genre knowledge relates to one's understanding of genres and how they function. As such, genre knowledge can be defined as understanding textual forms (e.g., how a website differs from a blog), organizational structures of texts (e.g., that websites have navigational bars), and both prescriptive and descriptive textual conventions (e.g., that websites use hyperlinks to link to additional information). More importantly, genre knowledge also involves an understanding of the purposes and social contexts that gave rise to these conventions, organizational structures, and textual forms: "As researchers from Miller (1984) to Spinuzzi (2004) have demonstrated, genre mediates intention, exigency, and context, thus providing a way to understand organizational structure and professional behaviour" (Coppola & Elliot, 2013, p. 276). In this way, like the other domains of knowledge described in this construct, genre knowledge is integrated with, and dependent upon, other domains of knowledge.

Understanding that genres reflect purposes of writing ties this domain of knowledge to that of rhetorical aim: "Genre can be said to represent typified rhetorical action" (Miller, 1984, p. 151). As writers define their intentions for a text they are composing—whether that be narrating, describing, expounding, arguing, or evoking—they draw on rhetorical moves or structures that enable them to deliver on these intentions. Historically, these rhetorical structures often became

linked to the genres themselves. This fossilizing notion of genre is problematic because it tends not to recognize that in addition to serving specific purposes, genres are designed to function within specific social contexts. Modes and structures of arguments that are effective in one social context, for example, may be highly problematic in others.

Success in writing depends on understanding that “genres are socially real and that to participate effectively in a discourse community one must adapt to (or around) readers’ generic expectations” (Salibrici, 1999, p. 165). Because they are “socially real,” genres are also fluid, evolving over time and changing across social contexts. Genre knowledge requires that writers understand this fluid contextual nature of textual structures, organizational features, and conventions. In this way, genre knowledge is tied to and dependent upon discourse community knowledge because it involves writers’ ability to understand the values and expectations of the discourse community; how those values and expectations are expressed in textual structures, features, and conventions; and how to shape their texts in light of those understandings.

3.1.6 Communication Task Processes Knowledge

Communications tasks are goal-oriented, rhetorical events that present writers with “goals, constraints, exigencies, and social circumstances” (Tardy, 2009, “task,” para. 1) that are at the core of the problem-solving challenge writers must work through when composing text. Communication task processes knowledge, then, involves knowing how to get discourse-specific communications tasks accomplished within the context of the constraints that define the specific task, including meta-knowledge of the cognitive processes in composing and the practical phases of communications projects (Beaufort, 2007; Flower & Hayes, 1981). In other words, communication task processes knowledge can be understood as having both cognitive and practical dimensions (Stotsky, 1990), as well as social ones. These are not generalized, one-size-fits-all approaches to writing. Instead, they involve selecting strategies and processes for efficient and effective task completion from a broader set of possible approaches.

Hayes and colleagues’ current writing model (Leijten et al., 2014) is divided into three levels: resource level, process level, and control level. The resource level includes attention, motivation management, reading (i.e., the text produced so far or secondary sources), long-term memory, and working memory. This level describes the resources that the writer can draw upon in the other levels, including the process level and control level. For example, a writer can call upon long-term memory to recall grammatical rules needed by the translator in the process level. The process level consists of internal processes (i.e., searcher, proposer, translator, transcriber, and evaluator) and the external environment of those processes (i.e., collaborators and critics, production technology, task-related-sources/written plans, and text-and-graphics-created-so-far). The searcher looks for information in external sources, such as finding the right word in a dictionary or researching information from secondary sources (Leijten et al., 2014). Chenoweth and Hayes (2001) describe the proposer as the prelinguistic production of ideas. The translator then converts the prelinguistic ideas “into strings of language with appropriate word order and

grammar” (Chenoweth & Hayes, 2001, p. 84). From here, the reviser evaluates what has been and is being written, while the transcriber turns these expressions of the mind into written language. At the control level, Hayes and his colleagues (Leijten et al., 2014) place motivation management, goal setting (for planning, composing, and revising), and the current plan/writing schemas/design schemas. Hayes (2012) noted that while schemas are represented at the control level, they are presumably stored in long-term memory. These writing schemas, which help writers accomplish specific writing or production tasks, “are assumed to be modifiable by experience and instruction and to constitute an important part of writing skill” (p. 375).

Drawing on Hayes and Flower’s (1980) model, Breetvelt et al. (1994) demonstrated that the quality of papers produced by adolescent writers was influenced by five processes: reading the external sources (assignment, documentation), planning text (goal setting, generating, structuring), text production/translating, text reprocessing (rereading already written text, evaluating already written text, revising already written text), and monitoring (self-instructions, meta-comments, pausing). Another important finding of the Breetvelt et al. (1994) study was that the relationship between the cognitive activity and text quality was dependent upon the stage in the writing process where it occurred. For example, a writer who revises frequently at the beginning of the writing process might be experiencing start-up difficulties (i.e., beginning over, and over again), while another writer who revises just as frequently, but towards the end of the process, is revising for a very different purpose (van den Bergh et al., 2016).

While there has been considerable agreement regarding the underlying cognitive processes involved in traditional writing, more recent studies on writing in digital environments and those in professional contexts have revealed that the writing process needs to be expanded to include a greater variety of subprocesses. Two examples of these subprocesses include locating online information and collaborative writing, subprocesses that have been greatly complicated, yet also facilitated, by the internet. A case study of professional writing revealed that locating online information is a crucial component of the writing process (Leijten & Waes, 2000). Those who can leverage Boolean operators (and, or, not), proximity searching strategies (within, near, before, after), and wildcard symbols (*, ?) are going to have greater proficiency using search engines and academic databases, particularly in a digital age where information is seemingly infinite. Having proficient search strategies helps writers identify multiple sources of information for both content and ideas (Leijten & Waes, 2000), but goes beyond that to enable writers to redesign or remix content from multiple sources (Lankshear & Knobel, 2007; Leijten et al., 2014; New London Group, 1996).

Another example of the way in which the construct of communications task processes could be expanded is to include collaborative writing (Marttunen & Laurinen, 2012). While collaborative writing has been around for some time, new communication technologies (e.g., Google Docs, workstreaming, online project management apps) have greatly facilitated this process. Though there is a paucity of research regarding how cognitive writing process knowledge has been affected by digital technologies, one can speculate that the cognitive load

required of locating, critically evaluating, and managing the massive amount of information available in a digital age would certainly exert an influence over the writing process. Further, writers require new mental schemas in order to adapt to the new grammars demanded of ever-evolving communication technologies.

Communication task processes knowledge has been generally conceived as linear—despite insistence from writing researchers that this is not the case (Ronald & Volkmer, 1989). In fact, writers—particularly expert ones—continually establish different configurations of subprocesses with respect to the writing context, notably the topic, genre, and task complexity (van Weijen, 2009). Just as writing skill varies widely across contexts, so too does communications task process knowledge; thus, van den Bergh and colleagues (2016) argued that we cannot rely on a single measurement of communication task processes in only one context should we wish to obtain a valid measurement of a student’s broader communication task processes knowledge.

Included in communication task processes knowledge are the practical, iterative processes of “planning (setting goals, generating ideas, organizing ideas), translating (putting a writing plan into action), and reviewing (evaluating, editing, revising)” (Graham & Sandmel, 2011, p. 396).

3.1.7 Substantive Knowledge

Substantive knowledge is an essential domain of the construct. After all, whenever we communicate, we communicate about something. Halliday (2003) described this domain as “the interpretation and expression in language of the different types of process of the external world, including material, mental, and abstract processes of every kind” (p. 314). This definition suggests that substantive knowledge is not simply content knowledge, but more significantly an understanding both of how the world works and of the relationships between bodies of knowledge. In the field of critical literacies, Freire and Macedo (1987) capture the breadth of this knowledge domain as one’s capacity to read the world.

Substantive knowledge also includes knowledge of information management processes—a writer’s ability to research and brainstorm information and ideas, to critically evaluate texts and information, to organize that information, and to connect and leverage that information for rhetorical effect (Abba et al., 2018; Olinghouse et al., 2015).

In this way, substantive knowledge does not function independently from other knowledge domains; it is linked to rhetorical knowledge and to many other facets of this construct. For example, ideational content, what we know about a subject, may structure the kind of argument we make, or the types of syntactic structures required to build that argument. Thus, substantive knowledge is linked to both rhetorical knowledge and genre knowledge. Of course, we often are expected to write about topics that we know very little about. In this respect, metacognitive knowledge and communication task process knowledge are closely linked to substantive knowledge because they determine how one acquires, organizes, and utilizes content.

An important dimension of substantive knowledge is its link to discourse community knowledge. While having some understanding of the topic one is writing about is important, it is

just as important to know about the discourse community for whom one is writing—its purposes, values, and expectations, and how that community views the subject one is writing about. For example, a paper on climate change for an environmental magazine would need to approach the topic of climate science differently than would a paper on the same topic for an oil industry magazine. The content may remain the same, but how one introduces or positions that content would very much be influenced by discourse community and rhetorical aim. The importance of both substantive and discourse community knowledge is empirically borne out in the literature: For example, for informative, narrative, and persuasive texts, between 30 percent and 43 percent of the variance in holistic scores was explained by substantive knowledge in combination with discourse knowledge in fifth-grade students (Olinghouse et al., 2015). Other studies showed that substantive knowledge was correlated with longer, more organized, more rhetorically aware, and better argued writing (Proske & Kapp, 2013).

3.2 Idiographic Model: Workplace English Communication as Captured by the WEC Modules

Because the sociocognitive model we have developed is focused on describing the knowledge domains that constitute expertise in writing, this model is ideally suited for supporting the design of the WEC modules (RQ 3). Ideally, the construct sample captured in the WEC curriculum and the construct sample captured in the WEC assessment should be aligned with one another.

Table 3 provides a summary of the sociocognitive model of writing expertise at the nomothetic level, and Table 4 exemplifies this model at the idiographic level, as captured by the evolving WEC modules, illustrating the construct sample the WEC modules are measuring (for an overview and description of the WEC modules, see Oliveri, Slomp, Elliot, et al., 2021, this issue).

Table 3

The Relation of the Domains of Expertise to Curriculum, Instruction, and Assessment

Domain of expertise	Curricular / Instructional foci			Assessment foci	Empirical support
	Know	Do	Be		
Metacognitive	-Know strategies for problem-posing, goal setting, planning, executing the plan, and evaluating the plan and its execution.	-Pose problems. -Set goals. -Create a plan. -Execute the plan. -Monitor execution and understanding. -Evaluate the plan and its execution.	-Be proactive in developing metacognitive awareness. -Transfer learning to new contexts.	-Capture process (metacognitive knowledge) separately from product evidence.	Flavell, 1979; Flower & Hayes, 1980; Hayes, 2012; Veenman et al., 2006
Critical discourse	-Know how communication is socially and historically constructed within specific power relations and communities. -Understand how and why texts reinforce dominance and marginalization.	-Create and analyze texts with an awareness of social and historical relations (asymmetries, marginalization, dominance) of power. -Make visible and respond to the inequities among discourse communities that have been rendered invisible.	-Recognize the wealth and diversity created by a heteroglossia of voices, languages, and modalities. -Be critically aware and socially responsible producers and consumers of texts. -Resist and contest the status quo.	-Represent diverse perspectives. -Encourage tasks that represent a means of civic engagement. -Require critical engagement with established communities and their discourses.	Berlin, 1992; Gee, 2014; Ivanič, 2004; Lea & Street, 2006; Luke, 2012; Street, 2003

Domain of expertise	Curricular / Instructional foci			Assessment foci	Empirical support
	Know	Do	Be		
Discourse community	<p>-Know the socially accepted association among ways of thinking, feeling, believing, valuing, and using language or signs that can be used to identify oneself as a member of a social network.</p>	<p>-Question how discourse communities shape and constrain the design and execution of text.</p> <p>-Identify oneself as a member of a socially meaningful group.</p> <p>-Signal that affiliation through the construction and deconstruction of texts.</p>	<p>-Signal group affiliation.</p> <p>-Challenge the ways that discourse communities shape and constrain texts.</p>	<p>-Require students to analyze and engage with a variety of discourse communities.</p>	<p>Beaufort, 2007; Gee, 1990; Ivanič, 2004; Kress, 2003; Kress & van Leeuwen, 1996; Lankshear & Knobel, 2008; Lea & Street, 2006</p>
Rhetorical aim	<p>-Know the needs of a specific audience and the purpose[s] a text serves for that audience.</p> <p>-Know both the grammar of a language and how that grammar is used to achieve a rhetorical purpose.</p>	<p>-Construct / deconstruct rhetorical choices by identifying and selecting from the representational resources that are available.</p> <p>-Select / analyze mode(s) and how they shape a message.</p> <p>-Construct or deconstruct</p>	<p>-Appreciate the complexity of the rhetorical problem.</p>	<p>-Require students to engage with multiple modes of representation.</p> <p>-Require students to construct and deconstruct texts across multiple modes of representation across multiple communities.</p>	<p>Beaufort, 2007; Brady, 1993; Flower & Hayes, 1981; Mailloux, 1989; New London Group, 1996; Ronald & Volkmer, 2015</p>

Domain of expertise	Curricular / Instructional foci			Assessment foci	Empirical support
	Know	Do	Be		
		rhetorical moves or structures that enable communicators to deliver on these intentions.			
Genre	<p>-Understand textual forms, organizational structures of texts, and both prescriptive and descriptive textual conventions.</p> <p>-Know how these differ across online and offline contexts and/or communities.</p>	<p>-Construct / deconstruct text types with regards to their purpose and audience.</p> <p>-Construct or deconstruct the purposes and social contexts that gave rise to genre conventions, organizational structures, and textual forms.</p>	<p>-Appreciate different text types.</p> <p>-Appreciate the fluid, contextual nature of textual structures, organizational features, and genre conventions</p>	<p>-Require students to engage with, construct, and deconstruct multiple genres across multiple communities.</p>	<p>Coppola & Elliot, 2013; Miller, 1984; Salibrici, 1999.</p>
Substantive	<p>-Understand the topic one is communicating about and know how the discourse community views that subject matter.</p> <p>-Understand how and why subject matter knowledge is represented within and</p>	<p>-Connect pieces of information for rhetorical effect.</p> <p>-Construct and deconstruct representation of the external world, including material, mental, and abstract processes.</p>	<p>-Recognize and appreciate both how the world works and the relationships between bodies of knowledge.</p>	<p>-Require students to construct and deconstruct communications with a view to demonstrating how representations of subject matter are shaped by/within discourse communities.</p>	<p>Halliday, 2003; Olinghouse et al., 2015; Proske & Kapp, 2013.</p>

Domain of expertise	Curricular / Instructional foci			Assessment foci	Empirical support
	Know	Do	Be		
	across different communities.				
Communication task process	<ul style="list-style-type: none"> -Understand collaboration strategies and processes. -Understand how to plan, enact, and review communications. 	<ul style="list-style-type: none"> -Plan communication by setting goals, generating ideas, and organizing ideas. -Enact communications plan. -Review and revise communications and communication plans. 	<ul style="list-style-type: none"> -Recognize that communicative processes are socially mediated. 	<ul style="list-style-type: none"> -Demonstrate knowledge of multiple processes and strategies. -Demonstrate ability to select and utilize multiple strategies as appropriate. 	Beaufort, 2007; Breetvelt et al., 1994; Emig, 1971; Flower & Hayes, 1981; Graham & Sandmel, 2011; Lankshear & Knobel, 2007; Leijten et al., 2014; Stotsky, 1990

Table 4

Idiographic Model of Writing Relative to WEC Modules

		Idiographic features WEC modules	
		Writers know	Writers do
Metacognitive	Understand the situation they are facing and its implication on stakeholders involved in the decision-making process (situational awareness)	<p>Consider new information presented in emails.</p> <p>Re-evaluate previous decisions, and to make changes, demonstrate flexibility.</p> <p>Reflect upon use of each of the six underlying knowledge domains when evaluating previously completed tasks.</p> <p>Process email content (substantive) and hierarchical structures (critical discourse); re-evaluate information in subject lines (genre) when reviewing/revising previous decisions.</p> <p>Explain reasoning.</p> <p>Monitor and understand email design choices.</p> <p>Monitor and review rhetorical goals.</p>	
Critical discourse	<p>Understand team dynamics (e.g., level of hierarchy of your teammates).</p> <p>Understand relationships among colleagues.</p> <p>Understand their place within a social hierarchy.</p> <p>Understand roles, responsibilities of people within an organization, and the implication of those roles and relationships for how we address them.</p> <p>Understand roles, responsibilities of people within an organization, and the implication of those roles and relationships for how we prioritize communication from them.</p> <p>Recognize levels of formality.</p> <p>Recognize relationship/dynamic with your supervisor and its role/implications on shaping greetings and closings.</p>		

Idiographic features WEC modules		
	Writers know	Writers do
	Recognize relationship between interactants and their role in shaping tone.	
Discourse	Demonstrate an understanding of group affiliation and current or future looking relationship.	Use genre of an email to signal affiliation with new group.
Genre	<p>Understand the function of a subject line.</p> <p>Recognize email genre features (subject line, sender, time stamp) and their communicative purpose.</p> <p>Understand the function/content of the subject line and its features (e.g., succinctness, keyword usage, brevity, and diction – connotation and denotation).</p> <p>Understand structure, organization, and substance of an introductory email.</p> <p>Understand features of the email genre in terms of information included, its structure, and level of detail (brevity, conciseness).</p>	Explain how features of greeting and closing allow us to achieve rhetorical intent.
Rhetorical aim	<p>Understand what tone is appropriate for which audiences.</p> <p>Understand tone and level of formality.</p> <p>Articulate the intentions an email is designed to achieve.</p> <p>Know how to organize the information in an email to achieve the rhetorical intent.</p> <p>Recognize relationship between rhetorical intent and tone, diction, genre features, substantive aspects.</p> <p>Recognize the goal of an email and the rhetorical moves needed to deliver on that goal.</p> <p>Know how to compose appropriate subject line to deliver on rhetorical intent</p>	<p>Use appropriate indicators to demonstrate their understanding (observable).</p> <p>Identify intentions—what is the writer’s goal or intention?</p> <p>Identify how to structure the text to achieve intention.</p> <p>Identify choices you make to deliver on that intention (word choice, diction, content, organization of the email, sequence of presentation of information, formality).</p>

Idiographic features WEC modules		
	Writers know	Writers do
Communication task processes	Understand factors for prioritizing emails (author, subject).	Review communications and justify sub-task sequencing. Prioritize sub-tasks based on internalized criteria. Use prior information to determine what the task is. Use prior information to shape email.
Substantive	Recognize level of detail/explaining context of the email. Know what should be the content of introductory email. Understand information shared in email being responded to. Include information in email that is appropriate to fulfilling the purpose of the task.	Infer the substance and importance of an email from a subject line and sender. Demonstrate awareness of an email's implication for work activities. Identify what the content of the email should be. Incorporate and respond to information shared in email being responded to.

3.2.1 Metacognitive Knowledge

Collectively, the tasks in the WEC modules focus most heavily on measuring procedural knowledge associated with metacognition. This includes the capacity to consider new information, to monitor email design choices and rhetorical goals, to re-evaluate decisions made, and to make changes based on those decisions. The WEC modules require test takers to reflect upon their choices and explain their reasoning.

3.2.2 Critical Discourse Knowledge

The WEC modules highlight a more declarative focus on critical discourse knowledge, measuring understandings related to team dynamics; social hierarchy and relationships among colleagues; roles and responsibilities; and the implications of these dynamics, hierarchies, and relationships for making choices regarding tone, formality, and structure of texts used in workplace communications.

3.2.3 Discourse Community Knowledge

The WEC modules have a more limited focus on discourse community knowledge, focusing on demonstrating understandings of group affiliations within their workplace settings and the use of the email genre to signal affiliations.

3.2.4 Genre Knowledge

With respect to genre, the focus of the WEC modules is on recognizing features of the email genre; the function of standard elements of an email (e.g., subject line, greetings, signature); and the structure, organization, and substance of different email types. The WEC modules further require test takers to explain how they leverage this knowledge to achieve rhetorical intent.

3.2.5 Rhetorical Aim Knowledge

The key feature of rhetorical aim knowledge measured by the WEC modules is a test taker's capacity to identify and articulate the intention behind specific email communications tasks, and then to demonstrate how they use critical discourse, discourse community, genre, and substantive knowledge to achieve that intent as they craft their emails.

3.2.6 Communications Task Processes Knowledge

Within this domain, the WEC modules focus most heavily on procedural knowledge such as prioritizing sub-tasks (e.g., email sequencing and responses), reviewing incoming communications, and ascertaining the nature of the task that is being prompted by the communication.

3.2.7 Substantive Knowledge

The WEC modules capture substantive knowledge of both a declarative and procedural nature. Declarative aspects of this domain include knowing what should be included in various forms of email (introductory, request making, scheduling) in order to achieve the task the email is trying to fulfil. Procedural knowledge includes the ability to infer the substance and importance of an email based on its subject line and sender, and the ability to identify and incorporate required information needed to achieve rhetorical intent for a given email task.

4.0 Discussion

4.1 General Implications

The sociocognitive construct of writing expertise serves to advance both sociocultural and cognitive models of writing by providing a holistic construct of expertise in writing. Gee (2014) warns that students cannot learn the discourse community values of one community (e.g., school) if doing so conflicts with the socially situated identity (e.g., ethnicity) that they take on as a member of another community:

If the identity required to be (and speak, write, and think) like a science student in this classroom here and now requires me, however tacitly, to disown, dishonor, or feel poorly about my other identities and social languages (including languages other than English), then all bets are off—we have a perfect recipe for failure. This means that the community of practice created in the classroom must honor and allow for bridging across multiple identities. (Gee, 2014, p. 22)

We believe that framing expertise in writing through a sociocognitive lens helps to further this goal because it positions forms and structures of language as both fluid and as social constructions that are mediated by the cultural factors and social hierarchies of the moments in which they are occurring. Situated as such, languages and their development become objects for study, helping learners to understand that each language, genre, and form evolves to serve specific purposes for the communities in which they evolved. Comparisons of Black Vernacular and Standard English, for example, then become studies of why these languages were developed, the contexts and social dynamics that gave rise to and perpetuate these Englishes, and of the features of these languages that enable them to achieve the purposes for which they were designed. Such explorations can help learners navigate the relationship between language and identity.

4.2 Importance of Critical Discourse Knowledge

To address Gee's concern, our construct calls direct attention to the importance of critical discourse knowledge. We feel that, in an era of equity, diversity, and inclusivity, it is insufficient for students to have only an implicit awareness (and oftentimes discomfort) about the

incongruity of language and text with their identities. This is a real challenge for students as they transition from writing in academic settings to writing in workplace settings. As they make this shift, they need to understand how the power dynamics, for example, within their organization shape how they address emails, what register to use, and how elaborated a text should be when addressing various members of their team. Entering the workplace, students need to be able to write with a full awareness of their sociocultural context and the ways in which that both enables and constrains their writing.

Similarly, our construct advances sociocultural models of writing. Flower and Hayes (1981) observed that people only solve the problems they define for themselves, and that weak writers often posed the wrong problems. In other words, novice writers are unaware of their rhetorical situation: They have limited knowledge of the discourse community for whom they are writing, they do not fully conceive the purpose or intention of their writing, and they are unfamiliar with the ways in which their discourse community constrains and enables their writing. As students learn to write in workplace settings, issues involving discourse community knowledge become amplified as the values, beliefs, and goals of the workplace shape what is written and how it is expressed. To succeed in this space, students need to learn both how to acquire an insider understanding of these values, beliefs, and goals, and they need to learn how to translate that knowledge into features of the texts they are creating. Indeed, cognitive and sociocultural knowledge are deeply integrated.

Greater emphasis on critical discourse knowledge in the curriculum may create greater awareness of the varied discursive practices students bring to the classroom. Not all students arrive in class with equal social capital—students may be disadvantaged by class, gender, linguistic, or racial inequities—thus making it more challenging for certain minoritized groups to attain insider status within academia (McKoski, 1995). Teachers' knowledge of this fact may help them recognize the strengths students bring from their varied discursive practices and build upon, rather than pathologize, those practices (Rodriguez, 2012).

In our view, critical discourse knowledge is an important resource in terms of writing expertise and ought to play an important role in informing the domains subsumed within. This recognition has important implications for curriculum, instruction, and assessment. Specifically, we believe that careful attention is needed to ensure that curriculum, instruction, and assessment do not further entrench inequalities along the lines of race, gender, sexuality, or language (Inoue, 2009; Slomp et al., 2014). Further, as schools are powerful agents of socialization, they are an ideal venue for developing students' awareness of social justice issues, challenging them to confront, rather than be complicit with, re/producing hegemonic discourses.

4.3 The Benefits of Idiographic Modeling

The process of developing an idiographic model assists in the process of construct modeling because it provides concrete scenarios in which the nomothetic model can be employed. As we drill down from the more abstract to the more concrete, patterns of relationships between

knowledge domains become clearer. For example, while the nomothetic model places substantive knowledge within four higher-level domains (metacognitive, critical discourse, discourse community, and rhetorical), examination of this domain at the idiographic level reveals how dependent these higher-order domains are on substantive knowledge.

At the same time, the idiographic model provides insight into the success of the construct sample the WEC is capturing. Our analysis reveals that future iterations of the WEC modules should build in more items related to discourse knowledge, the skill dimensions of critical discourse knowledge and genre knowledge, and the knowledge dimensions of metacognitive knowledge and communication task processes knowledge.

As the WEC modules continue to be developed, it is important to guard against misalignment between construct samples in the curriculum and in the assessment because misalignment tends to create negative consequences for teachers and students (Slomp, 2008). Hillocks (2002) demonstrates in *The Testing Trap* how more robust assessments (i.e., ones that capture more complete construct samples) better support teaching and learning than do more limited assessments (which capture a much smaller sample of the writing construct). Therefore, robust construct models are an integral part of designing effective curriculum, assessment, and instruction (Hillocks, 2002).

Applying a sociocognitive construct at the idiographic level also demonstrates the recursive nature of construct development work. The more concrete instantiation of the construct both challenges and reinforces construct development at the nomothetic level. This analysis makes clear the need to further refine, at more granular level, our understanding and representation of the knowledge, skills, and dispositions that support expertise in writing.

4.4 Importance of Instruction that Integrates Knowledge Domains

Uniting both cognitive and sociocultural perspectives in our construct signals to those who teach and assess writing that, in order to understand a writing problem, it is crucial for students to integrate all of the domains we present in the construct. This integration requires metacognitive knowledge in order for the writer to develop an awareness of the boundaries of the writing problem, which allows for more robust and successful solutions to that problem.

Research supports the premise that metacognition plays an immense role in the development of writing expertise. A recent meta-analysis evaluating 25 years of empirical studies revealed that the teaching of metacognitive strategies has a strong effect on writing performance across all developmental levels (Kent & Wanzek, 2016). Despite its importance, metacognition is rarely assessed on large-scale assessments (Jeffery, 2009; Slomp et al., 2014), which drive what is taught in the classroom (Hamp-Lyons, 1997; Hillocks, 2002; Messick, 1996).

Our modeling showed that metacognition frequently had a hierarchical relationship to other domains. For this reason, we positioned metacognition as superordinate to all other domains of writing knowledge in our integrated writing construct. This result suggests that we need to teach and assess all subsumed knowledge domains—critical discourse, discourse community,

rhetorical aim, genre, communication task processes, and substantive knowledge—at a metacognitive level. A writer’s discourse community importantly shapes the transaction between the writer’s rhetorical aim and the ecological context—but if, and only if, a writer has the metacognitive awareness of this.

Another significant theme that emerged was that of rhetorical aim knowledge. In our sociocognitive construct, the rhetorical situation brings together both the social and physical considerations of writing. The National Writing Project et al. (2010) logically advocate a double helix approach where the social and technological practices of writing are intertwined in educational standards and assessment. Teaching from an integrated writing perspective is “not about skills and competence; it is aimed at creating a kind of person, an active designer of meaning, with a sensibility open to differences, change and innovation” (Cope & Kalantzis, 2009, p. 175). Thus, the WEC pedagogy should focus on supporting students’ agency in their active and transformative creation of innovative, relevant, and productive texts.

Other themes that emerged from our review of the literature were the domains of genre, communication task process, and substantive knowledge. For these domains, metacognition is particularly important because writing is, by its very nature, deictic. In our fast-paced global village, students need to be able to transfer their writing practices as they encounter new genres, writing processes, and subject matter. Additionally, students will face a multitude of new communications technologies, new modalities, and new sociolinguistic contexts. No teacher could ever prepare their students for this vast array of writing contexts (Downs & Wardle, 2007; Graves & Hyland, 2017). However, we would argue that teachers could help students develop the metacognitive practices to adapt to the vast array of contexts students will face upon graduation, many of which do not yet exist. And of course, “knowing how to create a digital text is not the same as knowing why” (National Writing Project et al., 2010) texts work or do not work for a given rhetorical situation. It is this deeper level of understanding that separates novice writers from expert writers. For this reason, the instructional modules associated with the WEC curriculum should address all construct domains, with particular emphasis being placed on developing metacognitive knowledge, critical discourse knowledge, and rhetorical aim knowledge.

5.0 Conclusions

As we conclude this paper, we return to the challenges that motivated our work. More than five decades of research from across a range of research perspectives and traditions have contributed to our understanding of the knowledge, skills, and dispositions that support expertise in writing. More recently, there have been calls to develop models that integrate these insights. One challenge of modeling and representing the construct of writing expertise is the interrelated nature of the knowledge domains that form the broader construct. Indeed, given the interconnected nature of these domains, there is a real danger that these categories blur. Future

iterations of this work will require more extensive mapping of the subcomponents of these domains to better explicate the interrelationships between them.

This work, however, is necessary. If the goal of writing assessment is to make inferences about the underlying expertise that enable test takers to create the products being assessed, clearly mapped constructs are needed to support these inferences. This is even more true for formative assessments, such as the WEC modules discussed in this special issue, that are designed to inform instruction and guide learning.

The core learning challenge that student writers face is to develop the capacity to independently learn how to solve the unique and novel writing tasks they will be faced with in their lives beyond the classroom. This is why the focus on learning to problem-solve writing tasks is so important. Helping students understand what knowledge domains expert writers draw upon when solving writing problems then becomes the goal of writing instruction, and of the formative assessments that support that instruction. To be effective, that instruction should help students more clearly understand what domains of knowledge they are strong in and which domains they need to develop further. For this reason, we emphasize that metacognition needs to be at the forefront of curriculum, assessment, and learning. A significant body of evidence suggests that assessment as learning (a means of promoting metacognition) is one of the most effective means of supporting student learning, particularly across new contexts: It supports student motivation, leads to greater disciplinary expertise, leads to students taking greater responsibility for their own learning, and it has been documented to increase student achievement (Andrade & Boulay, 2003; Black et al., 2004; Black & Wiliam, 1998; Chappuis & Stiggins, 2002; McDonald & Boud, 2003; Ross, 2006). According to Earl (2003),

[a]ssessment as learning is a metacognitive process in which students take ownership for improving their own learning. It involves students setting learning goals as well as monitoring, reflecting upon, and adjusting their own learning, often in response to feedback from the teacher and their peers. (p. 2)

Metacognitive knowledge is essential if students are to become not only independent writers, but also independent thinkers about writing.

To support measurement and development of metacognitive knowledge, it is important for assessments to examine more than the written products students produce. These are imperfect artifacts of applied metacognition. The emphasis within the WEC modules on tasks that elicit information about students' metacognitive processes is an important design feature. These tasks capture more directly the procedural and declarative knowledge about writing possessed by students and that situates this information within the real-world contexts in which students are working (Leu et al., 2016; Slomp, 2012; Wardle & Roozen, 2012)

Students cannot develop a metacognitive awareness of a variety of contexts (discursive, rhetorical, genre, technological, etc.) without exposure to and practice in them:

So when anyone is trying to speak/write or listen/read within a given social language within a given domain of practice, the crucial question becomes, what sorts of experiences (if any) has this person had that can anchor the situated meanings of words and phrases of this social language? (Gee, 2014, p. 21)

Student learning should be scaffolded with the focus of developing metacognitive awareness that begins with being able to analyze the rhetorical situation. Students will require much practice and embodied experience within a discourse community in order to “trigger the pattern” (Gee, 2014, p. 20), in other words, develop the appropriate writing and design schemas (Leijten et al., 2014). Assessments designed to support the development of expertise in writing should give students the opportunity to trigger the patterns germane to workplace communication through practice applying their metacognitive knowledge across discourse communities and genres, and using a variety of rhetorical aims, communication task processes, and substantive knowledge.

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Appendix A: Texts Identified in Literature Review

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