

A Critical Review of the Logics of Inquiry in Studies of Early Writing Development

Sinéad J. Harmeý[°] and Ian A.G. Wilkinson*

[°] UCL Institute of Education, London | United Kingdom

* University of Auckland | New Zealand

Abstract: Comprehensive descriptions of early writing development are needed to adequately inform instruction and intervention and yet knowledge about how early writing develops is fragmented. This paper provides a critical review of longitudinal studies of early writing development with specific attention to the logics of inquiry used. Twenty-seven studies of children up to age 12, spanning 34 years from 5 countries, are included. Researchers' theoretical framing, research questions, definitions of writing, study designs, time span, analytic procedures, measurement or classification of writing, key findings, and attention to context or instruction are examined. Findings show that definitions of writing vary considerably or, in some instances, are nonexistent. These definitions have implications for the research designs and measures used, and how data were classified. Many studies describe developmental trends in a global way but few describe how the development occurs or goes awry. Few studies examine cognition in conjunction with context. Similarly, few studies present strong theoretical orientations toward writing with coherent connections between problem formulation and design, measures, or classifications used. Recommendations for future research are provided.

Keywords: Writing, early writing, research methodologies, logics of inquiry



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Contact: Sinéad Harmeý, UCL Institute of Education, 20 Bedford Way, London, WC1H 0AL, | United Kingdom– s.harmeý@ucl.ac.uk

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Writing is a complex process to define. One perspective is that it is a social and communicative act that involves the symbolic representation of talk and, for beginning writers, often occurs in interaction with teachers (e.g., Dyson, 1983a). Another perspective is that writing is a cognitive act that involves orchestration of a range of cognitive processes including but not limited to phonological and orthographic skills and strategies such as planning, monitoring, and error detection in addition to higher-order composition skills (e.g., Berninger & Swanson, 1994). For young children, writing is also a physical act that requires control of fine motor and transcription skills. These factors place considerable demands on the working memory of young writers (Kellogg, 2008).

Becoming a writer and being able to express oneself in print is a critical skill both in and outside of school and in later adult life. Writing is important in its own right as a means of expression and as a mode of communication (MacArthur, Graham, & Fitzgerald, 2016) but it is also a skill that is needed to participate and progress in the workplace (The National Commission on Writing, 2003). Writing is also essential because it contributes to overall cognitive and literacy development; it enables students to organize their thoughts, think critically, and construct new knowledge (Graham, Gillespie, & McKeown, 2013; Klein, 1999). Indeed, in a recent meta-analysis of studies of the effects of writing on reading, Graham and Hebert (2012) found that students' writing about texts they had read led to improvements in their reading comprehension.

Learning to write is a critical milestone in a child's journey to becoming literate and contributes positively to their overall early literacy development. Take for example, children's ability to write their own name. The single act of writing one's name has been found to correlate positively with alphabet knowledge, word recognition, and conceptual awareness of words (Bloodgood, 1999). Indeed, in a longitudinal study, Ouellette and Sénéchal (2017) found that children's invented spelling in kindergarten contributed to their reading ability.

Understanding how young children's writing develops is crucial. McNaughton (2011) argued that studying how any aspect of literacy changes over time or how development proceeds affords researchers a better understanding of the developmental properties of the process, the nature and pathways of their orchestration and integration and, crucially, the conditions under which they occur. Clay (2001) stated that detailed analyses of what young readers and writers do as they read or write continuous text and how this changes over time can provide a model of what it is that has to be done to read and write well. A model of early writing development can then, in turn, be used to optimize learning opportunities and permit early recognition of children's writing difficulties (Beard, Myhill, Riley, & Nystrand, 2009; Read, 2009).

Knowledge about the development of writing for children in the early grades is particularly important. Evidence from research has demonstrated that students who experience literacy difficulties in the first years of school are more likely to experience deleterious academic and social consequences later in life (Juel, 1988; Reynolds, Wheldall, & Madelaine, 2010; Stanovich, 1986). Empirical studies of early writing

development are of paramount importance because they inform understanding of how young children learn to write and of what is required in early literacy instruction.

Despite the importance of the topic, numerous researchers have expressed dissatisfaction with the field of writing research as it is represented in historical and contemporary literature. Nearly 30 years ago, Freedman, Dyson, Flower, and Chafe (1987) suggested a key problem was that the field was hampered by theoretical incoherence. Leu, Slomp, Zawilinski, and Corrigan (2016), referring to research on early writing development and new literacies, suggested that this incoherence was due to a paucity of research on the topic and use of a limited range of methodologies. In a recent position paper, scholars in the field echoed these concerns, stating that knowledge of writing development is “fragmented along lines of theory, method, age range or populations studied, with little done to create an integrated picture of writing development as a multidimensional process” (Bazerman et al., 2017, p. 352).

In this paper, we examine the logics of inquiry in studies of early writing development. We investigate how researchers’ theoretical and methodological choices influenced their descriptions of writing development and how these choices might contribute to the sense of fragmentation described by Bazerman et al. (2017). We begin by providing an overview of the notion of logics of inquiry. Next, we describe key conceptualizations of early writing development. We then report results of our review of studies of early writing development. We conclude by providing recommendations for future research, particularly in terms of methodological considerations.

1. Logics of Inquiry

Dewey (1938) stated that knowledge arises within, and is the end result of, the operation of inquiry. Therefore, if we are to consider why knowledge about writing development is so fragmented, it is necessary to examine critically how researchers have studied the phenomenon. To advance the field, it is important, as Dewey argued, to reflect on the processes or logics of inquiry and to conduct ‘inquiry into inquiry’ (p. 4).

Logics of inquiry refers to the connections between problem formulation and methodology (American Educational Research Association [AERA], 2006; Birdwhistell, 1977; Green, Dixon, & Zaharlic, 2003). According to the AERA (2006) *Standards for Reporting on Empirical Social Science*:

The design and logic of a study flows directly from the problem formulation. It is shaped by the intellectual tradition(s) in which the authors are working and the ways in which they view the phenomenon under study. This in turn influences the identification of questions, the choice of methods of data collection, the approach to analysis and interpretation, and the format of reporting. These decisions constitute the logic of inquiry that researchers report. (p. 34)

Wilkinson and Bloome (2008) suggested that research should be conceptualized as principled argument. As such, they argued that logics of inquiry need to follow a “systematic line of inquiry” that adheres to rules of a specific “disciplinary perspective” (p. 7). Such systematicity in turn makes clear to the reader how the claims put forth by the researchers are warranted (Wilkinson & Staley, 2017).

We do not suggest that every disciplinary perspective on early writing development must account for every factor that might play a role as children learn to write. Rather, we argue that it is important that we critically examine and interrogate the logics of inquiry according to different perspectives in the field of early writing development. This in turn permits an examination of the affordances and constraints of each approach to early writing and points towards potential synergies between perspectives.

2. Conceptualizing Early Writing Development

The difficulties in defining writing are reflected in Applebee’s (2000) assertion that ambiguity surrounds the term ‘writing development.’ He suggested that the term has been used variably and has referred to either the course of ordinary development of learning to write, or the refinement of the ‘in-the-head’ strategic processes and knowledge involved in writing (a cognitive processing perspective), or the increased linguistic sophistication of the final written text (a product perspective). He also noted that development has been conflated with programmes of instruction or curricula. The ambiguity surrounding the term is an indication of the vastness of the field of research about early writing development and the wide variety of theoretical perspectives used to frame this research. In this section, we provide a review of the different perspectives or models that have been used to frame studies about early writing development.

Graham et al., (2013) suggested that perspectives about writing development might be usefully divided along lines of a focus on cognitive or contextual factors. One of the most influential models of adolescent writing proposed by Bereiter and Scardamalia (1987) focused on the cognitive processes involved in composition. They suggested that novice writers engage in a less sophisticated *knowledge telling*, or a transcription-type of writing, whereas expert writers engage in a more sophisticated *knowledge-transforming* form of writing that takes into account audience awareness. Hayes (2000) suggested that Bereiter and Scardamalia’s (1987) knowledge telling model of text production has been used by some researchers to describe how younger children’s writing becomes more sophisticated. In a paper entitled *Kinds of Knowledge-Telling: Modeling Early Writing Development*, Hayes (2011) proposed three models of text structure that might be more suited to describing young children’s produced texts: flexible focus, fixed-topic, and topic-elaboration. Hayes mapped how written products changed by grade using these structures and found that, as development proceeded, children moved from using ‘fixed topic’ to ‘topic-elaboration’ structures.

Hayes (as cited in Graham et al., 2013) also proposed a cognitive processing framework that emphasized the role of working memory, visual-spatial learning, motivation and affect, and processes of planning, evaluating, and revision (see Graham et al., for a full description). The Simple View of Writing, another cognitive processing perspective, (Juel, Griffith, & Gough, 1985) is also often cited as a framework to describe skilled writing and help explain the development of early writing. Juel et al. (1985) proposed that early writing involved two components, spelling and ideation. From this perspective, the higher order skill of composing and writing meaningful connected texts (i.e., ideation) is dependent on mastery of lower-order skills like spelling, especially in the lower grades.

Building on Juel et al. (1985) and the Flower and Hayes' (1977) models, Berninger and Swanson (1994) proposed a model of early writing development that included description of the processes involved in transcription. They suggested that writing involved two processes, text generation and transcription. Text generation depends on fluent language skills (McCutchen, 2011) and transcription involves phonological and orthographic coding, text segmentation and fine motor skill (Alamargot & Fayol, 2009). This is a stage-like model of writing development in that control of lower-order transcription skills precedes and frees up memory resources for writers to engage in higher-order compositional skills.

Recently, Puranik and Lonigan (2014) proposed that emergent writing could be described by a model that comprised three related factors: conceptual knowledge about the function of print, procedural knowledge about letters and words, and generative knowledge or ability to produce meaningful units of text at a sentence or paragraph level. The authors suggested that the patterns of relations among these factors changed over time. What is notable about the cognitive processing models (Berninger & Swanson, 1994; Hayes, 2000; Juel et al., 1985; Puranik & Lonigan, 2014) is that, generally, they allude to descriptions of differences between skilled and less skilled writers and factors that predict skilled writing but they do not, apart from Hayes (2011), show how the changes occur.

Many researchers have provided descriptions of early writing development that focus on the increasing sophistication of the produced text as an indicator of development (a product-oriented perspective). These researchers have often framed their research in terms of Ferreiro and Teberosky's (1982) landmark study of Argentinian children's early writing development or Halliday and Hassan's (1976) semiotic perspective.

Ferreiro and Teberosky (1982) argued that Piaget's (1964) psychogenetic epistemology was particularly pertinent to the study of developmental processes in writing as it provided a theoretical framework for understanding how knowledge was acquired. Ferreiro and Teberosky's work has informed a large body of research on writing development (e.g., Levin, Both-de-Vries, Aram, & Bus, 2005) focused on children's written products and their conceptual understanding of writing as evidenced in clinical interviews. Tardibuono (2007) described how, from this perspective,

development in writing is not a cumulative process of learning about letters and sounds but, rather, a complex series of conceptualizations that change over time as the child assimilates new knowledge into existing schemes.

However, not all researchers who focus on written products focus on the cognitive development that is suggested by the increased linguistic complexity of children's written products. Many researchers have drawn on the work of Halliday and Hassan (1976) and applied a semiotic lens to focus on the development of children's coordination and use of writing as a system of signs to communicate on a social level (e.g., Rowe, 2009). They have examined how meaning is conveyed in written form and how indicators of linguistic complexity develop to convey meaning. Harste, Burke, Woodward, and Bouffler (1983), for example, described how the complexity of language could be examined by attending to changes in the semantic features of text, namely, cohesion, and micro- and macro-structural analysis of other linguistic features.

Finally, from a sociocultural perspective, writing development has been conceived as a reflection of a child's changing control and use of a symbolic system (Dyson, 1993; Vygotsky, 1987). Shultz and Feecho (2000) suggested that studies of writing development should focus on context and development could be conceptualized as "a transaction among individual learners, their many contexts, and the sign symbol system" (p.55). From this perspective, there is little focus on the cognitive processes involved in learning to write; instead, the focus is on the context in which development occurs.

In framing writing from a sociocultural perspective, Shultz and Feecho (2000) suggested that development in writing is non-linear, reflects social contexts including curriculum and instruction, and is variable across contexts. Therefore, researchers might usefully focus on interactions and actions in writing development by considering how social interactions, such as teacher support, impel or constrain writing development (e.g., Glasswell, 1999; Prior, 2006).

Similarly, from a sociocultural perspective, activities are situated in concrete interactions that are local and mediated by tools and practices (Prior, 2006). Hence, some scholars have focused on the tools and practices involved in writing and how these change across time and space. Dyson (1983a), for example, described how instructional practices shaped young children's use of symbolic tools (e.g., writing) to represent language. Other researchers have focused on the context, practice, or community of practice in which writing development occurs (e.g., Kostouli, 2009; Rowe, 2009).

Some researchers operating from a sociocultural perspective have examined writing as a social practice rather than the social action of writing. Research that explores writing as a social practice is different from 'mainstream' Vygotskian research in that there is a focus on how meanings are negotiated within a community of practice, how registers or genres are used in written texts, and how mediational tools shape writing practices (Kostouli, 2009). Rowe (2009) asserted that, from this perspective, writing

begins when children participate in social practices related to writing and that all writing practices are local and rooted in particular communities.

It is evident that the theoretical perspectives used to frame early writing research are rich and diverse. Yet the diversity can be problematic. Graham et al. (2013) argued that our knowledge of writing development is incomplete because conceptualizations have been firmly divided along lines of cognition versus context. In a review of the second edition of the *Handbook of Writing Research* (2006), Glasswell and Kamberelis (2011) described these theoretical lines as ‘fissures’ and stated that there is virtually “no critical dialogue either within or across the work” (p.320) of researchers from different theoretical perspectives.

Taken together, the diverse theoretical perspectives described previously, reinforce the fact that writing is a complex human endeavor. Bazerman et al. (2018) suggested that in the development of early writing “each individual’s biological, neurological, cognitive, and affective diversity interacts with that individual’s experiences, situations, opportunities, motivation, language repertoire, and other resources” (p. 370). Research framed by a Piagetian (1964) psychogenetic epistemology and more recent cognitive perspectives of emergent literacy (Puranik & Lonigan, 2014) have provided evidence that, for young children, writing begins at a conceptual level. Cognitive perspectives suggest that over time children gain control of a range of cognitive and motor skills. Over time, children develop control of various multi-dimensional processes which allows them to produce texts that range from symbolic representations to linguistically complex conventional texts (Bazerman et al., 2018, p.42). The changes that occur and the pathway of development are idiosyncratic, dependent on purpose (Dyson, 1983a) and shaped by instruction (Rowe, 2018).

3. Purpose

The purpose of this paper is to examine the logics of inquiry in studies of early writing development. We consider how the logics of inquiry vary according to differing theoretical perspectives and the constraints and affordances of researchers’ methodological choices. Our aim is to advance the field in terms of understanding the logics of inquiry in early writing research, in the hope that this may contribute to the building of more robust descriptions of young children’s writing development.

4. Method

4.1 Literature Search

We adopted several procedures in our search for relevant literature. First, we located studies of early writing development by conducting searches of five databases (ERIC, PsycINFO, Academic Search Complete, Education Research Complete, and Education Full Text). We used the term ‘writing’, rather than ‘writing development,’ as a keyword to provide a broad and inclusive coverage. We then restricted our initial search to

articles published in peer-reviewed journals and to studies conducted with a childhood population (birth through 12 years of age) and written in English. Because we were interested in studies of typical writing development, we excluded studies conducted with special populations (e.g., children with learning disabilities). We did not limit the time frame in which an article was published. This procedure yielded a total of 1,357 papers, both empirical and conceptual, for possible inclusion in our review.

Having located studies for possible inclusion, we read through titles and abstracts to ensure studies met four criteria: a) empirical study; b) described writing development of students in pre-kindergarten through 7th grade; c) analysis of writing development; and d) the outcome of interest was students' production of a meaningful message or the orchestration of a number of writing processes rather than performance on isolated component skills such as handwriting, spelling, or letter writing. Our main focus was the critical period, identified by Tolchinsky (2016), when children learn to put words and short sentences on paper and when they produce cohesive texts, so we did not include studies that focused only on preschool (e.g., Rowe, 1994). All studies had to describe development during this critical period (kindergarten to grade 2) even if children were tracked for a longer period of time. To qualify as a longitudinal study of writing development, researchers had to have collected data over at least three time points. We did not include studies with only two time points as they show what changes over time but provide limited information on how writing changes. We did not have a minimum time required between each time point. Time spans ranged from as short as nine weeks to as long as eight years. The average length of studies included was two years with studies spanning one year being the most frequent. Studies over wide time spans typically sampled at annual time points whereas studies conducted over an academic year typically collected data each term.

Our second search strategy was to read through relevant chapters on early writing development in the *Sage Handbook of Writing Development* (Beard et al., 2009) and the recent edition of the *Handbook of Writing Research* (MacArthur et al., 2016) for studies of writing development. This yielded three additional references. We included books only if they provided a full description of study design and analysis. For example, we did not include Schickedanz (1990) and Bissex (1980) because, although both provided a full description of a child's writing development, they did not describe their methods of analysis.

Our third search strategy was to consult colleagues with expertise in early writing (the invisible college). This yielded two additional empirical studies, one conducted in the 1980s at Indiana University (Harste et al., 1983) and one at The Ohio State University (King & Rentel, 1981), both funded by the National Institute of Education, United States.

Overall, after applying our selection criteria, we identified 27 studies of early writing development. The studies spanned 34 years from 1981 to 2015 and emanated from Argentina, Australia, New Zealand, the United Kingdom, and the United States. Grade levels ranged from preschool through seventh grade.

4.2 Analysis

Having identified studies for review, we created a spreadsheet to collate information about elements of the logics of inquiry used by researchers. We used the AERA (2006) standards for reporting on empirical social science to frame our analysis of logics of inquiry. We listed studies in rows and created columns for the name of the study, description of the theoretical frame or intellectual orientation described by the authors (if any), the research questions or purpose of the study, how the author defined writing (if any definition was presented), study design, time span, analytic procedures, measurement or classification of writing, key findings, instructional context, and any comments noted as we read through each study. We were particularly interested in how researchers measured or classified writing. Using the spreadsheet, we were able to visually inspect studies with similar theoretical frames, similar designs, or similar measures of writing. We then grouped studies together that espoused similar theoretical orientations to enable us to compare them across different orientations. Studies could not be included in more than one section and, for the most part, were easily categorized. During this process, we noted emerging patterns.

To understand how what we know about early writing development is influenced by the logics of inquiry, we examined the connections among the different aspects of inquiry. We analyzed how researchers from different theoretical perspectives defined and measured writing, the questions they asked, the methods they used, and what knowledge was gained about writing development from these different perspectives. We also considered the constraints and affordances of the various ways of studying change over time in early writing

5. Findings

We found the studies could be broadly categorized in terms of five theoretical orientations: (1) cognitive, (2) Piagetian, (3) sociocultural, (4) semiotic, and (5) atheoretical (i.e., no theoretical perspectives was articulated). In this section, we present our findings according to theoretical perspective. For each perspective, we consider how researchers defined and measured writing, the research design and methods of analysis, and whether context or instruction was taken into account. We then consider the knowledge gained from the studies according to perspectives and the constraints and affordances of each approach.

5.1 Cognitive Perspectives

We identified eight studies that focused on the cognitive processes involved in early writing development. We argue that there are two broad categories of cognitive processing perspectives—component skills, and processing perspectives—and have classified them accordingly. Studies classified under the component skills perspective are those where researchers explicitly framed the study according to the Simple View of Writing (Berninger et al., 2002) or investigated relationships between lower-level

component skills and later composition. Studies classified under the processing perspective are those where researchers framed cognitive development in terms of multiple interacting components and attended to *how* information is processed and *what* information is processed.

5.1.1 Component skills perspective

The focus of the four studies in this category (see Table 1) was the relationship between developmental skills in early and later writing development. Researchers seem to have assumed that children's later writing development is set in motion by their early skills and examined the factors that propel or constrain later development. For example, Juel (1988) sought to examine whether children remained poor writers over time and calculated correlations between skills at different points in time. Similarly, Abbott, Berninger, and Fayol (2010) examined longitudinal relationships between levels of language in writing.

The definitions of writing in studies conducted from this perspective varied but generally focused on lower-level developmental skills, such as letter writing, that preceded higher-order compositional skills. Using the Hayes and Flower (1980) model, Berninger et al. (1992) defined writing as comprising a wide range of lower- and higher-level developmental skills. Similarly, Juel (1988) described writing as an act of skill development with transcription preceding ideation. Abbott et al. (2010) described learning to write as the ability to produce letters and conventional spelling to form coherent text, whereas Dunsmuir and Blatchford (2004) described writing simply as language written down.

Rowe and Wilson (2015) described how development in writing from a cognitive perspective is typically captured or measured by the administration of separate tests that isolate component skills and by rubrics with holistic scores to capture overall linguistic complexity of the message. The implication is that as children gain control over lower-order transcription skills, they are freed to produce linguistically more complex messages. Rowe and Wilson's description captures well what we found in this category of studies—researchers focused on measuring processes involved in lower-order transcription skills (spelling and word production) as predictors of higher-order composition processes. Multiple measures of component skills were used to measure lower-order skills such as letter writing, neuro-motor function, name writing, or copying shapes. To capture the higher-order skills, researchers usually used researcher-designed scales with limited reliability and validity information (e.g., Juel, 1988) or standardized measures of written expression such as the Wechsler Individual Achievement Test (Wechsler, 2005).

All studies employed quantitative methods to analyze their data using correlations, multiple regression, confirmatory factor analysis, and structural equation modelling. Designs were cross-sectional or longitudinal and spanned several years with large spans

Table 1. Studies Framed by a Component Skills Perspective (in Chronological Order)

Study	Time Span Design	Research Questions (RQ) Purpose (P) Definition of Writing (Def)	Age/Grade Population (N) Location	Tests or Constructs Measured	Analysis	Conducted within instructional or naturalistic context	Key Findings
Berninger et al. (1992) Lower-level developmental skills in beginning writing	3-year cross-sectional	P: To study the developmental skills children bring to the task of writing Def: Writing is multiple interacting components	Grades 1, 2, & 3 8 schools 100 students per grade (N = 300) United States	Neuro motor function Visual motor integration Syllable and phoneme segmentation Reading tasks Handwriting Spelling Composition	Quantitative Correlational	No	Development in writing depended on an increasing mastery of lower-level developmental skills.
Juel (1988) Learning to read and write: A longitudinal study of 54 children from first through fourth grades	4-year longitudinal	RQ: Do children remain poor writers? RQ: What factors constrain poor writers? Def: Writing involves lower level transcription skills and higher-level ideation skills.	Grades 1 to 4 1 school (N = 54) United States	Writing Prompt Researcher designed rubric	Quantitative Correlational	No	Poor writers remained poor writers. Findings lend support to simple view of writing
Dunsmuir and Blatchford (2004) Predictors of writing competence in 4- to 7-year old children	3-year longitudinal	P: To investigate the relationship between home variables and writing development in preschool children. P: To determine associates between child characteristics and writing development P: To analyse s areas of discontinuity and continuity between home and school and impact on writing development Def: Writing is language written down	Ages 4 to 7 4 schools (N = 60) United Kingdom	British Ability Scales Shape Copying Task. Name Writing (Clay, (1975) National Curriculum test data Handwriting rating Semi structured interviews Questionnaires Observation Schedules Standardized assessments	Quantitative Regression Analysis	No, but conducted interviews with parents about home writing experiences and provided questionnaires about curriculum for teachers.	Preschool skills associated with writing proficiency at school entry. Home writing maintained a significant relationship at 7 years of age
Abbott et al. (2010) Longitudinal relationships of levels of language in writing and between writing and reading in grades 1 to 7	5-year longitudinal	P: To evaluate longitudinal relationships between levels of language in writing or writing and reading. Def: Writing involves lower level transcription skills and higher-level ideation skills.	Grades 1 to 7 Two cohorts Cohort 1: (N =128) Cohort 2: (N=113) 1 school district United States	WIAT Alphabet writing WIAT spelling WIAT written expression Word reading Reading comprehension	Quantitative Structural Equation Modeling	No	Relationships were observed within and across levels of language that demonstrate how children translate ideas to text.

of time between time points. Juel's (1988) study, for example, spanned first through fourth grade.

Apart from Dunsmuir and Blatchford (2004), none of the studies in this category took into account the instruction students received or the context in which the study was conducted. Dunsmuir and Blatchford (2004) conducted semi-structured interviews with parents about children's writing experiences and administered questionnaires to teachers asking about their curricular emphases.

Knowledge gained and limitations

These cognitive studies from a component skills perspective provide information about what factors are positively associated with later writing development in writing and whether early difficulties in a child's school career persist over time. Dunsmuir and Blatchford (2004) established which factors (e.g., writing at home) were significantly associated with later writing development. Abbott et al. (2010) found that word spelling was a critical skill that was positively related to text composing and that this relationship was consistent over time. Juel (1988) established that poor writers in early grades remained poor writers in later grades.

However, although the researchers used multiple time-points, the design of the studies does not provide a clear description of *how* these skills develop; rather, one is left to infer how the skills changed over a wide span of time. In line with cognitive processing theories of development, the focus is on the individual child and not on the contextual or cultural influences that might influence learning. Little to no attention is paid to how factors such as choice of writing topic, teacher instructional support, curriculum, or motivation act to impel or constrain the writing development of the students studied (we note Dunsmuir & Blatchford, 2004, is an exception in this regard).

5.1.2 Processing perspective

The other four studies conducted from a cognitive processing perspective (see Table 2) demonstrated a stronger temporal dimension or, in other words, focused on describing change over time. For example, Boocock, McNaughton, and Parr (1998) investigated what changed in children's observable actions in writing over time (e.g., fixing an error). Kamberelis (1992) identified 'markers of cognitive change' as children developed expertise in both reading and writing. Although not explicitly defined, we assume that the markers were observable features, such as invented spelling, that indexed cognitive development. In a later study, Kamberelis (2002) mapped changes in what children did as they wrote (i.e., their observable behaviors). Coker (2006) assessed the impact of a range of factors on writing growth.

We included Coker's (2006) study in this section because he conceptualized writing in terms of multiple interacting components rather than in terms of stages of development and was interested in change over time (albeit rate of change versus describing how change occurred). Coker did consider some contextual factors (namely,

teacher and student background) but he used this information to predict growth; his attention to context was therefore quite restricted compared to that in the more naturalistic studies.

Across all four studies, authors defined writing as either an element of emergent literacy or a system with multiple interacting components. Boocock et al. (1998) used Clay's (2001) literacy processing theory to frame their study of changes in children's written messages and observable writing behaviors. Clay's (2001) theory accounts for the multiple processes children engage in and the sources of information they use as they learn to read. Boocock et al., therefore, conceptualized writing as an element of a developing literacy processing system. Kamberelis (1992) drew on Goldin-Meadow, Wein, and Chang's (1992) research on children's development of conceptual understanding and, in his later study, referred to Siegler and Crowley's (1991) research on microgenetic studies of development. Thus, both Kamberelis (1992, 2002) and Boocock et al. (1998) framed their studies using general theoretical models of reading or cognitive development. Coker (2006), in contrast, drew on a theoretical model of writing development (namely, Cameron, Hunt, & Linton, 1996). This model accounted for the interaction of cognitive factors (accessing information, generating text, revising) with social factors and the environment. He also referenced the work of Hayes and Flower (1980), Berninger and Richards (2002), and Graham and Harris (2005).

In these studies, researchers measured writing in terms of the quality of the written product by conducting linguistic analyses of children's writing (Coker, 2006; Kamberelis, 2002), analyses of the level of conventionality of the written product (Kamberelis, 1992), or by using researcher-designed scales (Boocock et al., 1998).

The methods of analysis and design of these studies varied. Kamberelis (1992, 2002) and Boocock et al. (1998) used multiple methods by pairing calculation of measures of central tendency with qualitative observational data. In contrast, Coker (2006) utilized hierarchical linear modelling to ascertain rates of growth and how different factors influenced growth. In terms of design, Boocock et al. and Coker studied growth between grades. Kamberelis, in both of his studies, used a microgenetic design by conducting observations at multiple points over short spaces of time spanning weeks and months.

Unlike the studies in the previous section, the researchers accounted for a range of contextual factors that might impact writing development. Boocock et al. (1998) conducted observations of children writing within the classroom. Kamberelis (1992, 2002) conducted observations in a one-to-one setting with the researcher attempting to recreate more natural writing tasks (e.g., asking the child to write a story about how he learned to ride a bike). Coker (2006) accounted for instructional context only to the extent that he included the first-grade teacher as a variable that could account for variability. Although the role of instruction is not described in these studies, there is an acknowledgement that accurate description of writing requires knowledge of context and, in the case of Coker's study, that instruction plays a role in development.

Table 2. Studies Framed by a Processing Perspective (in Chronological Order)

Study	Time Span Design	Research Questions (RQ) Purpose (P) Definition of Writing (Def)	Age/ Grade Population (N) Location	Tests or Constructs Measured	Analysis	Conducted within instructional or naturalistic context	Key Findings
Boocock et al. (1998) The early development of a self-extending system in writing.	4-year cross-sectional	RQ: What changes can be observed in written language produced by children? What changes occur in the way children check and alter their writing? RQ: What changes occur in the way children transcribe their writing using searching strategies to problem-solve? Def: Writing is an element of emergent literacy.	Years 1 to 4 3 schools (N = 120) New Zealand	Observations: Coding oral behaviors Number of words written, Monitoring Resource use. Holistic rubric for message quality.	Quantitative ANOVA Descriptive Statistics	Yes Students were observed during classroom writing tasks.	Learning to write words had a generative effect. Significant differences by Year 4 between most and least competent. Self-regulation of observable strategies less overt over time
Kamberelis (1992) Markers of cognitive change during the transitions to conventional literacy.	2 year longitudinal	P: To examine markers of cognitive change as children transition towards conventional literacy Def: Writing is an element of emergent literacy.	Grades 1 and 2 (N = 24) United States	Compositions coded using Sulzby's writing and rereading classification scheme	Qualitative Coding using Sulzby's (1985) scheme.	Yes Researcher observed students individually during a message elicitation task	Relationships between sophistication of written narratives and reading marked transitions to conventional literacy.
Kamberelis (2002) Coordinating writing and reading competencies during early literacy development.	6 months longitudinal	P: To map changes in children's actions and inferred cognitive processes while working on reading-writing tasks Def: Not stated but draws on cognitive perspectives of conceptual development	Grade 1 (N = 46) Followed from kindergarten to 1 st grade United States	Spelling patterns (Gentry) Concept of word (locating word in text) Metalinguistic awareness (Berman's clausal analysis).	Quantitative and Qualitative Descriptive statistics.	Yes Researcher observed students individually during a message elicitation task	Co-ordination of competency was multi-dimensional and involved control of a range of skills and knowledge.
Coker (2006) The impact of first-grade factors on the growth and outcomes of urban schoolchildren's primary-grade writing	3-year longitudinal	P: To assess the impact of a range of factors on the descriptive writing growth of low-income students. Def: Writing involves interaction of cognitive, environmental, and social factors.	1 st , 2 nd and 3 rd grade 16 schools (N = 309) United States	Descriptive writing in 1st, 2nd and 3rd coded for: Picture content score Genre features Sentence conventions Spelling	Quantitative Hierarchical Linear modelling	No Teacher variable was included in HLM analysis	First grade factors that impacted growth and writing quality included student background, literacy skills, and their teacher.

Knowledge gained and limitations

The studies conducted from this perspective provide more information about how children's writing changes over time. We learn that growth in writing appears to move in progressions and regressions and is affected by a range of factors. This insight is accomplished by either having an elevated density of observations over a short span of time or by collecting a broader array of data. For example, like Juel (1988), Boocock et al. (1998) found that differences between the most and least competent writers became more pronounced over time as students moved up through the grades. However, because Boocock et al. collected observational data, they were able to show that having a stock of known words that could be written automatically (i.e., a writing vocabulary) helped children to write a broader range of words independently. They were also able to describe changes in the self-regulation of observable writing behaviors. Kamberelis (2002) was also able to identify markers of cognitive change, or observable actions or products, in reading and writing that preceded children's ability to write conventional text. He did this by documenting reductions in variability in observed overt actions (e.g., use of semi-phonetic spelling) over time and suggested these reductions signaled growing control of the writing process. According to Kamberelis, the reductions in variability provided evidence of cognitive change. Although Coker (2006) paid less attention to describing change over time, he did account for rate of change and considered how contextual factors impacted growth in writing.

That said, there is some tension in these studies between the amount of data collected and the number of participants. Although the researchers provided a more detailed account of change, there were fewer participants than in studies conducted from a component skills perspective. Coker (2006) had a relatively large sample ($N = 309$) but his description of change was limited to rate and assessing the impact of certain factors on change. A limitation of having such a small number of participants is that the results might not be generalizable, there may be limited variability in what was observed, and it is hard to ascertain if the changes observed were artifacts of instruction.

5.2 Piagetian Perspectives

Four researchers framed their research using a Piagetian psychogenetic epistemology (see Table 3). Ferreiro and Teberosky (1982) and Yaden and Tardibuono (2004) focused on children's conceptualizations of the functions of print and the stages through which these conceptualizations passed towards a fully conventional understanding. Pontecorvo and Zucchermaglio (1989) investigated how children learned to write in a cultural and linguistic context, whereas Jones (1998) determined whether the social context of writing had consequences for the child's use of literate language in writing. Taken together, these studies focused on either conceptual development or the influence of social context on writing development.

Table 3. Studies Framed by a Piagetian Perspective (in Chronological Order)

Study	Time Span Design	Research Questions (RQ) Purpose (P) Definition of Writing (Def)	Age/ Grade Population (N) Location	Tests or Constructs Measured	Analysis	Conducted within instructional or naturalistic context	Key Findings
Ferreiro and Teberosky (1982) Literacy before schooling	Cross-sectional and 1 year longitudinal	P: To examine development of conceptual awareness of print Def: Writing had a social and ideational purpose.	Ages 4 – 7 (N = 30) Argentina	Conceptual awareness Researcher designed rating scale	Qualitative and quantitative Descriptive statistics	No	Conceptual awareness influenced ability to produce conventional print. Change was idiosyncratic.
Pontecorvo and Zuccheromaglio (1989) From oral to written language: Preschool children dictating stories	6 months longitudinal	P: The authors were particularly interested in how children learn to write in a cultural and linguistic context. Def: Not defined	M = 4.4 years old (N = 14) Italy	Children constructed a dictated a story to a scribe who probed child's ideas about orthographic conventions. Texts were analyzed for Stein and Glenn's story grammar. Analyzed whether child paid attention to need to slow down, segment, or signal end of story	Quantitative ANOVA Qualitative Descriptions	Yes	Working with a scribe helped children to become aware of the demands of writing. Over time, dictated texts became more conventional
Jones (1998) Peer relationships and writing development: A microgenetic analysis.	9 weeks microgenetic	P: To determine whether an aspect of the social context in which writing occurs has consequences for the use of literate language and early writing. Def: Frames writing as genre using Stein and Glenn.	Ages 7 – 8 (N = 20) United States	Writing analyzed for cohesive ties and narrative structure (Trabasso, Stein and Glenn)	Quantitative 2x4 within subjects factorial design - outcome variables included frequencies of endophora/ lexis. Grammatical structure of narratives	Yes	Written narratives composed by friends better than non-friends but this was not consistent.

<p>Yaden and Tardibuono (2004) The emergent writing development of urban Latino preschoolers: Developmental perspectives and instructional environments for second-language learners.</p>	<p>1 year longitudinal</p>	<p>P: To examine how four-year-old Latino preschoolers interpreted their own writing and whether these interpretations followed a pattern of development. P: To compare their data from USA to those of Ferreiro and Teberosky's (1982) from Argentina. RQ: Whether developmentally appropriate instruction moves children forward conceptually towards conventional understandings of the writing process. Def: Not defined.</p>	<p>Preschool (N = 56) United States</p>	<p>Ferreiro and Teberosky's general and name writing task</p>	<p>Quantitative Mean writing level by age. Correlations Wilcoxon matched pairs signed rank task</p>	<p>Yes</p>	<p>Children in the USA had higher levels of literacy than those in Argentina. Children's conceptual understanding precedes ability to produce conventional text. Change was idiosyncratic.</p>
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We did not see explicit definitions of writing in these studies. Nonetheless, Jones (1998) and Ferreiro and Teberosky (1982) described the functions of writing by suggesting that the process had both an ideational and social function. In the other studies, the definitions of writing could be inferred from the constructs they measured. For example, Yaden and Tardibuono (2004) rated the conventionality of the written product using a scale devised by Ferreiro and Teberosky, and Pontecorvo and Zuccheromaglio (1989) measured the complexity of the text produced using Stein and Glenn's (1979) story grammar categories. This suggests that these researchers conceptualized development in writing as increases in linguistic complexity.

All researchers collected data over multiple time points with short time spans. Jones, (1998) collected data every two weeks over a nine-week period and Yaden and Tardibuono (2004) collected data over a year. In three of the studies, the act of writing was classified by conducting controlled observations (a classic Piagetian method of data collection). In contrast, Jones used naturalistic observations. Data were analyzed using descriptive statistics, ANOVA, and regression paired with qualitative analysis of texts using rating scales.

Knowledge gained and limitations

One of the key understandings about writing development gained from these Piagetian studies is that children's conceptual understanding of the writing system precedes their ability to produce conventional print. In other words, we learn that a child can more easily articulate their understanding about the function of print than physically reproduce it. This was made evident by the researchers' use of interviews in conjunction with writing tasks. Analyzing the writing product in combination with observations and interviews that provide insight to children's understanding may provide a more accurate representation of children's writing development. In addition, these studies reveal that there are considerable individual differences among children and that their literacy development is not uniform.

By focusing on one aspect of the writing process in detail, the studies described in this section provide detailed information about specific aspects of writing development, such as conceptual development about writing, the development of story structure, and the impact of peer support on written narrative complexity. Because the design of the studies incorporated repeated tasks over short periods of time, the researchers were able to provide information about how these aspects of writing changed over time.

Nonetheless, the focus on one aspect of writing alone has a potential disadvantage. For example, the work of Ferreiro and Teberosky (1982) provided valuable insight into children's conceptual awareness of the functions of print but did not account for the effect of instruction or the influence of cognitive factors such as phonological or orthographic awareness. The cognitive processes or factors described in the cognitive processing studies were, to a large extent, ignored in these Piagetian studies.

The use of controlled observations, a hallmark of studies operating from a Piagetian perspective, afforded researchers the opportunity to interweave observational data with data about the written product. We suggest, however, that there is a dissonance between conceptualizing writing as having a social and ideational function and the observation of writing within a controlled clinical interview where the participants' ability to convey meaning may be limited by the tasks assigned. The settings for the collection of observational data, although close to an instructional context, were, nonetheless contrived. Hence, the studies provide little insight into how instruction might influence conceptual development. We also note that, with the exception of Jones (1998), the methods of analysis were relatively simple and confined to small sample sizes. Ferreiro and Teberosky (1982), for example, presented their findings using frequency counts of ratings and, though there were 108 students in their larger longitudinal study, their analysis of writing included data from only 28 participants.

5.3 Sociocultural Perspectives

Eight studies drew on sociocultural theories of learning and the work of Vygotsky (1987) (see Table 4). A common thread in these studies is the attention paid to writing as a meaning-making process. The researchers' questions focused on three key areas of inquiry: the role of oral language in learning to write (Dyson, 1988, MacKenzie, 2008), the description of developmental patterns in learning (Glasswell, 1999; MacKenzie, 2008; Sipe, 1998, Sulzby, 1988), and the relationships between factors such as drawing and conceptual understanding (Dyson, 1988, 1983b; Eitelgeorge, & Barrett, 2003).

In this category of studies, the majority of researchers were very clear about their definitions of writing (e.g., Dyson, 1983a, 1983b, or 1988) or theorized writing as a component of emergent literacy (e.g., Sipe, 1998; Sulzby, 1988). Eitelgeorge and Barrett (2003) were the only researchers in this category who did not explicitly define writing or theorize the nature of writing.

Most researchers from this perspective used a case study design to describe children's writing development and conducted linguistic analyses of children's written products. Glasswell (1999), however, used a cross-sectional design to study differences between groups of children. In all studies, the researchers measured writing by examining the written product in terms of linguistic complexity or conventionality either by use of researcher-designed coding schemes or scales. Measures of the written product were usually paired with naturalistic observations. Sipe (1998), for example, coded a child's observable writing behaviors from naturalistic observations and Glasswell coded teacher's instructional focus from observations of children writing with a teacher and used a framework that accounted for the instructional focus of the teacher. Eitelgeorge and Barrett (2003) described the textual development of children's written messages and how development of linguistic complexity related to the children's conceptual understanding using data from naturalistic observations. MacKenzie (2008) was the only researcher who did not collect naturalistic observations but did conduct parent and teacher interviews.

Table 4. Studies Framed by a Sociocultural Perspective (in Chronological Order)

Study	Time Span Design	Research Questions (RQ) Purpose (P) Definition of Writing (Def)	Age/ Grade Population Location	Tests or Constructs Measured	Analysis	Conducted within instructional or naturalistic context	Key Findings
Dyson (1983b) The emergence of visible language: Interrelationships between drawing and early writing	13 weeks 3 phases	RQ: How did the observed children combine drawing and writing in their work? RQ: How did children differentiate between the two? Def: Writing has its roots in a young child's ability to form representation about the world (p.4)	Kindergarten (N = 22) United States	Categorized drawing and writing using Clay's (1975) levels of writing	Qualitative Inductive analysis. Unit of analysis was a graphic episode in which verbal or non-verbal behavior occurred during production of a graphic episode. Used frequency counts.	Yes	Learning to write was a gradual process of differentiating between forms of graphic representation.
Dyson (1983a) Role of oral language in early writing processes	13 weeks 3 phases	P: To explore the interrelationships between children's creation of written texts and their use of symbolic media and other resources, namely peers. Def: Early written products are language written down.	Kindergarten (N = 22) United States	Categorized drawing and writing using Clay's (1975) levels of writing and also linguistic organization Spontaneous talk around writing was recorded/ interviews about CAP	Qualitative Inductive analysis.	Yes	There were developmental patterns in how oral language interacted with writing. Provided hypotheses about how children developed control of writing.
Dyson (1988) Negotiating among multiple worlds: The space/time dimensions of young children's composing.	2 years longitudinal	P: To explore the interrelationships between children's creation of written texts and their use of symbolic media and other resources, namely peers. Def: Early written products are language written down.	Kindergarten (N = 8) United States	Noted function or meaning and message topic of journal writing	Qualitative Inductive analysis, and then wrote narrative case studies. Used frequency counts of each phenomenon in terms of function per grade level.	Yes	Analysis of written products did not permit analysis of writer's intention and there was little variation in young children's writing.
Sulzby (1988) Forms of writing and rereading from writing: A preliminary report.	1 year longitudinal	P: To describe developmental patterns of writing and rereading from writing of kindergarten children across groups and contexts Def: Not defined but provides clear notion of writing as a component of emergent literacy.	Kindergarten (N = 123) United States	Used Ferreiro and Teberosky's general and name writing task	Quantitative Mean writing level by age Correlations, Wilcoxon matched pairs signed rank task	Yes	Main forms of writing in kindergarten were scribbles, drawings, and letter strings. Scribbling persisted even when oral narratives became more sophisticated.
Sipe (1998)	1 year	P: To present a case study of one	Grade 1	30 composing	Qualitative	Yes	Categorised seven areas of

Transitions to the conventional: An examination of the first grader's composing process.	longitudinal	child's change over time in writing over the course of first grade. Def: Not defined but provides clear notion of writing as a component of emergent literacy.	(N = 1) United States	episodes were observed. The unit of analysis was a learner action (an utterance or behavior)	Constant comparative		writing that changed over time including use of resources, revision, and linking known to new.
Glasswell (1999) The patterning of difference: Teachers and children constructing development in writing	8 years cross – sectional	P: To focus on the circumstances in which development takes one course over another. Def: Writing has a social and ideational function.	Years 1, 5, and 8 (N = 54) New Zealand	Joint Activity (Modeling or Individual conference): Duration Engagement Level of cognitive work Participation structures Teachers' ideas Teacher focus Child participation. Independent Activity: Number of words produced Children's ideas and teachers' ideas Ambient Activity: Teacher focus Child participation Teachers' ideas and child ideas	Qualitative Used a matrix that combined text level analysis and participation stance. Percentages of participation in relation to text level were calculated.	Yes	Instructional supports were related to Matthew effects in writing.
Eitelgeorge and Barrett (2003) Multiple continua of writing development in a first-grade classroom.	1 year longitudinal	RQ: What are the various conceptual understandings that interact in the writing process? RQ: How are the conceptual understandings reflected in the composing process and the types of texts created? RQ: What textual patterns emerge as first grade students progress in their writing development across a school year? Def: Not explicitly articulated.	Grade 1 (N = 23) United States	Coded writing samples for textual development.	Qualitative Open and axial coding with presentation of six case studies	Yes	6 cases demonstrated individual progressions in textual and conceptual development.

MacKenzie (2008) Becoming a writer: Can we predict how children will engage with the writing process at school entry	1 year longitudinal	RQ: To identify relationship between language and writing development. RQ: To determine link between concepts about print and writing development RQ: To investigate and describe interactions and promotion of writing Def: Learning to write is a sociocultural, generative, developmental process providing a window into children's awareness of print, how print works, phonemic awareness, sense of story and ability to convey meaning using graphics and print.	Year 1 (N = 9) Australia	Hearing and recording sounds in words Writing vocabulary Spelling test Writing samples	Qualitative Categorized assessments according to above average/average/ below/	Yes	Teacher expectations and tests used did not reliably predict growth in writing.
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As is typical of studies conducted from a sociocultural perspective, researchers used analytic techniques such as inductive analysis (cf. Dyson, 1983a, 1983b, & 1988) or the constant comparative method (cf. Sipe, 1998) to generate theoretical hypotheses about how writing develops. Glasswell (1999) and Dyson (1988, 1983b) used coding frameworks to categorise written products and observed behaviors. We suggest that the analytic procedures used by these researchers lend themselves well to the purpose of the studies in which the authors sought to generate hypotheses rather than confirm existing hypotheses.

Context was accounted for by conducting the studies in as naturalistic a setting as possible. Both Dyson (1983a, 1983b, & 1988) and Sipe (1998) described in detail the observational techniques used and their attempts to account for the instructional context in which development occurred. Glasswell (1999) explicitly accounted for the type of teacher support that was provided by conducting observations of instruction. Although some researchers focused on written products (e.g., Eitlegeorge & Barrett, 2003; Sulzby, 1988), they worked with written products that were generally collected in naturally occurring contexts, thus providing information about how changes emerged.

Knowledge gained and limitations

Taken together, this body of research demonstrates that writing development is shaped by the instructional context in which children write and that development follows distinct patterns. Dyson (1988) claimed that product analysis alone cannot account for intention or context and masked variation in children's actions as they write. Sipe's (1998) and Glasswell's (1999) findings lend support to Dyson's claim. For example, the first grader in Sipe's case study, Mikey, changed school at the end of first grade. The change from a classroom where the teacher privileged process-oriented instruction to a setting where accuracy and neatness were privileged resulted in a change in what Mikey regarded as important in writing. Glasswell found that struggling writers were more likely to receive instruction that focused on accuracy than average progress writers which had implications for their progress in writing development.

The studies described in this section also provide rich descriptions of development in certain aspects of the writing process such as use of oral language or observable writing behaviors. Because the researchers examined written products as well as observable behaviors, they were able to analyze change in both the writing and the writer's actions. As such, a clearer picture of the child as an active agent in the writing process is provided. However, because these studies focused largely on context, the researchers paid little attention to cognitive factors such as monitoring or self-correcting. Sipe (1998) is an exception in this regard as he asserted that the observable behaviors exhibited by the child in his study were indicators of cognitive activity; thus he attended to both cognition and context. We caution that there appears to be a disconnection between the theoretical frame used by MacKenzie (2008) and the logic of inquiry of her study.

Despite an espoused focus on the social nature of writing development, much of MacKenzie's focus was on assessment results; she placed relatively little emphasis on the parent or teacher interviews or the transcripts of teacher-child interactions. In sum, for the most part, these studies attend closely to the context in which writing develops but give little attention to cognition.

5.4 Semiotic Perspective

Four research groups (see Table 5) drew heavily on Halliday and Hassan's (1976) semiotic theory, focusing on changes in the quality of the written message that occurred as a result of changes in the child's awareness of the interpersonal, ideational, and textual functions of language. They hypothesized that development in writing would be reflected in linguistically more cohesive text. The purpose of the King and Rentel (1981), Harste et al. (1983) and Donovan (2001) studies was to describe writing development. Donovan was particularly interested in story composition and informational texts across grade levels. The purpose of Kenner's (2000) study was to find evidence of children's understanding of genre.

All researchers clearly defined writing as a means of communication and described how writing had an ideational and social function. They measured the linguistic complexity of children's written texts comprehensively. For example, King and Rentel (1981) examined texts for cohesive ties and indicators of linguistic texture, using Halliday and Hassan's (1976) cohesion analysis scheme and Propp's (1968) functions to analyze the use of oral and written language and to find evidence of story elements. Donovan (2001) drew on Langer's (1986) story prompt task to collect written compositions and on the work of Stein and Glenn (1979), Newkirk (1987), and Hunt (1965) to examine the linguistic features of the texts produced. King and Rentel used controlled observations of story retelling and dictation in addition to a corpus of writing samples from a writing task. Harste et al. (1983) used a similar data collection method whereas Kenner (2000) used naturalistic observations.

The main methods of analysis included coding of written samples according to the measures described previously and calculation of measures of central tendency. King and Rentel (1981) also used ANOVA and MANOVA. In all four studies, a major portion of the analyses was dedicated to qualitative analysis of the coding of texts. In terms of design, studies were either longitudinal or cross-sectional across multiple time points or grades, whereas Kenner (2000) conducted a year-long case study.

Knowledge gained and limitations

The four studies in this category provide information about how children's written products develop. Although the researchers mainly used contrived tasks to collect their data, the tasks were closely matched to typical instructional tasks in early year's classrooms (e.g., a story dictation task). One can conclude, therefore, that the tasks more accurately reflect actual development. King and Rentel's (1981) analysis demonstrated that use of cohesive ties was a sign of early growth in writing. Harste et

Table 5. Studies Framed by a Semiotic Perspective (in Chronological Order)

Study	Time Span Design	Research Questions (RQ) Purpose (P) Definition of Writing (Def)	Age/Grade Population Location	Tests or Constructs Measured	Analysis	Conducted within instructional or naturalistic context	Key Findings
King and Rentel (1981) How children learn to write: A longitudinal study	2 year cross-sectional and longitudinal	P: To describe how children transitioned from oral to written texts in terms of their use of cohesive ties (the glue that holds ideas together in written texts are cohesive devices) and story structure elements Def: They discussed how written language has an ideational (Halliday, 1973' as cited in King & Rentel, 1981) function as opposed to spoken text that has an interpersonal one.	Kindergarten and grade 1 (<i>N</i> = 72) United States	A story retelling task (unknown to the child) A story dictation task (child dictated a task to the researcher Story writing task. Three oral language samples were collected at three points in time. The text was segmented into T- units and then coded according to Halliday and Hassan's (1976) cohesion in English scheme.	Qualitative and Quantitative Use of cohesive ties in writing: MANOVA Texts classified according to functions using Propp's functions or elements in a fairytale. They were also classified according to genre. Case studies	Yes	Use of cohesive ties in written texts was an early sign of writing development.
Harste et al. (1983) The young child as writer- reader, and informant: Final report	4 years cross-sectional	P: To study the cognitive processes involved in learning to read and write. Def: Writing is a system that operates within a broader system of language (linguistic data pool	3, 4, 5, and 6 year olds (<i>N</i> = 48) United States	Reading environmental print Writing name Free writing Drawing a picture of themselves and signing their name Dictating a language experience story, reading and rereading it Reading a book Writing and reading a story Writing and reading a personal letter	Qualitative Use of naturalistic settings (writing name or reading print). Coding of observations collected by video.	Yes	Key patterns of early writing development included intentionality, generativeness, risk, and awareness of context.
Kenner (2000) Symbols make text: A social semiotic analysis of writing in a multilingual nursery.	1 year longitudinal	RQ: What evidence can be found of children's understanding of genre and script in their response to play activities in the classroom? What understandings are shown by bilingual children and how do these connect with their social and cultural experience? Def: When children write text is a unified chunk of meaning.	Nursery (<i>N</i> = 30) United Kingdom	Texts collected -text was a piece of written material which a child presents as a piece of communication	Qualitative Frequencies of text feature. Length of text. Case studies of some children's movement towards alphabetic letters.	Yes	Awareness of visual appearance of different types of text, repertoire, and social identity explained development in use of symbols

Donovan (2001) Children's development and control of written story and informational genres: Insights from one elementary school	6 years cross sectional	P: To describe the intermediate forms of informational and story compositions across grades. Def: Learning to write is the learning of forms, demands and potentialities of different genre (Kress, 1994, p.11; as cited in Donovan. 2011)	Kindergarten, Grades 1-5 (N = 222)_ United States	Texts examines for global elements. Macro elements (t-units) and adapted Stein and Glenn story grammar.	Mixed methods Frequencies and percentages per grade level and per feature and per genre (information or story composition)	Yes	Young children could differentiate between genres. Labelling provides first signs of genre knowledge.
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Table 6. Atheoretical: Studies With No Stated Theoretical Frame (in Chronological Order)

Study	Time Span Design	Research Questions (RQ) Purpose (P) Definition of Writing (Def)	Age/Grade Population (N) Location	Tests or Constructs Measured	Analysis	Conducted within instructional or naturalistic context	Key Findings
Hooper et al.(2010) Preschool predictors of narrative writing skills in elementary school children.	6 years longitudinal	P: To examine the relationship between targeted language-based variables obtained in spring or summer before K and narrative writing in grades 3 through 5 Def: None provided	Kindergarten, Grades 1, 3, 5 (N = 65) United States	Broad written language cluster of the Woodcock Johnson	Quantitative HLM	No	Language ability, prereading skills, and maternal education predicted level of writing. Language ability predicted rate of growth.
Synders (2014) 'I wish we could make books all day!' An observational study of kindergarten children during writing workshop.	10 weeks case Study	P: To explore the development of kindergarten writers' confidence, identity, and growth within writers workshop Def: Multiple components interacting	Kindergarten (N = 3) United States	No measures Described writing samples	Qualitative Constant comparative	Yes	Students gained confidence in writing as writing developed over time.
Halls-Mills and Apel (2015) Linguistic feature development across grades and genre in elementary writing.	3 years cross sectional	RQ: Are there differences among grades and between genres in written linguistic microstructure elements? RQ: Are there differences among grades and between genres in written macrostructure elements? RQ: To what degree is development of microstructure elements related to development of macrostructure elements? Def: None provided	Grades 2, 3, 4 (N = 89) United States	FCAT Parallel forms for narrative and expository writing	Quantitative MANCOVA and Exploratory factor analysis	No	Differences between grades and genres. Disparity between grade level expectations and actual development.

al. (1983) identified developmental trends in terms of children's intentionality in writing even the simplest of marks on a page. Kenner (2000) found that children used a variety of symbols and that certain factors helped to explain the significance of these symbols. Donovan (2001) found that even young children could differentiate between genres.

In all studies, researchers provided a clear definition or declaration of their theoretical stance towards writing, which we suggest resulted in rather more detailed and sophisticated procedures to measure and classify writing. This level of sophistication was unlike that of the researcher-designed scales used in many other studies we reviewed. Thus, the definitions and measures of writing in these studies provided valuable information about how the linguistic complexity of children's texts might be measured.

Although the researchers used sophisticated measures of linguistic complexity, the statistical analyses were rather limited. More sophisticated statistical analyses (e.g., single or multi-level regressions) would have permitted calculation of the rate, breadth and variability of change over time. Similar to the Piagetian and sociocultural studies, the researchers neglected to account for the cognitive factors deemed so important by other researchers.

5.5 Studies With no Stated Theoretical Frame

Interestingly, three of the most recent studies (see Table 6) did not articulate a theory of writing development or learning. Hooper, Roberts, Nelson, Zeisel, and Kasambira-Fannin (2010) sought to examine the relationship between predictor variables in spring of kindergarten and narrative writing in grades 3-5. We infer, based on the battery of assessments used, that they were operating from a cognitive processing perspective but we chose not to include them in this category as they made no reference to theory or to the nature of writing in their literature review. In contrast, all studies included in the cognitive processing perspective explicitly referred to cognitive theories of writing or conceptual development. Halls-Mills and Apel (2015) sought to describe the linguistic development in school-age children's narrative and expository texts. They paid particular attention to the linguistic dimensions of text, especially micro- and macro-structures, but did not reference the work of Halliday and Hassan (1976), favoring instead to focus on curricular expectations. Snyders (2014) sought to describe the writing growth of three students in kindergarten. Again, there was no reference to theory; rather, curriculum and instructional approaches (a balanced literacy framework) were used to frame the study.

Snyders (2014), the only researcher to define writing, stated that writing was best conceptualized as multiple components interacting. Halls-Mills and Apel (2015) used both the written element of the Florida Comprehensive Assessment Test (Florida Department of Education, 2010) and the Systematic Analysis of Language Transcript (Miller & Chapman, 2005) software to measure the linguistic complexity of written product. Snyders (2014) used participant observations and collected writing samples which, she suggested, provided evidence of "indication of application of strategies" (p.

407) but provided no information about her coding scheme. Hooper et al. (2010) used a vast battery of assessments that measured receptive and expressive language, phonological processing, pre-reading skills, writing concepts, and measured the linguistic complexity of children's written messages using the Woodcock Johnson IV (McGrew, La Forte, & Schrank, 2014).

With respect to analysis, Hooper et al. (2010) used hierarchical linear modelling and Halls-Mills and Apel (2015) used exploratory factor analysis within a longitudinal design. Snyders (2014) used a case study methodology and constant-comparative analysis to code writing samples but, as stated previously, she did not make clear how the analysis was conducted.

Knowledge gained and limitations

In our judgment, the three studies in this category contribute little knowledge to the field of early writing development. Hooper et al. (2010) revealed which factors predicted writing level and growth. Halls-Mills and Apel (2015) demonstrated that there were differences between grades and disparity between grade level expectation and actual performance, which one might expect as children mature. Snyders (2014) concluded that students' writing changed as they gained in confidence in their ability to write.

Unlike studies in the previous sections, we were unable to trace the logic of inquiry from theory through to findings in the studies in this category. Similar to the methodologies used by researchers who framed their work from a simple cognitive processing perspective, Halls-Mills and Apel (2015) and Hooper et al. (2010) provided information about what developed but, because the intervals between data collection time-points were so large, we are left to infer how these changes occurred. In all three studies, theory and writing were not well defined. Perhaps as a consequence, the findings do not, in our opinion, contribute much to knowledge about writing development. What is most intriguing about these three studies is that they were the most recent studies of change over time in our corpus.

6. Discussion

In conducting this critical review, we wanted to move beyond a mere reiteration of the fact that there is theoretical incoherence or fragmentation in research about early writing development. We wanted to understand what might be contributing to the fragmentation by exploring the affordances and constraints of the logics of inquiry used by researchers of early writing development. We examined how writing was defined, measured and classified, the methods employed to study writing development, and the knowledge gained from each perspective. It is evident that researchers use a considerable array of theoretical perspectives to frame their research and that they operate from very different, often opposing, stances.

6.1 Definitions of writing

One consequence of the theoretical diversity is that what counts as ‘writing’ for different researchers varies considerably. It is well acknowledged that it is hard to define writing and writing development (see Applebee, 2000). As Olsen (2009) noted, writing might be considered the textual representation of speech but such a definition might neglect other visual signs and symbols used as means of communication such as pictures, maps, or infographics. Some researchers (e.g., Rowe & Wilson, 2015) look to the earliest marks children can make on a page and describe these marks as writing. From a Piagetian perspective, writing words (e.g., a name) constitutes writing. In contrast, other researchers might regard writing only as the production of connected text. Of course, in contemporary research, what constitutes conventional writing is debatable given how the very nature of writing is changing with the advent of new technologies (Leu et al., 2016).

Defining writing is important as it has clear implications for the logic of inquiry employed by a researcher. Drawing on Dewey (1938), it seems that a full description of the object under investigation and the object’s qualities would lay the foundations for a “correct logical interpretation” (p.131) of the phenomenon under investigation. We note that when researchers provided a clear consideration or description of writing, there was a tighter ‘fit’ between the construct or constructs under consideration and the measures used (as in King & Rentel, 1981).

6.2 Measurement and Classification

Because researchers defined writing differently, they used different ways to measure or classify writing. We agree with Slomp (2012) who asserted that theoretical orientations towards writing are reflected in the assessments researchers use. Most researchers relied on a battery of tests or measures reflecting the multi-dimensional nature of writing. Researchers who framed their work from a cognitive perspective tended to use established tests of writing. Researchers working from a sociocultural perspective used codes and schemes generated from actual observations. Some researchers relied on semiotic perspectives in the measurement or classification of writing (for example, using linguistic complexity as a marker of growth in writing) but many relied on holistic rubrics or rating schemes with limited evidence of reliability or validity (e.g., Dunsmuir & Blatchford, 2004; Ferreiro & Teberosky, 1982; Juel, 1998; Kamberelis, 1992, 2002). Although it is well established that writing is complex and multi-dimensional (Bazerman et al., 2018), the use of tools with limited reliability and validity has implications for the trustworthiness of findings and whether findings are accurately reflecting actual writing development. For example, without established inter-rater reliability it is hard to know whether the tools, if used by different researchers, would produce similar results. The limited availability of tools to accurately measure early writing development perpetuates the lack of knowledge about early writing development (Harmey, D’Agostino, & Rodgers, 2017; Rowe & Wilson, 2015).

We note that the measures used by researchers who drew on the work of Halliday and Hassan (1976), namely King and Rentel (1981), Harste et al. (1983), and Donovan (2001), provided valuable ways of measuring the linguistic complexity of children's written products. We suggest that these measures provide the most reliable assessment procedures as they (a) make specific the procedures used for data collection, and (b) provide a coding scheme that can be used to capture linguistic complexity. Both of these factors would lend themselves to use and replication by other researchers.

6.3 Design and Analysis

In the latest edition of the *Handbook of Writing Research* (MacArthur et al., 2016), researchers from different theoretical backgrounds agreed on one crucial point: that the theoretical incoherence in early writing research is perpetuated by the methodological choices of researchers. For example, Leu et al. (2016) stated that there was an urgent need for methods that attend to the complexity of writing and contribute to current understanding of developmental trajectories. We suggest that researchers need to consider carefully how the designs they use contribute to the comprehensiveness of their descriptions of development. Design has direct implications for whether a researcher is merely describing *what* develops or contributing insight into *how* development occurs.

As with studies of reading development, researchers have employed various research designs to describe writing development. Longitudinal studies of writing trace children's development over time and allow identification of common patterns and individual differences in their development (e.g., Abbott et al., 2010). Researchers who used such designs considered change at a macro-developmental level. The longitudinal studies we examined were useful in describing global developmental trends though they tended not to be so helpful in describing exactly how development occurs or goes awry (cf. Granott, 2002).

Cross-sectional studies like those used by Boocock et al. (1998) and Glasswell (1999) provided snapshots of the development of students at different age or grade levels at the same point in time, and permit inferences about change over time in a given aspect of development (see Ho, O'Farrell, Hong & You, 2006; McNaughton, 2011). Researchers who employed cross-sectional designs collected data on observable writing behaviors or instructional contexts and provided useful information about the nature of knowledge changes and inter-individual variability as well as the general factors that promote development within a specific domain (see Chinn, 2006). However, as noted by Chinn, the 'grain size' of measures used in cross-sectional studies is still quite coarse.

Researchers who used a microgenetic design (e.g., Kamberelis, 2002) focused on the processes through which students learned, and they examined how children's use of certain strategies might facilitate transitions to expertise over short spaces of rapid change, thereby capturing both progressions and regressions in learning. Using a microgenetic method to study change over time in writing development is resource

intensive but has benefits. Unlike longitudinal studies that collect data over wide time-points (e.g., yearly) or cross-sectional studies that provide snapshots of development, a microgenetic method can provide a picture of development more akin to the continuous flow of a movie (Lavelli, Pantoja, Hsu, & Messinger, 2006). This means that researchers can describe how development proceeds. However, because microgenetic methods are particularly useful during periods of rapid growth (Flynn, Pine, & Lewis, 2006), they might not be so informative in studying writing development in the upper elementary grades.

In contrast to these more nomothetic research designs, case study and ethnographic methodologies were used by researchers to describe *how* individual children's writing changed over time. Informed by sociocultural perspectives of thinking and learning, researchers using these methodologies (e.g., Dyson, 1983a, 1988; Sipe, 1998) paid close attention to the role of context, task, and the researcher. Sipe (1998) asserted that these more naturalistic studies add to existing knowledge about both the social and cultural contexts in which a child learns to write. Case studies of writing provide rich, detailed descriptions of children's development in several aspects of writing development. One advantage of these descriptions is that they are based on observations of writing events that occur naturally in the classroom. The results, of course, are specific to the context or the case studied and have limited generality. Therefore, these studies cannot be used to establish general trends in development.

6.4 Need for integrative approaches

The argument that there is a need for more integrative approaches with a more nuanced consideration of the constraints and affordances of methodological choices is not new (see Freedman et al., 1987; Leu et al., 2016). The fact that this situation persists, however, is cause for concern and has prompted our review. We suggest that scholars need to consider how their theoretical and methodological choices contribute to descriptions of writing development.

We noted that the types of data collected or factors considered by researchers significantly influenced the descriptions of writing development. If researchers focused on written products alone, then the picture of development relied solely on what children wrote and provided limited evidence of how children wrote or the context in which they produced the message. Researchers such as Dyson (1983a), Ferreiro and Teberosky (1982), and Coker (2006), however, found that what children wrote was context sensitive. For example, if researchers controlled the choice of topic, this limited the quality of children's written messages, especially for those who had limited background knowledge about the topic. Therefore, if one chooses to study change by examination of written products alone, the knowledge gained is incomplete. Similarly, if researchers considered a range of cognitive sub-skills but without attention to context, they provided insight into what factors impelled or constrained development but little understanding of the contextual factors that might moderate development. Conversely, descriptions of writing development that paid close attention to context without taking

account of cognitive factors did not consider how the cognitive skills involved in transcription and ideation might moderate development.

Only a few studies attended to cognition, context, process, and product, namely Coker (2006), Glasswell (1999), Kamberelis (2002), and Sipe (1998). We noted two of these studies, Coker (2006) and Sipe (1998), considered both cognition and context and presented a strong intellectual orientation toward writing with a choice of design, measures, or classifications that aligned with their theoretical orientation, and an analysis that permitted a nuanced description of change over time.

7. Conclusion

The study of development in any domain of learning is difficult. The study of early writing development is particularly difficult because of how dependent the act of writing is on task demands. Many designs simply do not lend themselves to describing writing development and researchers continue to ignore factors that colleagues, operating from different theoretical perspectives, have empirically shown to impact writing development. This issue is important because, without a clear picture of writing development, our efforts to build theory and clear models of writing development may stall. As Hayes (2011) argued, more precise modelling of the writing process can help to identify writing strategies and the associated cognitive processes that might escape our attention. This is particularly crucial in an era where benchmarks of what is to be expected of children's writing flourish.

Based on our examination of the logics of inquiry in studies of writing development, we provide four recommendations for researchers designing studies of change over time in writing:

1. Provide a clear definition of writing and consider what factors (cognitive, contextual, or textual) contribute to writing development and how development of these factors will be accounted for in the study.
2. Choose measures of writing or classification schemes that include items or codes that align with the factors identified in the definition of writing used to frame the study. Consider the reliability and validity of the measure and classification or coding schemes.
3. Reflect on whether the design of the study permits a description of either *what* or *how* writing changes over time in writing development. Consider if more frequent time-points would contribute to a more nuanced description of how change occurs.
4. Consider the measures and methods of analysis used by researchers from different theoretical perspectives and how their measures and methods might contribute to a more integrative study of writing development.

It is our hope that this review of logics of inquiry in studies of early writing development will provide scholars interested in studying change over time in writing

with an account of how different methodological choices contribute (or detract) from a comprehensive description of change.

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