Writing can be defined in a variety of ways. In this examination of learning to write, we view writing as a complex cognitive process and examine instruction that is designed to enable writers to communicate their ideas effectively and perform well in academic settings, on standardized assessments such as the Nation’s Report Card (Salahu-Din, Persky, & Miller, 2008), and in the modern workplace (e.g., Brandt, 2005). We do not discuss literary writing as done by writers such as Toni Morrison, Ian McEwan, and others whose interviews appear in The Paris Review; nor do we examine the relation between writing and other modes of communicative expression (i.e., other aspects of the traditional language arts or combinations of text, visuals, and sound as discussed in the emerging field of New Literacies Studies). In this review, we examine what is known about writing development from empirical research with children and youth, and we summarize 30 years of writing intervention research that addresses one or more cognitive process deemed central in theoretical accounts of the writing process.

A BRIEF HISTORY: SHIFTING THEORETICAL LANDSCAPE

In the teaching and learning of writing, focus on the writing process, as opposed to only the written product, is so widely accepted today that it may be difficult to imagine alternative instructional approaches. In classrooms from elementary schools to universities, it is now common to see students taking part in writers’ workshops and explicitly discussing their planning, drafting, and revising strategies. Such a process-focused approach contrasts sharply with product-focused instructional models, prevalent even in the 1970s. These product-focused models engaged students in detailed analyses of sample texts in books with chapters entitled “Writing a cause-and-effect paper” and “Writing a definition paper” (e.g., Skwire, Chitwood, Ackley, & Fredman, 1975) and then sent students off (typically alone) to mimic the genre.

Janet Emig’s (1971) publication of The Composing Processes of Twelfth Graders is often cited as the beginning of the empirical study of the writing process, at least in North America. As Nystrand (2006) reported in a recent review, empirical studies of writing
had appeared previously, but such work was largely isolated, without identifiable professional organizations and publication outlets. The field of composition and rhetoric emerged as a legitimate academic specialization in the 1980s, as doctoral programs began to train writing researchers (Nystrand, 2006).

The Zeitgeist of the 1970s no doubt helped fuel an interest in writing among cognitive psychologists. Cognitive psychology had replaced behaviorism as the dominant paradigm in the United States, and after abandoning studies of complex human thinking for much of the middle part of the twentieth century (e.g., Huey, [1908] 1968), psychologists renewed their interest in human activities such as reading (e.g., LaBerge & Samuels, 1974) and complex problem solving (e.g., Hayes, 1981; Hayes-Roth & Hayes-Roth, 1979; Larkin, McDermott, Simon, & Simon, 1980; Newell & Simon, 1972). In the 1970s, on the campus of Pittsburgh’s Carnegie Mellon University, the fields of process-oriented composition studies and cognitive psychology converged in the collaboration between Linda Flower and John R. Hayes, which provided a theoretical frame (Flower & Hayes, 1977, 1980; Hayes & Flower, 1980) that has influenced writing research for over thirty years.

Like other contemporaneous studies of human problem-solving in complex domains (e.g., Hayes, 1981; Newell & Simon, 1972), Hayes and Flower’s approach to writing followed the example of models developed within computer science, emphasizing constraint identification and problem decomposition. They described three primary processes—planning, translating (i.e., the production of text), and reviewing—that operated under the executive control of a monitor, all within the constraints of the external task environment and the writer’s long-term memory (Hayes & Flower, 1980). The model has been revisited and revised over the years (see Hayes, 1996; Hayes 2006). Yet it has retained its cognitive character, as well as its influence on the field.

Writing instruction also evolved from multiple traditions, each with a different approach to the writing process. Writers and teachers such as Donald Graves, Nancy Atwell, Lucy Calkins, and James Gray, from the National Writing Project, helped make what has come to be known as the process approach to writing instruction accessible to thousands of teachers (Atwell, 1987; Calkins, 1986; Graves, 1983; Gray, 2000). The process approach is typically characterized by an emphasis on personally-meaningful writing contexts and development of students’ identities as writers. Other educational researchers, influenced more by theorists such as Vygotsky (1978), Meichenbaum (1977), Brown (Brown, Campione, & Day, 1981), and Hillocks (1982), developed various forms of expert–novice apprenticeship models. Because the writing process is complex, requiring the coordination of multiple and simultaneously occurring cognitive elements, such apprenticeship models are forms of instruction that allow teachers to scaffold discrete thinking processes for students, and give students progressively more responsibility for decision-making over a series of lessons. Other forms of writing instruction (e.g., direct instruction and procedural facilitation; Bereiter & Scardamalia, 1987) are less widely practiced, but have also figured prominently in empirical intervention research in writing.

THE EMPIRICAL RESEARCH: CURRENT TRENDS AND ISSUES

Although writing warrants study from a range of theoretical perspectives (see Bazerman, 2008), the seminal cognitive model outlined by Hayes and Flower (1980) has generated a substantial body of empirical research on writing processes and writing instruction,
which is the primary focus of the present chapter. We use the three major processes proposed by Hayes and Flower (i.e., planning, translating and reviewing), as well as an examination of more current influences on writing (e.g., knowledge of genre and text structure), to organize our review. For each of these key processes, we overview the empirical research pertaining to that process and its development, and then specifically consider findings from the instructional research that show promise for improving classroom practice. We end with calls for researchers to parse effects of individual components within complex interventions, and to attend to disciplinary writing purposes.

Planning What to Write

Processes and General Development

Planning received considerable emphasis in early versions of the Hayes and Flower model (1980; Flower & Hayes, 1984), as it did in many problem-solving models of the time (e.g., Hayes-Roth & Hayes-Roth, 1979), and planning was held almost as the sine qua non of writing expertise. According to Hayes and Flower (1980), planning entails setting goals, generating content, and organizing that content in terms of the developing text. Plans can be general or local, and they can be made in advance or evolve during writing (Galbraith, 1996). The importance of planning as the hallmark of writing expertise has been downplayed considerably in Hayes’ later refinements of the model (Hayes, 1996, 2006), and currently planning is considered one thing, among many, that expert writers do more than novices, and especially more than children.

In addition to differences in the quantity of planning, the qualitative nature of the planning tends to differ strikingly between experts and children, in the absence of instruction. Even without prompting, expert writers can be quite articulate about the conceptual aspects of their planning. They formulate goals for their texts (e.g., to reach a given audience, to present a particular persona) and then develop plans to achieve those goals. Consider, for example, the protocol of a particular professional sports writer as he prepared his responses to readers’ letters for his weekly newspaper column:

I try to read them [the readers’ letters] and react to them in a way that is entertaining. And I will not be deadly serious about it unless I feel that it is demanded by the subject matter . . . And I try to avoid being jargonistic or requiring expertise for a reader to understand the answers, because I believe that this is a pretty good way to bring a lot of nontraditional sports readers into the section. So I don’t want to alienate them by, by writing in a way, which requires them to know—presupposes that they know a lot of things.

(McCutchen, 1988, p. 309)

Most writers, including young children, engage in some form of planning. Children may use drawings to generate ideas and “plan” their stories (Dyson, 2008; Teale & Sulzby, 1986). Young children’s protocols, however, typically reveal little explicit conceptual planning, especially in advance of writing. Analyses of prewriting pauses reveal that children often begin writing within a minute of receiving a writing task, and they are often incredulous when told that some writers spend 15 minutes or more before they write (Bereiter & Scardamalia, 1987). The protocols produced by children in the early elementary grades frequently consist of the words being written, rather than interplay among
planning, text production and reviewing processes (Bereiter & Scardamalia, 1987). The protocol of one second grade writer is illustrative. The child said, “My dad can swim better than us all” and immediately wrote *My dad is the swimmer*; she said, “Then sometimes my brother dunks me” and wrote *Sometimes my brother dunk’s [sic] me*; she said, “My mom makes me swim back and forth ten times” and wrote *My mother make’s [sic] makes me swim back and forth over and over* (McCutchen, 1988, p. 314).

It is not the case, however, that children are unable to plan. When the contexts are meaningful, even children as young as kindergarten show signs of implicit planning for a specific audience. Children can adapt the texts they produce (sometimes orally) for audiences who vary in age or setting (Lee, Karmiloff-Smith, Cameron, & Dodsworth, 1998) or who are physically present or absent (Littleton, 1998), although they are not often explicit about their reasons for doing so.

Still, *content* planning, in contrast to conceptual planning or audience considerations, dominates children’s planning through much of the school years. Bereiter and Scardamalia (1987) analyzed protocols from children at age 10, 12, 16, and 18, and they reported that approximately 90% of the statements produced by the two youngest groups involved either (a) generation of content or (b) explicit dictation or rereading. Content generation remained the predominant form of planning across all the age groups (see also Langer, 1986).

Still, amid the content generation, it is possible to see glimpses of emerging on-line attention to audience and the developing text, as in the following excerpt from the protocol of a 10-year-old writing about roller-skating:

> Hold it, no, “the wheels.” I’m going to put “the wheels,” not just “wheels” ’cause they won’t know where the wheels—well, “the wheels.”

(McCutchen, 1988, p. 315)

Although not a fully articulated conceptual plan for audience, this young writer was clearly thinking about her audience, wondering whether “they,” her readers, would know which wheels she was describing. Granted, this young writer’s plans for audience were not separate goals that she set in advance, but issues of audience surfaced momentarily.

When explicitly asked to plan in advance, children in the later elementary and middle school grades show signs of beginning to recognize planning as a process separate from other aspects of writing. Cameron and Moshenko (1996) reported that, on average, sixth grade students that they observed spent slightly over two minutes planning before beginning to write. Similarly, the 12- and 14-year-olds described by Bereiter and Scardamalia (1987) produced notes that they later expanded into text, whereas 10-year-olds typically wrote what amounted to a first draft of the composition itself. Further, children of middle-school age begin to distinguish among various types of planning. When shown a videotape of an adult planning a text, 12- and 14-year-olds correctly identified far more of the planning activities than did 10-year-olds (Bereiter & Scardamalia, 1987).

High-school students seem more likely than younger children to intentionally plan their texts and reference those intentions when asked (Bereiter, Burtis, & Scardamalia, 1988), although Paxton (2002) found that the context of the writing task influenced high school students’ planning and attention to audience. Students who read a text written with a strong personal voice wrote essays that contained more overt references to their
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readers than did essays written by students who read more typical textbook excerpts, and more often mentioned conceptual plans in their protocols. For example, one student in the strong-voice condition stated:

I’m just sort of thinking of my English class, and how you’re supposed to write a paper, and it seems kinds of—um. Now, I’m thinking what quote I’m going to use to get this thing going.

(Paxton, 2002, p. 229)

Although the student was searching for a quote (i.e., content), she clearly had in mind rhetorical goals as well as content goals.

Thus, by approximately age 12, children may begin to distinguish between plans and text; however, their plans are dominated by content generation. Conceptual planning remains relatively rare well into adolescence, in the absence of instruction.

Instruction: A Focus on Planning

Efforts to teach children to plan before composing have varied across instructional traditions. These traditions include process approaches, expert-novice apprenticeship models, direct instruction, and procedural facilitation. Studies involving instruction in planning within a process model are relatively rare, however, Pritchard and Honeycutt (2006) compare studies within the process approach to writing instruction, and report that in contrast to earlier years, teachers using the process approach now explicitly address prewriting, with the goal to create structure and organization, not only to generate content. Troia and Graham (2002) compared planning instruction within a process writing approach with direct instruction in three planning strategies with elementary students who experienced learning and writing problems. The process approach was based on the work of Calkins (1986) and Graves (1983) and emphasized purposeful writing, mini-conferences, sharing and publishing written work. The contrasting condition included direct instruction in three planning strategies: goal setting, brainstorming, and organizing. Students learned to write narrative compositions; at post-test and maintenance, children who learned via direct instruction wrote qualitatively better narratives they also wrote longer stories at maintenance. Troia and Graham (2002) concluded the explicit instruction benefited children with writing difficulties more than the incidental learning environment under comparison.

Bereiter and Scardamalia (1987) proposed that students could be scaffolded to execute more complex composing processes through procedural facilitation—the provisions of cues, prompts, routines or other forms of support that allow children to make better use of the knowledge and skills they already possess, or to recruit higher order strategies (Baker, Gersten, & Scanlon, 2002; Englert, Mariage, & Dunsmore, 2006). In a landmark study involving several procedural facilitators as well as an apprenticeship model, Englert and her colleagues (Englert, Raphael, Anderson, Anthony, & Stevens, 1991) demonstrated the benefit of using mnemonics, text frames, or “think sheets” and graphic organizers, combined with teacher and peer interaction, to teach students more sophisticated approaches to planning. With such instructional support, children across a broad range of ability showed increased metacognitive knowledge of the planning process and greater improvement in their expository texts, compared to children in a control group.

However, as Troia and Graham (2002) demonstrated, some students need more ex-
plicit forms of planning instruction than are typical in process approaches or procedural facilitation. These children, often identified as having learning disabilities (LD), are typically limited in their awareness of the differences between their writing skills and grade level expectations in text generation, content elaboration, organization, adherence to theme, and audience awareness (Englert & Raphael, 1988). They are also less able to coordinate the separate processes involved in writing. Both Thomas, Englert, and Gregg (1987) and Graham (1990) reported that students with LD typically approached writing by converting the assigned writing task into a question-answering task, telling whatever came to mind and then ending their responses.

To illustrate, consider an essay composed by Aaron, an African American seventh grader with learning and writing disabilities. When responding to the prompt, “Do you think children should be required to clean their rooms?” and asked to “Remember to plan your essay before you begin writing,” Aaron immediately wrote the following text.

I think children should be required to clean their room because if they derdy their room then they should clean it up. In my house you clean up if you derdy up

(De La Paz, 2001, p. 234)

In this essay, Aaron stated his position (i.e., a premise), and then continued with a single supporting reason and one personal example (elaborating the reason), ending abruptly without a conclusion.

For students such as Aaron, explicit instruction may be required. In response to the instructional needs of students with LD, researchers from several universities have developed various forms of apprenticeship models to teach planning strategies and self-regulation procedures, so students may develop more sophisticated approaches to writing and improve the quality of their compositions. When first conceived by Deshler and colleagues for application with adolescents with LD, planning strategies were thought to specify not only the sequence of actions to complete a task, but also provide guidelines and rules that help students make decisions during a problem-solving process (Deshler & Schumaker, 1986). Deshler and Schumaker and their colleagues (Schmidt, Deshler, Schumaker, & Alley, 1988; Schumaker & Deschler, 1992) developed a curriculum of strategies (strategic instruction model, SIM) to teach adolescents with LD how to generate different types of sentences, paragraphs, and five paragraph themes. Developers of the SIM model focused more on disseminating their work over the past 25 years than providing research evidence that their strategies are effective. However, several studies employing single subject design reveal effective to highly effective results when the percentage of non-overlapping data (PND) is considered for important dependent variables, such as number of complete sentences written (Mason & Graham, 2008).

As described previously, Englert and her colleagues designed a cognitive strategy instruction program that emphasized the development of students’ metacognitive knowledge about writing, including planning (Cognitive Strategy Instruction in Writing, CSIW, Englert et al., 1991). Through modeling, scaffolding, procedural facilitation, and peer conferencing, teachers emphasized the role of dialogue and the use of text structure as prompts to generate text, and the transformation of writing from a solitary to a collaborative activity, and improvements in expository writing were documented even for students with learning disabilities (Englert et al., 1991). In more recent studies, Englert and her colleagues have added scaffolds to the writing environment via Web-based
technology (see Englert, Zhao, Dunsmore, Collins, & Wolbers, 2007; Englert, Wu, & Zhao, 2005). Efficacy data regarding CSIW dates back to Englert’s original research studies (summarized in Englert, 2009); additional support for the teaching of text structure, one of the underlying tenets of CSIW, comes from Graham and Perin’s (2007) meta-analysis of instructional research on writing.

Another apprenticeship model was developed by Wong and her associates (Wong, 1997; Wong, Butler, Ficzere, & Kuperis, 1997; Wong, Hoskyn, Jai, Ellis, & Watson, 2008). Wong’s work emphasizes the transfer of interactive dialogue between teacher and students, as well as the use of dialogue between peers, teaching students to use language to regulate their writing behaviors (planning behaviors as well as revising). Through dialogue, teachers involve students in the writing process, encouraging writing partners to request clarifications and elaborations of one another and thereby identify ambiguities in their writing (Wong, Butler, Ficzere, & Kuperis, 1996). In work focused more explicitly on planning, Wong and her colleagues taught poor writers a variety of planning strategies for writing compare-and-contrast and persuasive essays (Wong et al., 1997; Wong et al., 2008). The strongest empirical evidence for the effectiveness of this instruction comes from Wong et al.’s most recent (2008) study in which a multilevel modeling procedure was used with three assessment waves for each dependent variable (clarity, organization, and cogency). Results revealed that planning instruction helped students learn to write stories that were more clearly developed and well organized than those written in the control condition; moreover, children in the intervention condition learned at a faster rate. Despite some variation in rate and level of individual learning, the apprenticeship model plus teacher conferencing promoted positive changes in students’ writing.

In addition, Graham and Harris and their colleagues (Graham et al., 1991; Harris & Graham, 1996) developed an approach referred to as the Self-Regulated Strategy Development model (SRSD) for teaching writing. This approach is similar in many ways to the above teaching approaches in that students learn specific strategies for accomplishing writing tasks. In contrast to other approaches, however, SRSD places a strong emphasis on self-regulation. Teachers give explicit definitions and examples of self-regulatory procedures and demonstrate their use. Such procedures typically include goal setting, self-instructions (e.g., defining what to do to execute a strategy), and self-monitoring. Thus, teachers typically model and help students identify verbal statements and physical actions to promote student mastery of the targeted writing process. Use of self-regulation can be differentiated for students in general education classrooms, and as students mature (De La Paz, 2005; De La Paz & Felton, 2010).

Using the SRSD model, students with LD have been taught various planning strategies, such as semantic webbing (MacArthur, Schwartz, Graham, Molloy, & Harris, 1996), brainstorming (Harris & Graham, 1985), using text structure to generate writing content (Danoff, Harris, & Graham, 1993), and setting process and product goals (Graham, MacArthur, Schwartz & Page-Voth, 1992). In addition, in their more recent work, Harris and Graham and their colleagues have extended the use of SRSD planning instruction to younger children in settings in which students worked with partners as they planned and composed (Graham, Harris, & Mason, 2005). Moreover, other researchers have independently used the SRSD model to teach planning strategies to students with and without learning problems in middle school (De La Paz, 1999, 2005), to gifted and normally-achieving elementary students (Albertson & Billingsley, 2001; Glaser & Brunstein, 2007), and to students with attention deficit disorder (Reid & Lienemann, 2006).
Instruction in SRSD strategies has demonstrated results in teaching students to self-regulate their performance, with improvements in the quantity and quality of writing, and those results are maintained over time. In addition, SRSD procedures have been successfully integrated in classrooms using a process approach to writing (e.g., Danoff et al., 1993; MacArthur et al., 1996). A recent meta-analysis of studies involving group designs by Graham and Perin (2007) found that strategy instruction is a highly effective approach for students from the fourth through the tenth grade (weighted effect size = .62). Importantly, the effect size was even greater when strategy instruction included self-regulation (ES = 1.14). Students who struggle with writing and who are emerging writers benefit from learning approaches that employ these apprenticeship models.

**Translating Ideas into Text: Transcription and Text Generation**

*Processes and General Development*

To provide a better account of children’s writing processes, Berninger and Swanson (1994) refined Hayes and Flower’s (1980) original conceptualization of translating by distinguishing two distinct components: transcription and text generation. Text generation shares many components with oral language generation, such as content refinement, lexical retrieval, and syntactic formulation. Transcription, in contrast, entails the cognitive and physical acts of forming written (as opposed to spoken) text.

**Transcription**

In many cognitive models of writing, spelling is not distinguished from other aspects of translating; but for young children, spelling represents a considerable challenge (Berninger et al., 1998). Many researchers have observed patterns in the growth of children’s spelling (e.g., Chomsky, 1970; Henderson & Beers, 1980; Treiman, 1993; Varnhagen, 1995), leading to various stage models of the development of spelling.

Gentry’s (1982) well-known model of children’s spelling of English is typical, entailing five stages extending through the early elementary years. The initial *precommunicative stage* involves the child’s emerging use of symbols to represent language. Children are not yet mapping individual letters to sounds, and they may confuse letters and numbers or the number of letters in a word with quantifiable aspects of the referent such as size or number, writing longer letter strings to represent larger objects (Ferreiro & Teberosky, 1982; Share & Levin, 1999).

Phonological strategies begin to emerge in the *semiphonetic stage*, as the child begins to use letters to represent some, but not necessarily all, sounds within words. During the semiphonetic stage, children may use the names of letters to represent entire words, as in the example from Bissex (1980), RUDF (i.e., “Are you deaf?”). Children’s spelling captures more complete representations of the phonological structure of words during the *phonetic stage*, but often with unconventional orthography (e.g., EGL for eagle). As children move into the *transitional stage*, and then to *conventional spelling*, they show a growing awareness of orthography (Varnhagen, 1995) and how it reflects word meaning (morphology) as well as sound (Ehri, 1992; Carlisle, 1988).

Like spelling skill, handwriting skill develops with age and experience. Clearly, the motor and cognitive aspects of writing words on a page require effort on the part of young children, and one issue examined by writing researchers is the extent to which
other aspects of writing are compromised by the effort required by transcription. Using a correlational approach, Berninger and Swanson (1994) documented that transcription-related measures were stronger predictors of writing quality for children in their primary grade sample than in their intermediate or junior high sample.

Resource demands imposed by transcription were also examined in a series of experiments by Bourdin and Fayol (1994), who varied response modality (written versus spoken) in a recall task. Bourdin and Fayol found that serial recall was significantly poorer in the written condition for second and fourth grade children but not for college students. Bourdin and Fayol argued that handwriting processes of children were still relatively inefficient and drew on working memory resources, whereas the college students’ handwriting processes were more automatic. In similar studies involving text recall (Bourdin, Fayol, & Darciaux, 1996) and text generation (Olive & Kellogg, 2002), handwriting was again found to impose higher resource costs for children than for adults. Interestingly, when adults’ fluent transcription processes were interrupted by novel response requirements (e.g., writing only in cursive uppercase), they too demonstrated interference during writing (Bourdin & Fayol, 1994; Olive & Kellogg, 2002).

Text Generation
According to Berninger and Swanson (1994; see also Chenoweth & Hayes, 2001; Hayes & Chenoweth, 2007), text generation involves the mental production of a linguistic message, distinct from transcription of that message into written text. Like speech, text generation involves turning ideas into words, sentences, and larger units of discourse within working memory. Pauses in the stream of language generated during writing are influenced by syntactic junctures such as paragraph, sentence and clause boundaries (Chanquoy, Foulin, & Fayol, 1996), text genre (Matsuhashi, 1981), knowledge of the language (Chenoweth & Hayes, 2001) and working memory demands (Hayes & Chenoweth, 2007).

There is evidence that the fluency of children’s text generation processes develop with age and increasing writing experience. McCutchen et al. (1994) observed that older children (seventh and eighth grades) generated sentences more fluently than did younger children (third and fourth grades), but at all grades, skilled writers were more fluent than less skilled writers. The ability to generate language efficiently remains a potent predictor of writing quality even for high-school students (Dellerman, Coirier & Marchand, 1996). Unlike transcription, text generation may never approach automaticity; text generation continues to require working memory resources even among college students (Hayes & Chenoweth, 2007; Kellogg, 2001).

Instruction: A Focus on Spelling, Handwriting, and Transcription
Early work in spelling instruction by Berninger and colleagues (1998) showed promise in teaching second graders to generalize alphabetic principles and write longer compositions. However, Graham (2000) found it was common in the 1980s and 1990s for systematic teaching of spelling to be renounced in favor of incidental teaching, such as when teachers provide rules to small groups of students during teachable moments, even in the absence of empirical support for such an approach. In contrast, Graham, Harris, and Fink-Chorzempa (2002) demonstrated the efficacy of a direct instruction approach in teaching second graders sound–letter combinations, spelling patterns involving long and short vowels, and common words that fit those patterns. Outcomes included improved
spelling as well as better decoding and sentence writing skills. Berninger, Winn, Stock, Abbott, Eschen, Lin, et al. (2007) randomly assigned children with dyslexia (Grades 4–6 and 7–9) to an intervention focused on orthography (in which students tried to recall visual images of written words, with particular attention to the order of letters) or morphology (focused on base words, affixes, and morphological spelling rules applied to word parts) in addition to phonology. Although the reported results go beyond those mentioned here, it is relevant to note that the orthographic treatment helped students spell novel real words and the morphological treatment helped children spell pseudowords—confirming that complex interventions are needed for students who struggle to make significant progress in spelling.

Literature on handwriting instruction includes a trivial (but longstanding) controversy over the initial use of manuscript alphabet that is later replaced by cursive script, versus calls for an italic or slanted version of print that is designed to ease students’ transition (Schlagal, 2007). However, a national survey of primary teachers suggests that teachers have moved past that controversy, and most (60%) report using effective practices when teaching students to write letters (Graham et al., 2008). Graham, Harris, and Fink (2000) describe one such program, using direct instruction to teach children to write lowercase manuscript letters accurately and fluently. Results indicate improved handwriting and writing skills more generally. Direct instruction in writing letters using visual cues appears an effective way to help children develop their ability to write letters automatically (Berninger et al., 2005), which is related to length and quality of composing throughout elementary schools (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997).

Speech recognition software, according to proponents (see MacArthur, 2006, for a recent review) provides the means to bypass the mechanical demands involved in transcription (handwriting and spelling) and in turn gives writers a more fluent means of composing. Students who are especially weak writers seem to benefit from opportunities to compose orally, especially if this is combined with planning instruction (De La Paz & Graham, 1997). MacArthur and Cavalier (2004) found that high-school students with LD derive specific benefit from composing to an adult scribe or when using speech recognition software (when they could see their text as they composed), in comparison to writing by hand (see also Quinlan, 2004). In comparison, students without special needs were not affected by different writing conditions.

**Instruction: A Focus on Text Generation**

Some students will benefit from direct instruction that focuses on a different aspect of mechanics (i.e., grammar) during elementary or secondary school. Unfortunately, common exercises (diagramming sentences, daily oral language exercises) do not have evidence demonstrating their effectiveness, most likely because most students do not apply what they learn from these activities to their own writing (Andrews et al., 2006); thus, we next discuss a more promising approach for teaching sentence construction skills.

Sentence combining appears to be an effective approach for teaching sentence construction skills when the goal is to increase a student’s syntactic complexity, regardless of the student’s age (ranging from 5 to 16), writing genre (persuasive, narrative, or expository) or presence of a learning disability (as demonstrated with fourth grade students; Saddler & Graham, 2005). Briefly, sentence combining refers to explicitly teaching students how to restructure sentences, for example, revising two simple sentences
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(referred to as “kernel sentences”) to form a more interesting complex sentence (often by modifying nouns, or by creating complex sentences with coordinate or subordinate phrases). Students then use standards such as clarity and directness of meaning, to judge the adequacy of their new sentence combinations. In their evaluation of the effectiveness of this approach, Saddler and Graham (2005) randomly assigned 44 average and struggling fourth grade writers to receive 30 sentence-combining or grammar lessons across 10 weeks. Students in the sentence-combining group learned to use connectors “and,” “but,” and “because” and how to embed an adjective or adverb from one sentence into another (e.g., “They passed the ball before shooting” and “They passed quickly” combined to “They quickly passed the ball before shooting.”) Subsequent objectives included learning to embed two syntactic forms into one new sentence. Students in the comparison grammar condition learned parts of speech. The focus of instruction was to generate better target sentence parts for a sentence completion task. Students also wrote and revised short stories using target parts of speech. Outcomes from this and other sentence combining studies are robust; an overall effect size of .50 was reported by Graham and Perin (2007).

Reviewing and Revision

Processes and General Development

Hayes (1996, 2004) elaborated the original description of the revision process (Hayes & Flower, 1980) to include critical reading, text evaluation, and rewriting. Thus, skilled revision involves critically reading the actual text and comparing it to a representation of the intended or ideal text, noting discrepancies and initiating changes to bring the actual text more in line with the ideal text (Bereiter & Scardamalia, 1987; Flower, Hayes, Carey, Shriver & Stratman, 1986).

Several processes in this sequence can be problematic for children, the first being the representation of the intended text. Because young children are less likely to engage in much conceptual planning, they have fewer specified intentions, and their memory representations of the intended text are often vague (Bereiter et al., 1988). Second, children may have difficulty with reading critically and then differentiating their interpretations from the actual text. Young children are less able than older children to distinguish inferred from explicit text information (Beal, 1990, 1996) and less likely to add information to support necessary inferences (although difficulties assessing readers’ knowledge and inference abilities are not unique to children; see Hayes & Bajzek, 2008). Third, children may have difficulty generating alternative language, even if they identify problematic text. Beal (1990) reported that younger children had more difficulty than older children in diagnosing and correcting text problems, even when the problems were pointed out to them.

Most students (from grade school to college) focus most of their revision efforts on changing surface features of the text (e.g., spelling, punctuation word choice), rather than attending to text meaning (e.g., Chanquoy, 2001; Faigley & Witte, 1981; Fitzgerald, 1987). There is considerable evidence that critical reading is crucial for meaning-focused revision. McCutchen, Francis, and Kerr (1997) listened as middle-school students collaboratively revised, and observed that skilled and less skilled writers employed markedly different reading strategies. Skilled revisers developed a macrostructure of the text they were revising (see Kintsch, 1998) and considered large sections of text as they worked,
whereas less skilled revisers edited sentence by sentence. Thus, sophisticated revision may depend, in part, on sophisticated reading strategies (see also Beal, 1996) that go beyond reading for surface understanding. Such reading strategies can, however, present challenges even for college students (Piolat, Roussey, Olive, & Amada, 2004).

Part of the focus on surface revision may however, be the result of the task schema that writers bring to the revision task. With very brief instruction, Wallace and Hayes (1991; Wallace et al., 1996) were able to reorient college writers to revise for meaning. The instruction was so brief (eight minutes) that Wallace and colleagues argued they could not have taught students revision processes per se; rather, they argued they simply altered the students’ revision schema by directing students’ attention to meaning over mechanical features of texts (see also Graham, MacArthur, & Schwartz, 1995). Such brief instruction, however, was not effective for struggling college writers (Wallace et al., 1996).

**Instruction: A Focus on Revising**

Direct instruction, procedural facilitation, and apprenticeship models have been used to improve the revision skills of students at different ages and varying levels of writing competence. Direct instruction attempts to describe, and explicitly model, what revision is about and how to revise. Research on direct instruction in revision appears limited, but at least one study revealed beneficial effects of teaching in this way to sixth graders. In Fitzgerald and Markham’s (1987) study, students learned four types of revisions (how to add, delete, rewrite, and move text) in a series of three-day lesson cycles. When compared to a control group, direct instruction in the revision process improved students’ knowledge of revision, their efforts to make revisions, and the quality of their stories across drafts. A recent example of direct instruction involving a contrast between collaborative and individual revision on fourth, sixth, and eighth grade students’ abilities to anticipate lack of clarity in narratives (Boscolo & Ascorti, 2004) revealed clear advantages for having students work together to identify and resolve ambiguities in text.

**Procedural Facilitation**

Scardamalia and Bereiter (1983, 1985) developed procedural routines for students in a series of studies to reduce the executive burden involved in revising, by signaling movement from one element of revising to the next and by limiting the number of evaluative and tactical decisions to be made. Their *compare, diagnose, and operate* (CDO) routines helped students identify problem areas, evaluate and explain the problems, select a revising tactic if needed, and carry it out. These routines generally elicited more revisions in students’ writing, and enabled students to focus on higher-level features of text than typically reported for similar students. Because students with disabilities are more likely to have problems with executive control, Graham (1997) taught fifth and sixth graders with LD how to use a modified version of the routine used by Scardamalia and Bereiter (1983). Revising one sentence at a time, the student selected one of seven possible evaluations (e.g., “This doesn’t sound right”) for each sentence (compare), explained orally how the evaluation applied (diagnose), and selected one of five directives (e.g., “Say more”) to execute (operate). Unfortunately, despite increases in the number of nonsurface (e.g., meaning-changing) revisions, which improved local aspects of text, gains in overall quality were not evident because the global structures of the texts were largely unchanged.
De La Paz, Swanson, and Graham (1998) replicated and extended Graham’s (1997) study. They used a CDO procedure to teach a revising strategy to twelve eighth grade students with LD. A primary difference in the more recent study was the inclusion of additional steps to engage students in applying the directives twice, first at a global level and then at a local level. Results indicated that when revising with the CDO procedure, students were more likely to improve the quality of their essays than under normal conditions. Meaning-preserving revisions tended to improve quality under the CDO procedure; in contrast, meaning-changing revisions appeared to lower quality. Thus, while students made more changes affecting the meaning of their text, some changes resulted in lower quality ratings, because these students with LD were limited in their ability to carry out evaluative and tactical decisions.

Recent evidence from a study by Midgette, Haria, and MacArthur (2008) demonstrates that setting content and audience awareness goals can function as procedural facilitators for students during revising. In their study, fifth and eighth grade students wrote persuasive essays and then revised them under one of three goal setting conditions: a condition that prompted students to make changes in general, a content condition that encouraged students to include reasons and a conclusion, and an audience awareness plus content condition that suggested students consider a reader’s position, especially one who might have another point of view. Older students were more successful than younger students in responding to the content plus audience awareness goals; however, all students in this condition outperformed other students in addressing and rebutting reasons in their essays. Moreover, the two content goal conditions appeared equivalent in terms of effects on overall quality.

Apprenticeship Models
The strategic instruction model (SIM), described previously in the context of instruction to support students’ planning, has also been used to support revising strategies in several studies on editing and proofreading (McNaughton, Hughes, & Ofiesh, 1997; Schumaker et al., 1982). Other researchers using the SRSD model, which combines strategy instruction with self-regulation support, have focused on changes in meaning (e.g., revising; Graham & MacArthur; 1988; Stoddard & MacArthur, 1993), or on both revising and editing, with word processors and peer review to facilitate the revising process (e.g., MacArthur, Graham, Schwartz, & Schafer, 1995). The study by MacArthur and colleagues (1995) was longitudinal and embedded instruction within a writer’s workshop model, making it more similar to the type of apprenticeship model developed by both Englert and Wong and their colleagues. In general, positive effects on the type of changes and quality of the revised texts have been found as a result of these interventions, which often include peer revising as a component of instruction.

It is important to note that some investigators have developed holistic writing programs that focus on both planning and revising instruction (Bui, Schumaker, & Deshler, 2006; De La Paz & Graham, 2002; Englert et al., 1991; Wong et al., 1996). In addition, recent studies have attempted to determine the effects of direct instruction in both planning and revising (Fidalgo, Torrance, & Garcia, 2007) and the benefits of planning versus revising strategy instruction, relative to a student’s initial writing profile (Kieft, Rijlaarsdam, Galbraith, & van den Bergh, 2007). Thus, our characterization of multi-pronged studies such as these as either planning or revising was done partly for convenience.
KNOWLEDGE OF GENRE

General Development

All writers rely on knowledge of shared rhetorical conventions, such as genre. By the term *genre*, we refer to more than the structural features of text and include the illocutionary purposes that texts serve within the contexts of specific disciplines and discourse communities. However, genre knowledge develops, in part, from experience with text structures. As a consequence of their broad early experience with narratives (Duke, 2000; Teale & Sulzby, 1986), even young children show signs of emergent narrative schemata (Stein & Glenn, 1979). Young children’s exposure to informational texts, even in school, is more limited than their exposure to narratives (Duke, 2000;), and it is therefore not surprising that children’s knowledge of expository genres generally develops later than knowledge of narrative (Englert, Stewart & Hiebert, 1988; Langer, 1986). Comparisons typically reveal that children’s written narratives are superior to their expositions (e.g., Cox, Shanahan, & Tinzmann, 1991; see Langer, 1986, and McCutchen, 1987, for qualifications). Crammond (1998) documented that students’ control over the argumentative text structure continues to develop throughout high school and beyond. However, use of non-traditional text structures may sometimes reflect purposeful genre selections that have more to do with expressions of personal identity than with lack of knowledge, especially for adolescents (Ball, 1992).

Instruction: A Focus on Genre and Text Structure

A survey of empirical intervention research revealed more published work on text structure than on genre; one reason for this finding might be the predominant use of qualitative or descriptive approaches by researchers who study the writing process more broadly (including genre), rather than the experimental designs that typify intervention research (Pritchard & Honeycutt, 2006). Ironically, however, a review of writing standards published on websites for state Departments of Education show a plethora of genres expected for students across K-12 (e.g., writing letters and journalistic feature writing). Moreover, popular books on the writing process for teachers often focus on genre and writing purposes more generally (e.g., Calkins, 1986). Thus, expectations around students’ genre knowledge are increasing despite a lack of empirical research on how to develop that knowledge.

With respect to research on text structure, writing intervention researchers have focused on teaching students basic elements of narrative, persuasive, or compare-contrast texts, (e.g., Fitzgerald & Teasley, 1986; Gordon & Braun, 1986; Kirkpatrick & Klein, 2009; Scardamalia & Bereiter, 1985), but typically with more emphasis on the writing process than was common in product-focused instruction (e.g., Skwire et al., 1975). More generally, it is important to note that researchers who employ expert–novice apprenticeship models typically embed instruction in text structure as a means to communicate information about the genre under consideration to students. Many writing intervention studies involving planning include a focus on text structure (e.g., Bui et al., 2006; Danoff et al., 1993; De La Paz, 1999; Wong et al., 2008). To illustrate, teaching students to understand text structures and to use them as ways to organize their writing has featured prominently in Englert’s research, from her early research on generic writing strategies (Englert et al., 1991) to her most recent work on content area writing (Englert, Okolo, & Mariage, 2009).
Briefly, Englert and her colleagues describe ACCelerating Expository Literacy (ACCEL) as a program designed to integrate reading and writing strategies in learning about science and social studies from expository texts. The ACCEL instruction includes Plan-It, Highlight-It, Read-It, Mark-It, Note-It, Map-It, Respond-to-It, and Write-It. Each strategy becomes a tool to be used in conjunction with knowledge about common text structures in expository text: cause/effect, problem/solution, compare/contrast, time (sequential order), classification, and explanation. Together, both strategies and text structure form the basis of the overall curriculum. In sum, the overall effort was to help students develop writing-to-learn strategies that would help them in the expository curriculum (Englert, 2009). In their most recent program evaluation, organizing information was difficult for students with and without learning difficulties to master. However, students with LD made relatively larger gains than students without learning problems, based on an improved ability to selectively identify main ideas and details in printed texts, take well-organized notes, and generate written retellings that contained related details and ideas.

Finally, we were able to locate one intervention study that involved a comparison of text structure and an expert–novice apprenticeship model (Reynolds & Perin, 2009). In this study, middle school students learned to summarize sources using text structure or a modified self-regulatory planning strategy. Students in the text structure condition received explicit instruction in composing from textbook sources, relying on the use of summarization rules and text structure (e.g., main idea, details, topic sentences). Students in the self-regulatory strategy condition followed mnemonics in addition, and engaged in personal goal setting. Results, while indicating nearly comparable performance, should be viewed as tentative, because essential elements in most expert-novice apprenticeship models were omitted (e.g., teacher modeling self-regulatory statements, collaborative practice among students, and criterion-based instruction). Moreover, independent practice was limited to completing assignments that teachers began for students (either in class or as homework) as opposed to independent execution of the planning and composing process, as is typical in true expert–novice apprenticeship models. What is most appealing about this study, however, is the authors’ attempt to separate the effects of text structure from its usual role as an embedded element within most expert–novice apprenticeship models. More work on the differential effects of components in multi-pronged intervention research is needed, both to be parsimonious and to understand which elements contribute most to the effects produced by complex interventions.

PRACTICAL IMPLICATIONS AND FUTURE DIRECTIONS

The model of writing proposed by Hayes and Flower in 1980 was intended to be general, not specific to a discipline. However, as writing research has matured, the importance of disciplinary perspectives, including genre, has become apparent. There is increasing interest in knowledge of genre and writers’ broader knowledge of the disciplinary community for whom (or perhaps more appropriately with whom) they write. For example, writers generally learn the discourse forms and honor the rhetorical values of their respective discourse communities, defined in terms of social and/or disciplinary affiliations (MacDonald, 1992; Myers, 1985; essentially Discourse, as discussed by Gee, 1996). Skilled writers seem to have ready access to, if not explicit awareness of, such Discourse
and rhetorical knowledge (Langer, 1992; Stockton, 1995). Genre and stylistic knowledge seem to influence many aspects of the writing process, including even lexical and syntactic choices (Barton, 1995; Bazerman, 1984; MacDonald, 1992; Vande Kopple, 1998).

**Argumentation: A Crucial Genre for Academic Discourse**

One genre of central importance in written communication is argumentation. Students’ argumentation skills have been studied as milestones of conceptual development (e.g., Kuhn, 2005), as rhetorical conventions (e.g., Toulmin’s 1958 model and Fulkerson’s 1996 explication of classical claims to teachers), and as grade-related benchmarks. For instance, in the Nation’s Report Card, Salahu-Din et al. (2008, p. 37) indicated that only 24% of twelfth graders were able to compose texts that “persuade[d] the reader” at levels judged as “sufficient” or better. Although the scoring criteria used in the Nation’s Report Card 2007 were not published, most standards for evaluating arguments suggest that good arguments are organized, elaborated, and supported by evidence (Perloff, 2003). In addition, Rieke and Sillars (2001) describe argument structure as presenting a clear position, supporting claims with relevant justification and elaborations, considering counterarguments, and finding ways of refuting those counterarguments.

However, Ferretti, Andrews-Weckerly, and Lewis (2007) contend that argumentative strategies are more complex, as they are influenced by the nature of the writing task, the degree to which writers hold shared knowledge about a topic, and the writing purpose. Moreover, Stevens, Wineburg, Herrenkohl, and Bell (2005) argued that the nature of effective argumentation differs across disciplines because the epistemological criteria for causal explanations differ. Thus, argument is a common text structure employed in many disciplines as a means for persuading or convincing others, but the nuances of the argumentation genre can vary across disciplines.

**Disciplinary Perspectives**

Students then must understand how arguments vary across disciplines. In recent years, advocates for disciplinary literacy articulate differences in the ways teachers should guide adolescents to approach reading and writing tasks in secondary content classes based on inherent differences in the ways that experts think in the sciences (e.g., biology; Carter, Ferzli, & Wiebe, 2007), mathematics (Brown, 2007), and history (Shanahan & Shanahan, 2008; National Research Council, 2000). It follows that in secondary social studies classes, students must learn to use historical evidence to write compelling arguments whether taking the role of novice historian (Wineburg, 2001) or democratic citizen (Barton, 2005). In science classrooms, students identify claims and evidence when constructing and defending scientific explanations (Berland & Reiser, 2009). Recent evidence from McNeil (2009) indicates that dialogue is a critical vehicle for helping students learn to justify claims as they write scientific arguments. Thus, more research is needed to explore how expert teachers help students learn to develop interpretations that are supported with evidence (see Monte-Sano, 2008), as well as research on interventions aimed at improving disciplinary argumentation (e.g., De La Paz & Felton, 2010).

**CONCLUSION**

We have presented an overview of empirical research on how writing develops and how researchers and teachers have endeavored to scaffold students’ learning using theoretical
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perspectives common to cognitive and process approaches. Although experienced writers describe overlapping and recursive processes during writing (such as revising the beginning of a sentence before returning to generate content that concludes the sentence), the ability to capture the development of such phenomenon in writing research, as well as our strategies for systematically teaching youngsters how to think about writing in such sophisticated ways, remain limited.

Interestingly, much of what we know about effective practices in the teaching of writing comes from the study of children and youth who struggle with this form of communication (Graham & Perin, 2007). Researchers who employ an empirical tradition have found benefit in direct instruction, procedural facilitation, and expert–novice apprenticeship models for teaching planning, translating, and reviewing. Knowledge of genre and text structure have an effect on the writer and writing task and as such may be viewed as influences from the task environment (Hayes, 1996); however, writing that is purposeful also has disciplinary meanings, and we note that recent activity, such as research on argumentation, has considered such contexts. We join others in a call for continued exploration of writing development and interventions that have disciplinary connections, especially for adolescents who are expected to connect writing to content area learning. This is an exciting time to engage in writing research, as the examination of writing within disciplines such as history and science provides opportunities for researchers and teachers to explore new avenues to support student writing and thinking.

NOTE

1 Both authors contributed equally to this chapter, the order of mention is alphabetical.

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