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Reading Into the Future: Competence for the 21st Century

Patricia A. Alexander and the Disciplined Reading and Learning Research Laboratory

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In this theoretical contribution, our purpose is to examine the nature of reading competence as it unfolds at the present and to project that nature into the future. More specifically, we ask what it will mean to be a competent reader for the 21st century and what combination of knowledge, beliefs, abilities, and processes that competence will require. To address this question, we begin by presenting our view of reading as essentially multidimensional, developmental, and goal directed, and of the development of reading competence as framed by research on expertise development and on the role of epistemic beliefs. With that view in mind, we then identify salient features of the current context and how they might present challenges that will make the development of competent readers even more vital as we move into the future. Finally, we forward three suggestions for supporting readers in their growth toward competence for this century.

Let not future things disturb thee, for thou wilt come to them,
if it shall be necessary, having with thee the same reason
which now thou usest for present things.

Marcus Aurelius, *The Meditations*, Book 7

In this theoretical contribution, our purpose is to examine the nature of reading competence as it unfolds at the present and to project that nature into the future. More specifically, we ask what it will mean to be a competent reader for the 21st century and what combination of knowledge, beliefs, abilities, and processes that competence will require. To what degree should the educational and research community be disturbed by “future things” that may be in store for developing readers in the 21st century? It is our contention that in order to become competent readers, developing readers will continue to need the same essential resources that support competent reading at present, and therefore that, as Marcus Aurelius suggests, we should not be disturbed by what is to come. In developing our case, we consider what has come before and what is ongoing as a means to speculate on what will be—in this case, what will be for reading competence.

Rarely in reading’s history have we witnessed such a convergence of forces committed to determining what configu-

ration of cognitive, psychosocial, and sociocontextual factors results in successful reading performance (Alexander & Fox, in press; Kamil, Afflerbach, Pearson, & Moje, 2011). We see that commitment in the efforts of state and national education agencies to articulate the knowledge and processes that are core to reading and, thus, to competence in reading (e.g., Common Core State Standards Initiative [CCSS], 2010). It is also evident in systematic explorations by reading researchers who study the demands and processes of online reading, seek better assessment approaches, or attempt to refine notions of text complexity for an Information Age (e.g., Coiro & Dobler, 2007; Leu, Kinzer, Coiro, & Commack, 2004). Manifestations of this commitment are likewise reflected in the consolidated efforts to conceptualize the “next generation” of reading standards and their associated assessments (e.g., Partnership for Assessment of Readiness for College and Careers [PARCC], 2010; Smarter Balanced Assessment Consortium [SBAC], 2012). Moreover, we even see concern in the actions of community, business, and political leaders who are attempting to address perceived inadequacies and inequities in reading achievement or in workplace performance and to understand what competent readers will look like in the 21st century and beyond (e.g., Partnership for 21st Century Skills, 2009).

Although we appreciate the renewed discourse on reading competence from so many education stakeholders and the concomitant emphasis on educating students to be competent readers, we argue here that the efforts to date have not been grounded in an adequately comprehensive understanding

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of the nature of reading and its development. Specifically, we endeavor to establish that what has been missing in this collective discourse is an integrated and comprehensive perspective on reading and reading competence that is informed by literatures in expertise development and epistemic beliefs. These dimensions have not been central to dominant information-processing based theories (e.g., Kintsch, 1998) or recent standards construction (e.g., CCSS, 2010; PARCC, 2010; see Valencia, Pearson, & Wixson, 2011) but are beginning to emerge in current research (e.g., Bråten, Britt, Strømsø, & Rouet, 2011; Duffy & Israel, 2009; Kienhues & Bromme, 2011).

Because we recognize that varying perspectives on the nature of reading and reading competence have been forwarded in the literature, we make our argument first by establishing the rationale for the specific view of reading, reading development, and reading competence that guides our analysis. In so doing, we highlight dimensions of reading and of reading competence that we regard as essential to ensuring adaptive processing of all manner of texts, even those yet to be conceived. Once we have put forward our perspective on reading and reading competence, we juxtapose that view with the reading demands confronted by today's reader. Here again, if we are going to speak to the tomorrows of reader competence, we must be well informed by the realities of the present. Our intention is to draw upon those realities to speculate as to the features, attributes, and processes that are currently challenges for readers and seem likely to become even more significant contextual forces driving the need for competent reading in future years. To bring this examination to a close, we then consider several avenues that we believe hold promise for those who are committed to preparing students to be adaptive (i.e., competent) readers now and in the future.

READING DEFINED

In general, the conception of reading that frames this contribution and is summarized in Table 1 takes as a given that reading is by nature *multidimensional*, *developmental*, and *goal-directed* (Alexander & Jetton, 2000; Fox & Alexander, 2011).

Reading as Multidimensional

Reading is multidimensional because it requires the orchestration of an array of cognitive, motivational, neurophysiological, and sociocontextual factors. For instance, individuals must be able to access the presented text via the senses and to perceive and recognize the relations among symbol, sound, and meaning. There is a growing interest in the neurophysiological bases of reading within the literature and increased efforts to forge meaningful bridges between brain and mind in order to understand the very nature of the reading act

(e.g., Hruby, Goswami, Frederiksen, & Perfetti, 2011). Much of the empirical and educational work in reading has targeted its mental or cognitive dimensions (e.g., decoding, predicting, inferring, or comprehending), but the burgeoning interest in the neurophysiological bases reminds us that there is inevitably a body and brain involved in any reading act.

However, despite the undeniable role of cognitive mental activity, reading cannot be conceived as simply a "coldly cognitive" undertaking (Brown & Campione, 1990; Pintrich, Marx, & Boyle, 1993). Why one reads, how one reads, and what results from that act are equally influenced by the motivations and affect at play. As those who investigate strategic processing are well aware, readers must be willing to engage in the act of reading or to exert effort toward meaning (Afflerbach, Cho, & Kim, 2011; Paris, Wasik, & Turner, 1991). Reading for meaning (beyond the level of automatic word recognition) is typically a voluntary act that is performed with explicit or tacit intentions on the part of the reader (McCrudden, 2011; van den Broek, Ridsen, Fletcher, & Thurlow, 1996). These personal intentions interface with those of the author of the message as well as with those of any others who may attempt to guide or direct the learning from text (McCrudden, Magliano, & Schraw, 2010; Pearson & Tierney, 1984). For example, in an investigation of college students' online search behaviors, List, Grossnickle, Loyens, and Alexander (2012) determined that a question they had intended to be open-ended, requiring an effortful, evidence-based response, was treated as an opinion question, thus requiring no substantiation beyond respondents' own personal experience. In effect, students entered the search task with intentions and ensuing behaviors that stood in sharp contrast to those anticipated by the researchers.

Along with the cognitive demands of reading, the intentions of the reader also serve to shape what the body does and what the mind sees. For instance, there is a growing literature on the interplay of cognitive and motivational goals that further establishes the power of learner intentions in relation to academic achievement (e.g., Pekrun & Linnenbrink-Garcia, 2012). What these historic and recent studies serve to remind us is that individuals come to any learning task, including those involving reading, with orientations and goals that shape what they set out to accomplish and what they ultimately achieve. Thus, understanding these motivational dimensions of reading is critical to comprehending the nature of reading and competence in reading.

Finally, there is always a time and place to reading, and there are social and contextual factors that influence reading at any given point in time and across time (RAND Reading Study Group, 2002). For one, readers must build their understanding based on the social conventions and nuanced meanings the author's message may hold for any given situation or context. For another, there is ample evidence in the literature to document the powerful role that "more knowledgeable others" play in reading acquisition and development (Vygotsky, 1934/1986). Whether one is reading for self at

TABLE 1
Characterizations of Reading and Reading Competence

<i>Reading</i>	<i>Reading Competence</i>
Is Multidimensional	
<ul style="list-style-type: none"> ● Orchestration of cognitive, motivational, neurophysiological, and sociocontextual factors ● Complexity within and across reading dimensions 	<ul style="list-style-type: none"> ● Represents the ability to modulate and tune the interactions among reading's dimensions ● Involves continued growth and refinement of the full complement of reading's dimensions
Unfolds Developmentally	
<ul style="list-style-type: none"> ● Acquired over time ● Undergoes change across the lifespan ● "Basics" best conceived as foundational processes that drive lifelong development ● Marked by continuous interaction between learning to read and reading to learn 	<ul style="list-style-type: none"> ● Signified by a particular interplay of strategies (deep and surface), interests, and principled knowledge ● Demands critical, analytic processing of texts ● Involves the bootstrapping of one's knowledge and interests to support learning
Is Goal-Directed and Intentional	
<ul style="list-style-type: none"> ● Involves an "authored" text ● Includes the intentions and purposes with which every reader comes to texts ● Entails reciprocal meaning-making between reader and author 	<ul style="list-style-type: none"> ● Comes with the acceptance of the underlying complexity of knowledge and knowing ● Acknowledges the "authored" nature of text ● Accepts that form and character of textual argument vary depending on the context

home or for others within an academic setting can likewise prove influential for the nature of the reading act (van den Broek, Lorch, Linderholm, & Gustafson, 2001): what is perceived as relevant, or the level of understanding sought, for example. Some research has suggested that the mode of text presentation (computer vs. print; Pang & Kamil, 2002), the tasks assigned (McCrudden et al., 2010), peer involvement (Wigfield et al., 2008), or the character of the texts themselves (e.g., inclusion of multiple media; Moreno & Mayer, 2007) must be considered when describing reading performance. Indeed, some who argue for "new literacies" frame much of their argument on such sociocontextual dimensions of reading (Lankshear & Knobel, 2003).

Collectively, what this brief discussion reminds us is that there is great complexity to reading, not just within any one of these dimensions (e.g., cognitive or motivational) but clearly across them as well. We return to these multidimensional aspects when we consider the demanding contexts that confront readers at present and when we consider one potential approach to preparing them for the challenges that lie ahead.

Reading as Developmental

Reading is developmental in that the ability to read is not innate—even if one accepts the premise that certain capacities and propensities toward language are within our genetic makeup (Briscoe, 2002; Chomsky, 2002). Rather, reading is a complex ability acquired over time, and that ability undergoes continual change across the lifespan as a consequence of human experiences and the knowledge, beliefs, and processes

that those experiences afford (Fox & Alexander, 2011). Consider, for example, the case of a 12th grader named Portia called upon to "read and comprehend history/social studies texts in the grades 11-CCR [College and Career Readiness] text complexity band independently and proficiently" (CCSS, 2010, p. 61). Such a standard assumes that this student not only has acquired increasingly sophisticated knowledge of reading informational texts associated with history/social studies along with the background knowledge tapped by the specific text but also holds correspondingly mature beliefs about what it means to engage in historical thinking and to do so "independently and proficiently." Further, a continued honing and instantiation of strategies and metastrategies required for this standard must also have occurred. Such developmental demands are additionally complicated when the act of reading and comprehending historical/social studies texts entails primary sources (Maggioni, Fox, & Alexander, 2010b; VanSledright, 2004) or multiple texts (List et al., 2012; Wiley et al., 2009).

The literature has certainly not been devoid of full developmental models of reading that extend into adulthood (Chall, 1983; Gibson & Levin, 1975; Gray, 1925; Russell, 1961). For instance, Jean Chall (1983) forwarded a perspective on reading development that included various stages. Stages 0 to 2 concerned the acquisition of the processes of reading including decoding (Stage 1; ages 6–7) and confirmation and fluency (Stage 2; ages 7–8). Once these reading basics were mastered, Chall proposed that students moved into Stage 3, characterized in her well-cited model as the *reading to learn* period, typically encompassing ages 9 to 13.

This bifurcation of reading into two distinct periods (i.e., learning to read and reading to learn), although not representing the essential core of Chall's view of reading development, has long persisted and appears to fairly capture the instructional emphasis placed on reading in K-12 classrooms (National Center to Improve the Tools of Educators, 1996). In particular, this dual-level approach to reading has been interpreted to mean that children should not be introduced to informational books until after they have achieved some level of reading fluency with storybooks (Duke, 2004). There is a relatively recent initiative to bring informational texts to early readers (and this is acknowledged in the CCSS, 2010), with a strong part of the rationale being the desirability of exposure to the variety of text structure and features present in informational texts (Duke, 2004; Pappas, 2006). In our more integrated view of reading development, reading and learning are co-occurring all along, and students at the very earliest stages of reading should be equally oriented toward learning from the text, learning about the text, and learning to read.

In addition, the splitting of reading into learning to read and reading to learn fails to take into account that whatever knowledge students already possess—whether directly related to reading or not—comes into play as they read (Kendeou & van den Broek, 2007; Ozuru, Dempsey, & McNamara, 2009; Tarchi, 2010). Prior knowledge influences the reading act and is affected by each reading act. So, as they read, students are expanding and building their base of knowledge about the world, about texts, and about themselves as readers. Building knowledge *by reading*, building knowledge *of reading*, and engaging *in reading* are always co-occurring events.

In this light, the true *basics* in the complex domain of reading are best conceived of as foundational processes that drive growth throughout reading development, from the initial period of emergent reading to more competent or even to expert stages; that is, essentials upon which lifespan reading development can build. Thus, our view of reading development extends beyond the acquisition of some finite set of basic linguistic processes (e.g., phonological processes or fluency) and continues to unfold on into adolescence and adulthood. Entry-level knowledge and capacities such as phonemic awareness become largely fluent and automatic over time and with experience, allowing for the development of more advanced capabilities that aid in meaning-making.

Instruction aimed at promoting the basics of reading in our view would include: dedicated reading instruction that extends beyond the early grades; concern for the optimal reading development of all learners beyond just getting struggling readers to fluency at decoding; commitment to preventing struggling readers from becoming struggling thinkers; the need for active, principled, thoughtful engagement in reading, writing, and discussion; a conceptualization of texts as

communications from authors rather than as conveyors of information; and acknowledgment of the multiplicity and diversity of text forms with which students must learn to engage successfully. Thus conceptualized, these basics would inform all levels of reading education, although the reading acts in which they will play out will clearly change across the lifespan.

This view of “basic” stands in contrast to the idea of the basics of reading as consisting of the “Big Five,” the pillars of reading (Armbruster, 2010; Armbruster, Lehr, & Osborn, 2001; International Reading Association, 2009). These “pillars” (i.e., phonemic awareness, phonics, fluency, vocabulary, and comprehension) were generated from a large-scale, evidence-based review of available reading literature presented in a report for the National Institute of Child Health and Human Development (National Reading Panel, 2000). A problem with this approach lies in the fact that the scientific literature driving this report was concentrated in the early years of schooling and predominantly emphasized interventions supporting beginning or struggling readers. As a result, whereas the findings from this report illuminate some important aspects of early reading, they do not shed much light on the nature of reading in older learners.

This view of “basic” also stands in contrast to the more recent articulation of the basics of reading in the Common Core State Standards for English Language Arts (CCSS, 2010). Rather than orienting instructional efforts toward early and remedial reading, the CCSS take the goal of reading development (and indeed, all academic development for students in grades K-12) to be college and career readiness. Their “basics” are the anchor standards around which instruction and assessment should be framed to achieve that goal. These standards, separately broken out for literature and informational text, are laid out for each grade level in terms of objectives that students should be able to achieve by the end of that grade, in these areas: key ideas and details, craft and structure, integration of knowledge and ideas, and range of reading and text complexity.

However, the nature of the goal that is established has ramifications for the essentials that are identified. Thus, in our view, the structure of reading offered in the CCSS remains an inadequate characterization of reading development. Basing standards on what college freshmen and entry-level workers need to be able to do with reading to achieve success in those venues does not capture the full range of essential attitudes, knowledge, and capabilities that underlie reading development. In particular, a key element that is missing in the CCSS is the communicative aspect of reading; the reader–author interaction moves to the background (if present at all), and texts are treated as independently existing artifacts inherently possessing greater or lesser complexity (e.g., Graesser, McNamara, & Kulikowich, 2011; Porter, McMaken, Hwang, & Yang, 2011).

Reading as Goal-Directed and Intentional

To do full justice to the goal-directed nature of reading, any definition of reading needs to acknowledge the “authored” character of any text and to take into account the relation between reader and author intentions. So defined, reading can be understood as a relation between the reader and the author via a text. Therefore, when we characterize reading as goal-directed, we are referring to two reciprocal aspects of the meaning-making process. Reading is typically defined as entailing an individual’s interaction with some message represented via written language, perhaps in the presence of other symbolic renderings (e.g., numeric, graphic, or pictorial; Kist, 2008; Unsworth, 2001). Our guiding conceptualization of reading does not disregard this reader—text interaction that is common to most definitions. However, it also takes seriously the realization that there is an author behind whatever message is encountered and a context in which that authored message and the reader interact (Pearson & Tierney, 1984; Shanahan, 1992). For that reason, the reader must give due consideration to goals and intentions of authors in reading any text.

We are encouraged by the acknowledgment of authors’ purpose or message within emerging instructional standards such as the CCSS (2010) or in recent frameworks for summative evaluation such as the National Assessment of Educational Progress (National Governing Board, 2010), PARCC (2010), or SBAC (2012). However, it is critical that these standards or frameworks do not translate into some identification or specification of text “givens” (e.g., “What is the author’s purpose”) but rather evoke a true reflection on or critique of such intentions that may well only be suggested by the text. A consideration of the author’s purpose must begin with consideration of the author; the focus is not on the text itself but on interaction with the author through the text. Without this orientation toward author rather than text, the attention to authors’ purpose or authors’ message in relation to yet another type of text feature or text element that can be decontextualized and turned into a worksheet exercise is inevitable.

Likewise, just as the explicit or tacit intentions of the author are embodied within any text, the intentions of the reader (personally or externally prompted) come into play in the process of reading. The other side of the goal-directedness of reading to which we refer is the intentions or purposes of the reader. We appreciate that there are many purposes or intentions for engaging in the act of reading and that these will shape what happens during the course of the reading act as well as its consequences (Halliday, 1973). In fact, testing situations have become particular and familiar contexts for reading for today’s students and standardized tests have been described as a new genre (Hornof, 2008). However, our particular interest is in the way in which the relation between reader and author, mediated through the text, results in “a relatively enduring change in a person or persons, and

consequently how that person or persons will perceive the world and reciprocally respond to its affordances physically, psychologically, and socially” (Alexander, Murphy, & Kulikowich, 2009, p. 186). Therefore, we see the foundational goal of reading as that of learning from text, whether that text appears in a bound volume, appears on a computer screen, or is displayed by some other multimedia device.

WHAT IS READING COMPETENCE?

Just as reading is multidimensional, developmental, and goal-directed, so too is reading competence (Alexander et al., 2011; Fox & Dinsmore, 2009; see Table 1). Competence as we articulate it here is also dynamic; that is, it represents the ability to modulate and tune the interaction of one’s reading knowledge, beliefs, abilities, and processes appropriately given the sociocontextual conditions confronted, along with one’s own intentions. Moreover, it is precisely the interplay of these salient attributes that characterizes the perspective on competence conveyed here.

To bring this interplay to life, let us return to that 12th grader, Portia, engaged in reading and comprehending history/social studies texts “independently and proficiently” in accordance with the CCSS (2010) standard (p. 61). Consider how this process should modulate when the text is self-selected, the task is reader specified, and the topic (Ancient Egypt) represents an area of personal interest and familiarity to that reader, as compared to when the text is assigned, the task is dictated, and the student’s interest in and background knowledge for the topic are limited. It falls to Portia to recognize these conditions and to respond to them accordingly by means of whatever cognitive and motivational strategies exist within her repertoire if a desired outcome is to be achieved.

In particular, assuming a developmental view of reading demands that one consider how the array of knowledge, beliefs, abilities, and processes that are central to reading continues to grow, transform, and interrelate over time and across situations and contexts. Competence within this framework thus becomes understood as a particular period in that developmental trajectory where readers can more consistently and routinely achieve a depth or richness of understanding across a variety of texts and contexts, if they so choose. When competence is so conceived, basic or emergent reading cannot be defined by one set of skills or processes and competent reading by some alternative set of skills or processes. Rather, competence is about continued growth and advancement within the full complement of reading knowledge, beliefs, abilities, and processes, along with the motivational and sociocontextual dimensions of reading that mark competence.

Of course, there are multiple developmental models that could be applied to reading and produce criteria for identifying reading competence. Just as there are competing theories of neurophysiological, cognitive, or social

development, models of learning and development within reading can similarly vary. The developmental lens through which we view reading competence has been strongly influenced by the decades of theory and research in expertise development and epistemic beliefs. This view reflects work in the Model of Domain Learning (Alexander, 1997, 2003) and domain-specific epistemic beliefs (Buehl & Alexander, 2001; Maggioni, 2010; Maggioni, Alexander, & Rikers, 2009), as well as the empirical and theoretical contributions of many others in psychology and philosophy.

The Role of Expertise

From the perspective of the MDL, and as captured in the description of our 12th grader engaged in history/social studies texts, competence entails a certain configuration of knowledge, strategies, and personal interest that is not typically witnessed among those just gaining a foothold in reading (Alexander, 2003, 2005). Competence is not conceived of as requiring a set of skills or processes truly distinct from the initial period of reading development but rather as a developmental shift in how those dimensions of knowledge, strategies, and interest are used or applied by readers. Although each of these dimensions is independently important to competence, it is the way they configure within this stage of reading development that merits attention. A more extensive description of each of the dimensions is available elsewhere (Alexander, 1997), but we briefly summarize them here. Specifically, for the domain of reading, *knowledge* pertains not only to individuals' knowledge of the domain of reading and of topics belonging to this domain (e.g., grapho-phonemic relations, genres, or literary devices) but also to individuals' understanding of the disciplinary domain (e.g., history or biology) or particular topic about which they are reading (e.g., the Trail of Tears or cellular recombination).

Strategies are the intentional, purposeful, and effortful procedures used to deal with a very particular (e.g., deriving word meaning using context clues) or broader (e.g., identifying a main idea) problem or for a more general concern (e.g., monitoring comprehension or evaluating author's tone; Alexander, 1997, 2005). Those strategies can be surface-level, that is, directed toward making sense of or managing the elements of the problem at hand (e.g., restating or rereading the text, or looking up word meanings). Conversely, efforts can be focused on delving deeply into, transforming, or analyzing the given problem (e.g., questioning the author, evidence seeking, or rerepresenting the text).

Beyond these more cognitive dimensions of reading, there are also critical motivational factors that guide performance. The goals that individuals set for themselves or their learning intentions (Alexander et al., 2009), intrinsic motivation (Oldfather & Dahl, 1994; Turner, 1995), or individuals' "can-do" beliefs (i.e., self-efficacy) are among these motivational factors (Baker & Wigfield, 1999; Schunk, 2003). The motivational construct on which we have primarily focused our re-

search has been *interest*. That interest may come in the form of heightened attention, engagement, or curiosity sparked by situational features of the task, text, or context (Hidi & Anderson, 1992; Schraw, Bruning, & Svoboda, 1995; Schraw, Flowerday, & Lehman, 2001). Or it can refer to a more enduring and stable form related to the individual's personal involvement in, identification with, or passion for the domain or topic in which individuals are engaged (Hidi, 1990; Murphy & Alexander, 2002; Schiefele, 1991).

Again, these dimensions of knowledge, strategy use, and motivation are in place from the onset of reading development through the attainment of competence and even expertise (Alexander, 2005). What distinguishes those who are new to or just gaining a foothold in the domain of reading (i.e., those in acclimation) from those who have attained competence is the way these forces reposition themselves and drive the learning process. Specifically, acclimating readers not only are trying to acquire foundational knowledge about reading but also are often relying on surface-level strategies to help them deal with the novel and unfamiliar texts they encounter (Dinsmore, 2011). What complicates this process further is that many young learners are at the same time acclimating to many other academic domains as well. Thus, they cannot draw on their knowledge of the given topic or domain in order to bootstrap their reading performance. Those in acclimation are also apt to rely heavily on features of the text, task, and context to motivate their engagement and sustain their performance (Alexander & Jetton, 2000).

By contrast, the reading-related knowledge of competent readers is both quantitatively and qualitatively different (Alexander, 2005). That is, these increasingly competent readers have much more knowledge of reading upon which to rely and that knowledge is appreciably more principled in nature. This means that these competent readers can, for example, see the relations between text structure and the author's purpose or argument, or they can appreciate how the author's specific choice of words or phrasing makes a text more persuasive or more interesting. In addition, it is expected that competent readers have an ample strategic repertoire upon which to rely, and they come to use both surface-level and deep-processing strategies in a manner that suits the text, task, and context (Pressley & Wharton-McDonald, 1997). Competent readers are also expected to think critically and analytically about the ideas encountered in text (e.g., Chinn, 2006; Clark et al., 2003; Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009).

Further, with this growing and more cohesive base of reading-related and world knowledge and an array of strategic tools, competent readers are expected to display more interest in reading even in those situations where the task is unfamiliar or complex and the text is particularly demanding or somewhat uninviting (CCSS, 2010; National Governing Board, 2010; RAND Reading Study Group, 2002). This interest is fed by competent readers' engagement with suitably challenging texts and tasks that allow them to apply their

linguistic abilities in the pursuit of knowledge not just about reading but also about the world that is open to them through their reading competence. Rather than relying on external text and task features for motivation, competent readers are able to use personal and preexisting knowledge and interest as motivation for engagement (Wigfield et al., 2008). We would further propose that the richer engagement exhibited by competent readers applies not only to traditional forms of text but also to hypermedia texts and to the many variants of text in the online world, a proposal supported by Leu et al. (2004).

The Role of Epistemic Competence

When we introduced the notion of competence, we described it in terms of the ability to modulate and tune the interaction of one's reading knowledge, beliefs, abilities, and processes appropriately given the sociocontextual conditions confronted, along with one's own intentions. This aspect of competence is particularly reflected by certain stances toward knowledge and knowing (i.e., epistemic beliefs) that are integral to the nature of reading and competence in that domain. The current literature on epistemic beliefs considers that individuals may hold more or less adaptive beliefs about the simplicity or complexity of knowledge, the ease or difficulty of knowledge acquisition, the certainty or uncertainty of what is known, and the evidence required to substantiate the veracity of information (Kardash & Scholes, 1996; Qian & Alvermann, 1995; Schommer, 1990; Schommer, Crouse, & Rhodes, 1992; Stanovich & West, 1997).

Over the past decade or so, there has been a growing awareness in the educational research community that epistemic beliefs can influence how individuals learn and what they learn (Greene, Muis, & Pieschl, 2010; Hofer, 2004; Murphy, Edwards, Buehl, & Zeruth, 2007). It has been repeatedly demonstrated that those who embrace the complexity of knowledge, who appreciate the time and effort required to achieve understanding, who recognize that many ideas are not simply right or wrong, and who realize that knowledge demands some manner of justification are more likely to be those who achieve well academically or who have arrived at higher levels of expertise than those who espouse less competent beliefs (Bromme, Kienhues, & Stahl, 2008; Wineburg, 2001; Wood & Kardash, 2002). For instance, students with competent epistemic beliefs perceive the process of knowing as effortful and its outcome provisional (Alexander, 2009; Kardash & Scholes, 1996; Stanovich & West, 1997), evaluate sources of "proof" for accuracy and suitability (Bråten, Strømsø, & Samuelstuen, 2008; Lee & Ashby, 2000; Lee & Shemilt, 2003; Rouet, Marron, Perfetti, & Favart, 1998; Wineburg, 1991, 2007), and question the fallibility of sources, even those widely considered to be authorities (e.g., authors or teachers; Mason, Boldrin, & Ariasi, 2010). With regard to reading, competent epistemic beliefs

call for acknowledgment of the authored nature of text and awareness of the need to justify one's interpretation of the meaning of text (Alexander et al., 2011; Maggioni, Fox, & Alexander, 2010a).

Epistemic competence includes the beliefs about knowledge and knowing just described together with one's ability to suitably adapt to the contextual and intentional dimensions at hand (Alexander et al., 2011; Henderson, 1994). In contrast, within the early stages of reading development, it is quite probable that readers possess certain nonfacilitative beliefs about knowledge and knowing that potentially hinder their attainment of competence, as has been found to varying degrees in other domains (Bråten et al., 2008; Muis, 2004; Schommer, 1990; VanSledright, 2002). For instance, those in acclimation may well believe that knowledge about reading is rather simple and straightforward, when in reality it is complex and often situational. These acclimating readers may expect such knowledge to be procedural and universally applicable. The consequences of such beliefs include an approach to reading as a relatively passive process of receiving the one correct meaning transmitted by the text (Schraw & Bruning, 1996, 1999). Thus, students may become easily frustrated when texts do not afford a quick and simple recovery of such meaning, and they may be unaware of the need to personally engage in the construction of meaning (Schommer, 1990; Schommer et al., 1992; Schreiber & Shinn, 2003; Songer & Linn, 1991).

Competent readers, by comparison, should manifest much different perspectives on knowledge and knowing. They should generally expect that knowledge is inherently complex—even the simplest of words have varied meanings shaded by the textual context in which they appear, for instance. Competent readers should also recognize that knowing will typically entail effortful pursuit and a questioning mind, which looks for confirming or disconfirming evidence within and across texts (Chinn & Anderson, 2000; Murphy et al., 2009). They should also appreciate that the justification they seek may well vary in form and character depending on the academic domain (e.g., history vs. mathematics), the context (e.g., at home vs. in school), and the task (e.g., for fun vs. for external evaluation).

In sum, our conception of reading competence considers reading-related abilities and processes in light of the readers' expertise development and epistemic beliefs. That is to say, we believe that competent readers not only display appropriately skillful abilities and processes but also have interest in and knowledge about reading, and hold competent epistemic beliefs about the nature of reading. Moreover, competent reading is informed by the context in which reading occurs and by the level of evidence or justification warranted by that context. For our 12th grader, Portia, engaged in reading history/social studies texts, the evidentiary demands placed on reading for her own purposes or pleasure versus for certain academic tasks could rightly be appreciably different, even if

the texts themselves were held constant. In this way, reading competence, as with competence in any domain, is marked by adaptive and consistent (i.e., what we identify as higher-order) thinking on the part of the reader and by performance that is principled in its focus and disciplined in its processing (Alexander et al., 2011).

We now turn to a critical examination of the challenging context facing today's learners to better understand how the perspective on reading and reading competence we have forwarded plays out within contemporary society. Again, our intention is not simply to document *what is* but to use that description to project *what will be*, as we move deeper into the 21st century.

THE 21ST-CENTURY CONTEXT

How do we begin to capture the complex and challenging context in which today's students find themselves? To address reading in this 21st-century context, we examine its salient characteristics and the particular affordances and challenges this context may present. In what follows we focus on those issues we deem most relevant and pressing for the development of reading competence.

Features of the 21st-Century Context

It is no overestimation to say that today's readers are surrounded by vast amounts of available information from the moment they awaken to the moment they go to sleep. The current information glut and the exponential rate at which the amount of information available continues to grow have been well documented (Bohn & Short, 2009; Gantz et al., 2008). With regard to printed material, for example, it was estimated that nearly 125 million books were in print by the beginning of 2011, with 15 million available digitally (Michel et al., 2011). Further, including digital publications with print publications, the output of new books has risen 40% since 2001 (Nielsen Book, 2011).

Along with the increasing quantity of print and digital media, the ways in which the reader gains access to text have expanded as well. The advent of the digital age has brought with it new types of online texts such as Internet pages, ebooks, hypermedia, blogs, and databases accessed by search engines. Recent studies by the Pew Center for Internet and American Life found that 93% of adolescents, ages 12 to 17, use the Internet (Pew Research Center, 2009), and 59% of adults use search engines on a daily basis (Pew Research Center, 2011).

In some cases, such as linear online texts, the structure of the text differs little from that of the printed text (d'Haenens, Jankowski, & Heuvelman, 2004; Taylor, 2011). However, some forms of digital media differ from traditional text in substantive ways. For example, hypermedia is characterized

by what has been termed "flexibility of information access," that is, nonlinear presentation of digital information that users can access in any order (Shapiro & Niederhauser, 2004).

In this 21st-century reading context, not only are there new text presentation formats, but the ways in which individuals engage with these formats may be changing as well. For example, an extensive study of the media lives of more than 2,000 preadolescent and adolescent students not only documented a noticeable increase in overall media use daily for children and youth in just 5 years (from 6 hr 21 min to 7 hr 38 min) but also found evidence that engagement with traditional print continues to lag well behind the use of digital, multimedia technologies among preteens and teens (Rideout, Foehr, & Roberts, 2010). These school-aged learners are also engaged in much more receptive use of media (e.g., listening to music or watching television) than in participatory reading acts (e.g., reading print), according to Rideout and colleagues.

Another salient aspect of the 21st-century reading context is a notable shift in how reading instruction is presented in schools. The prevalence of instructional methods aimed at teaching to the test, in conjunction with the high-stakes nature of such assessments, guides much of current reading instruction (Abrams, Pedulla, & Madaus, 2010; Hoffman, Assaf, & Paris, 2001; Paris & Urdan, 2000). It appears that much of school time and the academic agenda are devoted to ensuring that students pass the high-stakes assessments that now function as the benchmarks for a literate society (e.g., Au, 2008; Schraw, 2010).

This instructional tendency may well have been exacerbated by the increased demand for more curricular content with which teachers and students must deal (VanSledright, 2008); teachers are required to deal with far too much content in far too short a time span, with potential associated costs for students in terms of the depth and quality of the knowledge they are able to build (e.g., Cates, Burns, & Joseph, 2010; Schwartz, Sadler, Sonnert, & Tai, 2009). Recent efforts to provide a unified, standard curriculum related to reading and other academic subjects (e.g., CCSS, 2010) have tried to address this problem by concentrating on a limited set of instructional goals. These standards address some aspects of reading development that have frequently been neglected, such as extending reading instruction beyond the elementary grades and recognizing the importance of reading a variety of text types. Yet these standards also raise issues of their own, by failing to account for individual differences in developmental trajectories, by reducing reading comprehension to the mastery of a scripted series of goals, and by treating texts as authorless.

We have identified certain features of the 21st-century context that may impinge on developing readers and on the development of reading competence. We now turn to consider the nature of the specific challenges these contextual features may offer.

Challenges for Readers in the 21st-Century Context

Although acknowledging that potential advantages for readers and learners in the 21st century are numerous (e.g., Cold, 2006; Perse & Ferguson, 2000), we see these advantages as inextricably tied to challenges. For instance, the accessibility and the varied formats of information now available present significant opportunities for today's learners (Arsham, 2002). However, the need to deal with, make sense of, and build knowledge from such a variety of sources poses challenges for the reader that make the development of reading competence an even more pressing concern in the 21st-century context. We focus our efforts here on the challenges for reading development when reading is understood as we have framed it: multidimensional, developmental, and goal-directed.

Considering reading as entailing the interaction of cognitive, motivational, and sociocontextual factors, we see challenges for reading development related to the increased amount and speed by which information can be accessed, as well as the tendency for simultaneous processing in today's students. A challenge associated with the unprecedented amount of information now accessible is that high value appears to be placed on easy access to increasing amounts of information, rather than on the quality of that information (Fast & Campbell, 2004; Flanagin & Metzger, 2007; Liu, 2004; Metzger, Flanagin, & Zwarun, 2003; Rieh, 2002; Rieh & Hilligoss, 2007).

Another issue is the reliance on such aids as general search engines to provide direct delivery of answers, thereby allowing the user of information resources to go from question to answer with as few steps and as little reflection as possible (Garoufallou et al., 2008; Pan et al., 2007; Salmerón, Gil, Bråten, & Strømsø, 2010). The breadth of information readily available encourages students to "find" the answer rather than applying and synthesizing information to develop solutions of their own (Fidel et al., 1999; Jenkins, Corritore, & Wiedenbeck, 2003; Lazonder, Biemans, & Wopereis, 2000). In addition, readers tend to limit the role they play in identifying and locating sources. Search engines such as Google and Bing present searchers with millions of sources in seconds, based on opaque popularity and relevance algorithms, with the consequence that readers frequently rely on the first few sources presented (Griffiths & Brophy, 2005; M. Smith, Gertz, Alvarez, & Lurie, 2000).

In addition, researchers have documented students' difficulty with learning from multiple sources (e.g., Bråten et al., 2008; Stahl, Hynd, Britton, McNish, & Bosquet, 1996), a situation in which readers find themselves when navigating the increasingly complex informational terrain. Students' interactions with these sources range from finding information by scrolling through multiple texts (Coiro & Dobler, 2007) and integrating textual, graphic, and multimedia information, (Mayer, 2002; Mayer & Anderson, 1992) to constructing representations of the interrelations between sources (Perfetti,

Rouet, & Britt, 1999; Stahl et al., 1996). Students are now asked to navigate hypertexts (Rouet, 1996; Rouet & Passerault, 1999), gather information from modules and computer learning environments (Winters, Greene, & Costich, 2008), and search for texts online (Fidel et al., 1999; Schacter, Chung, & Dorr, 1998).

Along with its potential advantages, hypermedia may present particular challenges to readers (for a review, see Dillon & Gabbard, 1998; Shapiro & Niederhauser, 2004). For example, researchers have found that hypermedia users can be categorized into different profiles characterized by how they move through this type of text environment, with these different profiles associated with different levels of success in learning from hypermedia (Barab, Bowdish, & Lawless, 1997; Lawless & Kulikowich, 1996). More generally, a comparative analysis of reading behaviors found that readers exhibited different behaviors for digital versus print texts, being more likely to scan for keywords and to read nonlinearly and selectively when reading digital texts (Liu, 2005). Differences have also been found between printed and digital text in terms of readers' ability to understand the text, their interest in the text, and the perceived credibility of the author, with printed text being perceived as more comprehensible, interesting, and credible (Matthew, 1997; Murphy, Long, Holleran, & Esterly, 2003; Sutherland-Smith, 2002).

For the 21st-century reader, the time and place of reading is frequently situated within a context that places competing demands on the reader's cognitive and motivational resources. The survey data provided by Rideout et al. (2010) and others (Foehr, 2006; Lenhart, Madden, & Hitlin, 2005) testify to a pattern of media multitasking among school-aged learners. What these survey data do not convey, however, are the short-term and possible longer term effects of such multitasking on students' knowledge development and learning. With regard to the short term, there is no reason to assume that today's students are able to engage deeply in multiple cognitive tasks. There is only so much cognitive attention that can be directed to nonhabituated activities at any point in time (Paas, Renkl, & Sweller, 2003; Sweller, 1994). The research on multitasking increasingly supports the conclusion that when multiple tasks are in operation, fragmented and distributed cognitive and motivational attention typically result (Bowman, Levine, Waite, & Gendron, 2010; Lin, Robertson, & Lee, 2009). Even when initial learning is not impaired, what is learned under conditions of dual-task distraction may be learned less deeply and applied less flexibly (Foerde, Knowlton, & Poldrack, 2006).

In addition, over the long term, there is emerging evidence that repeated or intensive engagement in media multitasking may be related to an inability to attend deeply and to a focus on a superficial level of processing (Levine, Waite, & Bowman, 2007; Ophir, Nass, & Wagner, 2009; Wallis, 2010). It is a serious concern that students may gain the impression that they are managing multitasking effectively in their more superficial and passive interactions with media. Their

performance in reading not only for school but also for their own purposes will be hindered if they fail to recognize the actual cognitive and motivational demands associated with engagement in higher-order thinking, deep-level processing, and the attention to multiple intermediate goals required for the understanding and evaluation of text (Alexander et al., 2011; Fox, Maggioni, Dinsmore, & Alexander, 2008; Pressley & Afflerbach, 1995).

With regard to the goal-directed nature of reading, the 21st-century context brings forward concerns that were pertinent in earlier decades, in addition to posing some unique challenges of its own. In studies of competent reading (e.g., Fox & Dinsmore, 2009; Fox, Dinsmore, & Alexander, 2007; Maggioni & Fox, 2009), a somewhat discouraging phenomenon has been observed. Among even “good” middle school, high school, and undergraduate students, there is the propensity to treat even printed text as an authorless and decontextualized construction, which then negatively affects the range of processing and the critical analytic thinking that these preadolescent and adolescent readers exhibit. This already-occurring propensity may be further reinforced by the view of text underlying the treatment of reading in the CCSS (2010), where texts are presented as relatively authorless, suggesting that texts are to be decoded and understood irrespective of the author’s initial intent. Moving into the online realm, the author, publisher, and source of a given text are masked when it appears as a hit on a Google search page; with texts and sources of different types presented identically in format, alongside one another, today’s users of online media are increasingly discouraged from evaluating the quality of texts based on “sourcing features.” Uncovering and understanding author purposes and intentionality is not an easy task for students (Thompson, 2003), a difficulty that is exacerbated when such text features are not readily accessible.

Within the academic context of schools, the tests and curricula designed with the purpose of supporting reading in the 21st century present an array of motivational, cognitive, and sociocontextual demands and issues that pose challenges for the developing reader. The nature of high-stakes assessment and the concomitant instruction and curricula provide a minimum benchmark of reading performance that students are expected to achieve. However, such measures of performance frequently neglect motivational and strategic factors involved in reading (Afflerbach et al., 2011; Valencia et al., 2011). Although models of reading development have long supported the development of interconnected processes (e.g., interest, strategic processing; Alexander, 2003; Kintsch, 2004), school-based assessments infrequently measure these as hallmarks of an individual’s reading development. Moreover, these texts and testing situations often run counter to the support of motivation and interest that are necessary for full engagement of the reader’s cognitive and strategic processes (Guthrie & Wigfield, 2005).

The context of high-stakes testing also presents challenges with regard to the nature of the developmental milestones that

such assessments provide for readers in 21st-century classrooms. Schools have increasingly turned their attention to test preparation rather than to learning or to optimal academic development (Abrams et al., 2003; Gunzenhauser, 2003; McNeil, 2000). Perhaps this would not be so problematic if the assessments that have become the touchstone for academic excellence among the public, policymakers, and some educational leaders actually required critical analysis from those tested, that is, if successful performance came only by way of deep, intense, and reflective thought. Regrettably, that is not the case (Alexander & Riconscente, 2005), and the developmental range of reading has often become unnecessarily constrained by the goals provided in such assessments.

Taken together, the aforementioned concerns regarding both the school and the broader sociocultural context present a set of intertwined challenges for reading competence in the 21st century. Indeed, the challenges we have identified evoke the need for readers to be highly adaptive, reflective, strategic, and engaged. However, although the challenges we have depicted are unquestionably tied to the contemporary world of hypermedia and online reading, the ability of the reader to adaptively ply foundational knowledge, beliefs, attitudes, and processes in the context at hand have been, and will always be, the hallmark of competent reading in any age. Thus, instead of arguing for a new form of reading for the 21st century, we argue instead that the challenges of the current context simply highlight what we feel is becoming an ever more vital need: the development of reading competence. With this in mind, we now turn to the question of how competent reading for the 21st century can best be realized.

PROMOTING COMPETENT READING FOR THE 21ST CENTURY

What can those who seek reading competence for themselves or who support the development of competence in others do to harness the possibilities of this age while responding to its challenges? As seen in Table 2, our response to this question takes the form of juxtaposing our characterization of reading and reading competence to the challenges confronting today’s readers. We begin this discussion with the realization that the complexity of the issue precludes any fine-grained delineation of potential responses to the aforementioned challenges. Rather, we must look broadly at the question and at suitable responses, guided by the foundational characteristics of reading competence as developmental, multidimensional, and goal directed.

Specifically, we offer three guiding premises and associated instructional actions that we feel hold great promise (see Table 2). We devote the bulk of this discussion to the teaching of high-leverage meta-strategies (e.g., metacognitive, self-regulatory, and epistemic strategies). We particularly focus on what we regard as new meta-strategic territory, relational reasoning strategies, which both allow for the effective

TABLE 2
Summary of 21st-Century Reading Challenges and Proposed Responses

<i>Contemporary Challenges</i>	<i>Measured Responses</i>
<ul style="list-style-type: none"> • Informational deluge • Increasing speed of informational transmission • Rapid expansion of presence and use of multimedia, online texts • School-aged learners now engaged in much more receptive use of media • Much of school time devoted to preparing students for high stakes assessments • Tendency to “cover the content” in classrooms • Increased reliance on such aids as general search engines in information search • Students’ documented difficulty with learning from multiple sources • Competing demands placed on readers’ cognitive and motivational resources by multiplicity of reading forms and contexts • Possible association of multitasking with inability to attend deeply to text processing • Text viewed as “authorless” documents • Evidence of students’ nonadaptive or nonfacilitative beliefs about knowledge and knowing 	View Reading Through Lifespan Developmental Lens
	<ul style="list-style-type: none"> • Accept reading as a complex domain in which readers develop throughout their lifespan • Focus on the growth and interplay among knowledge, strategies, and motivations that signify movement toward competence in reading • Acknowledge that reading and readers must continue to adapt to new technologies and new forms of reading engagement • Provide support for critical, analytic engagement with any forms of media • View reading and learning as co-occurring, codependent processes
	Seek Principled Knowledge
	<ul style="list-style-type: none"> • Strive for qualitative as well as quantitative change in academic knowledge • Organize knowledge around core principles and concepts that define the topic or domain • Incorporate awareness of the author’s presence, purpose, and his or her use of writer’s craft in the evaluation of texts
	Teach High-Leverage Meta-Strategies
	<ul style="list-style-type: none"> • Focus on strategies having broad utility and applicability, such as metacognitive, self-regulatory, epistemic, and relational reasoning strategies • Guide readers in establishing epistemic criteria and in selecting and initiating epistemic strategies • Support readers in building meaningful associations within informational arrays by means of relational reasoning strategies • Counter piecemeal understandings of texts by instructing readers in relational reasoning strategies involving analogical, anomalous, antithetical, and antinomous processes

management of the information deluge that marks this century and promote the meaningful and critical processing requisite for the enduring, adaptive, and principled understanding that is the hallmark of competent reading.

View Reading Through a Lifespan Developmental Lens

As we have suggested, a critical step that must be taken is to reframe how both reading and reading competence are conceptualized in research, policy, and practice. We should begin with an acceptance of the reality that reading is, in fact, an academic domain in which readers can continue to develop throughout their lifespan (Alexander & Jetton, 2000). Without such a developmental perspective, it is highly likely that reading education will continue to be reduced to a set of some discrete set of basic skills (Hoover & Gough, 1990) that, once achieved, can be set aside and replaced with some alternative set of competencies that mark a more capable reader (Pressley & Wharton-McDonald, 1997). Within such a perspective, however, a number of fruitful questions arise.

For instance, how does reading-related knowledge become increasingly more principled and intertwined with knowledge of the world and of other academic domains? How do once-acclimating learners become armed with the knowledge, strategies, and motivations that would permit them to tackle increasingly more complex and demanding texts while addressing problems that require adaptive, reflective, evaluative, or critical thinking?

The influences of multimedia on reading development in the 21st century must also be taken into account (Fox & Alexander, 2009; Reinking, 2005). We must recognize that as new technologies and new forms of reading engagement emerge, competent readers will be those who have the flexible adaptability that allows for effective and critical engagement with any kind of media, from a printed document to a net of resources accessible through a web page on a screen.

Finally, we reiterate that this developmental perspective on reading indicates that reading and learning are always co-occurring processes. What one knows about reading opens the doors to other realms of knowledge, just as one’s knowledge of the topic or domain alters the very nature of the

reading act (Gibson & Levin, 1975). Thus, there should be a concerted effort in reading policy and practice to promote a relevant knowledge base among acclimating readers about critical concepts and important academic topics; this knowledge base cannot be sacrificed for the sake of language learning. In this regard we welcome the attention in the CCSS (2010) to the reading of varied text types and to the reading of informational texts by even young readers. Conversely, we are also aware that the emphasis in recent standardized testing programs on reading and mathematics (e.g., No Child Left Behind or Race to the Top) may have led to a focus on decontextualized procedural knowledge at the expense of the development of foundational conceptual knowledge.

Seek Principled Knowledge

The power that is afforded by one's knowledge does not lie simply or solely in the amount of that knowledge but as much in its character. A key feature in the move from acclimation to competence is not simply a difference in knowledge quantity; rather it is a fundamental change in knowledge quality (Alexander, 1997). As learners progress along their developmental path, their greater knowledge is also to a greater degree meaningfully organized around core principles and concepts that define the topic or domain under consideration.

Competent readers come to traditional or alternative texts with some knowledge of the topic or domain about which they are reading (Ozuru et al., 2009). The more principled knowledge of that topic or domain they have, the more prepared readers are to delve deeply into the text or to comprehend and retain critical understandings from the reading act (Fox, 2009). Competent readers grasp the interrelations among the ideas or events encountered in text (Fox, 2009). For instance, they see how an author's purpose is tied to text structure and how the descriptions, explanations, arguments, or evidence offered within the author's message not only shape that text structure but also serve the author's intended purpose (Meyer, 1987). Competent readers also appreciate that their awareness of an author's purpose and his or her use of a writer's craft comes into play in evaluating the text as reflecting that purpose or craft (Pressley & Afflerbach, 1995).

Teach High-Leverage Meta-Strategies

Throughout this examination, we have stressed the complexity of reading and have argued that a key to competence now and in the future lies in readers' ability to understand and respond flexibly and appropriately to the demands of a given text or texts processed for some purpose within a particular time and place. We have argued that competent readers are adaptive and oriented by and toward their principled knowledge, able to search for relevant content within a sea of information, and oriented toward the level and form of evidence or justification that the conditions warrant. With-

out question, such effective, evidence-based, and adaptive processing requires readers equipped with an extensive and well-honed repertoire of cognitive, metacognitive, and motivational strategies (Afflerbach, Pearson, & Paris, 2008; Pressley & Afflerbach, 1995; Salmerón, Kintsch, & Kintsch, 2010) that facilitate comprehension and evaluation of text.

Clearly we cannot begin to do justice here to the extensive array of strategies that merit attention within the instructional setting. For that reason, we have chosen to focus this discussion on a class of strategies that speak directly to the challenges confronting contemporary readers, as well as to the adaptability and evidence-based thinking indicative of competence. We refer to this class of high-leverage procedures as meta-strategies to signal their broad applicability across texts, tasks, time, and contexts. Among these meta-strategies, we would include metacognitive (Flavell, 1979) and self-regulatory strategies (Bandura, 1982; Zimmerman & Schunk, 2001, 2011), as well as epistemic and relational reasoning strategies.

Metacognition and Self-Regulation

As noted by Dinsmore, Alexander, and Loughlin (2008), metacognition and self-regulation are related but distinct constructs that are essential for academic success. Metacognition, as first articulated by Flavell (1977, 1979), refers to "thinking about thinking" (Miller, Kessel, & Flavell, 1970, p. 613). When readers reflect on their cognitive experiences, judge their understandings vis-à-vis some cognitive task, and consider what responses or actions may be required, they are engaged in metacognition. Because metacognition deals primarily with reflective abstraction in relation to new or existing cognitive structures, Moshman (1982) labeled it *endogenous constructivism*.

Competence in any domain, including reading, for this century or for centuries past or future cannot transpire without the self-reflection embraced by metacognition. Over the decades that have passed since Flavell first pointed our attention toward metacognition as a key to cognitive development, extensive empirical research have substantiated its role in learning and academic achievement (e.g., Veenman, Van Hout-Wolters, & Afflerbach, 2006). The connection between metacognition and reading competence has likewise been well documented (Baker & Beall, 2009; Paris & Oka, 1986).

As with metacognition, self-regulation has a long history within education and has been shown to relate to academic success (Zimmerman & Schunk, 2001, 2011), including success in reading (Schunk & Zimmerman, 2007; L. E. Smith, Borkowski, & Whitman, 2008). As conceptualized by Bandura (1982, 1986) self-regulation emphasizes the reciprocal determinism of the environment and the person, mediated through behavior. To perform well at some given task within some specified context, individuals must be able to exert control over not only their cognitions but also their

motivations, physical conditions, and their affective/emotional state. As a consequence of the strong focus on external conditions and the behavioral responses to those conditions, Moshman (1982) characterized self-regulation as a type of *exogenous constructivism*.

What is the significance of these two meta-strategies, metacognition and self-regulation, for meeting the challenges of competent reading in this century? What these two meta-strategies demand are reflective and aware readers: those who are not adrift in the flood of information confronting them but who seek to direct or steer the course of their processing and learning through the choices they make. Those choices are further informed by a level of self-knowledge juxtaposed upon the goals of a given or chosen task set within a particular time and place. Readers who are metacognitive and self-regulatory do not habitually surrender the decision-making processes to others, real or virtual (e.g., search engines) but determine when and to what level they must exert control over their own learning and performance.

Let us return to our 12th grader engaged in studying history to illustrate the importance of metacognition and self-regulation. Let us assume that Portia must prepare to demonstrate an understanding of assigned readings about the decline in Egyptian civilization following the Golden Age on an upcoming test. Based on prior tests (metacognitive experiences), she must judge her cognitive ability for such a task not just globally but also in terms of her specific cognitive strengths and weaknesses (metacognitive self-knowledge). She must then ascertain what actions or strategic approaches make sense in this situation (metacognitive strategy knowledge). Ultimately, Portia must execute those planned strategies and monitor their effectiveness during the studying period (cognitive self-regulation). She must also be aware of and responsive to any emotional or affective issues that arise, so that she can persist at her studying (emotional/affective self-regulation). Finally, Portia must at some point come to the determination that she has prepared adequately to meet the goals she has established for this particular academic task (metacognitive goals).

Epistemic Strategies

In 1983, Kitchener proposed that when faced with a complex problem for which a simple, agreed-upon response is not apparent or most appropriate, individuals engage in three levels of processing: cognitive, metacognitive, and epistemic. In Kitchener's model, the initial cognitive level entails such mental activities as perception, reading, memorizing, or computing that provide access to the surface or deep features of the problem at hand. There is also the metacognitive level that, as we have just discussed, encompasses reflection or monitoring of individuals' performance as they initiate actions or move toward a solution. The third level of Kitchener's model is epistemic cognition, which she argues involves spe-

cific reflection on the nature of knowledge and knowing and the establishment of criteria for knowing.

Recently, others have delved deeper into the topic of epistemic cognition and have focused on the question of how individuals come to establish the criteria they subsequently apply to judge or justify their understanding. For instance, Pluta, Chinn, and Duncan (2011) examined the criteria (e.g., accuracy, explanatory scope, or parsimony) that middle school students used in judging the "fit" of scientific models to available data. Similarly, List et al. (2012) investigated the epistemic and nonepistemic reasons that college students gave for selecting online sources to address more factual versus more open-ended questions. Overall, what this growing body of research on epistemic cognition and epistemic criteria suggests is that students engage in a particular form of strategic processing when they are determining what forms and what levels of evidence need to be pursued to accept the claims of a given text that will be used to accomplish a specific task, within a particular context (e.g., academic). This special class of strategies has been labeled as *epistemic strategies* (Hofer & Sinatra, 2010; Ritchter & Schmid, 2010).

According to Ritchter and Schmid (2010), when readers' actions are "aimed at validating the knowledge claims raised in expository or informational texts" (p. 49), they are manifesting epistemic strategies. These researchers conducted two experiments with university students in order to model the potential relations among epistemological attitudes, self-regulation, and epistemic strategies. For these studies, they focused on two kinds of self-reported epistemic strategies during the reading of academic texts: consistency checking and knowledge-based activation strategies. Consistency checking strategies pertained to the active monitoring of the internal consistency of the assigned text (e.g., "During reading, I looked for evidence presented for the claims made by the text"), whereas the knowledge-based validation strategies had to do with checking the textual content against prior knowledge and experiences (e.g., "I asked myself whether the information presented in the text matches with my own experiences"). On the basis of the mediation and moderation models they analyzed, Richter and Schmid concluded that, "in contrast to other types of learning strategies, the use of epistemic strategies seems to be strongly and consistently linked to epistemological attitudes and beliefs" (p. 47).

We mention this line of inquiry because the concept of epistemic strategies—especially when it reflects the articulation and enactment of epistemic criteria for determining what form and what level of evidence are relevant in learning from a given text—is central to the notion of epistemic competence we have forwarded. Further, as with metacognitive and self-regulatory strategies, those seeking to promote competent reading in themselves or others cannot assume that the ability to formulate evidentiary criteria or to devise the means of enacting and monitoring the actions those criteria indicate is naturally developing. Rather, as the decades of research in cognitive, metacognitive, and self-regulatory

strategies would suggest, epistemic strategies will most certainly require nurturance and extended practice over many texts, tasks, and contexts.

Consider the case of our 12th grader Portia as she is preparing to demonstrate an understanding of assigned readings on the decline in Egyptian civilization following the Golden Age on an upcoming test. Along with her motivations to do well and her general cognitive and metacognitive abilities, how she defines what “understanding of the readings” means will also play a critical part in what she does as a learner. Will these texts convey to her the voices and the intentions of their authors or will she perceive them as holding discrete pieces of information? Will she retain only those parts of the texts that fit with her prior knowledge and opinions, or will she begin to formulate criteria for judging the reliability of accounts and the plausibility of historical explanations proposed by the readings? Further, in terms of her epistemic strategies, how does she manage the task demands with regard to epistemic criteria in relation to her existing knowledge, interests, and intentions? The bottom line, we would argue, is that these issues cannot be left to chance or to any natural developmental trajectory but must be systematically acknowledged and addressed as part of a mission to promote Portia’s competent reading of historical texts. The role that academic tasks and types of assessment may play in this regard should not be overlooked (VanSledright, 2012).

Relational Reasoning Strategies

In Kitchener’s (1983) aforementioned processing model, she regarded cognitive processes such as perception and reading as the entry level to more reflective, deeper understanding. It might be mistakenly assumed that such processes are rather superficial, subordinate to more important metacognitive, self-regulatory, or epistemic strategies. In fact, it is our argument that the challenges we have described for competent reading in the 21st century can be meaningfully and directly addressed by learning to harness the power of rule-based processes that we have labeled *relational reasoning strategies*. Relational reasoning strategies are those cognitive procedures purposefully applied to recognizing or deriving meaningful relations or patterns between and among pieces of information that would otherwise appear unrelated. By their very nature, relational reasoning strategies require individuals to engage in a deeper processing of information than would typically occur (Stephens, 2006). Moreover, such strategies serve as a counter to the tendency to treat information in a piecemeal or isolated manner, and thereby contribute to the likelihood of developing more principled knowledge (van Gog, Paas, & van Merriënboer, 2004).

Relational reasoning strategies promote cross-text, cross-task, and cross-domain thinking, thereby promoting the transfer of knowledge from one specific situation or context to another (Bereby-Meyer & Kaplan, 2005). Because they require consideration of the attributes or features of information in its

many forms, relational reasoning strategies have the potential to heighten readers’ attentional and perceptive abilities (e.g., Dunbar & Fugelsang, 2005).

Although there are various relational reasoning strategies that might be examined, we wish to mention four that we regard as particularly basic for forging associations between and among pieces of information, and as having potential applications related to adaptive, reflective, competent reading: analogy, anomaly, antinomy, and antithesis. Analogy and anomaly have been widely studied in relation to learning and problem solving (Hacker, 1997). As such, their value as relational reasoning strategies is somewhat established. Antinomy and antithesis have been less widely studied but are offered as suggestions to foster the type of thinking required for 21st-century reading.

Analogy. Of these four relational reasoning strategies, *analogies* and *analogical reasoning* are perhaps the most empirically studied (Cosgrove, 1995; Gentner & Markman, 1997; Glaser, 1984; Hong & Liu, 2003; Novick, 1988). There are those in the research community who would argue that analogical reasoning is the very basis for concept formation or for knowledge transfer (Alexander & Murphy, 1998; Salomon & Perkins, 1989). Fundamentally, an *analogy* involves the recognition of relational similarity between two seemingly disparate ideas, objects, or events (Hesse, 1959). In analogical reasoning, there is the effort to construct meaningful associations or relations between objects or events that initially appear dissimilar.

Competent readers use this analogical strategy across and within text. For example, competent readers who are able to integrate knowledge from multiple printed texts may analogically apply their knowledge and strategies for that type of task to integrating ideas in a hypertext environment. Or readers might look for structural and stylistic similarities within and across texts in addressing questions related to genre, theme, or author craft. Our 12th grader Portia might recognize that the accounts she has read about the decline in Egyptian civilization following the Golden Age include certain themes having strong similarities to the reasons given in certain history texts to explain the decline of the Roman Empire—*analogical reasoning* on her part.

Anomaly. The ability to detect and analyze dissimilarities or aberrations in typical patterns is also invaluable for reading competence. An *anomaly* is defined as any occurrence or object that is strange, unusual, or unique; it is a discrepancy or deviation from an established rule or trend (Chinn & Brewer, 1993). The awareness of and response to anomalous data are also critical to conceptual restructuring (Chinn & Brewer, 1993; Chinn & Malhotra, 2002), and thus to the development of principled knowledge in any academic domain, including reading.

Competent readers evaluate the text’s internal consistency in building a situation model of the author’s meaning

(Guzmán & Klin, 2000; Myers & O'Brien, 1998; Stewart, Kidd, & Haigh, 2009) and make cross-textual evaluations for dissimilarities or inconsistencies in a multiple text situation (Afflerbach & Cho, 2009). In scouring her historical documents, for example, Portia might observe that the date given for a key event in one particular source conflicts with the timelines she has seen in other reputable sources—anomalous thinking.

Antinomy. Unlike analogical thinking where the intention is to forge some similarity or anomalous reasoning where the point is that some fact or observation appears aberrant from others, with antinomy the goal is to understand what something *is* by ascertaining what it *is not*. *Antinomy* refers to multiple principles or statements that are apparently contradictory but nonetheless true (Mosenthal, 1988). By extension, antinomy therefore also encompasses the type of mutual exclusivity involved in distinguishing different conceptual categories and the paradox that arises when they are brought together. For example, the idea that we both change and remain the same over time involves such an antinomy-based paradox (Chandler, Lalonde, Sokol, Hallett, & Marcia, 2003).

Engaging in this type of antinomy-based analysis requires an examination of the boundaries between various associated concepts and, thus, sharpens one's understanding of the concepts being compared and contrasted. In this very explanation of the meaning of *antinomy*, for instance, the identification of how it differs from the other relational reasoning strategies serves to mark out its boundaries.

Competent readers are sensitive to the importance of identifying and respecting such conceptual boundaries. In the aforementioned example, once competent readers see that the word *antinomy* refers to a type of relational reasoning strategy, they will also be alert to potential ways that this concept is distinct from associated terms such as *analogy*, *anomaly*, and *antithesis*. Let's follow our 12th grader Portia while she is working on a research assignment aimed at exploring a historical question of her choice regarding the Ancient Egyptian civilization.

While she was formulating the question for her history research assignment, Portia realized that she needed to have a much clearer idea of what the general chronological boundaries of "Ancient" Egyptian civilization are in order to figure out the specific historical territory within which her inquiry could be positioned. Relying on converging information from leading historians, Portia settles on the period beginning with the unification of the vast territory between the Nile's delta and the Nile's first cataract (c. 3100 BCE) and ending with the death of Cleopatra when Egypt becomes a Roman province (c. 30 BCE) as the boundaries for Ancient Egypt. Sharpening her understanding of the definitions of what counts as "Ancient" Egypt and what lies outside of that historical construct, such as the reign of Augustus Caesar (and why there might

be different versions of this), required antinomous reasoning for her.

Antithesis. Although antithetical comparisons, like antinomies, involve conflicting information, the contrast is much sharper and entails apparent opposites viewed as in a mutually exclusive, either/or relation. Specifically, an *antithesis* arises when two propositions, principles, or explanations are set in direct contrast or direct opposition (Antithesis, 2010). Antithetical reasoning is central to the work done in argumentation and in persuasion (Felton & Kuhn, 2001; Kuhn & Udell, 2001, 2007). For instance, some of the interesting research in refutational text, where two sides of an argument are developed with one being summarily dismantled, draws heavily on the principle of thesis and antithesis (Fives, Alexander, & Buehl, 2001; Hynd, 2001).

The idea of text as presenting an argument also evokes in the competent reader the need to engage in antithetical reasoning, insofar as an active and critical reader will be looking for possible counterarguments (Chinn & Anderson, 2000; Fox et al., 2008; Larson, Britt, & Larson, 2004; Murphy et al., 2009). One of the requirements Portia faced in doing her history research project was that her teacher specified that students must not only present a reasonable and well-supported argument for the answer they had arrived at to their initial question but also present a counterargument for a plausible alternative answer. This meant that Portia not only had to pull together the threads in what she read that built a case for the story she wanted to tell about her particular question but also had to track a competing story with its justifications and evidence as well. This was a difficult exercise for her but gave her excellent practice in antithetical reasoning.

CONCLUDING THOUGHTS

We opened this theoretical contribution with the words of Marcus Aurelius reminding us that we should not let such future things disturb us, but rather to be sure that the "reason which now thou usest for present things" serves us well as we move forward. This quote frames our argument that it is not necessary to reinvent reading for this new century; reading has always been and will always be multidimensional, developmental, and goal-directed in nature. Even when the features of the context or the character of the texts undergo change, perhaps dramatic change, these defining elements of reading remain.

In this light, we have argued that it is time to set aside views of reading that privilege some constrained set of linguistic or cognitive processes, that mistakenly conflate early reading acquisition with the lifelong trajectory that marks reading development and that overlook the goals and motivations of the reader interacting with text in a given time and place. Rather, we have highlighted the need to embrace the

conception of reading that recognizes its multidimensional, developmental, and goal-directed nature, and that acknowledges the authored character of texts and the intentions of their originators.

Just as the prevailing notions of reading demand reassessment as we move forward into the 21st century, so too does the concomitant idea of reading competence that currently permeates educational research, instructional practice, and legislative mandates. In keeping with the assertion that there is no definitive list of knowledge, beliefs, abilities, or processes that signify the acquisition of reading, there is no set of knowledge, beliefs, abilities, or processes that represent competence. Rather, competence arises from the dynamic, flexible, and adaptive configuration of those dimensions for the text and context at hand—a context that regards not only the goals and intentions of the reader but also those embodied within the authored messages. As with reading, this conceptualization of reading competence is neither new nor particular to the contemporary age, but its importance is brought into sharp focus in light of the demands of the current context.

Those who propose “new literacies” that are especially aligned with the contemporary world of hypermedia and online reading recognize the challenges of reading and learning competently in this century that we have considered herein. However, their very attempt to anchor reading and reading competence to the features of current technologies ultimately dooms their efforts. What is “new” about the literacies they depict will not remain so. Long before computers, tweets, and blogs, technologies have come and gone and along with them the concepts of reading and reading competence that were tied in any definitive way to those technologies. Rather than attempt to continually redefine reading or reading competence for this age or any age, we propose a conception of reading competence that remains relevant for whatever textual and contextual situations arise today, tomorrow, or decades in the future. This is especially crucial, as the readers we educate today will also need to be competent readers tomorrow.

Of course, we do not diminish the challenges confronting readers within this still-new century or belittle the opportunities that new technologies can afford. There is no reason to assume that the breadth of available information will decrease, that the pace of informational confrontation will slow, or the likelihood of multitasking will ebb. Nor do we expect that competent reading will just happen. Competence of the form we have depicted requires nurturance and instructional support, albeit of a type that is less prevalent. As the work of Chinn and Anderson (2000; Clark et al., 2003) and Murphy and colleagues (2009) suggests, competent readers will need more than the typical litany of reading-specific skills or procedures. They will require the ability to think critically and analytically about text and the content and intentions those texts convey. In keeping with the writings of Hofer (2004), Greene (Greene et al., 2010), Muis (2004), and Fox

(Fox & Dinsmore, 2009; Fox et al. 2008), competent readers must also come to the reading act with an understanding of knowledge and knowing that fosters their engagement and heightens their abilities to think critically and analytically.

Moreover, as we have endeavored to argue, such a critical eye and a facilitative epistemic orientation must be aided by the continued and lifelong pursuit of expertise in reading, by principled knowledge of the domains or topics encountered, and by perceptiveness and the ability to see relations within the flood of information that unrelentingly assaults us all. Reading competence cannot be achieved within the first years of schooling; there is simply too much to be learned, to be honed, and to be experienced. Further, reading competence must be founded on a base of knowledge that permits the reader to navigate the hazards of irrelevant, inaccurate, and misleading content. And competent readers must be able to quickly and effectively grasp the similarities, contradictions, and conflicts within the ideas and voices that informational deluge contains.

None of the essentials for competent reading in the 21st century and beyond will be achieved easily or without extensive guidance and practice under the watchful eyes of more knowledgeable others and the concomitant efforts of the many education stakeholders concerned with reading competence—state and national education agencies, reading researchers, and community, business, and political leaders. But those essentials must be developed if reading competence is ultimately to be realized.

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REFERENCES

- Abrams, L. M., Pedulla, J. J., & Madaus, G. F. (2003). Views from the classroom: Teachers' opinions of statewide testing programs. *Theory Into Practice, 42*, 18–29. doi:10.1207/s15430421tip4201_4
- Afflerbach, P., & Cho, B-Y. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. In S. E. Israel & G. G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 69–114). New York, NY: Routledge.

- Afflerbach, P., Cho, B.-Y., & Kim, J. (2011). The assessment of higher order thinking skills in reading. In G. Schraw & H. Robinson (Eds.), *Assessment of higher order thinking skills* (pp. 185–215). Charlotte, NC: Information Age.
- Afflerbach, P., Pearson, P. D., & Paris, S. G. (2008). Clarifying differences between reading skills and reading strategies. *The Reading Teacher*, *61*, 364–373. doi:10.1598/RT.61.5.1
- Alexander, P. A. (1997). Mapping the multidimensional nature of domain learning: The interplay of cognitive, motivational, and strategic forces. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 213–250). Greenwich, CT: JAI.
- Alexander, P. A. (2003). The development of expertise: The journey from acclimation to proficiency. *Educational Researcher*, *32*, 10–14. doi:10.3102/0013189x032008010
- Alexander, P. A. (2005). The path to competence: A lifespan development perspective on reading. *Journal of Literacy Research*, *37*, 413–436. doi:10.1207/s15548430jlr3704.1
- Alexander, P. A. (2009, December). *Knowledge, information, and truth: Sitting in judgment of the epistemic beliefs of others*. Presentation to the meeting of the European Network for Research on Epistemological Beliefs, Münster, Germany.
- Alexander, P. A., Dinsmore, D. L., Fox, E., Grossnickle, E. M., Loughlin, S. M., Maggioni, L., Winters, . . . F. I. (2011). Higher-order thinking and knowledge: Domain-general and domain-specific trends and future directions. In G. Schraw & D. H. Robinson (Eds.), *Assessment of higher order thinking skills* (pp. 47–88). Charlotte, NC: Information Age.
- Alexander, P. A., & Fox, E. (in press). A historical perspective on reading research and practice, redux. In N. J. Unrau & D. E. Alvermann (Eds.), *Theoretical models and processes of reading* (6th ed.). Newark, DE: International Reading Association.
- Alexander, P. A., & Jetton, T. L. (2000). Learning from text: A multidimensional and developmental perspective. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research* (Vol. III, pp. 285–310). Mahwah, NJ: Erlbaum.
- Alexander, P. A., & Murphy, P. K. (1998). The research base for APA's learner-centered principles. In N. M. Lambert & B. L. McCombs (Eds.), *Issues in school reform: A sampler of psychological perspectives on learner-centered schools* (pp. 25–60). Washington, DC: American Psychological Association. doi: 10.1037/0022-0663.90.3.397
- Alexander, P. A., Murphy, P. K., & Kulikowich, J. M. (2009). Expertise and the adult learner: A historical, psychological, and methodological exploration. In M. C. Smith & N. DeFries-Densch (Eds.) *The handbook of research on adult learning and development* (pp. 484–523). New York, NY: Routledge.
- Alexander, P. A., & Riconscente, M. M. (2005). A matter of proof: Why achievement \neq learning. In J. S. Carlson & J. R. Levin (Eds.), *The No Child Left Behind legislation: Educational research and federal funding* (pp. 27–36). Greenwich, CT: Information Age.
- Antithesis. (2010). *Merriam-Webster Online Dictionary*. Retrieved from <http://www.merriam-webster.com/dictionary/antithesis>
- Armbruster, B. B. (2010). *Put reading first: The research building blocks for teaching children to read, kindergarten through Grade 3*. Washington, DC: Center for the Improvement of Early Reading Achievement (CIERA).
- Armbruster, B. B., Lehr, F., & Osborn, J. (2001) *Put reading first: The research building blocks for teaching children to read, kindergarten through grade 3*. Washington, DC: National Institute for Literacy.
- Arsham, H. (2002). Impact of the Internet on learning and teaching. *USDAL Journal*, *16*(3). Retrieved from <http://www.usdla.org/html/journal/MAR02.Issue/article01.html>
- Au, W. W. (2008). Devising inequality: A Bernsteinian analysis of high-stakes testing and social reproduction in education. *British Journal of Sociology of Education*, *29*, 639–651. doi:10.1080/01425690802423312
- Aurelius, M. (167 ACE). *The meditations: Book 7* (G. Long, Trans.). Retrieved from <http://classics.mit.edu/Antoninus/meditations.7.seven.html>
- Baker, L., & Beall, L. (2009). Metacognitive processes and reading comprehension. In S. E. Israel & G. G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 373–388). New York, NY: Routledge.
- Baker, L., & Wigfield, A. (1999). Dimensions of children's motivation for reading and their relations to reading activity and reading achievement. *Reading Research Quarterly*, *34*, 452–477. doi:10.1598/RRQ.34.4.4
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*, 122–147.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Barab, S. A., Bowdish, B. E., & Lawless, K. A. (1997). Hypermedia navigation: Profiles of hypermedia users. *Educational Technology Research & Development*, *45*, 23–42.
- Bereby-Meyer, Y., & Kaplan, A. (2005). Motivational influences on transfer of problem-solving strategies. *Contemporary Educational Psychology*, *30*, 1–22. doi:10.1037/0882-7974.20.2.341
- Bohn, R. E., & Short, J. E. (2009). *How much information? 2009 report on American consumers*. La Jolla, CA: UC San Diego Global Information Industry Center. Retrieved from http://hmi.ucsd.edu/pdf/HMI.2009_ConsumerReport_Dec9_2009.pdf
- Bowman, L. L., Levine, L. E., Waite, B. M., & Gendron, M. (2010). Can students really multitask? An experimental study of instant messaging while reading. *Computers & Education*, *54*, 927–931. doi:10.1016/j.compedu.2009.09.024
- Bråten, I., Britt, M. A., Stromsø, H. I., & Rouet, J. F. (2011). The role of epistemic beliefs in the comprehension of multiple expository texts: Toward an integrated model. *Educational Psychologist*, *46*, 48–70.
- Bråten, I., Stromsø, H. I., & Samuelstuen, M. S. (2008). Are sophisticated students always better? The role of topic-specific personal epistemology in the understanding of multiple expository texts. *Contemporary Educational Psychology*, *33*, 814–840. doi:10.1016/j.cedpsych.2008.02.001
- Briscoe, E. J. (2002). *Linguistic evolution through language acquisition*. Cambridge, UK: Cambridge University Press.
- Bromme, R., Kienhues, D., & Stahl, E. (2008). Knowledge and epistemological beliefs: An intimate but complicated relationship. In M. S. Khine (Ed.), *Knowing, knowledge and beliefs: Epistemological studies across diverse cultures* (pp. 423–441). New York, NY: Springer Science.
- Brown, A. L., & Campione, J. S. (1990). Communities of learning and thinking, or a context by any other name. *Contributions to Human Development*, *21*, 108–126.
- Buehl, M. M., & Alexander, P. A. (2001). Examining beliefs about academic knowledge: Domain general or domain specific? *Educational Psychology Review*, *13*, 385–418.
- Cates, G. L., Burns, M. K., & Joseph, L. M. (2010). Introduction to the special issue: Instructional efficiency and the impact on learning and data-based decision making. *Psychology in the Schools*, *47*, 111–113.
- Chall, J. S. (1983). *Stages of reading development*. New York, NY: McGraw-Hill.
- Chandler, M. J., Lalonde, C. E., Sokol, B. W., Hallett, D., & Marcia, J. E. (2003). Personal persistence, identity development, and suicide: A study of native and non-native North American adolescents. *Monographs of the Society for Research in Child Development*, *68*, 1–138.
- Chinn, C. A. (2006). Learning to argue. In A. M. O'Donnell, C. Hmelo-Silver, & G. Erkens (Eds.), *Collaborative learning, reasoning, and technology* (pp. 355–383). Mahwah, NJ: Erlbaum.
- Chinn, C. A., & Anderson, R. C. (2000). The structure of discussions that promote reasoning. *Teachers College Record*, *100*, 315–368
- Chinn, C. A., & Brewer, W. F. (1993). The role of anomalous data in knowledge acquisition: A theoretical framework and implications for science instruction. *Review of Educational Research*, *63*, 1–49. doi:10.2307/1170558
- Chinn, C. A., & Malhotra, B. A. (2002). Children's responses to anomalous scientific data: How is conceptual change impeded? *Journal of Educational Psychology*, *94*, 327–343. doi:10.1037/0022-0663.94.2.327

- Chomsky, N. (2002). *Syntactic structures* (2nd ed.) New York, NY: Mouton de Gruyter.
- Clark, A.-M., Anderson, R. C., Kuo, L.-J., Kim, I.-H., Archodidou, A., & Nguyen-Jahiel, K. (2003). Collaborative reasoning: Expanding ways for children to talk and think in school. *Educational Psychology Review*, 15, 181–198. doi:10.1023/A:1023429215151
- Coiro, J., & Dobler, E. (2007). Exploring the online comprehension strategies used by sixth-grade skilled readers to search for and locate information on the Internet. *Reading Research Quarterly*, 42, 214–257.
- Cold, S. J. (2006). Using Really Simple Syndication (RSS) to enhance student research. *ACM SIGITE Newsletter*, 3, 6–9. doi:10.1145/1113378.1113379
- Common Core State Standards Initiative. (2010). *Common core state standards for English language arts and literacy in history/social studies, science, and technical subjects*. Washington, DC: Council of Chief State School Officers and National Governors Association. Retrieved from <http://www.corestandards.org/>
- Cosgrove, M. P. (1995). The fruit of integration: Results in the teaching of psychology. *Journal of Psychology & Theology*, 23, 289–295.
- d'Haenens, L., Jankowski, N., & Heuvelman, A. (2004). News in online and print newspapers: Differences in reader consumption and recall. *New Media & Society*, 6, 363–382. doi:10.1177/1461444804042520
- Dillon, A., & Gabbard, R. (1998). Hypermedia as an educational technology: A review of the quantitative research literature on learner comprehension, control, and style. *Review of Educational Research*, 68, 322–349. doi:10.3102/00346543068003322
- Dinsmore, D. L. (2011). *A multidimensional investigation of deep and surface processing* (Unpublished doctoral dissertation). College Park: University of Maryland, College of Education.
- Dinsmore, D. L., Alexander, P. A., & Loughlin, S. M. (2008). Focusing the conceptual lens on metacognition, self-regulation, and self-regulated learning. *Educational Psychology Review*, 20, 391–409.
- Duffy, G. G., & Israel, S. E. (2009). Where to from here? Themes, trends, and questions. In S. E. Israel & G. G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 668–675). New York, NY: Routledge.
- Duke, N. K. (2004). The case for informational text. *Educational Leadership*, 61(6), 40–44.
- Dunbar, K., & Fugelsang, J. (2005). Scientific thinking and reasoning. In K. J. Holyoak & R. Morrison (Eds.), *Cambridge handbook of thinking and reasoning* (pp. 705–726). New York, NY: Cambridge University Press.
- Fast, K. V., & Campbell, G. (2004). “I still like Google”: University students’ perceptions of searching OPACs and the web. *Proceedings of the American Society for Information Science and Technology*, 41, 138–146.
- Felton, M., & Kuhn, D. (2001). The development of argumentative discourse skill. *Discourse Processes*, 32, 135–153. doi:10.1080/0163853X.2001.9651595
- Fidel, R., Davies, R. K., Douglass, M. H., Holder, J. K., Hopkins, C. J., Kushner, E. J., . . . Toney, C. D. (1999). A visit to the information mall: Web searching behavior of high school students. *Journal of the American Society for Information Science*, 50, 24–37.
- Fives, H. L., Alexander, P. A., & Buehl, M. M. (2001). Teaching as persuasion: Approaching classroom discourse as refutational text. In J. V. Hoffman, D. L. Schallert, C. M. Fairbanks, J. Worthy, & B. Maloch (Eds.), *Fiftieth yearbook of the National Reading Conference* (pp. 200–212). Chicago, IL: National Reading Conference.
- Flanagin, A. J., & Metzger, M. J. (2007). The role of site features, user attributes, and information verification behaviors on the perceived credibility of web-based information. *New Media & Society*, 9, 319–342. doi:10.1177/1461444807075015
- Flavell, J. H. (1977). *Cognitive development*. Englewood Cliffs, NJ: Prentice-Hall.
- Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitive developmental inquiry. *American Psychologist*, 34, 906–911. doi:10.1037/0003-066X.34.10.906
- Foehr, U. G. (2006). *Media multitasking among American youth: Prevalence, predictors and pairings*. Menlo Park, CA: Kaiser Family Foundation.
- Foerde, K., Knowlton, B. J., & Poldrack, R. A. (2006). Modulation of competing memory systems by distraction. *Proceedings of the National Academy of Science*, 103, 11778–11783. doi:10.1073/pnas.0602659103
- Fox, E. (2009). The role of reader characteristics in processing and learning from informational text. *Review of Educational Research*, 79, 197–261. doi:10.3102/0034654308324654
- Fox, E., & Alexander, P. A. (2009). Text comprehension: A retrospective, perspective, and prospective. In S. E. Israel & G. G. Duffy (Eds.), *Handbook of research on reading comprehension* (pp. 227–239). New York, NY: Routledge.
- Fox, E., & Alexander, P. A. (2011). Learning to read. In P. A. Alexander & R. Mayer (Eds.), *Handbook of research on learning and instruction* (pp. 7–31). New York, NY: Routledge.
- Fox, E., & Dinsmore, D. L. (2009, August). Reading competence and reading goals in four gifted young adolescent readers. In P. A. Alexander (Chair). *What is competence really: Part I, Bringing together threads in empirical research*. Symposium presented at the meeting of the European Association for Research on Learning and Instruction, Amsterdam, The Netherlands.
- Fox, E., Dinsmore, D. L., & Alexander, P. A. (2007, April). Situational success at reading challenging texts: Exposing the fragile understanding of college students. In P. A. Alexander (Chair), *Fragile understanding: When good ideas go bad*. Symposium presented at the annual meeting of the American Educational Research Association, Chicago, IL.
- Fox, E., Maggioni, L., Dinsmore, D. L., & Alexander, P. A. (2008, March). *The multi-layered reading goals of expert readers: Bridging between knowledge, interest, and strategy use*. Paper presented at the annual meeting of the American Educational Research Association, New York, NY.
- Gantz, J. F., Chute, C., Manfrediz, A., Minton, S., Reinsil, D., Schlichting, W., & Toncheva, A. (2008). *The diverse and exploding digital universe*. Farmingham, MA: IDC. Retrieved from <http://www.emc.com/collateral/analyst-reports/diverse-exploding-digital-universe.pdf>
- Garoufallo, E., Balatsoukas, P., Siatri, R., Zafeiriou, G., Asderi, S., & Ekizoglou, P. (2008). Greek academic librarians’ perceptions of the impact of Google on their role as information providers. *Education for Information*, 26, 133–145.
- Gentner, D., & Markman, A. B. (1997). Structure mapping in analogy and similarity. *American Psychologist*, 52, 45–56. doi:10.1037/0003-066X.52.1.45
- Gibson, E. J., & Levin, H. (1975). *The psychology of reading*. Cambridge, MA: MIT Press.
- Glaser, R. (1984). Education and thinking: The role of knowledge. *American Psychologist*, 39, 93–104. doi:10.1037/0003-066X.39.2.93
- Graesser, A. C., McNamara, D. S., & Kulikowich, J. M. (2011). Coh-Metrix: Providing multilevel analyses of text characteristics. *Educational Researcher*, 40, 223–234. doi: 0.3102/0013189X11413260
- Gray, W. S. (1925). A modern program of reading instruction for the grades and the high school. In G. M. Whipple (Ed.), *24th Yearbook of the NSSE, Part I – Report of the National Committee on Reading* (pp. 21–73). Bloomington, IL: Public School Publishing.
- Greene, J. A., Muis, K. R., & Pieschl, S. (2010). The role of epistemic beliefs in students’ self-regulated learning with computer-based learning environments: Conceptual and methodological issues. *Educational Psychologist*, 45, 245–257. doi:10.1080/00461520.2010.515932
- Griffiths, J. R., & Brophy, P. (2005). Student searching behavior and the web: Use of academic resources and Google. *Library Trends*, 53, 539–554.
- Gunzenhauser, M. G. (2003). High-stakes testing and the default philosophy of education. *Theory Into Practice*, 42, 51–58. doi:10.1207/s15430421tip4201.7
- Guthrie, J. T., & Wigfield, A. (2005). Role of motivation and engagement in reading comprehension assessment. In S. G. Paris & S. A. Stahl (Eds.), *Children’s reading comprehension and assessment* (pp. 187–213). Mahwah, NJ: Erlbaum.

- Guzmán, A. E., & Klin, C. M. (2000). Maintaining global coherence in reading: The role of sentence boundaries. *Memory & Cognition*, 28, 722–730. doi:10.1006/jmla.2000.2719
- Hacker, D. J. (1997). Comprehension monitoring of written discourse across early-to-middle adolescence. *Reading and Writing*, 9, 207–240. doi:10.1023/A:1007989901667
- Halliday, M. A. K. (1973). *Explorations in the functions of language*. London, UK: Edward Arnold.
- Henderson, D. K. (1994). Epistemic competence and contextualist epistemology: Why contextualism is not just the poor person's coherentism. *The Journal of Philosophy*, 12, 627–649.
- Hesse, M. B. (1959). On defining analogy. *Proceedings of the Aristotelian Society*, 60, 79–100.
- Hidi, S. (1990). Interest and its contribution as a mental resource for learning. *Review of Educational Research*, 60, 549–571. doi:10.3102/00346543060004549
- Hidi, S., & Anderson, V. (1992). Situational interest and its impact on reading and expository writing. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The role of interest in learning and development* (pp. 215–238). Hillsdale, NJ: Erlbaum.
- Hofer, B. K. (2004). Epistemological understanding as a metacognitive process: Thinking aloud during online searching. *Educational Psychologist*, 39, 43–55. doi:10.1207/s15326985ep3901_5
- Hofer, B. K., & Sinatra, G. M. (2010). Epistemology, metacognition, and self-regulation: Musings on an emerging field. *Metacognition and Learning*, 5, 113–120. doi:10.1007/s11409-009-9051-7
- Hoffman, J. V., Assaf, L. C., & Paris, S. G. (2001). High-stakes testing in reading: Today in Texas, tomorrow? *The Reading Teacher*, 54, 482–492.
- Hong, J., & Liu, M. (2003). A study on thinking strategy between experts and novices of computer games. *Computers in Human Behavior*, 19, 245–258. doi:10.1016/S0747-5632(02)00013-4
- Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading and Writing*, 2, 127–160. doi:10.1007/BF00401799
- Hornof, M. (2008). Reading tests as a genre study. *The Reading Teacher*, 62, 69–73.
- Hruby, G. G., Goswami, U., Frederiksen, C. H., & Perfetti, C. A. (2011). Neuroscience and reading: A review for reading education researchers. *Reading Research Quarterly*, 46, 156–172.
- Hynd, C. (2001). Refutational texts and the change process. *International Journal of Educational Research*, 35, 699–714. doi:10.1016/S0883-0355(02)00010-1
- International Reading Association. (2009). *New literacies and 21st-century technologies* (Position paper). Retrieved from <http://www.reading.org/General/AboutIRA/PositionStatements/21stCenturyLiteracies.aspx>
- Jenkins, C., Corritore, C. L., & Wiedenbeck, S. (2003). Patterns of information seeking on the Web: A qualitative study of domain expertise and Web expertise. *IT & Society*, 1(3), 64–89.
- Kamil, M. L., Afflerbach, P. A., Pearson, P. D., & Moje, E. B. (2011). Reading research in a changing era. In M. L. Kamil, P. A. Afflerbach, P. D. Pearson, & E. B. Moje (Eds.), *Handbook of reading research* (Vol. IV, pp. xiii–xxvi). New York, NY: Routledge.
- Kardash, C. M., & Scholes, R. J. (1996). Effects of preexisting beliefs, epistemological beliefs, and need for cognition on interpretation of controversial issues. *Journal of Educational Psychology*, 88, 260–271. doi:10.1037/0022-0663.88.2.260
- Kendeou, P., & van den Broek, P. (2007). The effects of prior knowledge and text structure on comprehension processes during reading of scientific texts. *Memory and Cognition*, 35, 1567–1577. doi:10.3758/BF0319-3491
- Kienhues, D., & Bromme, R. (2011). Beliefs about abilities and epistemic beliefs: Aspects of cognitive flexibility in information-rich environments. In J. Elen, E. Stahl, R. Bromme, & G. Clarebout (Eds.), *Links between beliefs and cognitive flexibility* (pp. 105–124). New York, NY: Springer.
- Kintsch, W. (1998). *Comprehension*. New York, NY: Cambridge University Press.
- Kintsch, W. (2004). The construction-integration model of text comprehension and its implications for instruction. In R. B. Ruddell & N. J. Unrau (Eds.), *Theoretical models and processes of reading* (pp. 1270–1328). Newark, DE: International Reading Association.
- Kist, W. (2008). Film and video in the classroom: Back to the future. In J. Flood, S. B. Heath, & D. Lapp (Eds.), *Handbook of research on teaching literacy through visual and communicative arts* (Vol. II, pp. 521–527). Newark, DE: International Reading Association.
- Kitchener, K. S. (1983). Cognition, metacognition, and epistemic cognition. *Human Development*, 26, 222–232.
- Kuhn, D., & Udell, W. (2001). The path to wisdom. *Educational Psychologist*, 36, 261–264. doi:10.1207/S15326985EP3604_6
- Kuhn, D., & Udell, W. (2007). Coordinating own and other perspectives in argument. *Thinking and Reasoning*, 13, 90–104. doi:10.1080/13546780600625447
- Lankshear, C., & Knobel, M. (2003). *New literacies: Changing knowledge and classroom learning*. Buckingham, UK: Open University Press.
- Larson, M., Britt, M. A., & Larson, A. A. (2004). Disfluencies in comprehending argumentative texts. *Reading Psychology*, 25, 205–224. doi:10.1080/02702710490489908
- Lawless, K. A., & Kulikowich, J. A. (1996). Understanding hypertext navigation through cluster analysis. *Journal of Educational Computing Research*, 14, 385–399.
- Lazonder, A. W., Biemans, H. J. A., & Wopereis, I. G. J. H. (2000). Differences between novice and experienced users in searching information on the World Wide Web. *Journal of the American Society for Information Science*, 51, 576–581. doi:10.1002/(SICI)1097-4571
- Lee, P., & Ashby, R. (2000). Progression in historical understanding among students ages 7–14. In P. N. Stearns, P. Seixas, & S. Wineburg (Eds.), *Knowing, teaching and learning history: National and international perspectives* (pp. 199–222). New York, NY: New York University Press.
- Lee, P., & Shemilt, D. (2003). A scaffold, not a cage: Progression and progression models in history. *Teaching History*, 113, 13–24.
- Lenhart, A., Madden, M., & Hitlin, P. (2005). *Teens and technology: Youth are leading the transition to a fully wired and mobile nation*. Washington, DC: Pew Internet and American Life Project.
- Leu, D. J., Kinzer, C. K., Coiro, J. L., & Comstock, D. W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. In R. B. Ruddell & N. J. Unrau (Eds.), *Theoretical models and processes of reading* (5th ed., pp. 1570–1613). Newark, DE: International Reading Association.
- Levine, L. E., Waite, B. M., & Bowman, L. L. (2007). Electronic media use, reading, and academic distractibility in college youth. *CyberPsychology & Behavior*, 10, 560–566. doi:10.1089/cpb.2007.9990
- Lin, L., Robertson, J., & Lee, J. (2009). Reading performances between novices and experts in different media multitasking environments. *Computers in the Schools*, 26, 169–186. doi:10.1080/0738056090309-5162
- List, A., Grossnickle, E. M., Loyens, S. M. M., & Alexander, P. A. (2012). *The role of educational context and beliefs in students' multiple source use*. Manuscript submitted for publication.
- Liu, Z. (2004). Perceptions of credibility of scholarly information on the web. *Information Processing & Management*, 40, 1027–1038. doi:10.1016/S0306-4573(03)00064-5
- Liu, Z. (2005). Reading behavior in the digital environment: Changes in reading behavior over the past ten years. *Journal of Documentation*, 61, 700–712. doi:10.1108/00220410510632040
- Maggioni, L. (2010). *Studying epistemic cognition in the history classroom: Cases of teaching and learning to think historically* (Doctoral dissertation). Retrieved from ProQuest Dissertation and Theses Database (Document ID 2180012291).
- Maggioni, L., Alexander, P. A., & Rikers R. (2009, August). Competence in the high-school history classrooms: Three case studies. In P. A. Alexander (Chair), *What is competence really? Seeking threads in empirical research*. Symposium presented at the 13th Biennial Conference

- of the European Association for Research on Learning and Instruction, Amsterdam, The Netherlands.
- Maggioni, L., & Fox, E. (2009, April). *Adolescents' reading of multiple history texts: An interdisciplinary exploration of the relation between domain-specific reading and epistemic beliefs*. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Maggioni, L., Fox, E., & Alexander, P. A. (2010a). The epistemic dimension of competence in the social sciences. *Journal of Social Science Education*, 9(4), 15–23.
- Maggioni, L., Fox, E., & Alexander, P. A. (2010b, May). *When change does not mean progress: Historical thinking, intertextual reading, and domain-specific epistemic beliefs in the context of one high-school history class*. Paper presented at the annual meeting of the American Educational Research Association, Denver, CO.
- Mason, L., Boldrin, A., & Ariasi, N. (2010). Searching the web to learn about a controversial topic: Are students epistemically active? *Instructional Science*, 38, 607–633.
- Matthew, K. (1997). A comparison of the influence of interactive CD-ROM storybooks and traditional print storybooks on reading comprehension. *Journal of Research on Computing in Education*, 29, 263–275.
- Mayer, R. E. (2002). Multimedia learning. *Psychology of Learning and Motivation*, 41, 85–139. doi:10.1016/S0079-7421(02)80005-6
- Mayer, R. E., & Anderson, R. B. (1992). The instructive animation: Helping students build connections between words and pictures in multimedia learning. *Journal of Educational Psychology*, 84, 444–452. doi:10.1037/0022-0663.84.4.444
- McCrudden, M. T. (2011). Do specific relevance instructions promote transfer appropriate processing? *Instructional Science*, 39, 865–879. doi:10.1007/s11251-010-9158-x
- McCrudden, M. T., Magliano, J., & Schraw, G. (2010). Exploring how relevance instructions affect personal reading intentions, reading goals, and text processing: A mixed methods study. *Contemporary Educational Psychology*, 35, 229–241. doi:10.1016/j.cedpsych.2009.12.001
- McNeil, L. M. (2000). *Contradictions of school reform: Educational costs of standardized testing*. New York, NY: Routledge.
- Metzger, M. J., Flanagin, A. J., & Zwarun, L. (2003). College student Web use, perceptions of information credibility, and verification behavior. *Computers & Education*, 41, 271–290. doi:10.1016/S0360-1315(03)00049-6
- Meyer, B. J. F. (1987). Following the author's top-level organization: An important skill for reading comprehension. In R. J. Tierney, P. L. Anders, & J. N. Mitchell (Eds.), *Understanding readers' understanding* (pp. 59–76). Hillsdale, NJ: Erlbaum.
- Michel, J.-B., Shen, Y. K., Aiden, A. P., Veres, A., Gray, M. K., The Google Books Team, Aiden, E. L. (2011). Quantitative analysis of culture using millions of digitized books. *Science*, 331, 176–182. doi:10.1126/science.1199644
- Miller, P. H., Kessel, F. S., & Flavell, J. H. (1970). Thinking about people thinking about people thinking about...: A study of social-cognitive development. *Child Development*, 41, 613–623.
- Moreno, R., & Mayer, R. E. (2007). Interactive multimodal learning environments. *Educational Psychology Review*, 19, 309–326. doi:10.1007/s10648-007-9047-2
- Mosenthal, P. B. (1988). Research views: Anopheles and antinomies in reading research. *The Reading Teacher*, 42, 234–235.
- Moshman, D. (1982). Exogenous, endogenous, and dialectical constructivism. *Developmental Review*, 2, 371–384.
- Muis, K. R. (2004). Personal epistemology and mathematics: A critical review and synthesis of research. *Review of Educational Research*, 74, 317–377. doi:10.3102/00346543074003317
- Murphy, P. K., & Alexander, P. A. (2002). What counts? The predictive powers of subject-matter knowledge, strategic processing, and interest in domain-specific performance. *Journal of Experimental Education*, 70, 197–214. doi:10.1080/00220970209599506
- Murphy, P. K., Edwards, M. N., Buehl, M. M., & Zeruth, J. A. (2007). Using the *Domain-Specific Beliefs Questionnaire* with adolescents enrolled in high-poverty, high-minority schools: Examining psychometric properties. *Journal of Experimental Education*, 76, 3–25. doi:10.3200/JEXE.76.1.3-25
- Murphy, P. K., Long, J. L., Holleran, T., & Esterly, E. (2003). Persuasion online or on paper: A new take on an old issue. *Learning and Instruction*, 13, 511–532. doi:10.1016/S0959-4752(02)00041-5
- Murphy, P. K., Wilkinson, I. A. G., Soter, A. O., Hennessey, M. N., & Alexander, J. F. (2009). Examining the effects of classroom discussion on students' comprehension of text: A meta-analysis. *Journal of Educational Psychology*, 101, 740–764. doi:10.1037/a0015576
- Myers, J. L., & O'Brien, E. J. (1998). Accessing the discourse representation during reading. *Discourse Processes*, 26, 131–157. doi:10.1080/01638539809545042
- National Center to Improve the Tools of Educators. (1996). *Learning to read/reading to learn: Helping children with learning disabilities to succeed*. Washington, DC: Special Education Programs.
- National Governing Board (2010). *Reading framework for the 2011 National Assessment for Reading Progress*. Washington, DC: U.S. Department of Education.
- National Reading Panel. (2000). *Report of the National Reading Panel*. Washington, DC: National Institute of Child Health and Human Development.
- Nielsen Book. (2011). Nielsen Book releases 2010 book production figures. Retrieved from www.nielsenbookdata.co.uk
- Novick, L. R. (1988). Analogical transfer, problem similarity, and expertise. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14, 510–520. doi: 10.1037/0278-7393.14.3.510
- Oldfather, P., & Dahl, K. (1994). Toward a social constructivist reconceptualization of intrinsic motivation for literacy learning. *Journal of Reading Behavior*, 26, 139–158.
- Ophir, E., Nass, C., & Wagner, A. D. (2009). Cognitive control in media multitaskers. *Proceedings of the National Academy of Science*, 106, 15583–15587. doi:10.1073/pnas.0903620106
- Ozuru, Y., Dempsey, K., & McNamara, D. S. (2009). Prior knowledge, reading skill, and text cohesion in the comprehension of science texts. *Learning and Instruction*, 19, 228–242. doi:10.1016/j.learninstruc.2008.04.003
- Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, 38(1), 1–4. doi:10.1207/S15326985EP3801.1
- Pan, B., Hembrooke, H., Joachims, T., Lorigo, L., Gay, G., & Granka, L. (2007). In Google we trust: Users' decisions on rank, position, and relevance. *Journal of Computer-Mediated Communication*, 12, 801–823. doi:10.1111/j.1083-6101.2007.00351.x
- Pang, E., & Kamil, M. L. (2002). Reading hypertext: Comprehension and strategies of third grade students. In J. Hoffman, D. L. Schallert, C. M. Fairbanks, J. Worthy, & B. Maloch (Eds.), *51st Yearbook of the National Reading Conference* (pp. 333–343). Oak Creek, WI: National Reading Conference.
- Pappas, C. C. (2006). The information book genre: Its role in integrated science literacy research and practice. *Reading Research Quarterly*, 41, 226–250. doi:10.1598/RRQ.41.2.4
- Paris, S. G., & Oka, E. R. (1986). Children's reading strategies, metacognition, and motivation. *Developmental Review*, 6, 25–56. doi:10.1016/0273-2297(86)90002-X
- Paris, S. G., & Urdan, T. (2000). Policies and practices of high-stakes testing that influence teachers and schools. *Issues in Education*, 6, 83–108.
- Paris, S. G., Wasik, B. A., & Turner, J. C. (1991). The development of strategic readers. In R. Barr, M. L. Kamil, P. B. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research* (Vol. II, pp. 609–640). Mahwah, NJ: Erlbaum.
- Partnership for Assessment of Readiness for College and Careers. (2010, June). *Application for the Race to the Top comprehensive assessment*

- systems competition*. Retrieved from <http://www.fldoe.org/parcc/pdf/apprtcasc.pdf>.
- Partnership for 21st Century Skills. (2009). *Framework for 21st century learning*. Washington, DC: Author. Retrieved from <http://www.p21.org/>
- Pearson, P. D., & Tierney, R. J. (1984). On becoming a thoughtful reader: Learning to read like a writer. In K. J. Rehage, A. C. Purves, & O. S. Niles (Eds.), *Becoming readers in a complex society: 83rd yearbook of the National Society for the Study of Education* (pp. 144–173). Chicago, IL: NSSE.
- Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 259–282). New York, NY: Springer.
- Perfetti, C. A., Rouet, J. F., & Britt, M. A. (1999). Toward a theory of documents representation. In H. van Oostendorp & S. R. Goldman (Eds.), *The construction of mental representations during reading* (pp. 99–122). Mahwah, NJ: Erlbaum.
- Perse, E. M., & Ferguson, D. A. (2000). The benefits and costs of web surfing. *Communication Quarterly*, 48, 343–359. doi:10.1080/01463370009385603
- Pew Research Center. (2009). *Demographics of teen Internet users*. Washington, DC: Pew Internet and American Life Project. Retrieved from <http://pewinternet.org/Static-Pages/Trend-Data-for-Teens/Whos-Online.aspx>
- Pew Research Center. (2011). *Trend data*. Washington, DC: Pew Internet and American Life Project. Retrieved from <http://pewinternet.org/Static-Pages/Trend-Data/Online-Activities-Daily.aspx>
- Pintrich, P. R., Marx, R. W., & Boyle, R. A. (1993). Beyond cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research*, 63, 167–199.
- Pluta, W. J., Chinn, C. A., & Duncan, R. G. (2011). Learners' epistemic criteria for good scientific models. *Journal of Research in Science Teaching*, 48, 486–511. doi:10.1002/tea.20415
- Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011). Common Core Standards: The new U. S. intended curriculum. *Educational Researcher*, 40, 103–116. doi:10.3102/0013189X114
- Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale, NJ: Erlbaum.
- Pressley, M., & Wharton-McDonald, R. (1997). Skilled comprehension and its development through instruction. *School Psychology Review*, 26, 448–466.
- Qian, G., & Alvermann, D. (1995). Role of epistemological beliefs and learned helplessness in secondary school students' learning science concepts from text. *Journal of Educational Psychology*, 87, 282–292. doi:10.1037/0022-0663.87.2.282
- RAND Reading Study Group. (2002). *Reading for understanding: Toward an R&D program in reading comprehension*. Santa Monica, CA: Author.
- Reinking, D. (2005). Multimedia learning of reading. In R. E. Mayer (Ed.), *Cambridge handbook of multimedia learning* (pp. 355–374). Cambridge, UK: Cambridge University Press.
- Richter, T., & Schmid, S. (2010). Epistemological beliefs and epistemic strategies in self-regulated learning. *Metacognition and Learning*, 5, 47–65. doi:10.1007/s11409-9038-4
- Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Generation M²: Media in the lives of 8- to 18-year-olds*. Menlo Park, CA: H. J. Kaiser Family Foundation.
- Rieh, S. Y. (2002). Judgment of information quality and cognitive authority in the Web. *Journal of the American Society for Information Science and Technology*, 53, 145–161. doi:10.1002/asi.10017
- Rieh, S. Y., & Hilligoss, B. (2007). College students' credibility judgments in the information-seeking process. In M. Metzger, & J. Flanagan (Eds.), *Digital media, youth, and credibility. MacArthur Foundation Series on Digital Media and Learning* (pp. 49–72). Cambridge, MA: MIT Press.
- Rouet, J. F. (1996). *Hypertext and cognition*. Mahwah, NJ: Erlbaum.
- Rouet, J., Marron, M., Perfetti, C., & Favart, M. (1998). Understanding historical controversies: Students' evaluation and use of documentary evidence. In J. Voss & M. Carretero (Eds.), *International review of history education, Volume 2: Learning and reasoning in history* (pp. 95–116). London, UK: Woburn.
- Rouet, J., & Passerault, J. M. (1999). Analyzing learner-hypermedia interaction: An overview of online methods. *Instructional Science*, 27, 201–219. doi:10.1023/A:1003162715462
- Russell, D. H. (1961). *Children learn to read* (2nd ed.). New York, NY: Ginn.
- Salmerón, L., Gil, L., Bråten, I., & Strømsø, H. (2010). Comprehension effects of signalling relationships between documents in search engines. *Computers in Human Behavior*, 26, 419–426. doi:10.1016/j.chb.2009.11.013
- Salmerón, L., Kintsch, W., & Kintsch, E. (2010). Self-regulation and link selection strategies in hypertext. *Discourse Processes*, 47, 175–211. doi:10.1080/01638530902728280
- Salomon, G., & Perkins, D. N. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist*, 24, 113–142. doi:10.1207/s15326985ep2402.1
- Schacter, J., Chung, G. K. W. K., & Dorr, A. (1998). Children's internet searching on complex problems: Performance and process analysis. *Journal of the American Society for Information Science and Technology*, 49, 840–849. doi:10.1002/(SICI)1097-4571(199807)49:9<840::AID-ASI9>3.0.CO;2-D
- Schiefele, U. (1991). Interest, learning, and motivation. *Educational Psychologist*, 26, 299–323. doi:10.1207/s15326985ep2603&4.5
- Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82, 498–504. doi:10.1037/0022-0663.82.3.498
- Schommer, M., Crouse, A., & Rhodes, N. (1992). Epistemological beliefs and mathematical text comprehension: Believing it is simple does not make it so. *Journal of Educational Psychology*, 84, 435–443. doi:10.1037/0022-0663.84.4.435
- Schraw, G. (2010). No school left behind. *Educational Psychologist*, 45, 71–75. doi:10.1080/00461521003720189
- Schraw, G., & Bruning, R. (1996). Readers' implicit models of reading. *Reading Research Quarterly*, 31, 290–305.
- Schraw, G., & Bruning, R. (1999). How implicit models of reading affect motivation to read and reading engagement. *Scientific Studies of Reading*, 3, 281–302.
- Schraw, G., Bruning, R., & Svoboda, C. (1995). Sources of situational interest. *Journal of Reading Behavior*, 27, 1–17.
- Schraw, G., Flowerday, T., & Lehman, S. (2001). Increasing situational interest in the classroom. *Educational Psychology Review*, 13, 211–224. doi:10.1023/A:1016619705184
- Schreiber, J. B., & Shinn, D. (2003). Epistemological beliefs of community college students and their learning processes. *Community College Journal of Research and Practice*, 27, 699–709.
- Schunk, D. H. (2003). Self-efficacy for reading and writing: Influence of modeling, goal setting, and self-evaluation. *Reading & Writing Quarterly: Overcoming Learning Difficulties*, 19, 159–172. doi:10.1080/10573560308219
- Schunk, D. H., & Zimmerman, B. J. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading & Writing Quarterly: Overcoming Learning Difficulties*, 23, 7–25.
- Schwartz, M. C., Sadler, P. M., Sonnert, G., & Tai, R. H. (2009). Depth versus breadth: How content coverage in high school science courses relates to later success in college science coursework. *Science Education*, 93, 798–826. doi:10.1002/scs.20328
- Shanahan, T. (1992). Reading comprehension as a conversation with an author. In M. Pressley, K. R. Harris, & J. T. Guthrie (Eds.), *Promoting academic competence and literacy in school* (pp. 129–148). San Diego, CA: Academic.

- Shapiro, A., & Niederhauser, D. (2004). Learning from hypertext: Research issues and findings. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (Vol. 2, pp. 605–620). Mahwah, NJ: Erlbaum.
- Smarter Balanced Assessment Consortium. (2012, January). *English Language Arts item and task specifications*. Retrieved from <http://www.smarterbalanced.org/smarter-balanced-assessments>
- Smith, L. E., Borkowski, J. G. & Whitman, T. L. (2008). From reading readiness to reading competence: The role of self-regulation in at-risk children. *Scientific Studies of Reading, 12*, 131–152. doi:10.1080/10888430801917167
- Smith, M., Gertz, E., Alvarez, S., & Lurie, P. (2000). The content and accessibility of sex education information on the Internet. *Health Education & Behavior, 27*, 684–694. doi:10.1177/109019810002700603
- Songer, N. B., & Linn, M. C. (1991). How do students' views of science influence knowledge integration? *Journal of Research in Science Teaching, 28*, 761–784. doi:10.1002/tea.3660280905
- Stahl, S., Hynd, C., Britton, B., McNish, M., & Bosquet, D. (1996). What happens when students read multiple source documents in history? *Reading Research Quarterly, 31*, 430–456.
- Stanovich, K. E., & West, R. F. (1997). Reasoning independently of prior belief and individual differences in actively open-minded thinking. *Journal of Educational Psychology, 89*, 342–357. doi:10.1037/0022-0663.89.2.342
- Stephens, A. C. (2006). Equivalence and relational thinking: Preservice elementary teachers' awareness of opportunities and misconceptions. *Journal of Mathematics Teacher Education, 9*, 249–278. doi:10.1007/s10857-006-9000-1
- Stewart, A. J., Kidd, E., & Haigh, M. (2009). Early sensitivity to discourse-level anomalies: Evidence from self-paced reading. *Discourse Processes, 46*, 46–69. doi:10.1080/01638530802629091
- Sutherland-Smith, W. (2002). Weaving the literacy web: Changes in reading from page to screen. *Reading Teacher, 55*, 662–669.
- Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and Instruction, 4*, 295–312. doi:10.1016/0959-4752(94)90003-5
- Tarchi, C. (2010). Reading comprehension of informative texts in secondary school: A focus on direct and indirect effects of reader's prior knowledge. *Learning and Individual Differences, 20*, 415–420. doi:10.1016/j.lindif.2010.04.002
- Taylor, A. K. (2011). Students learn equally well from digital as from paperbound texts. *Teaching of Psychology, 38*, 278–281.
- Thompson, C. (2003). Information illiterate or lazy: How college students use the Web for research portal. *Libraries and the Academy, 3*, 259–268. doi:10.1353/pla.2003.0047
- Turner, J. (1995). The influence of classroom contexts on young children's motivation for literacy. *Reading Research Quarterly, 30*, 410–441. doi:10.2307/747624
- Unsworth, L. (2001). *Teaching multiliteracies across the curriculum: Changing contexts of text and image in classroom practices*. Philadelphia, PA: Open University Press.
- Valencia, S. W., Pearson, P. D., & Wixson, K. K. (2011, April). *Assessing and tracking progress in reading comprehension: The search for keystone elements in college and career readiness*. Paper commissioned by the Center for K–12 Assessment and Performance Management, Educational Testing Service, Princeton, NJ.
- van den Broek, P., Lorch, R. F., Jr., Linderholm, T., & Gustafson, M. (2001). The effects of readers' goals on inference generation and memory for texts. *Memory & Cognition, 29*, 1081–1087.
- van den Broek, P., Risdien, K., Fletcher, C. R., & Thurlow, R. (1996). A "landscape" view of reading: Fluctuating patterns of activation and the construction of a stable memory representation. In B. K. Britton & A. C. Graesser (Eds.), *Models of understanding text* (pp. 165–187). Mahwah, NJ: Erlbaum.
- van Gog, T., Paas, F., & van Merriënboer, J. J. G. (2004). Process-oriented worked examples: Improving transfer performance through enhanced understanding. *Instructional Science, 32*, 83–98. doi:10.1023/B:TRUC.0000021810.70784.b0
- VanSledright, B. (2002). *In search of America's past: Learning to read history in elementary school*. New York, NY: Teachers College Press.
- VanSledright, B. A. (2004). What does it mean to read history?: Fertile ground for cross-disciplinary collaborations? *Reading Research Quarterly, 39*, 342–346.
- VanSledright, B. (2008). Narratives of nation-state, historical knowledge, and school history education. *Review of Research in Education, 32*, 109–146. doi:10.3102/0091732X07311065
- VanSledright, B. (2012). Learning with texts in history: Protocols for reading and practical strategies. In T. Shanahan & C. Shanahan (Eds.), *Adolescent literacy within disciplines: General principles and practical strategies* (pp. 199–226). New York, NY: Guilford.
- Veenman, M. V. J., Van Hout-Wolters, B. H. A. M., & Afflerbach, P. (2006). Metacognition and learning: conceptual and methodological considerations. *Metacognition and Learning, 1*, 3–14. doi:10.1007/s11409-006-6893-0
- Vygotsky, L. S. (1986). *Thought and language* (A. Kozulin, Trans.). Cambridge, MA: MIT Press. (Original work published 1934)
- Wallis, C. (2010). *The impact of media multitasking on children's learning and development. Report from a research seminar*. New York, NY: The Joan Ganz Cooney Center at Sesame Workshop.
- Wigfield, A., Guthrie, J. T., Perencevich, K. C., Taboada, A., Klauda, S. L., McRae, A., & Barbosa, P. (2008). Role of reading engagement in mediating effects of reading comprehension instruction on reading outcomes. *Psychology in the Schools, 45*, 432–445. doi:10.1002/pits.20307
- Wiley, J., Goldman, S. R., Graesser, A. C., Sanchez, C. A., Ash, I. K., & Hemmerich, J. A. (2009). Source evaluation, comprehension, and learning in internet science inquiry tasks. *American Educational Research Journal, 46*, 1060–1106. doi:10.3102/0002831209333183
- Wineburg, S. (1991). Historical problem solving: A study of the cognitive processes used in the evaluation of documentary and pictorial evidence. *Journal of Educational Psychology, 83*(1), 73–87. doi:10.1037/0022-0663.83.1.73
- Wineburg, S. (2001). On the reading of historical texts: Notes on the breach between school and academy. In S. Wineburg (Ed.), *Historical thinking and other unnatural acts: Charting the future of teaching the past* (pp. 63–88). Philadelphia, PA: Temple University Press.
- Wineburg, S. (2007). Unnatural and essential: The nature of historical thinking. *Teaching History, 129*, 6–11.
- Winters, F. I., Greene, J. A., & Costich, C. M. (2008). Self-regulation of learning within computer-based environments: A critical analysis. *Educational Psychology Review, 20*, 429–444. doi:10.1007/s10648-008-9080-9
- Wood, P., & Kardash C. A. (2002). Critical elements in the design and analysis of studies of epistemology. In B. K. Hofer & P. R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp. 231–260). Mahwah, NJ: Erlbaum.
- Zimmerman, B. J., & Schunk, D. H. (2001). Reflections on theories of self-regulated learning and academic achievement. In B. Zimmerman, & D. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (2nd ed., pp. 289–307). Mahwah, NJ: Erlbaum.
- Zimmerman, B. J., & Schunk, D. H. (2011). *Handbook of self-regulation of learning and performance*. New York, NY: Routledge.