



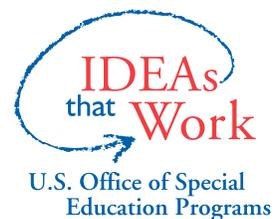
National Center
on Accessing the
General Curriculum

NCAC

Background Knowledge

Curriculum Enhancement Report

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Background Knowledge

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INTRODUCTION

Students are constantly confronted with new information, particularly once they progress to the upper elementary grades and transition from “learning to read” to “reading to learn” (Chall, 1983). To read to learn effectively, students need to integrate new material into their existing knowledge base, construct new understanding, and adapt existing conceptions and beliefs as needed. Proficiency at these tasks is essential to literacy (Davis & Winek, 1989; Squire, 1983; Weisberg, 1988). However, students who lack sufficient background knowledge or are unable to activate this knowledge may struggle to access, participate, and progress throughout the general curriculum, where reading to learn is a prerequisite for success.

Teachers can facilitate their students’ literacy success by helping them to build and activate background knowledge. The purpose of this article is to introduce the topic of background knowledge and identify effective, research-supported instructional approaches for its development and activation. After defining the term background knowledge, we identify background knowledge instructional approaches and compare their reported effectiveness based on a review of the K-12 research literature between 1980 and 2003. For further information, lists of Web resources and referenced research articles are provided at the end of the article.

DEFINITION

There is an extensive terminology to describe different kinds of knowledge. Consistency in the use of these terms is a recognized problem; subtle and dramatic differences exist between different people’s definitions of the same term (Alexander, Schallert & Hare, 1991; Dochy & Alexander, 1995). The terms background knowledge and prior knowledge are generally used interchangeably. For example, Stevens (1980) defines background knowledge quite simply as “...what one already knows about a subject... (p.151).” Biemans & Simons’ (1996) definition of background knowledge is slightly more complex, “...(background knowledge is) all knowledge learners have when entering a learning environment that is potentially relevant for acquiring new knowledge (p.6).” Dochy et al., (1995) provide a more elaborate definition, describing prior knowledge as the whole of a person’s knowledge, including explicit and tacit knowledge, metacognitive and conceptual knowledge. This definition is quite similar to Schallert’s (1982) definition. Thus, while scholars’ definitions of these two terms are often worded differently, they typically describe the same basic concept.

Prior knowledge and background knowledge are themselves parent terms for many more specific knowledge dimensions such as conceptual knowledge and metacognitive knowledge. Subject matter knowledge, strategy knowledge, personal knowledge, and self-knowledge are all specialized forms of prior knowledge/background knowledge. The research studies selected and reviewed for this article targeted the parent concepts prior knowledge/background knowledge for study, and in discussing these studies and throughout the remainder of this article, these two terms are used interchangeably.

APPLICATION ACROSS CURRICULUM AREAS

By far the most frequent curriculum application of interest for studies of background knowledge is content-area reading, with reading comprehension and recall being the most frequently evaluated learning measures. All but one study in our review investigated the impact of background knowledge or activation of background knowledge on reading comprehension and/or recall; the exception was a study that looked for an impact on writing performance. The overwhelming majority of studies explored outcomes relating to the reading of expository text, with only a few focusing on narrative text. The range of curriculum subject areas targeted for investigation was fairly narrow, including science, social studies, and reading. It is worth emphasizing that in spite of this relatively narrow curriculum area focus, it is likely that findings for these curriculum areas generalize to other areas of the curriculum where reading informational text is also an important activity.

EVIDENCE FOR EFFECTIVENESS AS A LEARNING ENHANCEMENT

Prior knowledge has a large influence on student performance, explaining up to 81% of the variance in posttest scores (Dochy, Segers & Buehl, 1999). There is a well established correlation between prior knowledge and reading comprehension (Langer, 1984; Long, Winograd & Bridget, 1989; Stevens, 1980). Irrespective of students' reading ability, high prior knowledge of a subject area or key vocabulary for a text often means higher scores on reading comprehension measures (Langer, 1984; Long et al., 1989; Stevens, 1980). In addition, high correlations have been found between prior knowledge and speed and accuracy of study behavior (reviewed in Dochy et al., 1999) as well as student interest in a topic (Tobias, 1994). Thus, prior knowledge is associated with beneficial academic behaviors and higher academic performance.

It is tempting to conclude from observations such as these that prior knowledge promotes better learning and higher performance, but different research methods are needed to establish such a causal relationship. In the sections below we consider research findings that speak directly to the ability of prior knowledge to influence academic outcomes. In the first section, we discuss research findings from studies that have investigated instructional approaches for building students' prior knowledge. In the second section, we discuss findings from research studies that have investigated instructional approaches for helping students activate prior knowledge. In the course of these discussions we identify instructional approaches that the research indicates can effectively support students' use of background knowledge and improve their academic performance.

Evidence for Effectiveness of Strategies for Building Prior Knowledge

Direct instruction on background knowledge can significantly improve students' comprehension of relevant reading material (Dole, Valencia, Greer & Wardrop, 1991; Graves, Cooke & Laberge, 1983; McKeown, Beck, Sinatra & Loxterman, 1992; Stevens, 1982). For example, in one study, students who received direct instruction on relevant background knowledge before reading an expository text demonstrated significantly greater reading comprehension than peers who received direct instruction on an irrelevant topic area (Stevens, 1982). Dole et al., (1991) extended these findings, showing that teaching students important background ideas for an expository or narrative text led to significantly greater performance on comprehension questions than did no prereading background knowledge instruction. By building students' background knowledge teachers might also help to counteract the detrimental effects that incoherent or poorly organized texts have on comprehension (McKeown et al., 1992).

Direct instruction on background knowledge can be embedded into an approach such as previewing, where students are presented with introductory material before they read specific texts. Such introductory material may include important background information such as definitions of difficult vocabulary, translations of foreign phrases, and explanations of difficult concepts. For example, in a study by Graves et al., (1983), students were given previews of narrative texts that included a plot synopsis, descriptive list of characters, and definitions of difficult words in the story. Thus, students were given both a framework for understanding the stories and important background information. Students not only liked the previews but made significant improvements in both story comprehension and recall.

As an alternative to a direct instruction approach, teachers might consider one more indirect, such as immersing students in field experiences through which they can absorb background knowledge more independently. Koldewyn (1998) investigated an approach that combined reading trade books, journal keeping, field trips that put students in authentic experiences related to their reading, and follow-up Language Experience activities. Qualitative observations in Koldewyn's report reflect positively on the technique. However, the data is too preliminary to clearly establish the effectiveness of the approach or clarify which of its elements are most valuable.

By building students' background knowledge, teachers may also be able to indirectly influence other aspects of academic performance such as writing. For example, Davis et al., (1989) found that students felt better prepared to write a research paper when they took part beforehand in an extended course of building background knowledge through individual research and in-class sharing and discussion. While this study does not show any direct impact on writing quality, it might be expected that improving students' sense of preparedness might raise their engagement and/or motivation, translating into better performance.

Factors Influencing the Effectiveness of Strategies for Building Prior Knowledge

The studies discussed above provide corroborating support for the effectiveness of direct instruction on background knowledge as a means to build reading comprehension. The degree of effectiveness of this approach could presumably be influenced by a variety of factors including student characteristics, duration of instruction, grade level, and ability level. None of these factors have been routinely investigated, and the studies we have reviewed do not identify any of them as notably influential. On the contrary, these studies support the effectiveness of direct instruction on background knowledge under a range of conditions. Research by Stevens (1982), Dole et al., (1991) and Graves et al., (1983) demonstrates effectiveness for grades five, seven, eight, and ten and with students with poor reading ability as well as students from "average classes." After controlling for reading ability in the sample, Stevens (1982) still reported a significant effect of prior knowledge building on reading comprehension. Thus, this approach appears to be effective for a range of grade levels and student populations. Additional research is needed to extend these findings and investigate more comprehensively the factors that might influence the success of direct instruction of background knowledge.

Evidence for Effectiveness of Strategies for Activating Prior Knowledge

There is a good amount of research investigating the effectiveness of instructional strategies for activating prior knowledge as a means to support students' reading comprehension. As a whole, the research base provides good evidence to support the use of prior knowledge activation strategies; prior knowledge activation is regarded as a research-validated approach for improving children's memory and comprehension of text (Pressley, Johnson, Symons, McGoldrick &

Kurita, 1989). There are a variety of strategies for helping students to activate prior knowledge. We have divided this review into six sections, each addressing a different approach.

Prior knowledge activation through reflection and recording. One of the simplest methods for helping students activate background knowledge is to prompt them to bring to mind and state, write down, or otherwise record what they know. Asking students to answer a simple question such as, “What do I already know about this topic” orally or on paper is a straightforward way to do this. The reported effectiveness of this simple strategy is quite good, with five studies (Carr & Thompson, 1996; Peeck, van den Bosch & Kreupeling, 1982; Smith, Readence & Alvermann, 1983; Spires & Donley, 1998; Walraven & Reitsma, 1993) in our review reporting some beneficial impact relative to control treatments, and just one study (Alvermann, Smith & Readence, 1985) reporting only no benefit or a negative impact. Reading comprehension was the most frequently measured outcome in these studies, but some studies also report beneficial effects on text recall (Peeck et al., 1982; Smith et al., 1983).

Activating relevant prior knowledge by expressing in some form what one already knows about a topic has been demonstrated to be more effective than activating irrelevant background knowledge (Peeck et al., 1982) or not activating any background knowledge (Carr et al., 1996; Smith et al., 1983; Spires et al., 1998) at improving text recall and/or comprehension. Spires et al., (1998) found that activating background knowledge through reflection and oral elaboration during text reading was a more effective strategy than taking notes on main ideas and their corresponding details. Walraven et al., (1993) found equally good effectiveness when embedding instruction in prior knowledge activation within a Reciprocal Teaching approach. Strategy instruction that incorporated direct instruction in prior knowledge activation promoted student reading comprehension more effectively than the regular program of instruction. However, Reciprocal Teaching without instruction in prior knowledge activation was no less effective.

A weakness in this research base is the failure to characterize the duration of the learning effects, with most studies presenting only a minimal delay between instruction and testing. Only Spires et al., (1998) and Walraven et al., (1993) looked for effects at delayed time points, but both found that reading comprehension gains were maintained for roughly 4 weeks after instruction, suggesting that restatement of prior knowledge can produce a lasting impact.

There are important subtleties to some of these findings indicating an influence by various factors on the effectiveness of this prior knowledge activation strategy. Some studies have shown, for example, that this strategy has a different impact on reading comprehension depending on the text features (Carr et al., 1996; Peeck et al., 1982); familiar vs. unfamiliar text, consistent vs. inconsistent with prior knowledge. This issue is an important one and will be discussed in the Factors Influencing Effectiveness section below.

Prior knowledge activation through interactive discussion. With the general approach discussed in the previous session, students, once prompted, record prior knowledge with little or no discussion or other stimulation from teacher or peers. An alternative to this is an interactive approach, where student reflection on prior knowledge is supplemented with interactive discussion. For example, Dole et al., (1991) designed an intervention where students reflected on and recorded their prior knowledge on a topic and then engaged in a group discussion of the topic, during which the teacher encouraged them to contribute knowledge to complete a semantic map. This approach was determined to be more effective at promoting reading comprehension than no prereading instruction. However, it was less effective than direct

instruction on the information needed to understand the text. Thus, it is not clear that an interactive approach would have any advantage over direct instruction.

The robustness of interactive approaches is not always very impressive. For example, findings from Schmidt & Patel (1987) suggest that topic area novices may significantly benefit from this kind of approach, whereas subject area experts may not. In this study, students activated background knowledge by gathering in small groups to analyze a problem and then proposing and discussing solutions. Results of a study by Langer (1984) were inconsistent, showing no reliable advantage to participating in a prereading activity called the Pre Reading Plan (PReP), where students are trained to free associate on key vocabulary words, reflect on these associations, discuss their associations as a group, and then reformulate their knowledge based on the discussion. Students' performance on comprehension tests was not consistently better than that of peers who engaged in general discussion of the topic before reading or took part in no prereading activity.

Thus, consistently solid evidence to support the use of an interactive approach to prior knowledge activation is lacking. Based on the studies we reviewed, it is not clear that the added effort involved in such an approach improves upon the results of direct instruction in background knowledge. However, it is also possible that the apparent advantage of direct instruction in background knowledge over an interactive approach derives only from its greater familiarity to students (Dole et al., 1991). This is a possibility that merits investigation. Further research is also needed to better determine the conditions under which an interactive approach is beneficial (e.g., does it differently affect students with different levels of subject area expertise). It should also be noted that there are many possibilities for designing an interactive approach, and we have touched on only a few of them.

Prior knowledge activation through answering questions. Research by Rowe & Rayford (1987) suggests that teachers can facilitate student activation of background knowledge by having them answer questions before and/or while they read new material. They analyzed student responses to a series of 3 prereading purpose setting questions. Students were shown 3 purpose questions from the Metropolitan Achievement Test and asked to make predictions about the passage and end-of-passage questions that might go with each question. Students were also asked to put themselves in the test-taker's position and describe what they would try to find out while reading the passage. Analysis of the students' responses suggested that students were able to activate background knowledge under these conditions, an indication that purpose questions may be helpful cues for activating background knowledge.

Extending this work, studies have investigated whether activating background knowledge through question answering improves reading comprehension. It has been theorized that generating answers to questions facilitates deep processing and high level knowledge construction, which in turn facilitate learning (King, 1994; Pressley, Wood, Woloshyn, Martin, King & Menke, 1992). Experimental findings support this theory. First, King (1994) found that a guided reciprocal peer questioning and answering approach, where students were trained to study new material by asking and answering each other's self-generated questions, promoted significantly better lesson comprehension than untrained questioning. Interestingly, King's data showed that questioning focused on linking prior knowledge with lesson material led to a more maintained high performance than did questioning focused on making connections within the lesson material. Thus, instruction in peer questioning and explaining through connecting text to prior knowledge may be a particularly effective question answering strategy for improving comprehension.

Pflaum, Pascarella, Auer, Augustyn & Boswick (1982) investigated a somewhat different question-based method for prior knowledge activation where students were asked, before and during reading, five questions about the topic in the text. The questions prompted students to define the topic, make associations between the topic and their background knowledge, identify the role and location of the topic matter, and comment on the topic's importance. Data suggest that this strategy may be effective for some readers and not others, depending on their reading ability.

A review by Pressley et al., (1992) builds a strong case for the hypothesis that question answering approaches can increase learning. After reviewing a large number of research studies, they conclude that asking students to generate explanatory answers to questions about content to be learned can facilitate learning of the material. The reviewed approaches included guided reciprocal peer questioning, asking students to respond to prequestions accompanying text, elaborative interrogation where students generate elaborations in response to why questions about to-be-learned facts, and asking students to generate explanatory answers to questions as part of group learning. Pressley et al., (1992) emphasized that not all questioning interventions are effective; the most effective questioning requires deep processing of the to-be-learned material and relating it to prior knowledge.

The K-W-L strategy for activating prior knowledge. Ogle (1986) developed a strategy for helping students access important background information before reading nonfiction. The K-W-L strategy (accessing what I Know, determining what I Want to find out, recalling what I did Learn) combines several elements of approaches discussed above. For the first two steps of K-W-L, students and the teacher engage in oral discussion. They begin by reflecting on their knowledge about a topic, brainstorming a group list of ideas about the topic, and identifying categories of information. Next the teacher helps highlight gaps and inconsistencies in students' knowledge and students create individual lists of things that they want to learn about the topic or questions that they want answered about the topic. In the last step of the strategy, students read new material and share what they have learned. Informal evaluations indicate that the K-W-L strategy increases the retention of read material and improves students' ability to make connections among different categories of information as well as their enthusiasm for reading nonfiction (Ogle, 1986). The approach has been recommended by teaching professionals (Bean, 1995; Carr & Ogle, 1987; Fisher, Frey & Williams, 2002), but it has not been rigorously tested.

CONTACT-2, computer-assisted activation of prior knowledge. The approaches discussed so far involved traditional materials such as paper and pencil and face-to-face discussion. Biemans et al., (1996) investigated a computer-assisted approach for activating conceptions during reading, called CONTACT-2. CONTACT-2 assists students in searching for preconceptions, comparing and contrasting these preconceptions with new information, and formulating, applying, and evaluating new conceptions. Students working with CONTACT-2 developed higher quality conceptions than students in a no activation group, and this advantage was still apparent at a 2-month follow-up. More recent research suggests that the key component of CONTACT-2 is comparing and contrasting new and existing knowledge, which most accounts for students' successful performance on lesson tests (Biemans, Deel & Simons, 2001). These findings reinforce the idea that integrating new information with prior knowledge is a valuable learning strategy and suggests that a computer-assisted approach can be as successful as a teacher-directed one.

Prior knowledge activation through interpretation of topic-related pictures. Croll, Idol-Maestas, Heal & Pearson (1986) describe a unique approach that combines building and

activating prior knowledge. The approach entails training students to interpret topic-related pictures. Two students trained in this strategy significantly improved reading comprehension for both pictures and text. These data suggest this to be an effective approach, but the limited sample of two students and lack of a control group make any such claims, tentative and preliminary at best. Moreover, there has been no subsequent research to help validate these findings.

Factors Influencing the Effectiveness of Strategies to Activate Prior Knowledge

Grade level. Students across a wide range of grade levels, spanning first to tenth grade, are represented in the studies we have discussed, although most studies sampled students toward the middle of this range, in grades five and six. Looking across these studies there is no apparent relationship between study outcome and the grade level sampled. On the contrary, our review suggests that prior knowledge activation strategies can be effective with elementary, middle school, and junior high students.

Student characteristics. Students bring to a text different levels of topic area familiarity, and this is understandably a factor of interest when investigating the effectiveness of prior knowledge activation strategies. Two studies investigated the possibility that students' level of familiarity with the topic matter might influence the effectiveness of prior knowledge activation strategies. Carr et al., (1996) discovered a different pattern of results depending on the familiarity of the text topic to the student participants. When reading unfamiliar passages, students that were asked to state their prior knowledge on the text topic significantly outperformed students who were not asked to state prior knowledge. However, when reading familiar passages, only a subset of the student population, age-matched students without disabilities, benefited from prior knowledge activation. Similarly, Schmidt et al., (1987) found that novices and experts on passage subject matter responded differently to a prior knowledge activation strategy. Novices demonstrated better performance after having taken part in interactive prior knowledge activation than after having activated irrelevant prior knowledge, while experts showed no benefit. These findings both suggest that students with more limited knowledge of the topic area may more consistently benefit from prior knowledge activation strategies.

Of course, readers may be familiar with a topic area – even have considerable knowledge of it – without that knowledge being accurate. A question of interest is whether or not prior knowledge activation is advantageous when students are activating false preconceptions. The consensus from the three studies we reviewed on this topic is that prior knowledge activation may in fact interfere with learning when learners are confronted with material at odds with their preconceptions. When text is inconsistent with prior knowledge, students that mobilize this prior knowledge perform significantly more poorly on tests of recall and comprehension than do peers who do not activate prior knowledge (Alvermann et al., 1985; Smith et al., 1983). Lipson (1982) commented that students tend to disregard passage information inconsistent with their prior knowledge and therefore construct more accurate meaning when lacking prior knowledge versus when having inaccurate prior knowledge. Although Peeck et al., (1982) reported a beneficial effect of activating incongruous prior knowledge, they did not randomize group assignment, raising the possibility that pre-existing differences in recall ability confound their findings. Moreover, a more recent review article, Pressley et al., (1989) minimizes the importance of these findings by reporting that there are more studies showing inconsistent prior knowledge to be detrimental than beneficial.

Weisberg (1988) claims that students with disabilities, as a group, demonstrate a considerable over reliance on prior knowledge when text material is inconsistent with their preconceptions.

This raises another issue, which is whether a student's educational group or disability status influences the effectiveness of prior knowledge activation strategies. Many of the studies in our review included students from different educational groups, most often students with different reading levels (Biemans et al., 2001; Langer, 1984; Smith et al., 1983; Spires et al., 1998) but also students with and without learning disabilities (Carr et al., 1996; Croll et al., 1986; Pflaum, et al., 1982; Walraven et al., 1993). A few of these studies analyzed the data in a way that would reveal differences in responsiveness to prior knowledge activation across educational groups (Carr et al., 1996; Langer, 1984; Pflaum et al., 1982). Their findings suggest that the effectiveness of prior knowledge activation strategies may in fact differ across different student populations.

For example, Pflaum et al., (1982) found that "same age normal" students significantly benefited from prior knowledge activation, whereas "young age-matched normal" students and students with disabilities did not (instead these students showed significant improvement with sentence aids). Langer (1984) found that the PReP prior knowledge activation activities were not effective for below-level readers. On-level readers demonstrated the greatest and most consistent benefit, and above-level readers a less consistent benefit. Langer's findings also suggest that the impact of prior knowledge activation on students from different educational groups may depend in part on the topic familiarity. Thus, a range of data suggests that it is very important to consider learners' unique strengths, weaknesses, and preferences when selecting instructional approaches.

Text characteristics. The studies we reviewed used both expository and narrative texts to investigate the impact of prior knowledge activation strategies on learning; however, the vast majority used only expository texts. These studies provide strong evidence that prior knowledge activation strategies are effective at improving comprehension of informational texts. Although very few studies investigated the use of these strategies when reading narratives, two studies by Carr et al., (1996) and Dole et al., (1991) suggest that prior knowledge reflection and recording and interactive prior knowledge activation, respectively, may be beneficial when working with this kind of text. Additional research may help to clarify any differences in effectiveness of prior knowledge activation when working with different kinds of text.

CONCLUSION

Supporting students as they read to learn is an important instructional goal throughout the curriculum. Research studies have clearly established the importance of background knowledge to reading and understanding texts. Research studies also provide direct evidence that instructional strategies designed to support the accumulation and activation of prior knowledge can significantly improve student reading comprehension of informational texts. These studies suggest that by implementing instructional strategies to support students' background knowledge, teachers can better support students' content area learning.

The best-supported approaches emerging from this review are direct instruction on background knowledge, student reflection on and recording of background knowledge, and activation of background knowledge through questioning. However, there are other promising approaches, including the computer-supported approach CONTACT-2 (Biemans et al., 1996), which merit additional research. The impact of such approaches on general literacy is another issue worth further study. Although a few studies support the effectiveness of background knowledge instruction for improving student comprehension of narrative texts, more research is needed.

Another important conclusion that emerges from the research is the importance of considering student characteristics, including their familiarity with a topic area and the accuracy of their prior

knowledge, in selecting approaches to support the activation of background knowledge. For example, students who hold inaccurate preconceptions may not be helped by prior knowledge activation strategies. For these students, instruction that clarifies and/or expands prior knowledge may be important. By effectively selecting and implementing instructional strategies to build and/or activate background knowledge, teachers can better support all students on their way toward reading to learn and succeeding throughout the curriculum.

RESOURCES ON THE INTERNET

General Background Knowledge

Prior Knowledge

http://labweb.education.wisc.edu/ep301/Science_Peter/prior.htm#top

This Web site provides definitions of prior knowledge and major conceptual perspectives on the roles of prior knowledge in learning. The importance of prior knowledge is explained with respect to the concepts suggested by some cognitive theorists, such as Piaget, Vygotsky, and Woolfork. The last section of this site connects the concepts of prior knowledge to a case study described in the home page of the site.

North Central Regional Educational Laboratory - Critical Issue: Building on Prior Knowledge and Meaningful Student Contexts/Cultures

<http://www.ncrel.org/sdrs/areas/issues/students/learning/lr100.htm>

This Web site illustrates how teachers can more effectively support students' learning through building and activating prior knowledge. This site houses information about instructional issues, goals, and methods related to the use of students' prior knowledge in classroom. This site also provides a series of links to sites with definitions of key terms and ideas suggested by experts in the field. Three cases are provided as successful models.

U.S. Department of Education - Teaching Our Youngest: A Guide for Preschool Teachers, Child Care & Family Providers. Building Children's Background Knowledge and Thinking Skills

<http://mirror.eschina.bnu.edu.cn/Mirror/ed.gov/www.ed.gov/offices/OESE/teachingouryoungest/building.html>

This Web site provides an instructional guide for caregivers and teachers to help develop young children's background knowledge and thinking skills. This site proposes concrete ideas to enrich and expand children's knowledge building through the uses of various educational resources, such as books, discourse, classroom guests, and field trips. The PDF version of this guide is available through: http://www.ed.gov/teachers/how/early/teachingouryoungest/page_pg11.html

Queensland Government – The New Basics Project/Productive Pedagogies: Background Knowledge

<http://education.qld.gov.au/corporate/newbasics/html/pedagogies/connect/con2a.html>

The New Basics Project takes place in Queensland, Australia, and aims to improve students' learning outcomes through dealing with students' identities, new economies and workplaces, new technologies, diverse communities and complex cultures. This Web site illustrates instructional practices with different degrees of connectedness between students' linguistic, cultural, world knowledge and experience. It also includes the topics, skills and competencies in lessons. This site provides definitions of high-connected and low-connected instructional

practices, the continuum to describe different degrees of connectedness, and an example of a high-connected instruction in a grade 6 classroom.

Background Knowledge and Technology

Joseph, Linda C. (2002). Multimedia Schools, Cyberbee: Building Prior Knowledge

<http://www.infotoday.com/MMSchools/may02/cybe0502.htm>

This website contains an example of successful classroom instruction which incorporated multimedia technology into every aspect of the lesson in order to foster the students' use of their background knowledge and overall learning. This site describes the social studies instruction conducted by a fourth grade classroom teacher who used the multimedia technology, such as Microsoft Word/Digital Photographs, PowerPoint, Website, and Microsoft Publisher in order to activate and build students background knowledge. The lesson plan is provided with other resources and links regarding the topic, Jackie Robinson.

Background Knowledge and Reading

Farrell, Jack – What Exactly is “Prior Knowledge”?

<http://www.readfirst.net/prior.htm>

This Web site contains an article written by Jack Farrell, who is an English teacher at Newbury Park High School in California (his home page is <http://www.readfirst.net>). In this article, Farrell explains the role of prior knowledge in learning and pervasive misconceptions that students should not be exposed to new concepts unless they have some prior knowledge of the topic. Read First is an instruction method through which the students read silently and independently before others, including their teachers, and control their thinking processes. Ferrell describes how Read First is aligned to California Reading standards for middle school age students.

DiGiacomo, Susan – Reading Instruction Handbook: Activating Personal Knowledge

<http://curry.edschool.virginia.edu/go/edis771/webquest2000/student/ssusandigiac/priorknowledge.htm>

This Web site provides information of using students' prior knowledge as one of the reading comprehension strategies. Susan DiGiacomo emphasizes student's realization of the importance of their prior knowledge to their reading processes and provides some instructional techniques that teachers can employ in order to activate students' prior knowledge, including pre-reading activities. This site is linked to a Web site with more information of various reading comprehension strategies and to DiGiacomo's home page, <http://curry.edschool.virginia.edu/go/edis771/webquest2000/student/tsusandigiac/home.html>

TLL (The Library Lady) Education Services – Building a Network of Prior Knowledge

http://www.thelibrarylady.net/Childhood%20-%20From%20the%20Inside%20Out/building_a_network_of_prior_know.htm

The focus of TLL Education Services is to assist educators and parents of emergent readers to initiate the development of teaching methods and new curriculum. This Web site highlights the importance of prior knowledge to child's reading development based on the notion of neural reorganization and restructuring of new information. This sites also provides some ideas of shortening child's assimilation period through using activities which build a network of prior knowledge, such as introducing the subject topics prior to actual instructions and connecting the subject topics to child's personal lives.

School Improvement in Maryland - Activating Prior knowledge

http://www.mdk12.org/instruction/success_mspap/general/projectbetter/thinkingskills/ts-1-2.html

This Web site illustrates the importance of prior knowledge in reading comprehension. This site provides the finding that “teachers who activate relevant prior knowledge promote learning by enhancing comprehension of text, especially when information in the text is compatible with prior knowledge” and the rationale behind this finding. Ideas of incorporating this finding into reading instructions are briefly explained. The reference section introduces two books and an article on this topic although they are not very recent resources.

Christen, William L. & Murphy, Thomas J. (1991). Increasing Comprehension by Activating Prior Knowledge. ERIC Clearinghouse on Reading, English, and Communication

http://www.ericfacility.net/databases/ERIC_Digests/ed328885.html

The authors report three major topics of research: (1) building readers’ background knowledge; (2) activating readers’ existing background knowledge and attention focusing BEFORE reading; and (3) guiding readers’ DURING reading and providing review AFTER reading. The authors also suggested three major instructional interventions for students who have little prior knowledge: (1) teach vocabulary as a prereading step; (2) provide experiences; and (3) introduce a conceptual framework that will enable students to build an appropriate background for themselves, as well as classroom implications based on teachers’ understandings of the levels of students’ prior knowledge.

Bank State College of Education - Literacy Guide: Making Connection between New and Known Information

<http://www.bankstreet.edu/literacyguide/back.html>

This Web site provides information of effective literacy teaching, which builds students’ learning of new concepts on their diverse areas of existing knowledge of language, world, and how the system of prints works. The site supports the concept that activating prior knowledge before reading is an important step to foster comprehension for both experienced and beginner readers.

Activating Prior Knowledge: Using Background Knowledge as Learning Strategy

http://students.lisp.wayne.edu/~ah3082/activating_prior_knowledge.html

Activating prior knowledge is introduced as one of the reading comprehension strategies in this Web site. The site provides the definition of the strategy, research findings related to the field, and some examples of strategy use in teaching, including the K-W-L strategy, prediction, the “Yes/No...Why? It Reminds Me of...” strategy, and think-aloud. More information about these strategies can be found on the listed links provided at the end of the site.

Intervention Central - Prior Knowledge: Activating the ‘Known’

<http://www.interventioncentral.org/htmldocs/interventions/rdngcompr/priorknow.shtml>

This Web site provides information on how to use text prediction strategies in order to activate students’ prior knowledge and to increase their levels of reading comprehension. The information includes materials, preparation, and a step-by-step explanation of the procedure when the text prediction strategy interventions are implemented in classroom.

Lewin, Larry (2003). Practical Ideas for Improving Instruction: Connecting to Prior Knowledge

<http://www.larrylewin.com/Three%20Rs/Reading%20Comprehension/connectingpriorknowledge.htm>

Larry Lewin, an educational consultant, explains that tapping in students' prior knowledge is one of the reading comprehension strategies and that students need assistance to use this strategy successfully. This site provides teachers a template of "open mind" to brainstorm their students' prior knowledge before reading.

Wilkes, Glenda - How Prior Knowledge Impacts New Learning

<http://www.utc.arizona.edu/tact/tact2-5.html>

This Web site is a part of the site created by University Teaching Center at the University of Arizona. Wilkes explains that college students' prior knowledge often interfere with their accurate learning of new concepts due to their misconceptions and learning strategies. Wilkes states Ross's categorization of five possible text-related learning strategies used by college students and suggests that identification of students' prior knowledge is an important step for teachers to find out misconceptions and to avoid the negative impact of prior knowledge to new learning.

Houghton Mifflin Education Place – Learner Variables to Consider in Meeting Individual Needs: Prior Knowledge

<http://www.eduplace.com/rdg/res/literacy/meet1.html>

This Web site contains a short explanation of use of prior knowledge as one of the important variables which affect students' learning. Other variables introduced in this site include language and cultural background, rate of learning, amount of instructional time, and interests and attitudes. The site provides a suggestion that prior knowledge is a key for literacy learning and constructing meaning for all students.

Coiro, Julie (2000). Literacy Information and Technology in Education – Qualitative Reading Inventory: Assessment of Prior Knowledge

<http://www.lite.iwarp.com/qriprior.htm>

Coiro introduces a reading inventory to assess students' familiarity/prior knowledge to the topics of reading and to activate students' prior knowledge. This Web site includes descriptions of this inventory in terms of preparation, purpose, procedures, scoring, and a guide to analyze the results. This inventory has two sections of tasks, namely conceptual questions tasks and prediction tasks.

Background Knowledge and Science Instruction

Roschelle, Jeremy (1995). Learning in Interactive Environments: Prior Knowledge and New Experience

<http://www.exploratorium.edu/IFI/resources/museumeducation/priorknowledge.html>

The focus of this article is on developing new perspectives of the roles of prior knowledge in learning. Considering the paradoxical views of prior knowledge (prior knowledge as an important element for constructive learning process and prior knowledge as a conflicting element to learning process). Roschelle reviews research findings, major theories, and empirical instructional methods and provides scientific interpretations of learning, major perspectives on the process of learning as conceptual change, and successful learning experiences that foster

learners' reasoning skills. This site is a part of the Museum Education site, this site was developed by Institute of Inquiry, which focuses on inquiry-based science instruction.

Biology Lessons for Prospective and Practicing Teachers - Instructional Philosophy: Prior Knowledge

<http://www.biologylessons.sdsu.edu/philosophy/prior.html>

This Web site is designed for prospective and practicing elementary school teachers to improve their teaching in science and biology. This site provides four philosophical lessons for teachers: (1) to elicit students' prior knowledge as a starting point, (2) to present familiar topics, (3) identify student's prior knowledge, and (4) identify students' alternative conceptions which may impede their learning new concepts.

Jason Project Online – Learning Analysis: Background Knowledge

http://www.stanford.edu/~btobin/courses/106/jason_online/design_review_site/pages/learning_analysis/features_details.htm#background

Jason project proposes a multimedia and interdisciplinary approach to improve teaching and learning science. This Web site introduces the uses of digital labs (multimedia game) and video as possible instructional tools to build students' background knowledge in science.

Pearson Prentice Education Inc. – Unit 8 Human Biology: Reading Strategy 1 Using Prior Knowledge

<http://www.phschool.com/science/biosurf/superread/unit8/8strategy1.html>

This Web site provides definitions of prior knowledge and an explanation of how readers' prior knowledge can support their understanding the meanings of the texts. This sites also provides ideas of activities which facilitate activating prior knowledge before reading. There is a link at the end to sites where the viewers can try the activity using a science textbook.

REFERENCES

Alexander, P.A., Schallert, D.L. & Hare, V.C. (1991). Coming to terms: how researchers in learning and literacy talk about knowledge. *Review of Educational Research*, 61(3), 315-343.

The authors of in this article provide a conceptual structure for organizing and relating terms that relate to select knowledge constructs. The author begins with a review of the literature. A structure is built to clarify terms, and the associations among them, and to articulate definitional statements for these knowledge terms. In conclusion, the authors also consider the significance of this theoretical task for future research in cognition and in learning.

Alvermann, D.E., Smith, L.C. & Readence, J.E. (1985). Prior knowledge activation and the comprehension of compatible and incompatible text. *Reading Research Quarterly*, 20(4), 420-436.

The authors studied the effect of prior knowledge activation on average readers' comprehension of compatible and incompatible text. Their findings support the concept that prior knowledge may interfere with, rather than facilitate, reading comprehension under certain conditions. Those students, who activated relevant background knowledge prior to reading text, were found to have limited their ideas with their existing knowledge structures rather their previous knowledge and experience to override the text information. There was

no difference in performance between activators and non-activators on compatible text. The authors provide some instructional recommendations for changing inaccurate background knowledge.

Bean, T.W. (1995). Strategies for enhancing text comprehension in middle school. *Reading & Writing Quarterly: Overcoming Learning Difficulties*, 11(2), 163-171.

The authors present a case study for a middle school setting in which teaching strategies related to vocabulary, comprehension and writing are employed as a part of the curriculum. The strategies include: dialog journals, the verbal-visual strategy for vocabulary, K-W-L charts, and graphic organizers.

Biemans, H.J.A. & Simons, P.R., (1996). CONTACT-2: A computer-assisted instructional strategy for promoting conceptual change. *Instructional Science*, 24, 157-176.

The authors in acknowledging the importance of activating or teaching prior knowledge prepared a study in which they could provide instructional guidance to assist in this process. The CONTACT, then CONTACT-2 computer assisted instructional programs were devised then studied with fifth and sixth-grade participants. Author's results indicated that students in the CONTACT-2 group achieved higher performance and generalized information better than students in the CONTACT in other condition.

Biemans, H.J.A., Deel, O.R. & Simons, P.R. (2001). Differences between successful and less successful students while working with the CONTACT-2 strategy. *Learning and Instruction*, 11, 265-282.

This article describes a study investigating the use of a computer assisted program to employ a strategy to help activate students' prior knowledge in preparation for novel instruction. CONTACT-2, the computer-assisted activation system, was evaluated in 2 experimental conditions and found to be most effective with the inclusion of a compare contrast strategy session regarding preconceptions about a topic with new information. The authors provide information for educational practices as well as future research.

Carr, E. & Ogle, D. (1987). K-W-L Plus: A strategy for comprehension and summarization. *Journal of Reading*, 30(7), 626-631.

These researchers supplemented the traditional K-W-L (Know, Want to Know, Learned) strategy with mapping and summarization strategies for use in content area texts. Their findings indicate that these additions to the K-W-L strategy were helpful for remedial and non-remedial high school students.

Carr, S.C. & Thompson, B. (1996). The effects of prior knowledge and schema activation strategies on the inferential reading comprehension of children with and without learning disabilities. *Learning Disability Quarterly*, 19, 48-61.

The purpose of this study was to compare the reading comprehension abilities of students with learning disabilities as well as age peers and reading level peers. The topics included familiar and unfamiliar reading passages to review the use of prior knowledge under varying conditions. The researchers concluded that all children benefited from experimenter activation of prior knowledge, but that the benefits were important for children with LD, and when the topics were different.

CAST. *Teaching Every Student*.(n.d). Retrieved September 03, 2003, from <http://www.cast.org/teachingeverystudent/>

Chall, J.S. (1983). *Stages of reading development*. New York: McGraw-Hill.

Croll, V.J., Idol-Maestas, L., Heal, L. & Pearson, P.D. (1986). *Bridging the comprehension gap with pictures: Center for the Study of Reading*. University of Illinois at Urbana Champagne.

The researchers of this study focus on two special education students from a middle school who were taught to interpret pictures that were related to reading passages by topic. The authors used a time series design to evaluate this method of activating prior knowledge. Following 10 three-day sequences of pre-picture reading, picture student, and post-picture reading, the students reading comprehension significantly improved in many areas. The authors credit the students' increases in the amount of accessibility of prior knowledge to the systematic study of the pictures.

Davis, S.J. & Winek, J. (1989). Improving expository writing by increasing background knowledge. *Journal of Reading, December*.

The authors report their findings of the "fit" of background knowledge in the expository writing process for seventh grade gifted students. Implementing thoughtful research to increase background knowledge on a chosen research topics improved students' expository writing.

Dochy, F., Segers, M. & Buehl, M.M. (1999). The relation between assessment practices and outcomes of studies: The case of research on prior knowledge. *Review of Educational Research, 69*(2), 145-186.

The authors conducted a research review to overview prior knowledge and its role in student performance; to examine the effects of prior knowledge in relation to the method of assessment. They reviewed 183 articles, books, papers and research reports related to prior knowledge. They reported that prior knowledge usually had positive effects on students' performance, the effects varied by assessment method. In addition, prior knowledge was more likely to have negative or no effects on performance when inconsistent assessment measures were conducted.

Dochy, F.J. R.C. & Alexander, P.A. (1995). Mapping prior knowledge: A framework for discussion among researchers. *European Journal of Psychology of Education, 10*(3), 225-242.

This article is a review for foci: (1) to observe numerous problems related with usage of prior knowledge terminology; (2) to observe key dimensions of prior knowledge referenced mainly by researchers in the field of cognitive psychology and artificial intelligence; (3) to observe a conceptual chart of prior knowledge terminology; and (4) to illustrate suggestions for future research and instructional practices. The authors develop the argument to address prior knowledge variables in future research.

Dole, J.A., Valencia, S.W., Greer, E.A. & Wardrop, J.L. (1991). Effects of two types of prereading instruction on the comprehension of narrative and expository text. *Reading Research Quarterly, 26*(2), 142-159.

In this study, 63 fifth-grade U.S. students' were assigned to one of three conditions: (a) teacher directed preteaching; (b) interactive preteaching, and; (c) no preteaching control. The researchers compared the effects of two prereading instructional treatments on students'

comprehension of narrative and expository texts. The authors found that pretreatment was more effective than none and the teacher directed pretreatment had the most impact on student reading comprehension.

Fisher, D., Frey, N. & Williams, D. (2002). Seven literacy strategies that work. *Educational Leadership*, 60(3), 70-73.

A focus on seven instructional strategies for improving reading and writing across the curriculum were reported by the authors of this research. The seven interventions included: read alouds, K-W-L charts, graphic organizers, vocabulary instruction, writing to learn, structured note-taking, and reciprocal teaching.

Graves, M.F., Cooke, C.L. & Laberge, M.J. (1983). Effects of previewing difficult short stories on low ability junior high school students' comprehension, recall, and attitudes. *Reading Research Quarterly*, 18(3), 262-276.

In this study, 32 eighth-grade students reading at about the 5th grade level and 40 seventh-grade students reading at about the 3rd grade level were the subjects used to explore the effects of previewing difficult short stories on students' comprehension, recall and attitudes. The authors found that both previews considerably improved students' comprehension of the stories, improving factual and inferential comprehension using a multiple choice test. Previews significantly increased students' recall of the stories and their scores on the short-answer comprehension test.

King, A. (1994). Guiding knowledge construction in the classroom: Effects of teaching children how to question and how to explain. *American Educational Research Journal*, 31(2), 338-368.

In this study, pairs of 4th and 5th graders were asked to study the material and ask and answer each others' self-generated questions in science lessons. In one condition, the students' discussion was guided by questions considered to support connections among ideas within a lesson. In the second condition, the discussion was guided by comparable lesson-based questions and questions proposed to access prior knowledge/experience and encourage associations between the lesson and that knowledge. The authors found that students who used both lesson questions and access questions out-performed students in question only and control groups.

Koldewyn, E.A. (1998). Building the prior knowledge of disadvantaged first-grade students through the use of field experience. *Education* (pp. 85). Ogden: Weber State University.

This master's thesis study focuses on the effects of increasing prior knowledge for an inner-city school in Northern Utah. Based on research results, the authors concluded that the use of field experiences and related activities can broaden prior knowledge, build schema, and make up experimental deficits for first-grade students who are at-risk.

Langer, J.A. (1984). Examining background knowledge and text comprehension. *Reading Research Quarterly*, 19(4), 468-481.

The author of this study focuses on examining relationships between background knowledge and passage comprehension, relative usefulness of certain variations in measuring available knowledge, value of a background knowledge measure as applied to teacher-directed small group pre-reading language and concept organizer activity, and the effect of a pre-reading activity on text-specific knowledge and on comprehension. The researcher found that pre-

reading activity significantly affects background knowledge and this noted improvement on student responses to reading comprehension questions.

Lipson, M.Y. (1982). Learning new information from text: The role of prior knowledge and reading ability. *Journal of Reading Behavior*, 14, 243-261.

Researchers examined 28 3rd grade students, half considered below average and the other half considered average in reading based on standardized achievement test scores. An intervention in which types of explicit versus inferential information was tested to evaluate student acquisition of new information. Their reported findings include: (a) prior knowledge was a great factor in reading comprehension for both groups, (b) acquiring new information was higher than correcting old inaccurate information, and (c) all readers resorted to using text to find information, only if prior knowledge was weak.

Long, S.A., Winograd, P.N. & Bridget, C.A. (1989). The effects of reader and text characteristics on imagery reported during and after reading. *Reading Research Quarterly*, 24(3), 353-372.

The authors of this study explored how the characteristics of reader and text affect readers' spontaneous production of mental imagery, both during reading and later in recalling their reading. Reading achievement, prior knowledge, vividness of mental imagery, and interest in passages read were the reader characteristics measured. Considering 4 passage of 3 types, the researchers concluded that imagery occurred spontaneously both during and after reading and that the production of imagery by both reader and text characteristics were affected. The researchers concluded that the relationship between mental imagery and reading comprehension is more complex than was formerly believed.

McKeown, M.G., Beck, I.L., Sinatra, G.M. & Loxterman, J.A. (1992). The relative contribution of prior knowledge and coherent text to comprehension. *Reading Research Quarterly*, 27(1), 78-93.

The focus of this article was to present students' important background knowledge embedded in revised text and test the effects of this knowledge text comprehension. Text were used in this study from a fifth grade social studies textbook on or about the period of the American Revolution. The results of this study were that students who read revised text recalled notably more material and were able to respond to more questions correctly than those students who read original text.

Ogle, D.M. (1986). K-W-L: A teaching model that develops active reading of expository text. *Reading Teacher*, 39, 564-570.

This article contains information about a process that assists teachers to become more receptive to students' knowledge and interest when reading expository material. Prior knowledge is deemed by the author as essential in learning. Here, the author synthesizes the benefits of the K-W-L strategy to activate learning and understanding of expository text.

Peeck, J., van den Bosch, A.B. & Kreupeling, W.J. (1982). Effect of mobilizing prior knowledge on learning from text. *Journal of Educational Psychology*, 74(5), 771-777.

The researchers conducted a study with sixty-eight 5th graders who studied a 125-word passage consisting of 18 statements, and after reading, they tried to reproduce the text. The students were given a multiple choice test on this content one week later. Half of the students mobilized relevant preexisting knowledge prior to reading the passage. The authors

found that the mobilizing of pre-existing knowledge facilitated retention of information inconsistent with prior knowledge and did not interfere with congruous information.

Pflaum, S.W., Pascarella, E.T., Auer, C., Augustyn, L. & Boswick, M. (1982). Differential effects of four comprehension-facilitating conditions on LD and normal elementary-school readers. *Learning Disability Quarterly*, 5, 106-116.

In this research, 99 learning disabled and non-disabled elementary students were studied. Each group was assigned to one of 4 comprehension – facilitating conditions (word identification and meaning aids, sentence aids, purpose-setting aids, and prior knowledge aids) to establish their effects on comprehension. Taking into consideration, age, intelligence, prior reading achievement, and pretest comprehension levels, sentence aids were found to be considerably more effective than prior knowledge for both learning disabled and equally achieving younger readers.

Pressley, M., Johnson, C.J., Symons, S., McGoldrick, J.A. & Kurita, J.A. (1989). Strategies that improve children's memory and comprehension of text. *The Elementary School Journal*, 90(1), 3-32.

These researchers focused on reading comprehension research of summarization, representational- and mnemonic-imagery, story-grammar, question-generation, question-answering, and prior-knowledge activation of strategies. The authors provide information on teaching these strategies effectively across the curriculum areas and consistently within the school day.

Pressley, M., Wood, E., Woloshyn, V.E., Martin, V., King, A. & Menke, D. (1992). Encouraging mindful use of prior knowledge: Attempting to construct explanatory answers facilitates learning. *Educational Psychologist*, 27(1), 91-109.

These authors tested the hypothesis that learning is increased when students generate explanations to not yet learned content information. Several years of correlational research were reviewed and analyzed in relation to use of explanatory questions and prior knowledge to improved content understanding. The question being, does prior knowledge serve as a mediator in novel learning? The authors noted the lack of research specific to this question related to explanatory answers as a means to promote content understanding by activation of prior knowledge. They note too, the promising effects for students based on the scant research that has been conducted, and make thorough recommendations for future research.

Rowe, D.W. & Rayford, L. (1987). Activating background knowledge in reading comprehension assessment. *Reading Research Quarterly*, 22(2), 160-176.

The purpose of this study was to investigate readers' activation of background knowledge in response to prepassage purpose questions from the reading comprehension segment of the *Metropolitan Achievement Tests* (1985). There were three purpose questions from appropriate levels of the MAT shown to 74 students from Grades 1, 6 and 10. The students were asked to make predictions about the content of related passages. The results concluded that a wide range of students can use purpose questions as cues to activate background knowledge; yet, all purpose questions are not equally helpful in performing.

Schallert, D.L. (1982). The significance of knowledge: A synthesis of research related to schema theory. In W. Otto & S. White (Eds.), *Reading expository prose (pp. 13-48)*. New York: Academic.

Schmidt, H.G. & Patel, V.L. (1987). Effects of prior knowledge activation through small-group discussion on the processing of science text. *Meeting of the American Educational Research Association*. Washington, D.C.

These researchers conducted a study with ninth and tenth-grade students in science. Students had differing background knowledge due to grade experience in science. Student groups discussed a science problem, all individuals studied text about the problem, and were then administered a free recall measure. There was no significant difference between expert and novice groups on the free recall measure. With additional analysis the researchers did find that discussion were richer and explanations more accurate for the expert students than those students with less background knowledge.

Smith, L.C., Readence, J.E. & Alvermann, D.E. (1983). Effects of activating background knowledge on comprehension of expository prose. *Annual meeting of the National Reading Conference*. Austin, TX.

This paper is a technical report presented at the Annual Meeting of the National Reading Conference. The study examined students' ability to comprehend consistent or inconsistent text when activating relevant or irrelevant background knowledge. Subjects who activated prior knowledge and then read consistent text comprehended more text information than those in other treatments. In addition, subjects that did not activate relevant knowledge but read inconsistent text appeared to be more accepting of textual incongruity.

Spires, H.A. & Donley, J. (1998). Prior knowledge activation: Inducing engagement with informational texts. *Journal of Educational Psychology*, 90(2), 249-260.

This study focused on students at the high school level who are expected to read independently but often fail to engage with informational texts. In addressing this issue, a prior knowledge activation strategy (PKA) was taught to 9th grade students. These students were encouraged to make spontaneous connections between their personal knowledge and informational texts. Those students who learned to use the PKA strategy consistently outperformed students in a main idea (MI) treatment group as well as those in a no-instruction control group on comprehension questions. In addition, a second study was conducted to duplicate the operations from the first study, with the addition of an MI-PKA treatment designed to combine both strategies, the results were that both the PKA and the MI-PKA groups performed higher on application-level comprehension questions and demonstrated more positive attitudes toward reading than the other groups.

Squire, J.R. (1983). Composing and comprehending: Two sides of the same basic process. *Language Arts*, 60, 581-589.

Squire builds the reading and writing discussion and states that these process-oriented thinking skills are interrelated. Additionally, the author provides recommendations to assist the instructional process for composing and comprehension.

Stevens, K.C. (1980). The effect of background knowledge on the reading comprehension of ninth graders. *Journal of Reading Behavior*, 12(2), 151-154.

The researcher in this study examined on ninth-grade students' differences in reading understanding and activation/instruction of background knowledge. Initially, students were assessed on knowledge information, based on this knowledge quiz, students read a high or low knowledge topic passage and were administered reading comprehension questions. The author concludes a significant difference was found between conditions. Those students with

high prior knowledge demonstrated greater comprehension of the passages. The authors are very enthusiastic about these results and conclude that while additional research is needed, the nurturing of prior knowledge is necessary if reading with understanding is to result.

Stevens, K.C. (1982). Can we improve reading by teaching background information? *Journal of Reading, January*, 326-329.

In this study, the researcher sought to determine whether or not direct teaching of background knowledge on the topic of instruction would benefit students when reading passages on that topic. The research was conducted with tenth grade high school boys in which students were randomly assigned to one of two conditions, pre-reading instruction related to the reading topic, and non-relevant instruction on another topic. The authors conclude that instruction prior to reading on text-related information improves student reading comprehension. They also provide questions for future research to aide reading comprehension abilities.

Tobias, S. (1994). Interest, prior knowledge, and learning. *Review of Educational Research*, 64(1), 37-54.

The authors in this article present importance of studying interest knowledge relationships and review research on the relationship between interest and prior knowledge. The authors establish that there is a substantial linear relationship among interest and prior knowledge based on the model of interest knowledge. They provide an updated interest-knowledge model based on a review of recent research.

Walraven, M. & Reitsma, P. (1993). The effect of teaching strategies for reading comprehension to poor readers and the possible surplus effect of activating prior knowledge. *National Reading Conference Yearbook*, 42, 243-250.

In this research, the authors examined students identified with severe problems in reading comprehension and the effects of teaching comprehension-fostering strategies. The strategies selected for this study included those from Palincsar & Brown's reciprocal teaching; clarifying the purpose, making predictions, activating background knowledge, using self-questioning, and summarizing and interpreting information provided in the text (1989). In this treatment and control experimental condition research, the authors found that pupils who followed the experimental instructions, outperformed the control students in their use of strategies to activate and increase prior knowledge in novel reading materials.

Weisberg, R. (1988). 1980s: A change in focus of reading comprehension research: A review of reading/learning disabilities research based on an interactive model of reading. *Learning Disability Quarterly*, 11, 149-159.

The focus of this article was to review reading comprehension research from 1980 to 1988 based on the interactive model of reading with the center of attention on reading disabilities/learning disabilities. The study investigated the influences of readers' prior knowledge of a topic, text structure and task demands, as well as metacognitive strategies. The author's conclude that for reading disabled students' the benefits of explicit instruction in understanding what the assignment is, how to use the procedures properly, and why the use of metacognitive strategies can help them become a stronger reader.