# Summary of Major Graphic Organizer Research Findings

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<th>General Education</th>
<th>Best Practice (all learners)</th>
<th>RESEARCH (all learners)</th>
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<td><strong>READING COMPREHENSION</strong></td>
<td>Before reading, teachers should discuss the structure of the text, during reading they should use a variety of graphic organizers that match the structure, and after reading help students write about what they have learned (Forsten et al., 2003). Pre-reading activities can include brainstorms, graphic organizers of students' background knowledge (using concept maps, clusters, or webs), or cloze exercises (during which students attempt to replace important vocabulary or concepts that the teacher has deleted from the text in order to draw attention to those points). In addition, the teacher or students may develop questions, through directed writing or interactive discussions, such as, “What do I already know and what do I need to know before reading?” or “what do I think this passage will be about, given the headings, graphs, or pictures?” Such pre-reading activities not only prepare students to understand text but also help build their vocabulary and study skills (Jacobs, 2002) Instruction in metacognitive strategies can improve reading comprehension. Good readers read for a purpose and actively monitor their own understanding of what they read. Explicit instruction in such strategies as questioning, summarizing, comprehension monitoring, and using graphic organizers can help poor readers learn to retain, organize, and evaluate the information that they read (RAND, 2002). Teachers may use semantic webs or graphic organizers to help</td>
<td>The implementation of reading strategies that focuses on advance organizers and self-assessment were selected as intervention strategies. Various graphic organizers, an observation checklist, and a document analysis were incorporated into the daily curriculum in the targeted classrooms. Post-intervention data indicated an improvement in accessing prior knowledge, organizing ideas, and strengthening connections to understanding (Langford et al., 2003). Concept-mapping strategies (map correction, scaffold fading, and map generation) determined effects on students' text comprehension and summarization abilities. Results with 126 fifth graders show that the map correction method enhanced text comprehension and summarization, and the scaffold-fading method facilitated summarization (Chang et al., 2000). When coupled with the seeming import of complementary factors (e.g. student involvement, criteria measures) indicated by previous graphic organizer research, findings of this study suggest a refined and intricate usage of the pre-graphic organizer as an aid to comprehension and recall (Simmons, et al, 1988).</td>
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students prepare themselves for reading. Graphic organizers, such as comparison charts or story frames, helps students externalize their thinking and often causes them to recheck their sources to verify ideas (Salinger, 2003).

Teachers need to provide means for students to organize information before, while, and after reading. They should guide students in articulating their prior knowledge and develop linkages between prior knowledge and new information. They should establish various means for students to respond to text by encouraging and teaching various organizational structures for recording information (Ruddell, 2001).

Graphic organizers can enhance learning in a number of ways. Prior to reading they can be used to acquaint the reader with the information in text, to allow student to acknowledge and share their collective understanding or views on lesson objectives, or they can be used as a teacher-directed activity to enhance students’ prior knowledge. They can direct the reader’s attention as he or she is studying a text by serving to act as a study guide, and they can be used to review an extend one’s thinking at the conclusion of a reading regardless of the age group or content area (West et al., 1991).

The main effect GOs appears to be on the improvement of the reader’s memory for the content that has been read. Readers improve memory and comprehension for text in its review, the Panel identified 16 categories of text comprehension instruction of which 7 appear to have solid scientific basis for concluding that these types of instruction improve comprehension in on-impaired readers. Some of these types of instruction are helpful when used alone, but many are more effective when used as part of a multiple-strategy method. The types of instruction are:

1) Comprehension monitoring; 2) Cooperative learning; 3) Use of graphic organizers (including story maps), where readers make graphic representations of the materials to assist comprehension; 4) Question answering; 5) Questions generation;
6) Story structure; and 7) Summarization (NRP, 2000).

Graphic organizers can be used as a practical tool while using basal readers, tapping into prior knowledge, cultivating active participation, and fostering an understanding of conceptual relationships, thus leading to a facilitation of comprehension (Kirylo & Millet, 2000).

Creating concept maps prior to engaging in manipulative experiments will produce better long-term retention than the opposite sequence (Ritchie & Volkl, 2000).

Teachers strive to engage their students in literacy acquisition in ways that maximize their time and materials and that are efficient and effective. We know from decades of reading research, especially in the primary grades, that the use of graphic organizers helps students understand new or difficult concepts about literacy (Dye, 2000; Robinson, 1998).

Instructional tips for teaching specific words and concepts include presenting new vocabulary in semantically related groups (e.g., semantic maps, semantic feature analysis (Nagy, 1998).

Story maps are graphic organizers with story elements used as headings on some kind of teacher-made worksheet. These headings are used to prompt students to locate key information from the story, and, once located, to record it on the graphic organizer. Researchers have consistently demonstrated the benefits of using story grammar to map narratives so that general and special education elementary and secondary students improve their reading comprehension (Swanson & De La Paz, 1998).

Whether used to depict an entire text's structure or to illustrate related attributes of a concept, graphic and other visual organizers help students to understand inter-concept relationships by presenting the information spatially. This is true in regular classrooms and is applicable to students with special needs and
those whose heritage languages are not English (Ritchie & Gimenez, 1995-1996).

**WRITING**

Graphic organizers come in many forms and provide students with visual information that complements the class discussion or text. Students at this school consistently reported that the graphic organizer is the most helpful strategy that we employed (Fisher et al., 2002).

Writing from maps is relatively easy. They require light to moderate teacher preparation time and can be used for whole class, collaborative groups, or partnerships. Mapping, by definition, is an organization activity; it therefore, preceded writing naturally by providing visual representation of students’ constructions and organizations of knowledge from a learning event. Maps are their preliminary organizational plan; they show what ideas the student selected as most meaningful, how these ideas are connected, and the supporting details for each (Ruddell, 2001).

Effective writing lessons have clear and specific objectives and prepare students to write about specific topics. Effective writing instruction is characterized by planned brainstorming activities that help students organize information prior to writing (Hillock, 1984).

**CONTENT**

Creating a graphic organizer for an instructional lesson plan is an effective way to engage students in learning. You give them more ownership of the learning process by sharing the purposes and direction of instruction and by providing opportunities during the construction process for them to express their perceptions about the lesson content. It also provides a way to integrate an additional learning modality into instruction (Lenz et al, 2004).

Venn diagrams, or graphic organizers, have many uses in the...
elementary classroom and can be used across the curriculum and in ever-increasing patterns of complexity (Moore, 2003).

Graphic organizers are constructed to reflect teacher objectives and text information that will facilitate those objectives (Ryder & Graves, 2003).

Webbing is another effective strategy for activating prior content knowledge. As students brainstorm their ideas, the teacher begins to construct a web depicting how these ideas relate to the concept, making mental notes of what students know and what misinformation or gaps in learning the class needs to address. As the web develops, the teacher may add information that students missed but need to know before they tackle the text. Students can refer to this map while they read, making connections with new information (Barton & Heidema, 2002).

The underlying function is to position several related terms, ideas, or concepts around one central element in a graphic or spatial organizer, then to help the students understand the relationships that tie the various parts together. The graphic organizer spatially represents the interrelationships of the concepts to students and facilitates the integration of related ideas in new ways. A bonus is that the process can recapture time throughout the instructional day by maximizing the use of everyone's time and materials as effectively and efficiently as possible (Brunn, 2002).

Visual learning tools can be types of node-link diagrams where geometric shapes that represent the main ideas of a communication links are the lines that label the nature of the connection between main ideas. In graphic form, the cause/effect events are arranged in a chain link, showing how each event contributed to the end result. The arrangement of the nodes and links enhance social studies instruction because they help students comprehend challenging passages in their textbooks (Ciardiello, 2002).

In both experiments, the students who studies GOs were able to apply text knowledge best when review was delayed. The students who received GOS were more likely to use memorization strategies when review was immediate, whereas they were more likely to use non-memorization strategies when the review was delayed (Robinson & Katayama, 1998).

The results suggest that the explicitness of instruction and/or the graphic organizer played important roles in students’ ability to generalize the instruction to novel textual material. The performance of student in the EX GO, EX No-GO, and Im GO conditions was statistically superior on the transfer to that of students in the traditional instructional condition (Griffin & Malone, 1995).

Positive outcomes have been reported when graphic organizers are used as both advance (Boyle & Weishaar, 1997) and post organizers (Willerman & Mac Harg, 1991).

Data obtained in this study provide supportive evidence to indicate that the subjects in the study who were adjudged to be good concept mappers exhibited superior performance in solving the three problems of the study (Okebukola, 1992).

A control group of 40 eighth graders completed a unit on elements and compounds. An experimental group of 42 completed concept maps on the same topic. Results of a one-tailed T test demonstrated the usefulness of concept maps as advance organizers (Willerman & Mac Harg, 1991).

On three GO experiments, the results indicated that GOs as a form of textbook modification was effective for all students. However, GOs produced significantly higher performance than self-study for the students with LD enrolled in social studies, science, and health classes at the secondary level. Across the three experiments, the pupils with LD averaged 70% correct with GOs and 20% correct
Implementing a graphic organizer notebook (blank webs and organizers for students to complete after reading chunks of content) in a content area unit enables teachers to teach reading, writing, and study skill strategies meeting the needs of all students (Fisher, 2001).

We offer five attributes for effective GO implementation:
1. verbalize relationships (links) among concepts expressed by the visual;
2. provide opportunity for student link;
3. connect new information to past learning;
4. make reference to the upcoming text; and
5. seize opportunities to reinforce decoding and structural analysis (Merkley & Jefferies, 2000).

Concept mapping allows thinkers, readers, and writers to translate ideas and concepts into a visual, graphic display that they can use for reading or writing assignments. Students see how the ideas they will read or write about connect with their previous knowledge about a topic. Concept maps become idealized graphic representations of text structures. Such graphic plans help students form mental constructs of how texts are organized (Sinatra, 2000).

One approach that has been used to overcome poor text structure is the use of adjunct aids or displays that are inserted in text to communicate which information is important and how it is structured (e.g., outlines, advance organizers). The graphic organizer is one type of adjunct display that was developed to assist students in understanding important inter-concept relations by displaying information spatially. They facilitate memory for text in a wide variety of settings (Robinson, 1998).

Students can grasp the concepts in literacy acquisition and content area studies more readily within the context of a graphic or spatial organizer than they can without the illustration of the concepts' attributes (Monroe, 1997).

Junior high school students taught using semantic mapping using hierarchical relationships from vocabulary lists and semantic feature analysis using the relationship matrix indicated qualitatively and quantitatively greater recall comprehension and vocabulary learning as compared to the group using other strategies. (Bos & Anders, 1990).

High school students were taught concepts using Concept Diagrams and Concept Teaching Routines (i.e., advanced organizer, symbols reviewed on diagrams, post-organizers) and showed gains in their performance on texts of concepts and in note-taking (Bulgren, et al., 1988).
By developing a series of several graphic organizers, teachers can make a whole research process visible during the period of exploration and idea development. Different construction of facts become the subject of discussion of debate, highlighting the purpose of historical research (Clarke & Martell, 1994).

As an adjunct to lecture-discussion instruction, visual depictions such as webs, matrices, timelines, networks, and charts of relationships have been shown to result in greater student learning by students with learning disabilities of content information than conventional content instruction (Crank & Bulgren, 1993).

Graphic organizers can be used to acquire knowledge of relationships between concepts in a content area. Hierarchically organized graphics require analysis and elaboration of content and seem to enhance recall and transfer of learning. Hierarchical graphics require integration of content, which facilitates inference and problem-solving. While other characteristics of graphic techniques may affect learning outcomes, the primary differences will result from the types of cognitive processes induced when the graphics are generated (Beissner, et al., 1993).

To lead students through a complex intellectual process, teachers can arrange simple graphic organizers in sequences from the model that represents different kinds of historical analysis. Graphic organizers are visual representation of different thought processes (Clarke, 1991).

Learner constructed concept maps (GOs with labeled links) reflect learner’s understanding of science concepts better than traditional forms of testing (Novak, 1991).

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<td>READING COMPREHENSION</td>
<td>The positive effect of using graphic organizers with LD was sufficient enough to support the theory that: GOs accommodate the LD student’s need for structure, organization and a clear</td>
<td>A study examined the effects of Venn diagram strategy on the literal, inferential, and relational reading comprehension of 26 high school students with mild disabilities who exhibited poor reading</td>
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format, as well, as his/her need to related information to personal experience. Graphic organizers encourage higher order thinking which is a hard concept for LD students to grasp (Quist, 1995).

Results demonstrated that the students with LD clearly benefited from the story mapping instruction (Idol, 1987).

This study confirmed that explicitly teaching text structures such as the story map enhances reading comprehension for students with LD (Idol & Croll, 1987).

Students who were taught the Venn diagram strategy demonstrated gains in both literal and relational comprehension measures (Boyle, 2000).

Results of the study suggest that advanced story map instruction led to improved reading comprehension for the students. All students scored above passing levels on story grammar tests following the intervention. The combined effects of explicit instruction and practice in this study were seen to facilitate comprehension. Apparently, advanced story map instruction provided students with a framework to organize and retain critical story elements that, in turn, enhanced comprehension. (Gardill & Jitendra, 1999).

Results showed that the group taught using semantic mapping and semantic feature analysis indicated qualitatively and quantitatively greater recall comprehension and vocabulary learning as compared to the group using other strategies. (Bos & Anders, 1990).

A study assessed the effects of story map instruction in promoting comprehension skills of secondary students identified as being at risk for reading failure, including six students with LD. Story maps were found to be more effective in improving students’ reading comprehension than the traditional basal instruction. In addition, students in the story grammar instruction group performed better than those in the traditional basal instruction group on measures of written retells and theme questions (Dimino et al., 1990).

The use of advanced story mapping procedures using a modified multiple baseline design investigated the effects of a traditional basal literature and a story grammar instruction on the comprehension of seven high school students with LD. Results indicated that students’ abilities to comprehend important elements in literature anthologies improved as a function of story grammar instruction (Gurney et al., 1990).

Qualitative and quantitative changes occurred in two severely LD readers’ cognitive processes during strategy training that included a
mapping organizer to enhance remembering. Results suggested that a qualitative shift in verbal strategy reports occurred during prose recall. Introduction of cognitive training increased recall of prose compared to baseline conditions (Swanson et al., 1987).

Results revealed significantly higher scores for the group of LD students that were provided Advanced Organizers which used outline/overview of important facts and concepts from each unit prior to text reading. (Darch & Gersten, 1986).

**WRITING**

The study demonstrated that the writing performance of students with LD can be improved by teaching them to set goals, brainstorm ideas, and organize their ideas in advance of writing. This finding supports the hypothesis that students with LD benefit from explicit writing instruction designed to help them improve their planning behaviors. It also adds to a growing body of literature showing that the writing difficulties of students with LD are due at least in part to difficulties with planning (Graham & Harris, 2000), as instruction in planning resulted in improvements in these children's writing performance. (Troia & Graham, 2002).

There was a significant main effect for organization and use of text structures called think sheets to encourage students to plan, organize, write, edit and revise their written products. The think sheets clearly played a central role in the writing gains by students in the experimental group. When the students used text structures, such as compare and contrast, their essay were well organized (Englert, et al, 1991). Extensive teacher modeling and scaffolding, collaboration throughout the writing process, and a set of structuring think-sheets enabled students with to move beyond “learned helplessness” so common among adolescents with LD; they came to see themselves as genuine writers and to employ the writing process as a tool for effective written expression (Hallenbeck, 2002).

With the support of a relatively simple procedural facilitator, student with LD were able to reflect on, critically analyze, and improve their writing (Graham et al, 1995). Junior High students with LD made substantial increases in the amount they wrote and mild to moderate increases in the quality of the stories produced after being taught to use procedural facilitation techniques which included a story-ender, grammar cue card, and story parts (Montague & Leavell, 1994).

Sixth graders with mild learning disabilities were taught expository writing strategies that included “instruction sheets” and “organizing sheets/templates.” The intervention was effective in teaching writing and the students maintained criterion and above criterion level scores after learning the strategies (Boyer, 1991).

Eighth graders with LD were taught a metacognitive text structure strategy that included outlining as a paragraph planning guide. By providing the students with intensive instruction in a text structure
<table>
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<th>Strategy, all the students reached the criterion level for instructional outcomes on writing compare/contrast and sequence paragraphs (Wallace &amp; Bott, 1989).</th>
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<td>CONTENT</td>
<td>The use of <em>Inspiration</em> software to create spatial organization of academic content resulted in increased learning of world history (Mastropieri et al., 2003).</td>
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<td>The results of this study demonstrated the efficacy of GOs for student with LD within the context of intensive instruction (DiCecco &amp; Gleason, 2002).</td>
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<td>The results of this study demonstrated that the process of constructing concept maps with extensive support from the teacher. Students made substantial improvement in creating mnemonic procedures on their own for recalling information, the ability to construct difference mnemonic devices based on demands of the task, and improved performance on content tests (Bulgren et al., 1995).</td>
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<td>When an Unit Organizer Routine was used in secondary science and social study classes, the unit-test performance of students with and without LD increased an average of 10 percentage points over baseline (Lenz et al., 1994).</td>
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<td>Reports results of meta-analysis of 19 studies on concept mapping in science instruction. Results showed it has positive effects on student achievement and attitudes (Horton, et al., 1993).</td>
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<td>LD students who were taught an explicit strategy for solving problems where the teacher explained the use of a pictorial presentation of a decision tree performed better on two transfer measures than students given supportive feedback and encouraged to induce their own strategies (Hollingsworth &amp; Woodward, 1993).</td>
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<td>Interactive strategies (semantic feature analysis, semantic mapping, and semantic/syntactic feature analysis) were found to be more</td>
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<td>Elementary-age students with a LD learned significantly more social studies and science content when taught with visual displays than when taught by a teacher-directed activity involving reading and discussing text (Darch &amp; Carnine, 1986).</td>
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effective than instruction emphasizing definitions for junior high LD students with reading disabilities studying science content and striving to learn content and concepts (Bos & Anders, 1992).

The results showed that the group of LD students not taught with GOs did not make gains between pre and post testing (Griffin et al., 1991).

On three GO experiments, the results indicated that GOs as a form of textbook modification was effective for students with LD and for the remedial and general education student. Each of the three experiments substantiated that GOs produced significantly higher performance than self-study for the students with LD enrolled in social studies, science, and health classes at the secondary level. Across the three experiments, the pupils with LD averaged 70% correct with GOs and 20% correct with self-study (Horton et al., 1990).

High school students with LD were taught using instructional materials that included relationship charts that consisted of matrices on which important passage ideas were listed across the top and related vocabulary words were listed down the side. Results indicated significantly greater comprehension of content (Bos et al., 1989).

High school students classified as LD and remedial recalled a greater number of facts from a life science text when material was presented graphically than when presented by using a study guide or when learned through self-study (Bergerud et al., 1988).

When learning-disabled high school students were taught about astronomy by either presenting key concepts with a visual spatial display or by presenting concepts with texts, tests measuring short-term mastery of content favored students taught with the visual display. (Darch & Eaves, 1986).

| Graphic organizers | The systematic procedure by which a complex task is accomplished-- | The principles and methods of instruction-- |
### Special Strategies/Techniques for all learners

**READING COMPREHENSION**

The prewriting sub-process, organizing ideas, involves helping students use an outline or graphic organizer to arrange their content (Scott & Vitale, 2003).

The National Reading Panel (National Institute of Child Health and Human Development, 2000) concluded that instruction in systematic phonics, phonemic awareness, fluency, and comprehension strategies (including graphic organizers) were important in a complete reading program. (NRP, 2000).

Seven instruction strategies have a firm scientific basis for concluding that they improve comprehension in normal reading. The seven individual strategies that appear to be effective and most promising for classroom instruction are (in alphabetical order): comprehension monitoring, cooperative learning, graphic and semantic organizers, including story maps, questions answering, question generation, and summarization. (NRP, 2000).

In general, explicit instruction in both story grammar and the use of story maps has resulted in positive effects on reading comprehension skills of elementary (Baumann & Bergeron, 1993; Idol & Croll, 1987) and secondary (Dimino et al., 1990; Gurney et al., 1990) students with and without LD (Gardill & Jitendra, 1999).

Various instructional strategies increase comprehension by enhancing the organization of knowledge—for example, "advance organizers," "structured overviews," and "concept maps." Current researchers suggest that the regular use of such strategies in the classroom is the best way to increase comprehension, retention, and use of information gained by reading (Fuentes, 1998).

To make the process interactive and support the students as they read, teachers can create the map collaboratively with the students prior to reading (using key vocabulary and their background

### Pedagogy for the Learning Disabled

A rationale for using graphic organizers is based on the fact that students with language disorders often struggle with traditional instruction that places large demands on language skills (Ives & Hoy, 2003).

For teaching text structure, credence has especially been given to the use of visual representation of key ideas expressed in expository text for teaching text structure. The graphic organizer is an example of a visual representation of ideas expressed in text. Teachers can use GOs to guide students through a discussion before or after reading. Alternatively, teachers can show students how to use and create GOs independently (Sáenz & Fuchs, 2002).

Learning new words takes both will and skill on the part of students. The facility to attend to words depends on meta-linguistic sophistication that can be fostered by teachers who assist students by thinking aloud, modeling, and guiding until effective learning strategies become automatic. Students need explicit instruction to understand what strong readers do when they encounter unknown words and to know that they too are capable of making good decisions while they read (Greenwood, 2002).

A growing body of research suggests that direct instruction in text structure and use of organizational devices promotes comprehension (Gardill & Jitendra, 1999).

The purpose of graphic organizers is to help students better understand important text ideas and how they are related. The information from a visual structure also aids summarization and allows for use of multiple modalities (Dowhower, 1999).

A teacher must use multiple ways to present information, makes learning visible, and provides the students with multiple ways to demonstrate learning. It also provides practice to move students toward independence. When reading expository text, relationship maps or charts can be used as another means of representing the key
knowledge), have students read the text, and then revisit the map
and make modifications based on the text (Reyes & Bos, 1998).

Effective strategy instruction involves teachers who provide
advance organizers in outline form, so students can examine the
structure of the lesson's content (Deshler et al., 1996).

Strategies such as activating prior knowledge, using visual
imagery, paragraph summarization, specific mnemonic
procedures, survey-question-read-recite-review, and story
mapping have been identified in the literature as promising
practices for promoting reading success. Studies have
demonstrated that teaching students to use strategies for reading
increases their ability to comprehend text materials (Salembier,
1990).

The Word Map technique is useful for helping students develop a
general concept of “definition.” It makes them aware of the types
of information that make up a definition and how that information
is organized. A Word Map is a graphic representation of the
definition of a word and focuses on three questions: What is it?
What is it like? What are some examples? (Schwartz and Raphael
1985).

LD students have more difficulty with inferential comprehension of
expository texts than of narrative texts could potentially be
explained by ineffective utilization of prior knowledge (Carr &
Thompson, 1996).

By using visual tools that correspond to thinking processes, students
can organize their ideas on paper or by computer, and as a result—
read, write, and think better (Hyerle, 1995).

Graphic organizers facilitate memory for text (Dunston, 1992).

Organization and retention of expository text can be aided by
graphic organizers and visual-spatial arrangements of information
to show the interrelationships among ideas (Horton et al., 1990).

There is consensus among researchers that skilled readers have a
plan for comprehending; they use a variety of reading strategies
effectively to monitor their own comprehension before, during, and
after they read. Much of this research has focused on teaching
students with reading difficulties to employ one or more strategies
when they read for processing information and monitoring their
own comprehension (Ellis & Lenz, 1990).

The fact that the procedural facilitators (think sheets, story maps,
etc.) are visible helps demystify the process for students with
disabilities. In other works, it seems to be less important to teach all
steps in a strategy to a student than to use a strategy or procedural
facilitator to initiate and focus dialogue that leads to higher levels of
performance (Baker et al, 2002).

Verbal organization and working memory in the writing process
separate the good writers from the poor writers. Also influencing
writing are problem-solving efficiency, self-monitoring,
planning sheets is to provide a common language for teachers and students to sharpen their dialogue about writing tasks and assignments (Baker, et al., 2003).

Procedural facilitators make writing using text structures visible to students and help demystify the writing process. A suggested procedural facilitator is the “Think Sheet”. The Think sheet helps the student plan their writing through a series of sequential and structures prompts. The use of targeted procedural facilitators for specific writing tasks helps students recognize sameness, or recurring text patterns. (Gersten & Baker, 2001).

**CONTENT**

Research has subsequently confirmed that graphic organizers (GO) are valuable devices for younger students with general and special needs. Studies have linked the use of GOs with advanced student achievement and recall in reading comprehension and application, retention, and structure within written compositions. Based on the literature, the question facing all educators no longer centers on whether GOs are valuable instruction tools, but rather on how to use these learning devices effectively to meet the diverse learning needs of students. Students are more likely to retain the information contained in a GO. The cause-and-effect GO is one of the most common and beneficial instructional tools in the classroom. Pictures are particularly beneficial to many students with special needs, who often struggle with written communication but excel in artistic displays (Baxendell, 2003).

Providing statements about a subject to be learned has been shown to provide a structure for new information and relates it to information the student already possesses. Advanced organizers provide students with a “mental scaffold” on which to build new understandings of information. This scaffolding may consist of helping students access information already in their minds and new concepts or principles that can organize this information in a form that will aid in new learning. (Swanson & Hoskyn, 2001).

Regardless of the general models of instruction, only a few attention regulation (Hooper et al, 2002).

Concrete structures for advanced planning are critical to the completeness and overall quality of expository essays produces by students with LD (De La Paz & Graham 1997).

The brain works by making patterns; and we can visualize this process through a medium called “visual tools.” There are three types of visual tools that can help students and teachers construct knowledge, organize information, and communicate their learning with others: brainstorming webs, task-specific organizers, and thinking process maps (Hyerle, 2004).

Give students worksheets and they will learn for today; teach students how to use a visual took and they will learn for a lifetime (Hyerle, 2004).

Mapping the content can be a helpful way to sort out critical information. Relationships and connections may be seen more clearly if you map them rather than just listing them (Lenz et al., 2004).

Procedural facilitators and cognitive strategies support students taking action. They can stimulate thinking and promote more effective organization (Baker et al, 2002).

Students comprehend and acquire new information by specifying what concept is going to be learned, accessing the knowledge students possess related to the new concept, explicitly depicting information related to the new concept in a graphic organizer connecting student knowledge with the new concept and
instructional models of instructional components increase the predictive power of treatment effectiveness...3. Advanced organizers. (Swanson, 2001).

Concept mapping is a flexible tool that may be used to illustrate students' existing understanding and suggest routes for future learning. It can enable the classroom teacher to differentiate between students in a non-threatening manner using a simple classification scheme. This, in turn, may be used to optimize the composition of collaborative groups to promote conceptual change. The development of the students' concept maps encourages participation by reducing the burden on working memory and acts as a focus for the group's discussions (Kinchin & Hay, 2000).

Representing knowledge in the visual format of a concept map allows one to gain an overview of a domain of knowledge. Because the nodes contain only a keyword or a short sentence, more interpretation is required of the reader, but this may be positive. Concept mapping can be used for several purposes: To generate ideas (brainstorming); To design complex structures (long texts, hypermedia, large web sites); To communicate complex ideas; To aid learning by explicitly integrating new and old knowledge; and To assess understanding or diagnose misunderstanding. Visual symbols are quickly and easily recognized; Minimum use of text makes it easy to scan for a word, phrase, or the general idea (Plotnick, 1997).

Another way the content can be taught strategically is by using GO, which depict the organization of various key ideas and related details. Teacher-constructed GOs can help students perceive relationships between ideas that otherwise may go unnoticed. These can also help students begin to recognize common information organizational patterns found in texts, which in turn can potentially enhance relational understanding between ideas as well as increase the sophistication of their understanding of summarizing what has been learned in a brief written statement (Deshler et al, 2001).

Nonlinguistic representations help students construct meaning, deepen their understanding, and recall knowledge for later use. Students can symbolize their personal associations of a term in a graphic form that combines verbal and visual word associations (Marzano, Picketing, & Pollock, 2001).

Visual representation allows for development of a holistic understanding that words alone cannot convey (Plotnick, 1997).

Educators should "teach to the brain's natural capacity for thinking and organizing information." Vocabulary maps, webs, and other graphic organizers give students a chance to manipulate new ideas, see how they are related to familiar concepts, and construct a visual representation of these relationships (Monroe & Pendergrass, 1997).

Visual displaying key content ideas can benefit learners who have difficulty organizing information (Fisher & Schumaker, 1995).

Much of traditional education breaks wholes into parts, and then focuses separately on each part. We need to see the “whole” before we are able to make sense of the parts (Brooks & Brooks, 1993).

We are coming to understand the importance of relationships and non-linear connections as the source of new knowledge. Out task is to create organizational forms that facilitate these processes (Wheatley, 1992).

Transforming information by identifying and developing curricula around structural sameness can lead to a pedagogy that is efficient and effective (Kameenui, 1991).

Graphic organizers are words on paper arranged to represent an individual’s understanding of the relationship between words. Whereas conventional sentence structure make most writing linear
information structures and motivation to understand more about the topic. Their use with students with mild learning disabilities has a strong empirical basis (Ellis, 1994).

One modification technique that has been successfully applied with pupils with mild disabilities and general education students is the writing of study guides. Study guides are questions or statements that appear on worksheets to help students learn content information during or after they have read a passage (Lovitt & Horton, 1994).

Notes that content area teachers recognize that visual organizers such as time lines, Venn diagrams, inductive towers, concept maps, causal chains, force fields, and flow charts help students recognize and take control of the intellectual processes which bring meaning to the study of academic content (Clarke, 1991).

A process that works well for any content areas is:
1. Present at least one good example of a completed graphic organizer;
2. Model how to construct either the same graphic organizer of the one to be introduces;
3. Provide procedural knowledge;
4. Coach the students; and

in form, graphic organizers take their form from the presumed structure of relationships among ideas (Clarke, 1991).

Visual displays rich with data are not only appropriate and proper complement to human capacities, but also such designs are frequently optimal. If the visual task is contract, comparison, and choice—as often it is—then the more relevant information within eye span, the better (Tufte, 1990).

The notion that learning comes about by the accretion of little bits is outmoded learning theory. Current models of learning based on cognitive psychology contend that learners gain understanding when they construct their own knowledge and develop their own cognitive maps of the interconnections among facts and concepts (Shepard, 1989).

References


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