

Graphic organizers in reading instruction: Research findings and issues

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Abstract

As an instructional tool, graphic organizers (GOs) have been highly recommended and used in contemporary classrooms. Over the past decade, a number of concerns have been raised about claims for the effectiveness of GOs. These concerns involve the inconsistent research results on student improvements, the limitation in generalizability from research studies, and the need for research studies with second language (L2) students and with more extended instructional exposure time. This paper argues that GOs, which directly represent the discourse structures of a text, provide stronger evidence for the effectiveness of the technique, and these versions of GOs should be adopted in comprehension instruction. The authors propose a number of generic forms of graphic representations that apply to regularly recurring text structures, and recommend further research on the impact of GOs with learners of English as a second or foreign language as well as research that involves more extended instructional time.

Keywords: graphic organizers, text and discourse structure, reading development, comprehension instruction

Recent overviews of reading have argued that discourse comprehension skills contribute to reading abilities (e.g., Grabe, 2004; Kintsch & Rawson, 2005; Perfetti, Landi, & Oakhill, 2005; Trabasso & Bouchard, 2002). More specifically, awareness of how texts are organized is seen as an important part of a reader's overall comprehension abilities (Pearson & Fielding, 1991; Trabasso & Bouchard, 2002). One of the major ways in which students can be trained to recognize discourse structuring in texts is through the use of graphic organizers (GOs)—visual representation of information in the text. The recommendations to use GOs as part of reading instruction are commonly found in the first language (L1) reading literature (e.g., Blachowicz & Ogle, 2001; Dymock, 1999; Maria, 1990; McKenna & Robinson, 1997; Parks & Black, 1992; Readence, Bean, & Baldwin, 1981; Vacca & Vacca, 1999) and extensively incorporated in textbooks for young L1 readers (e.g., Gunning, 2003; Thresher, 2004), though generally less common in second language (L2) contexts (cf. Grabe, 1997, 2003; Mohan, 1986; Smith & Mare, 2004; Tang, 1993). GOs are said to be particularly valuable because “a good graphic representation can show at a glance the key parts of a whole and their relations, thereby allowing a holistic understanding that words alone cannot convey” (Jones, Pierce, & Hunter, 1988–1989, p. 21). Given these strong claims for GO effectiveness, an important goal would be to generalize the results of GO use to L2 student population.

Although the suggestions for using various types of GOs as a technique for facilitating reading comprehension seem intuitively appealing, questions have been raised about whether these claims are supported by specific empirical studies. In fact, research on GOs has produced incongruent findings and has raised questions about the overall effectiveness of GOs in reading instruction. A second major issue lies in the various understandings regarding what a GO is and how it should be designed for research or instructional purposes. GOs are often seen as a very general term and advocates may refer to very different visual formats when they recommend the use of GOs. In some studies, “GOs have taken the form of anything from hierarchical listings of vocabulary terms to elaborate visual-spatial displays with accompanying descriptors and phrases” (Griffin & Tulbert, 1995, p. 86). An issue, then, is to determine what types of GO are most effective for student learning purposes. A third issue involves an apparent lack of GO research with learners of English as a second or foreign language. Almost all the GO studies have been carried out with L1 readers. As L2 students come into contact with more dense and complex reading materials, they need special scaffolding devices to facilitate their reading comprehension. It is important to know if GOs serve this purpose. Finally, another issue involves the limited training time in most research studies. The instructional use of GOs for purposes of reading development is most likely to be an incremental process which benefits from long-term, consistent exposure. Most GO studies provided students with trainings as short as a few hours or a few weeks. Such a minimal period of exposure typically restricts the overall impact of GO practices on students’ reading development and limits their generalizability.

This paper addresses the above major concerns about the use of GOs. Outcomes of this review will include a focus on GOs that more closely reflect the discourse organization of the text, leading to more consistent representation of major text structures. The analysis will also recommend the necessity of GO research in L2 and the need for research with extended instructional training. Before describing criticisms with GO-based instruction, a brief review of the concept of text structure establishes the potential importance of GOs for reading comprehension.

Text Structure in Reading Research and Instruction

One of the major assumptions in reading research and instruction is that all texts have structures above the level of the sentence. This assumption is well supported by a wide range of research on written discourse analysis, cognitive psychology, and rhetoric (Christie, 1989; Hoey, 2001; Kintsch & van Dijk, 1978; Martin, 1989; Meyer, 1975, 1982; Mohan, 1986, 1990; Swales, 1990; van Dijk & Kintsch, 1983). People in these fields generally agree that there are patterns in the organization of texts (e.g., cause and effect, comparison and contrast, classification, problem and solution, for and against, procedure and sequence, definition). These organizational patterns play important roles in how readers read and writers write. A number of researchers have contended that texts following certain conventional organizational patterns are easier to comprehend and remember than texts that do not (e.g., Carrell, 1984; Coiro, 2001; Collins, 1994); some have argued that awareness of text structure promotes reading comprehension and retention (e.g., Carrell, 1985; Coiro, 2001; Collins, 1994; Grabe, 1991; Koda, 2005; Taylor, 1992); still others have suggested that a well-structured expository text facilitates comprehension of main ideas

(Kintsch & Yarbrough, 1982). Text structures can be thought of as “knowledge structures or basic rhetorical patterns in texts” (Grabe, 2003, p. 1), “the organization of ideas in text” (Taylor, 1992, p. 221), or the way in which “the ideas of a text are interrelated to convey a message to the reader” (Meyer & Rice, 1984, p. 319). Other terms such as discourse structure, discourse pattern, text type, rhetorical organization, and top-level structure are sometimes used interchangeably with text structure.

There are a relatively small number of text structures (perhaps 12 to 15) consistently recurring across texts and in various combinations (cf. Grabe, 2003; Meyer, 1985; Mohan, 1986). The limited variety of discourse structures and their recurrence across texts enable teachers to provide explicit instruction to students in text structure knowledge, and students, once familiarized with the major textual patterns, can transfer their knowledge across texts and content areas. A series of research studies has demonstrated that text structure awareness enhances comprehension and that students can be trained in raising their text structure awareness (e.g., Carrell, 1984, 1985, 1992; Davis, Lange, & Samuels, 1988; Ghaith & Harkouss, 2003; Goh, 1990; Hague & Olejnik, 1990; Leon & Carretero, 1995; Martinez, 2002; Meyer & Poon, 2001; Raymond, 1993; Richgels, McGee, Lomax, & Sheard, 1987; Tang, 1992). These text structures can be depicted in the form of GOs to represent the interrelationships among ideas and patterns of discourse organization.

Inconclusive Findings in GO Research

Many L1 researchers have offered their own definitions and procedural descriptions of GOs (e.g., Alvermann, Boothby, & Wolfe, 1984; Armbruster, Anderson, & Ostertag, 1987; Bean, Singer, Sorter, & Frazee, 1986; McGee & Richgels, 1985). From implementations of the various GO methodologies proposed, a body of empirical research has provided preliminary but inconclusive findings of the facilitative effect of GOs on students’ comprehension and retention of information from expository texts. Armbruster, Anderson and Meyer (1991), for example, found positive effects of GOs on reading texts of social studies with the fifth graders, but not with the fourth graders. Bean, Singer, Sorter and Frazee (1986) found GO training no more effective than instruction in outlining if not combined with previous summarization training. Griffin, Malone, and Kameenui (1995) found GO transfer effects with fifth graders but no training effect as measured by the immediate and delayed recall of the training materials. Simmons, Griffin, and Kameenui (1988), on the other hand, failed to demonstrate any advantages of GOs over traditional instruction with the sixth graders in science classes.

After synthesizing findings from meta-analyses, research reviews, and research studies on the impact of GOs, Griffin and Tulbert (1995) cast some doubt on their facilitative effect in reading instruction. They concluded that “much of this research provides contradictory results and recommendations” (p. 84). They asserted that studies of GOs in the past 20 years “have failed to increase significantly our knowledge base concerning GOs” and “have not added to our knowledge about the effectiveness of the GO” (p. 84). From their perspective, “no clear trend in the literature is evident at this point” (p. 84).

Instead of being frustrated at the inconclusiveness of previous findings and discouraged about the future of GO research, it is important to view the issue from a different perspective and try to

determine why some GOs have a facilitative impact on reading instruction but not others. Based on the information from previous studies, the effectiveness of GOs seems to have to do with the type of GOs used, and particularly whether or not they are designed to represent the specific discourse structures of a text.

Types of GOs

The paradox in research findings is that researchers in discourse analysis and reading instruction have recognized a well-established association between GOs and specific patterns of text structures, particularly with expository texts (e.g., Grabe, 1997, 2003). For example, GOs have been adopted as an effective, direct way of teaching knowledge of top-level discourse organization to students. This line of research shows that GOs that reflect the larger discourse structures of a text can help students raise their text structure awareness and, consequently, their reading comprehension (Armbruster et al., 1991; Guri-Rosenblit, 1989; Meyer & Poon, 2001; Slater & Graves, 1989).

However, in the literature of GO research, not all GOs are constructed to reflect the discourse structures of a text. Many GOs create a very general frame for listing and sorting information from a text without requiring recognition of how the discourse structure of the text organizes information. If GOs that represent the discourse structures of a text consistently facilitated reading comprehension, then the problem of ineffective GOs may rest with the types of GOs that do not represent the specific discourse structures of a text. In other words, GOs that do not represent the discourse structures of the text may be less effective than the ones that represent the discourse structures. The incongruence of previous findings warrants a systematic comparison of the impact of GOs that represent discourse structures of a text and GOs that only reflect the relationships between main ideas of a text. A review of studies involving different types of GOs may help reveal interesting and important outcomes.

GOs That Do Not Represent the Discourse Structures of a Text

In the literature, GOs have undertaken a variety of definitions, including a visual, hierarchical display of expository prose (Bean et al., 1986; Simmons et al., 1988), spatial arrangements and wording that organize key conceptual relationships graphically (Carnine & Darch, 1986), and graphic representation of the hierarchical relationships of information (Griffin et al., 1995). These GOs typically present information as a semantic web or as an outline of main ideas in a text. They are often seen as advance organizers for textbook chapters. These GOs have emphasized the hierarchical nature in the text information without paying attention to the specific discourse structure of the text. As the following studies show (see Appendix A), the effectiveness of these more general GOs in reading research and instruction is questionable. Bean et al. (1986) explored the effect of GO instruction versus outlining on students' L1 text recall in 10th-grade world history. The GOs used in the study displayed the interrelationships among ideas in the text but did not focus on the discourse structure of the text. Three groups of students participated in this study: one GO group with previous training in summarizing, another group trained in a generic GO, and the third group receiving instruction in outlining. The results

from the first five quizzes did not show significant differences for the three groups; however, the sixth quiz, administered after the strategy had been phased out, indicated that the GO group with previous summarization training achieved significantly higher quiz scores than the basic GO and outlining groups; that is to say, the GO training alone was no more effective than instruction in outlining. The delayed recall involving a difficult college level passage showed that the GO group with previous summarization training achieved a significantly higher score than the other two groups. The authors suggested a cumulative, long-range view of metacognitive instruction and recommended that GO instruction should take at least 14 weeks. However, their results may be based, at least in part, on summary training and practice.

Simmons et al. (1988) compared the effectiveness of three instructional procedures for facilitating L1 sixth graders' comprehension and retention of science content: the use of teacher-constructed advance organizers, the use of teacher-constructed post-organizers, and the use of a traditional form of instruction. The GOs used in the study reflected the hierarchy of information within the passage and the relationships of individual facts within the hierarchy, but not the discourse structure of the text. The results indicated that there was no significant difference on daily probe measures and an immediate short-answer posttest among all three groups. However, subjects who received advance GO treatment performed significantly better on delayed short-answer posttest than did students who received the post-organizer treatment, but not the traditional instruction treatment.

Griffin, Simmons, and Kameenui (1991) examined the effect of general GOs on L1 fifth- and sixth-grade students with learning disabilities. In contrast to the GO treatment, the comparison group received the critical information from the text in a vertical list form. The GOs employed in this study were not designed to reflect discourse structure of the reading; instead, they were hierarchically arranged to incorporate key vocabulary words and phrases extracted from the passage and to reflect the relationships of the individual units within the hierarchy. Both groups received four consecutive training sessions of 45 minutes each in their classrooms. The results showed no significant difference on both immediate and delayed posttests between the GO group and the list of facts group as measured by oral retells, production response, and choice response. GOs did not significantly enhance students' comprehension and recall of science content more than the alternative instructional adjunct, a more easily constructed list of facts.

Griffin et al. (1995) investigated the facilitative effect of GO instruction and the degree of explicitness in GO instruction with 99 L1 fifth-grade students in five treatment conditions: explicit GO instruction, explicit-comprehension instruction without GO, implicit GO instruction, implicit-comprehension instruction without GO, and traditional basal instruction. The training was conducted over a 10-day period with 45 minutes per day in the students' classrooms. The GOs used in the study were designed to reflect the hierarchy of information within the passage and the relationships of this information within the hierarchy, but not the discourse structure of the text. The results showed no significant difference in participants' performances on the immediate and delayed posttests with short-answer comprehension items, and participants who received GO instruction did not perform better in either immediate or delayed recall of the training material. (Actually, the students who received traditional basal instruction performed significantly better than students who received implicit GO instruction in the delayed recall of the teaching material.) However, students who received GO instruction performed significantly

better on the recall of novel social studies text material as a transfer measure than students who received the traditional basal instruction.

The findings of these studies appear to be non-supportive. Since there are only four studies reported with the more general type of GOs and three of them are conducted by Griffin and colleagues, the findings might not be generalizable to other similar studies. Moreover, they might have been affected by other variables, for example, the length of training period (e.g., Bean et al., 1986), the possible lack of sensitivity in certain measures such as short-answer comprehension items, production response, and choice response items (e.g., Griffin et al., 1995; Griffin et al., 1991; Simmons et al., 1988), and the inadequacy of reader involvement. Although these factors seem to have affected most of the GO studies in the field, the overall impact of GOs that do not represent the discourse structures of a text awaits further exploration.

GOs That Represent the Discourse Structures of a Text

As one of the major ways to teach discourse structures to students, GOs that represent the discourse structures of a text have been the focus of a set of empirical studies. Students are expected to comprehend texts better when shown visually how information in the text is organized. The following studies (see Appendix B) represent a range of this research involving the effects of GOs which represent the discourse structures of a text.

Geva (1983) trained less skilled readers to represent text structures (paragraphs) in node-relation flowcharts. She conducted two studies with 1st-year L1 community college students. The instruction time was two 2-hour sessions in the first study and four weekly 1-hour sessions in the second study. The results of both studies showed significant improvement on the Nelson Denny Reading Comprehension scores and the quality of text flowcharts produced by experimental students. The author concluded that learning to recognize text structure through flowcharting transferred to more careful reading of expository texts by less skilled readers.

Boothby and Alvermann (1984) examined the effectiveness of GOs on fourth-grade L1 students in helping them remember the main ideas within social studies texts. Students in the GO treatment filled out partially completed instructional graphics that were designed to depict the top-level structure of passages from their regular social studies textbooks. The results showed that the GO group scored significantly higher than the control group on both immediate and 48-hour-delayed recall tests.

Alvermann and Boothby (1986) investigated the transfer effects of GO instruction on 24 fourth-grade L1 students' ability to use top-level structure as an aid in the comprehension and recall of content area text. The GOs used in the study were partially completed diagrams reflecting the top-level structure of the reading text. Students were asked to use key concepts from the text to fill in the empty slots of the diagram. Students were randomly assigned to one of the three conditions: GO instruction for 14 class periods, GO instruction for 7 class periods, and the control group with the typical reading-recitation method. Each period was 25 minutes in length. Students in the 14-day GO group comprehended and recalled significantly more information than the control group, but no reliable difference was found between the 7-day GO group and the

control group. The result of the study shows that length of the treatment period can be an important variable in classroom training studies.

Berkowitz (1986) investigated two experimental methods of instructing sixth-grade L1 students to use text structures as a framework for studying expository text: map-construction and map-study procedures. In her study, a map is a graphic representation of the organizational pattern of the superordinate and some important subordinate ideas in a passage. The two control study methods which did not focus students' attention on text organization were question-answering and rereading procedures. After a 6-week instructional program, students who used map-construction scored significantly higher on immediate and delayed free recall than students who used the other study procedures. On short-answer assessment, both the question-answering and map-construction groups performed significantly better than the other groups. Berkowitz (1986) found that sixth-graders who constructed their own GOs had better comprehension than those who studied ones constructed by the teacher. Studying maps constructed by someone else did not seem to foster students' memory for text content. However, as the author suggested, an intermediate step that might be helpful would be to provide students with partially completed GOs.

Armbruster et al. (1987) examined the effect of text structure training on fifth-grade L1 students' comprehension of social studies material. A structure-training group received direct instruction in recognizing and summarizing a problem–solution text along with a schematic representation called *frame*; a traditional training group read and discussed answers to questions about social study passages. Compared to traditional training students, structure-trained students recalled about 50% more of the macrostructure ideas, and the training was effective for all high-, medium-, and low-ability students. Moreover, the structure-training group included significantly more Level 1 (most important) and significantly fewer Level 4 (least important) idea units in their summaries than the traditional training group, and their summaries were better organized.

Guri-Rosenblit (1989) investigated whether a tree diagram assisted Israeli L1 college students' comprehension of main ideas in a 3,500-word social science expository text and to what extent a verbal explanation would assist the processing of a diagram. The tree diagram used in the study represented the main ideas of the text in a hierarchical organization and depicted the text structure of comparison-contrast. Four versions of the text were used: the original text, added diagram version, explained diagram version, and elaborated text version without diagram (with marginal notes, different type face, subheadings, and additional explanation of the relations between various elements in the text). The results demonstrated that students who received the tree diagram performed significantly better on comprehension of main ideas and on recall of the relations between various elements in the text than those who received either the original or the elaborated text without a diagram. Students who received the diagram plus an explanation were more able to perceive subtle relations and interrelations than those who received no such explanation. There was no difference in performance between the original text group and the elaborated text group.

Balajthy and Weisberg (1990) investigated the effect of training in the use of GOs and summary writing on the recognition of the compare–contrast text structure by college L1 freshman in a developmental reading course and wanted to find out whether the training effect would be

transferred to the real-world textbook materials. The results from the posttests demonstrated that the experimental group outscored the control in both GO and summarizing after four training sessions of 40 minutes each over a 2-week period. The authors concluded that the developmental college students were able to transfer their training in the use of GOs and summaries to real-world textbook materials.

Armbruster et al. (1991) reported on a year-long study on the effectiveness of a particular type of GO called frame on fourth- and fifth-grade L1 students' ability to learn from their social studies textbooks. The frame is a visual representation of the organization of important ideas by reflecting the top-level text structure of the text. A total of 365 students from six fourth-grade and six fifth-grade regular classrooms in 10 elementary schools and their teachers participated in this four-round study. The combined analysis of recall and recognition measures for all four rounds showed that students in the framing condition scored higher than students in the control condition; however, framing was more successful for fifth-grade than for fourth-grade students.

Students' active involvement may be crucial in the effectiveness of GO training. Spiegel and Barufaldi (1994) investigated the combining effect of text structure awareness and GOs with 120 L1 community college students, 69 in the experiment group and 51 in the control group. Four treatments were provided to the experiment group during an 8-week study skill class which met for 2 hours, 1 day per week. The treatments were (a) reading a text with the text structure explicitly stated, (b) reading a text with the active determination of the text structure by the student, (c) reading a text with the text structure explicitly stated and explicitly outlined as a GO, and (d) reading a text with active determination of the text structure by the student and the active construction of GOs of the text structure by the student. The researchers found that students who were provided with the text structure of textual excerpts (Treatment 1) did not significantly recall more information than the control group. Similarly, students who were required to identify text structure within excerpts of text while studying them (Treatment 2) did no better in a recall task than did students studying the same excerpts in a traditional manner. Students who were provided with a pre-reading GO (Treatment 3) did no better in a recall task than did students studying the same excerpts in a traditional manner. Only those who spent time on the paper-and-pencil task of reorganizing text (Treatment 4) retained information better. Spiegel and Barufaldi suggested that self-regulated learning strategies with active involvement of the students should be introduced instead of the passive ones. Students need to actively work to fill in and complete GOs for them to be effective.

In one of the few L2 training studies, Tang (1992) reported on an experiment which investigated the effect of graphic representation of the knowledge structure of classification on comprehension. Classification tree graphs were used to depict the top-level structure of classification in the text passages. The participants in the experiment were 45 intermediate (seventh grade) English as a second language (ESL) students. In the training the graphic group was presented the content of a passage in the form of a tree graph, completed a partially complete graph, and wrote a recall. Then they received another practice session following the same pattern. The nongraphic group read the same practice passage but focused on some key vocabulary and interacted with the material by answering questions. They also wrote a recall and received another practice session following the same pattern. The results of the posttest showed that the graphic group did significantly better than the nongraphic group in the recall test. Using

a graphic representation of the structure of a passage to present knowledge to students and have their attention to the graphic (letting them finish a partially complete graph) significantly increased the total amount of information recalled. In addition, the majority of the students in the experimental group were positive that using a GO helped comprehension.

Some important conclusions can be drawn from the current review about the effect of GOs that represent the discourse structures of a text. First, these GOs have consistently shown to facilitate comprehension of macrostructures and recall of main ideas for an immediate text (Armbuster et al., 1987; Guri-Rosenblit, 1989; Tang, 1992). However, measures of general or overall learning such as comprehension questions, recognition probes, or recall of factual details did not always seem sensitive enough to measure GO facilitation. Second, the constructor of the GO also influences its effectiveness in comprehension. GOs constructed by students themselves were found to be more effective than those constructed by teachers (Berkowitz, 1986; Moore & Readence, 1984; Spiegel & Barufaldi, 1994). The active involvement of readers in constructing a GO, even simply finishing a partially complete graph, provides them an opportunity for deeper processing of the material than studying organizers produced by others. Third, GOs can be used as pre-reading or post-reading tasks, but these options produce different effects on comprehension. Based on the research to date, graphic post-organizers produced greater effects than graphic advance organizers overall (Griffin & Tulbert, 1995; Moore & Readence, 1984; Rice, 1994; Spiegel & Barufaldi, 1994). Fourth, GO training combined with summarization training seemed to produce greater effects than organizer training alone (Bean et al., 1986; Armbuster et al., 1987; Balajthy & Weisberg, 1990). Finally, the length of treatment period and the educational level of participants are also important factors in the effectiveness of GOs (Alvermann & Boothby, 1986; Swafford & Alvermann, 1989). Overall, the findings of the above studies are rather consistent; that is, GOs representing the discourse structure of the text can facilitate the comprehension and retention of content area reading material.

Consistency in the Design of GOs

Despite the converging evidence for the supportive effect of GOs which represent text structures in reading comprehension of L1 expository texts, researchers and instructors still face a second major problem: how to design GOs so that they consistently represent the text structure of the reading. Even in the subset of studies on GOs representing the text structures of a text, a variety of names has been used to refer to GOs, such as *framing*, *tree-diagramming*, *mapping*, and *flowcharting*. Each of these notions represents different ways of organizing information and different degrees of detail included in the graphic representation, which causes unnecessary difficulty in comparing and synthesizing research findings. In order to avoid the “anything goes” situation noted by Griffin and Tulbert (1995, p. 86) a more unified means for GO design is needed.

Any careful study of a set of texts will show that different types of texts make use of different types of text structure. Although the representations of text structure seem consistent from theory to framework (Mohan, 1986; Tang, 1993), it is not always the case with actual diagrams. In some cases, the differences in text types lead to consistent distinguishing patterns in discourse structuring. In particular, there is an increasing need to recognize narrative and expository

macro-structures (Grabe, 2002; Pearson & Camperell, 1994). A fair amount of educational research has demonstrated repeatedly that students work with narrative and expository texts in quite different ways (e.g., Crowhurst, 1987, 1990; Meyer, 1987; Richgels et al., 1987; Spiro & Taylor, 1987). The primary function of narrative text structure is to entertain or to explore human situations, as in biographies, tales, historical events, and fictions. Expository texts, on the other hand, primarily communicate information by describing an event or thing, presenting a sequence of actions or steps, establishing a conceptual framework, or making an argument (Calfee, Henry, & Funderburg, 1988; Dymock, 1999; Weaver & Kintsch, 1991). Textbooks, essays, research articles, and most news magazine articles are typical examples of expository text (Pearson & Fielding, 1991).

In the literature of text structure and GO research reviewed above, and more generally in studies in reading strategies, “expository text was used almost exclusively” (Swafford & Alvermann, 1989, p. 168). Since narrative texts are often used for low-level L2 students in their early reading development, instruction in the structure of narrative texts to improve comprehension “has primarily involved instruction in story structure schemas and anticipatory questions generating” (Grabe, 1997, p. 2). Older and more skilled L2 readers may not benefit as much in narrative comprehension from explicit text structure training (Pearson & Fielding, 1991). Therefore, whether GOs will work equally well with narrative texts remains an empirical question (cf. Koda, 2005).

Recognizing these differences between expository and narrative texts, and the greater role of expository prose on GO research, there is a more urgent need for consistency with GOs applied to expository prose. A review of research on text structuring and our experience in developing GOs for more than seventy instructional texts show that there is a relatively small number of text structures consistently repeated in expository texts. They include cause–effect, problem–solution, comparison–contrast, classification, definition, process, argument–reasoning, for–against, time sequence, and description (Meyer, 1985; Mohan, 1986). Argumentative, polemic, and hortatory texts may require their own most common GO patterns as a set independent of expository texts (Bhatia, 2002; Martin, 2002). While some researchers may discount the extent of these differences across genres, most discourse analysts agree that the differing goals of authors lead to quite distinct text structuring. Moreover, efforts to develop graphic representation of text structures quickly reveal the need for very different organizational formats for each macro-genre type.

Despite the strong patterning of text structure within macro-genres, developing a consistent set of GO structure for texts can be a challenge. As demonstrated by the different names applied to GOs in previous research, there is a range of ways to develop GOs, and creating GOs for a text is not always as straightforward as it seems to be. A considerable amount of practice is needed before the best way is found to represent the ideas of a text in GOs and to arrange them in such a way that they illustrate the text interrelationships and patterns of organization in a clear, simple, and effective manner.

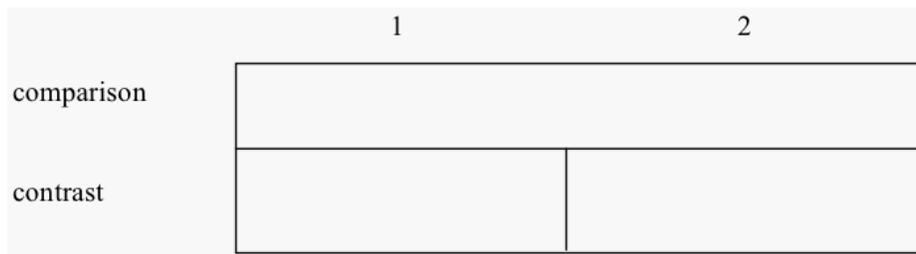
However, it is possible to create consistent visual representations of the recurring discourse structures. Based on Grabe (1997, 2003) and our practice in creating GOs for a large number of instructional texts, a core set of GOs can be used to apply to an extensive set of instructional

texts. These GOs can represent either the main or local patterns of discourse structures in these texts and illustrate the interrelationships among ideas and details. It is important to recognize that the use of text structures is not limited to “top-level” structures. In fact, most texts are a combination of multiple text structures, often nested one within another. As information varies in a text, different text structures will be used to convey this information consistently in ways that are readily recognizable by fluent readers. The key point in developing GOs reflecting text structure is simplicity. GOs need to be as clear and direct (and teachable) as possible. Figure 1 is a list of some examples of GOs designed to match specific recurring text structures.

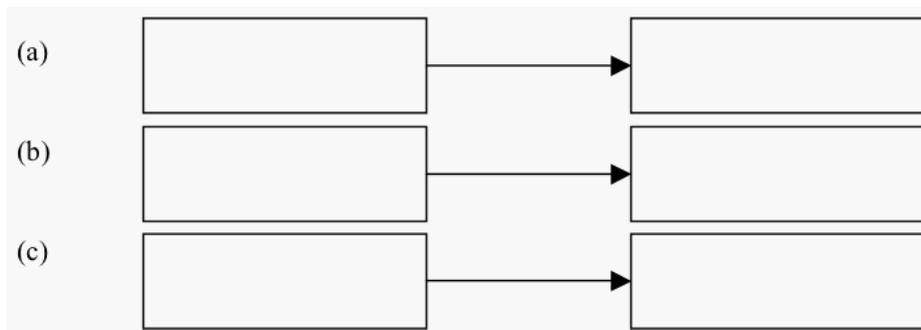
1. Definitions



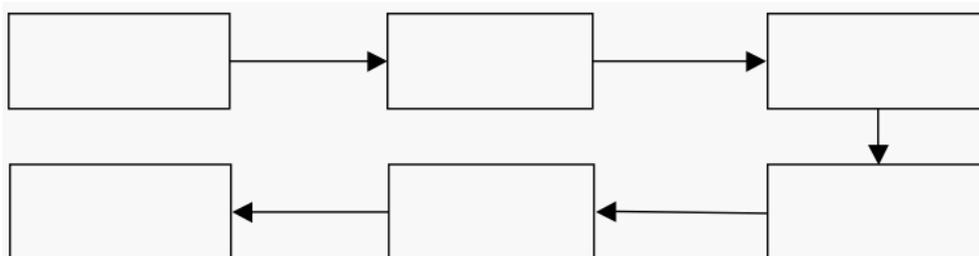
2. Comparison–contrast



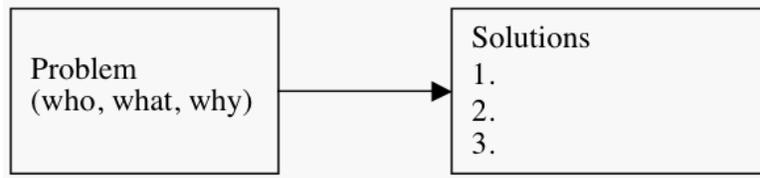
3. Cause–effect (in any number as is needed)



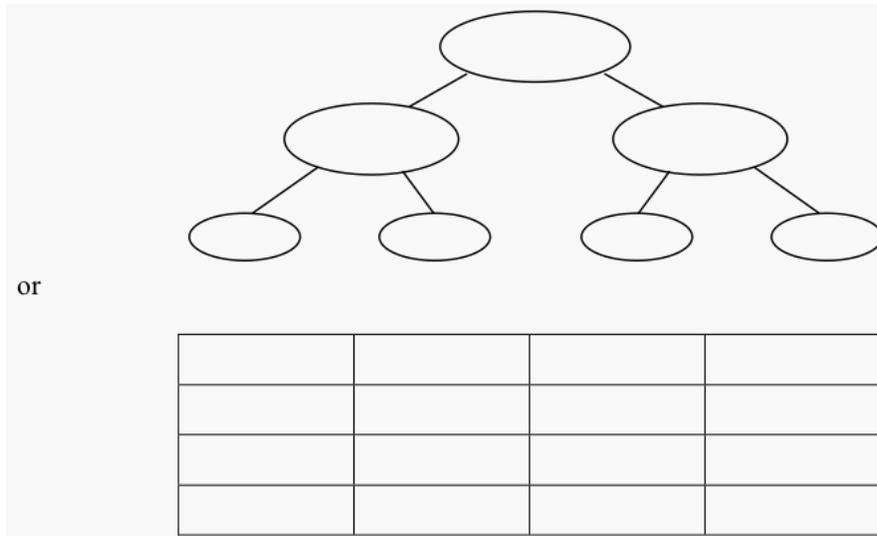
4. Process and sequence



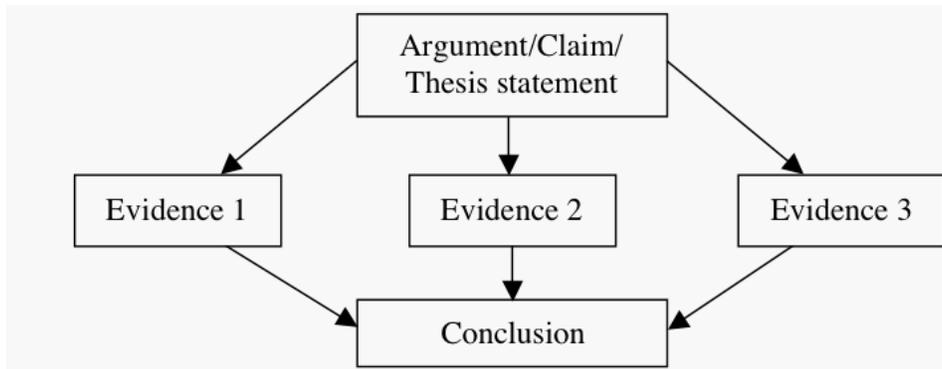
5. Problem–solution (in any number as is needed)



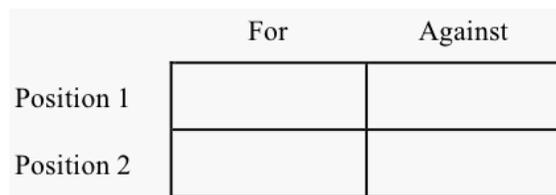
6. Description and classification



7. Argument



8. For–against (cf. comparison-contrast)



9. Timeline

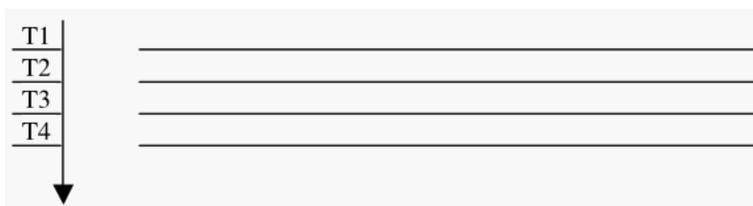


Figure 1. Examples of GOs reflecting text structures.

At a first glance, the design of the above GOs may seem rather simplistic; however, they depict the common text structures clearly and can be applied over and over to sections of different instructional texts with necessary adaptations and readily recognizable complications. The goal of such simple GOs is to allow students (and teachers) the opportunity to work with recurring patterns that are easily recognized and readily used.

To this point we have argued that there is a strong set of research studies from L1 context to support the use of GOs to raise text structure awareness among students. The most effective application of GOs must involve those that reflect the discourse structure in the text. We also outlined briefly how such GOs can be created and used consistently in instruction. In the following two sections, we briefly consider two further issues noted at the outset of the article: the need for L2 research and the need for more extended-training studies.

L2 GO Research Needed

A serious remaining concern is the lack of GO research with L2 students. Since the first attempt of Barron (1969, 1979) and Earle (1969) to incorporate GOs into reading instruction with structured overviews, various ways to utilize GOs have been suggested by both L1 and L2 reading researchers (e.g., Alvermann, 1986; Chamot & O'Malley, 1994; Kang, 2004; Grabe & Stoller, 2002; Tang, 1993). However, much of the empirical research on actual instructional effects of GOs on reading comprehension has centered on L1 readers rather than L2 readers. The above review of GO research shows that, except for Tang's (1992) study of GOs with seventh-grade ESL students, most carefully designed studies are conducted with L1 readers. The lack of research with L2 readers is apparent, and explorations of the effects of GOs with ESL students and students of English as a foreign language (EFL) are especially necessary.

ESL and EFL students are a particular population who needs special attention in reading development, especially those who wish to pursue academic work in their second language. Learning how to read informational texts to obtain content-area knowledge becomes critical for their success. Reading to learn from texts involves abilities to remember main ideas and certain details, to link the text to the reader's prior knowledge, and to recognize and build rhetorical frames which organize the text information (Grabe & Stoller, 2002). One of the major challenges L2 students face in academic settings is learning to comprehend increasingly more dense and complex reading material, especially when the rhetorical convention of L2 texts may differ from that of L1 texts.

In order to develop learners' reading comprehension, one of the most important goals is to raise their awareness of text structure through in-class explorations of discourse patterns with L2 texts (e.g., Carrell, 1985). As noted at the outset of this article, one of the more recent consistent recommendations for raising awareness of text structure with English for Academic Purpose (EAP) students has been the use of GOs. Many L2 students should be quite comfortable working with formal and structural aspects of language, and as part of instruction, GOs should be more engaging for L2 learners than L1 learners. Research efforts are needed to demonstrate the extent to which GOs will have an impact on the way ESL and EFL students read texts, as well as the long-term impact of GOs on students' reading development. These efforts will lead to a better understanding of the overall effectiveness of GOs in reading comprehension, add to our current knowledge base regarding the impact of GOs, and have the potential to facilitate reading development in many EAP settings.

Extended Instructional Training Needed

A final critical issue for the use of GOs and the development of discourse awareness on the part of learners is the need for extended training studies and longitudinal research. Discourse structure awareness is a knowledge base that grows incrementally from increasing exposure and explicit instruction (Koda, 2005). Students need time and repeated exposure to develop their abilities to recognize discourse structuring in texts. However, most previous GO studies have a training period ranging from only a few hours to a few weeks, covering two to eight passages. This short instruction period may explain the small overall effect of GOs reported by Moore and Readence's (1984) meta-analysis of 23 studies with an effect size of 0.22. As suggested by Bean et al. (1986), GO instruction should take at least a semester and instructors should take a cumulative, long-range view of the positive impact of such instruction. Studies that examine the impact of GOs on reading comprehension will require extended instructional training rather than a short, intense exposure to visual facilitation. The learning assumption behind the instructional use of GOs for reading development is that students need consistent exposure to and practice with GOs. Repetition in the form of GOs, reflecting a set of basic knowledge structures conveyed through discourse organization, should allow students to recognize discourse structure in new texts and apply this knowledge to reading comprehension. The extended time should allow for the consistent repetition of general patterns, leading to useful learning transfer effects.

This article provided a careful analysis of the research on GOs and their impact on reading comprehension. Although GOs have been strongly recommended and widely practiced by reading experts and classroom instructors, more consistent definitions and procedural descriptions of GOs are essential. A variety of definitions and implementation methodologies of GOs have been used in the previous literature, though not all of them have facilitated reading comprehension. However, empirical studies have consistently demonstrated the facilitative effect of GOs that represent the discourse structure of the text in reading comprehension. Future recommendations and practices in GOs should focus on those types that represent the discourse structure of the text. Furthermore, a consistent set of GO designs should be adopted across different instructional texts to match the commonly recurring text structures. These proposed GO formats would also create more comparable research findings in empirical studies. They also

offer ways to train classroom instructors to recognize text structures themselves and ensure the use of GOs on a more regular basis.

GO research has remained an ongoing avenue of inquiry for L1 reading researchers. Except for Tang (1992), very few research efforts have been reported for L2 populations. Currently, some textbooks intended for ESL and EFL learners have begun to recommend the use of GOs as an instructional tool (e.g., Brinton, Jensen, Repath-Martos, Frodesen, & Holten, 1997; Brinton, Frodesen, Holten, Jensen, & Repath-Martos, 1997; Chamot & O'Malley, 1994; Sanabria, 2004). Moreover, some recent textbook materials have incorporated GOs that reflect the discourse structuring in the text being read (e.g., Smith & Mare, 2004). However, more research studies with ESL and EFL readers, especially those well-controlled studies with an extended period of instruction, should be carried out to further investigate the effectiveness of GOs and add to our knowledge base regarding the impact of GOs on L2 reading comprehension.

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Appendix A

Studies in the Effect of Graphic Organizers That do not Reflect Text Structures

Studies	Subjects	Treatment	Comparison	Outcomes
Bean, Singer, Sorter, & Frazee (1986)	10 th -grade, L1	1) Graphic organizer with previous training in summarizing 2) Graphic organizer alone	Outlining	Graphic organizer with summarization training scored higher in delayed measures, suggesting a cumulative, long-range view on graphic organizer instruction.
Griffin, Malone, & Kameenui (1995)	5 th -grade, L1	1) Explicit GO instruction 2) explicit comprehension instruction without GO 3) implicit GO instruction 4) implicit comprehension instruction without GO	Traditional basal instruction	1) No significant difference among groups on the immediate and delayed posttest with short-answer comprehension items. 2) Participants who received GO instruction did not perform better in either immediate or delayed recall of the training material. 3) Participants who received GO instruction performed significantly better on the recall of novel social studies text material as a transfer measure than students who received the traditional basal instruction.
Griffin, Simmons, & Kameenui (1991)	5 th - and 6 th -grade learning disability students, L1	Graphic organizer	Text information in a list	No significant difference on both immediate and delayed posttests between the two groups as measured by oral retells, production response, and choice response.
Simmons, Griffin, & Kameenui (1988)	6 th -grade, L1	1) Teacher-constructed advance organizers 2) Teacher-constructed post organizers	Traditional form of instruction	1) No significant difference on daily probe measures and an immediate short-answer posttest among all three groups. 2) The advance organizer group performed significantly better on delayed short-answer posttest than the post organizer group, but not the traditional instruction group.

Appendix B*Studies in the Effect of Graphic Organizers That Reflect Text Structures*

Studies	Subjects	Treatment	Comparison	Outcomes
Alvermann & Boothby (1986)	4 th -grade, L1	1) 14 days of graphic organizer instruction 2) 7 days of graphic organizer instruction	Control group with the typical reading-recitation method	The 14-day GO group comprehended and recalled significantly more information than the control group, but no reliable difference was found between the 7-day GO group and the control group.
Armbruster, Anderson, & Meyer (1991)	4 th - and 5 th -grade, L1	A type of graphic organizer called "frame"	Following directions in the teachers' edition	Framing condition scored higher; framing more successful for 5 th -graders
Armbruster, Anderson, & Ostertag (1987)	5 th -grade, L1	Structure-training in recognizing and summarizing along with "frame"	Read and discussed answers to questions	Structure-training group better recall in macrostructure ideas, better organized summaries
Balajthy & Weisberg (1990)	College freshmen, L1	Graphic organizer training and summary writing	Comprehension-oriented activities	The experimental group outscored the control in both graphic organizer and summarizing.
Berkowitz (1986)	6 th -grade, L1	1) Map-construction 2) Map-study	1) Question-answering 2) Rereading	Map-construction group scored higher than the others; some passages are better suited for mapping.
Boothby & Alvermann (1984)	4 th -grade, L1	Graphic organizer	The teacher's instructional approach resembled directed reading activity.	The GO group scored significantly higher than the control group on both immediate and 48-hour delayed recall tests.
Geva (1983)	Less skilled first-year community college students, L1	Taught to represent prior knowledge and text structure in nodes-relations flowcharts	Speed reading related tasks involving skimming texts and looking for key words	The flowchart group performed significantly better in the Nelson Denny Comprehension test and improved in the quality of the flowcharts they produced.
Guri-Rosenblit (1989)	College students in Israel, L1	1) Tree diagram plus explanation 2) Tree diagram without explanation	1) The original text without diagram 2) The elaborated text without diagram	Tree diagram groups performed better in comprehension of main ideas; diagram plus explanation group were more able to perceive subtle relations and interrelations; no difference between original and elaborated text groups.

Studies	Subjects	Treatment	Comparison	Outcomes
Spiegel & Barufaldi (1994)	community college students, L1	Trained to recognize text structure and use text structure knowledge in graphic organizer form as an aid to recall and retention	Study the same text excerpts in a traditional manner	1) Students who were provided with or required to identify the text structure did no better in a recall task. 2) Students provided with a pre-reading graphic organizer did no better in a recall task. 3) Students who actively determined the text structure of an excerpt of text and constructed a graphic post-organizer of the text structure gained in recall and retention.
Tang (1992)	7 th -grade, ESL	Graphic organizer training	Non-graphic, traditional	Gain for the graphic organizer group, no change for non-graphic group; positive attitude of graphic organizer students

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