The Effect of Graphic Organizer on Students' Learning in School

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Abstract
Graphic organizers are instrument of representation, illustration and modelling of information in visuals or graphics form that use to achieve a meaningful learning. GOs are a set of learning strategies which involve translating words expressed in linear form into visual structures. When written material or difficult concepts are expressed graphically, the students can develop alternative structures for understanding the course concepts. In this paper, illustrate the use of graphic organizers on the effects of students' learning in schools. Previous research studies investigating on the effects of graphic organizers on students' learning in schools are reviewed. It was found that graphic organizers had effect on the improvement of students' comprehension, performance and motivation in learning.

Introduction

A Graphic Organizer (GO) is simply a graphical or spatial representation of text concepts. It is an instructional tool that can help students to organize, structured the information and concepts to relate with the other concepts. In addition, the spatial arrangement of GOs allows the students to identify the missing information or absent connections in one's strategic thinking (Ellis, 2004). GOs have many names including visual maps, mind mapping and visual organizers. As an instructional tool, GOs used to illustrate students' prior knowledge about a topic or section of text that have been highly recommended to be used in classrooms. GOs are visual representations, models, or illustrations that depict relationships among the key concepts involved in a lesson, unit, or learning task (Braselton & Decker, 1994) while Meyen et al (1996) stated that GOs are "visual displays teachers use to organize information in a manner that makes the information easier to understand and learn".

The idea of GO is based on Ausebel's assimilation theory of cognitive learning (Ausebel et al., 1978). According to them, the information is organized by mind in a hierarchical top-down fashion. The cognitive approach to learning seeks to understand how incoming information is processed and structured into memory" (Weinstein & Mayer, 1986). Cognitive learning theory is that the memory system, with its short-term and long- term sorting and encoding components, guide the learning process. Learning is the best achieved when the information is presented systematically and stored in the student's brain in an organized, meaningful and useable manner (McElroy & Coughlin, 2009).

Studies have shown that meaningful learning can be assisted through the use of GOs. Students who used GOs as a learning strategy performed better rather than the students who used underlining (Amer, 1994), note-taking (Reader & Hammond, 1994), discussing with co-students (Chularut & De Backer, 2004) or outlining (Robinson & Kiewra, 1995). McElroy and Coughlin (2009) state that there were several examples of GOs for how law professors can apply cognitive learning theory to their classroom teaching of counter-analysis using GOs. GOs also can be used in all phases of learning from brainstorming ideas to present findings. They can be used individually or in large groups. For example, some teachers like to create a class concept map as a large group to review at the end of a unit or develop a character map while reading a book aloud to the class. These tools are particularly useful in activities that require critical thinking skills.

According to Clark (2007), GOs not only enable students to record and categorize information, but also help students to understand difficult concepts, generate thoughts, and identify connections between ideas. When used effectively, these visual tools can have a positive impact on student achievement. Students who work with GOs often show improved writing and critical thinking skills. While working with colleagues across the curriculum, teacher-librarians are in an ideal position to include GOs in their instructional practice as they guide students through the inquiry process. Teacher-librarians who are familiar with GOs can model an effective literacy strategy and develop new partnerships with classroom teachers.

Types of Graphic Organizer

GOs could be presented in six different pattern which are; *hierarchical, conceptual, sequential, evaluative, relational and cyclical* (Gil-Garcia & Villegas, 2003). The table below shows type of organizer best fits with the structural patterns of the informational texts.

Graphic Organizer Pattern	Organizational Pattern of Text
Hierarchical	Categories and subcategories, matrix, plot, tree, pyramid
Conceptual	Description, mind map, concept map, concept chart
Sequential	Time line, chronology, process/ product, cycle graph, line graph
Evaluative	Agreement scales, satisfaction scales, evaluation chart
Relational	Fishbone, pie chart, cause/ effect, characteristic chart
Cyclical	Cycle graph, life cycle, repetitive events

When text is chapter length, multiple GOs are needed to organize the content. Robinson et al. (2003) stated that tree diagram showed the hierarchical relations among the major concept while matrix GOs are used to organize more detailed chapter sections. Some examples of GOs are Venn diagrams, Semantic webs, Genealogical trees and Frames.

According to Jiang and Grabe (2007), there are some examples of GOs designed to match specific recurring text structures. Below is the figure of those examples:
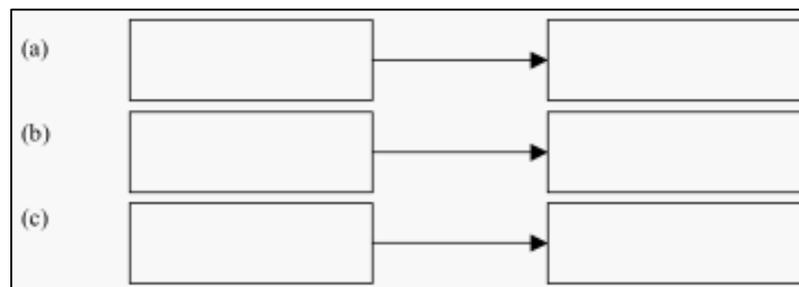

Figure 1   Definition

Figure 2   Cause–effect (in any number as is needed)
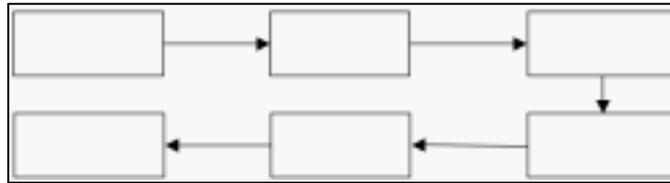
Figure 3   Processes and Sequence
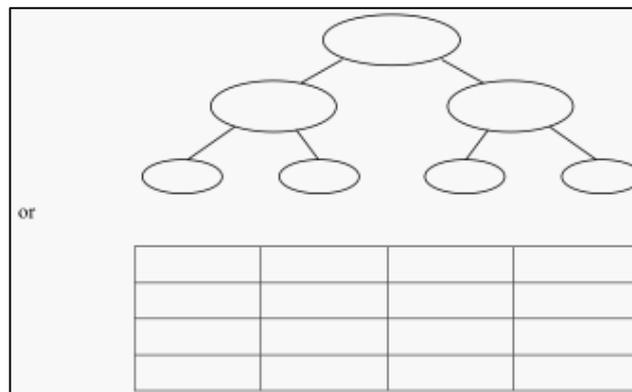

Figure 4   Description and classification

Effects of Graphic Organizer in Learning

GOs are a set of learning strategies which involve translating words expressed in linear form into visual structures. When written material or difficult concepts are expressed graphically, the students can develop alternative structures for understanding the course concepts (McElroy & Coughlin, 2009). GOs also enhance students' ability to learn to refute arguments. In addition to being an established cognitive tool promote learning, GOs also aid students with differing learning styles in their quest to master legal analysis. So from this, the increasing attention paid to the role of learning styles in the law school classroom. More specifically, GOs may help students learn analysis because they visualize relationships, steps or chronology by showing the spatial relationship between the ideas (McElroy & Coughlin, 2009).

GOs can have a positive impact on reading comprehension (I.A.R.E., 2003). The reading comprehension skills of students in elementary and secondary schools improve with the introduction of GOs. After studying the research literature on reading comprehension, the National Reading Panel (2000) in the United States declared that GOs are one of the seven most effective teaching strategies for reading comprehension. Teachers who include GOs in their instructional practice can improve their students' academic performance (I.A.R.E., 2003). Three studies revealed that "GOs are a helpful method for improving student retention and recall of information for both elementary and junior high students with learning disabilities, as well as upper elementary students" (p. 6).

Previous Research Related on the Effect of Graphic Organizer on Students' Comprehension

Research by scholars found that graphic organizers are especially effective for teaching technical vocabulary. Monroe and Pendergrass (1997) stated that use of GOs is effective in increasing the use of mathematical vocabulary in students' writing. Through the study, they compared the effects of Integrated

GO model (combination Concept of Definition GO with Frayer model) and definition only model (traditional teaching) on the mathematical vocabulary used by students.

Study by Oliver (2009) about the effectiveness of concept mapping on students' comprehension of science text structure found that students enjoyed concept and would prefer to read and map rather than just read without mapping. It is due to the concept map is particularly useful graphic that requires students to express in writing how to linked related concept, understand text structure and improve reading comprehension.

Research on GO, highlight the use of that material emerged as an instructional tool to facilitate the comprehension of content area. Research presented by DiCecco and Gleason (2002) propose that, by using Graphic Organizers which is to attain relational knowledge from expository text. They had investigated the effects of explicit instruction GOs on students' ability to gain and apply relational knowledge to their comprehension reading. The learner disability (LD) uses GO as recall their relational knowledge and benefited from a longer treatment. This study demonstrates the efficacy of GOs for student with LD within the context of intensive instruction.

Supported by previous findings on the effectiveness of explicit instruction at the primary- grade level, Williams et al (2007) have evaluated the effectiveness of comprehension cause-effect instructional program for second graders at risk for academic failure on their study. That program represented the type of listening and reading instruction suit to grade level for all students, including those at risk for academic failure. The type of instruction has the potential for improving comprehension on both oral and written task. From findings, the content area of social studies and strengthens the conclusion that explicit comprehension instruction can be effective at the primary school level and necessary for difficult effect concept.

In general, previous research studies had examining the effects of graphic organizers on reading comprehension for students with learning disabilities. An extensive research from Kim et al (2004) stated that, by using graphic organizers (i.e., semantic organizers, framed outlines, cognitive maps with and without a mnemonic) was associated with improved reading comprehension overall for students with LD. The effectiveness of using graphic organizers across grade levels, analysis demonstrated effective outcomes at the elementary and secondary levels for the use of graphic organizers.

The graphic organizers contribute value of specific design to comprehension of a health education brochure. From that, a research by Kools et al (2006) had examined the effect of GO on the comprehension of a health education brochure text and compared subjective with objective comprehension measures. In this experiment, they propose four kinds of comprehension questions. There are text base macro, text base micro, situation model macro, and situation model micro questions. At the end of this experiment, the graphic organizers reflected information on the macro level of the text. It is concluded that health education texts could benefit from relatively simple techniques to increase comprehension.

Studied by Robinson and Molina (2002) stated that, there relative involvement of visual and auditory working memory when studying adjunct displays by using seven outlines or graphic organizers. In that experiment research, there are students who studied graphic organizers performed worse on the visual task, or second experiment, students who studied outlines performed worse on the auditory task. The results provide evidence that GOs are encoded in a more visual format than outlines, whereas outlines are encoded in a more auditory format than GOs. By using the models of text learning and help to explain GOs are more effective than outlines in helping students learn concept relations in text.

Previous Research Related on the Effect of Graphic Organizer on Students' Performance

Graphic organizers are associated with increased learning and retention of subject matter (Stone, 1983), improved reading comprehension (Kirkland, 1981), and meaningful learning of intellectual skills such as mathematics. A study by Githua and Nyabwa (2007), indicated that the use of analogies increased students' success in solving mathematical problems in enhance learning. They proposed six steps for creating and using GO for teachers which were state objectives, oral presentation, integrative reconciliation, promotion of active reception learning, encouragement to adopt critical approach, application to solution of problems.

Zollman (2009) designed a classroom action research to investigate a problem solving instructional approach by using GOs. The designed GO is use to teach how to write essay writing in 5 steps. The five steps included the questions about what the students need to find, what they already know, brainstorm the possible ways to solve the problem, show the calculations, and the students' conclusion or opinion about the problem solving given. They found that GO helped students to construct content and strategic knowledge; improved their mathematical communication skills. Besides, GO also helps students with all ability levels to produce more complete answer.

Using diagram has been identified as the effective strategies to improve efficiency in mathematical problem solving (Uesaka et al, 2007). Through the study by Pantziara et al (2009) who investigated the effect of three types of diagrams; network, hierarchy and matrix in non-routine mathematical problem solving for all abilities of students. They have administered two different test to the same students which were Test A (without diagram) and Test B (with diagram). Findings indicated that presented diagrams in non-routine problem helped students who previously encountered difficulty in solving problems without diagrams and non-routine problems could be given without diagram at first and useful diagrams for their solution could be provided next while matrix diagrams were found to make the problem easier than network and hierarchy diagrams.

Discussion and Conclusion

In general, the functions of GOs in the learning process are:

i. Clarifying knowledge and reasoning. The function of GOs is to explain the relations between concepts. There are GOs that organize information into categories, facilitating in this way the definition of different concepts. Also, the visual organization of knowledge represents an efficient support for the process of thinking.

ii. Strengthening the learning process. Filling in a GO is a complex process which requires taking the decision on which GO is the most suitable for the given type of knowledge and cognitive processes. This decision involves the selection of the necessary knowledge and also the evaluation of the approach and of the intermediary and final results. This type of work with knowledge contributes to the increase of learning comprehension and critical thinking in education.

iii. Integration the new knowledge in the prior knowledge system. This association of the new knowledge with the previous knowledge leads to a superior learning process.

iv. Identified the conceptual errors (and misconceptions). Filling in a GO shows the teacher and the student the conceptual and perceptual errors. Therefore, both teacher and student can proceed with the required revisions.

As a conclusion, there are a few effects of GOs in learning. Use of GOs can improve students' comprehension through the present of significant concept and attendant relationship between material

to be learned and the learner's cognitive structure. GO acts as roadmap that guides learners over the new content to be learned. Hence, GO also can enhance students' performance. In addition, GO also enhance students' motivation when learners satisfied learning. As GO appeared to be effective in learning it can reinforce and direct students' thinking. Students can transfer the difficult information to right ways by transform the information from short term memory to long term memory easily.

By referring to the SMCR Model, GO was found to be a part of Instructional Message Design. Communication skills and knowledge of teachers act as the source while content and treatment by using GO are the message to be delivered. Seeing and hearing are the channel to receive the messages and the receiver which is the student has to communicate with all those elements.

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