WHITE PAPER

Using Foldables® in the Classroom

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Graphic organizers are powerful learning tools. Most of us are familiar with common graphic organizers such as diagrams, maps, outlines, and charts, all of which are two-dimensional. Foldables® are three-dimensional, interactive graphic organizers that were created more than 30 years ago by educator Dinah Zike. Foldables "encourage student ownership of study material, provide a kinesthetic component to teaching strategies, and promote long-term retention of academic lessons" (Casteel & Narkawicz, 2006, p. 6).

Based on current research, graphic organizers are extremely useful teaching and learning tools. Graphic organizers are visual representations combining line, shape, space and symbols to convey facts and concepts or to organize information. Graphic organizers, when designed and used appropriately:

- Speed up communication
- Help organize information
- Are easy-to-understand
- Show complex relationships
- Clarify concepts with few words
- Convey ideas and understanding
- Assess comprehension

Graphic organizers help students organize information in a visual manner. The old saying that "a picture is worth a thousand words" gets a new twist when applied to graphic organizers. This is a profound concept, especially as the number of non-native English-speaking students increases. A student is able to utilize graphic organizers to clarify concepts or to convey ideas and understandings with fewer words.

Graphic organizers also make complex relationships or concepts easier to understand, particularly for visual learners. Foldables take that process to the next level, and most notably,

for tactile/kinesthetic learners. For example, once students have made a "three-tab Foldable" they will never forget there are (insert appropriate subject area example: for Social Studies: three branches of the government; for Science: three types of rock; for Math: three measures of central tendency; for generic elementary: three primary colors, etc.).

When to use graphic organizers

Graphic organizers may be used at any point during instruction, but just as with any other instructional strategy, they are most successful when they are built into the instructional plan, rather than presented as an 'extra' activity.

Graphic organizers can be used to supplement note-taking and outlining. Many students do not know how to take classroom notes. They often write profusely, attempting to catch every word, but sometimes missing key words or concepts along the way. Graphic organizers, including concept maps, tables, and tree diagrams, may work better than outline notes in helping students discover relationships between concepts (Robinson & Kiewra, 1995). Foldables help teach students how to take notes by visually and kinesthetically chunking information into sections and providing limited space for note-taking. Some studies indicate that it may be more valuable to learn to analyze information and to select only the important points rather than writing verbatim notes (Bretzing & Kulhavy, 1979; Van Meter, et al., 1994).

Graphic organizers are often used to reinforce understanding, or to review information. Students use them to organize ideas or to show relationships between concepts. Foldables may be used as an alternative form of assessment in the classroom. Because the Foldable has readily identifiable sections, a teacher can quickly see gaps in student knowledge!

Reading and Writing Across the Curriculum

Graphic organizers have been shown to be highly effective in literacy development. In numerous studies, graphic organizers help improve the development of literacy skills—including oral, written, and comprehension. In one study, researchers concluded that graphic organizers helped at least 80 percent of students master key vocabulary skills (Brookbank et.al,. 1999). Other studies found that elementary students' writing skills improved when graphic organizers were part of the writing process (Gallick-Jackson, 1997; Meyer,1995). Reading comprehension was found to have improved with young students when graphic organizers were used (Brookbank, et.al., 1999; Sinatra, et.al., 1984).

The National Reading Panel (2000) found that graphic and semantic organizers are one of the seven most effective categories of instruction to improve reading comprehension. Graphic organizers aid students in developing critical thinking and other higher-order thinking skills (Brookbank, et.al., 1999; DeWispelaere & Kossack, 1996) Other studies found that graphic

organizers are a helpful tool for improving retention and recall of information for students at all ages and skill levels (Bos & Anders, 1992; Ritchie & Volkl, 2000; Griffin, et.al., 1995).

In Science

Graphic organizers have been shown to aid student comprehension and retention of science material (Guastello, et.al., 2000; Hawk, 1986; Ritchie & Volkl, 2000; Simmons, et.al., 1988; Willerman & MacHarg, 1991). In the science classroom, we try to help students organize their thoughts. Scientists classify, categorize, and organize things, so Foldables are a perfect fit—with Foldables, we put information in chunks that make sense.

In Social Studies

Graphic organizers have been found to help students organize information from expository social studies texts and comprehend content area reading. They also help students select, organize, and recall relevant information and help transfer thinking and learning skills to new situations and content areas (Alvermann & Boothby, 1983; Alverman & Boothby, 1986; Armbruster, et.al., 1991; Griffin, et.al., 1995). Casteel & Narkawicz (2006) compared lecture/worksheet style instruction with instruction focused around the use of Foldables in a social studies classroom and found that Foldables significantly improved students' attitudes toward the discipline.

In Mathematics

In mathematics, graphic organizers may help students develop stronger problem-solving skills as well as general mathematical skills and knowledge (Braselton & Decker, 1994; Monroe & Orme, 2002).

With Students with Special Needs

Graphic organizers may help English language learners improve higher-order thinking skills (DeWispelaere & Kossack, 1996).

Because of their visual organization, graphic organizers seem to be quite beneficial for use with learning disabled students. They appear to help students comprehend content area material, to organize information, and to retain and recall content (Boyle & Weishaar, 1997; Doyle, 1999; Gardill & Jitendra, 1999; Griffin et al., 1991; Scanlon et al., 1992; Sinatra et.al., 1984).

Conclusions

There is a common thread to the research cited here: graphic organizers may lead to improved student performance, whether measured by classroom-based observation, textbook assessments, or standardized assessments, when compared with more traditional forms of instruction.

Graphic organizers work at all grade levels. They seem to be just as effective with primary students as with high school or college students. Studies have been conducted with early elementary (Brookbank et al., 1999), upper elementary/intermediate grades, and middle school (Guastello et al., 2000), and with secondary grades/high school (Doyle, 1999), all showing similar results.

There are four keys or phases to effective learning, according to Kolb (1984). These phases are: getting involved through concrete experience, reflective listening and observation, creating an idea with an abstract conceptualization, and making decisions through active experimentation. Graphic organizers address all four of these phases at some level and, when combined with other classroom instruction, they can be a powerful tool for learning.

Marzano, Pickering, and Pollack (2001) contend that to foster higher-order thinking, instruction must require learners to restructure prior knowledge and to link it to new information. These researchers and others use graphic organizers to restructure existing knowledge and make new connections. In fact, Marzano, Pickering, and Pollack (2001) propose nine instructional strategies to improve student achievement, and Foldables can be utilized in each of them.

When students construct their own graphic organizers, as they do with Foldables, they are active participants in their learning (Moore and Readence, 1984). Student-constructed graphic organizers allow teachers to observe levels of understanding, to identify misconceptions, and to make appropriate instructional interventions (Naughton, 1993, 1994).

Our goal as educators is to help students glean important information and understand key concepts and to be able to relate these concepts or apply them to real-world situations. The Glencoe/McGraw-Hill ***iScience*** program includes instruction for study organizers, called Foldables. A Foldable is designed to fit each chapter's content and guides students in choosing the important concepts and recording them in an organized format. Since students make their own three-dimensional Foldable as well as enter the notes, they feel a sense of ownership. The Foldables also serve as an effective tool to use as notes or a study guide before tests to help students achieve greater success (Carter & Van Matre, 1975; Van Meter et al., 1994).

Glencoe/McGraw-Hill ***iScience*** chose to embrace the use of Foldables because of the wide research support that demonstrates the effectiveness of graphic organizers. Students read science textbooks, magazines and newspaper articles, trade books, and web sites to gain

information to answer science questions. Reading is intentional thinking during which the reader constructs meaning from the text. Graphic organizers help support and develop students' note-taking skills, summarizing skills, reading comprehension, and vocabulary development which leads to better understanding and application of science content.

Dinah Zike is an award-winning author, educator, educational consultant, and inventor, known internationally for graphic organizers known as Foldables®. Based outside of San Antonio, Texas, Zike is a frequent keynote speaker and conducts seminars for over 50,000 teachers and parents annually.

References

Some of the citations listed were reviewed but not cited specifically in the White Paper.

Alvermann, D.E. & Boothby, P.R. (1983). A preliminary investigation of the differences in children's retention of "inconsiderate" text. Reading Psychology: An International Quarterly, 4, 237-246.

Alvermann, D.E. & Boothby, P.R. (1986). Children's transfer of graphic organizer instruction. Reading Psychology: An International Quarterly, 7(2), 87-100.

Armbruster, B.B., Anderson, T.H., Armstrong, J.O., Wise, M.A., Janisch, C., & Meyer, L.A. (1991). Reading and questioning in content area lessons. Journal of Reading Behavior, 23, 35-60.

Bos, C.N. & Anders, P.L. (1992). Using interactive teaching and learning strategies to promote text comprehension and content learning for students with learning disabilities. International Journal of Disability, Development, and Education, 39, 225-238.

Boyle, J.R. & Weishaar, M. (1997). The effects of expert-generated versus student-generated cognitive organizers on the reading comprehension of students with learning disabilities. Learning Disabilities Research & Practice, 12(4), 228-235.

Braselton, S. & Decker, B.C. (1994). Using graphic organizers to improve the reading of mathematics. The Reading Teacher, 48(3), 276-282.

Bretzing, B.H., & Kulhavy, R.W. (1979) Note-taking and depth of processing. Contemporary Educational Psychology, 4, 145-153.

Brookbank, D., Grover, S., Kullberg, K., & Strawser, C. (1999). Improving student achievement through organization of student learning. Chicago: Master's Action Research Project, Saint Xavier University and IRI/Skylight. (ERIC Document Reproduction Service No. ED435094).

Casteel, D.B., Narkawicz, M.G. (2006). "Effectiveness of Foldables™ Versus Lecture/Worksheet In Teaching Social Studies in Third Grade Classrooms". Efficacy study. The Forum on Public Policy.

Chi, M. (1985). Interactive roles of knowledge and strategies in the development of organized sorting and recall. In S.F. Chipman, J.W. Segal, & R. Glaser (Eds.), thinking and learning skills, Vol.2: Research and open questions. Hillsdale, NJ: Lawrence Erlbaum Associates.

DeWispelaere, C. & Kossack, J. (1996). Improving student higher order thinking skills through the use of graphic organizers. Elk Grove Village, IL: Master's Thesis, Saint Xavier University.

Doyle, C.S. (1999). The use of graphic organizers to improve comprehension of learning disabled students in social studies. Union, NJ: Master of Arts Research Project, Kean University.

Dye, G.A. (2000). Graphic organizers to the rescue! Helping students link—and remember—information. Teaching Exceptional Children, 32 (3), 72-76.

Egan, M. (1999). Reflections on effective use of graphic organizers. Journal of Adolescent & Adult literacy, 42 (8), 641-645.

Ekhami, L. (1998). Graphic organizers: Outlets for your thoughts. School Library Media Activities Monthly, 14 (5), 29-33.

Fisher, D., Zike, D., and Frey, N. (2007). Foldables: Improving Learning with 3-D Interactive Graphic Organizers. Classroom Notes Plus, August 2007, Urbana, IL: National Council of Teachers of English

Gallick-Jackson, S.A. (1997). Improving narrative writing skills, composition skills, and related attitudes among second grade students by integrating word processing, graphic organizers, and art into a process approach to writing. Fort Lauderdale, FL: Master of Science Practicum Project, Nova Southeastern University.

Gardill, M.C. & Jitendra, A.K. (1999). Advanced story map instruction: Effects on the reading comprehension of students with learning disabilities. The Journal of Special Education, 33, 2-17.

Griffin, C., Malone, L., & Kameenui, E.J. (1995). Effects of graphic organizer instruction on fifth-grade students. Journal of Educational Research, 89(2), 98-107.

Griffin, C., Simmons, D.C., & Kameenui, E.J. (1991). Investigating the effectiveness of graphic organizer instruction on the comprehension and recall of science content by students with learning disabilities. Journal of Reading, Writing, and Learning Disabilities International, 7, 355-376.

Guastello, E.F., Beasley, T.M., & Sinatra, R.C. (2000). Concept mapping effects on science content comprehension of low-achieving inner-city seventh graders. Remedial and Special Education, 21, 356-364.

Hawk, P.P. (1986). Using graphic organizers to increase achievement in middle school life science. Science Education, 70, 81-87.

Irwin-Devitis, L. and Pearse, D. (1995). Using graphic organizers for learning and assessment in middle level classrooms. Middle School Journal, 26 (5), 57-64.

Kolb, D.A. (1984). Experiential Learning. Englewood Cliffs, NJ: Prentice Hall.

Marzano, R.J., Pickering, D.J., and Pollack, J.E. (2001). Classroom instruction that works. Alexandria, VA; ASCD Publications.

McTighe, J. (1992). Graphic organizers: Collaborative links to better thinking. In N. Davidson and T. Worsham (Eds.), Embracing thinking through cooperative learning (pp. 182-197). New York: Teachers College Press.

Meyer, D.J. (1995). The effects of graphic organizers on the creative writing of third grade students. Union, NJ: Master of Art Project, Kean College of New Jersey, 46 pp.

Monroe, E.E., & Orme, M.P. (2002). Developing mathematical vocabulary. *Preventing School Failure*, 46(3), 139-142.

Moore, D. & Readence, J. (1984). A quantitative and qualitative review of graphic organizer research. Journal of Educational Research, 78, 11-17.

National Institute of Child Health and Human Development. (2000). Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction (NIH Publication No. 00-4769). Washington, DC: US Government Printing Office.

Naughton, V.M. (1993-94). Creative mapping for content reading. Journal of Reading, 37, 324-326.

Project Better. Website: School Improvement in Maryland Project. Articles on the power of successful teaching and learning using graphic organizers such as Foldables.

Ritchie, D. & Volkl, C. (2000). Effectiveness of two generative learning strategies in the science classroom. School Science & Mathematics, 100, 83-89.

Robinson, D.H., Kiewra, K.A. (1995). Visual argument: Graphic organizers are superior to outlines in improving learning from text. Journal of Educational Psychology, 87(3), 455-467.

Scanlon, D.J., Duran, G.Z., Reyes, E.I., & Gallego, M.A. (1992). Interactive semantic mapping: An interactive approach to enhancing LD students' content area comprehension. Learning Disabilities Research and Practice, 7, 142-146.

Simmons, D.C., Griffin, C.C., & Kameenui, E.J. (1988). Effectiveness of teacher-constructed pre- and post-graphic organizer instruction on sixth-grade science students' comprehension and recall. Journal of Educational Research, 82, 15-21.

Sinatra, R.C., Stahl-Glemake, J. & Berg, D.N. (1984). Improving reading comprehension of disabled readers through semantic mapping. Reading Teacher 38, 22-29.

Van Meter, P.M., Yokoi, L., Pressley, M. (1994). College students' theory of note-taking derived from their perceptions of note-taking. Journal of Educational Psychology, 86(3), 323-338.

Willerman, M. & MacHarg, R.A. (1991). The concept map as an advance organizer. Journal of Research in Science Teaching, 28(8), 705-712.