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## Improving Accelerated College Courses: How Foldable<sup>®</sup> Graphic Organizers Can Help Learners Retain Information

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### Abstract

Teaching accelerated college courses presents unique challenges since often the same amount of information covered in a 15 week semester might need to be covered in only a few class meetings. In this study, use of a specific type of graphic organizer (a hands-on manipulative called a Foldable<sup>®</sup>) was examined as a way to improve students' retention of course content in an accelerated course. The purpose of this study was to see if those taught basic research methods in an accelerated course (three class meetings of four hours each) using lecture interspersed with Foldables<sup>®</sup> performed better on quizzes than those taught with lecture only. The findings indicated that students who were taught with lecture only got 43% of related quiz questions correct while those taught with lecture plus Foldables<sup>®</sup> got 65% of related quiz questions correct (a significant difference). Constructing these quick and inexpensive graphic organizers allowed lengthy lectures to be broken into mini-lectures of 15-20 minutes which seemed to improved students' attention as well as provided students with a study tool. Improved retention of material was a key end result. The use of Foldables<sup>®</sup> is recommended as a method to help students retain information learned in courses which rely on lecture for content delivery.

*Key Words: instructional methods, accelerated courses, graphic organizers, student engagement, learning retention*

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## **Improving Accelerated College Courses: How Foldable<sup>®</sup> Graphic Organizers Can Help Learners Retain Information**

One of the newest trends in college education is to offer courses and even undergraduate and graduate degrees in an accelerated time frame. Teaching accelerated courses presents unique challenges since often the same amount of information covered in a long time span must be covered in as little as one-third of the normally allotted time. The present study focused on an accelerated course in undergraduate research methods which met for three sessions, each one four hours in duration, for a total of 12 contact hours. Although the timeframe was much shorter, the goals and objectives of this course were the same as those for a similar semester-long course that required 36 contact hours. Because of this accelerated format, much more of the required learning must take place outside of the class contact times. Thus, identifying an effective format so that the students retain the information is more critical in such courses due to the limited amount of class time available.

Lecture is often the predominant form of teaching found in the college classroom and has distinct purposes as a teaching method (Bland, Saunders, & Frisch, 2007). Because it is an efficient method for delivering large amounts of information from diverse sources in a short amount of time, those who teach in an accelerated timeframe often utilize lectures to share information with students regarding key concepts of the subject being taught (McKeachie & Svinicki as cited in Bland et al., 2007; Berry, 2008). Often today's students are inundated with PowerPoint based lectures while the literature is replete with criticism, including that it focuses too much on the presenter, encourages summarizing, and limits ideas (Tufte; Parker as cited in "Presentations", 2004). Others contend, however, that failure to follow basic communication principles is the root cause of problems associated with PowerPoint based lectures (Shwom as cited in "Presentations", 2004). Unfortunately, research has also found that students' retention of information from lecture begins declining after about 15 minutes (Lake, 2001) and although there are more active teaching methods available (Tanenbaum, Cross, Tilson, & Rodgers, 1998), integrating such methods into the classroom can require a considerable amount of the teachers' planning time and use up a lot of classroom time (both precious resources in accelerated courses). Additionally these other techniques often rely on the use of technology which in some locations may be unreliable and even, in some cases, inaccessible. A technique that, therefore, does not rely on technology, nor require a great amount of classroom time, but which improves student retention of lecture information would be of interest to teachers of these accelerated courses.

One low-tech teaching technique that has been effectively used to improve student learning in a variety of disciplines and formats is graphic organizers (McKown & Barnett 2007; Hoffman 2003; Jacobucci, Richert, Ronan & Tanis. 2002; Fisher, 2001; Katayama & Robinson, 2000; Schau & Mattern, 1997). The term graphic organizer refers to a hands-on manipulative that helps students construct meaning from assigned readings (Hoffman, 2003). Graphic organizers highlight ideas and visually represent relationships among key concepts (Dinah-Might Adventures, LP, n.d.). A Foldable<sup>®</sup> is one particular type of graphic organizer that requires students to simultaneously use auditory, visual, and kinesthetic skills (which can increase retention) (Dinah-Might Adventures, LP, n.d.; Casteel & Narkawicz, 2009). Creating Foldables<sup>®</sup> in class can help to break lectures into smaller segments of time and give students the

opportunity to momentarily shift focus and then reengage more energetically. An added benefit is that the Foldable<sup>®</sup> is then available as a study tool.

Since there was limited research on the effectiveness of using Foldables<sup>®</sup> in an accelerated college course format, this study examined their use in reinforcing undergraduates' knowledge of key concepts while participating in an accelerated course on basic research methods (taught in three 4-hour class meetings.) The major topics covered in the course included research design, reviewing literature, ethics in research, sampling, measurement, validity, reliability, and basic data analysis. The purpose of this study was to see if those taught using lecture interspersed with Foldables<sup>®</sup> performed better on quizzes than those taught with lecture only.

### Methods

The college at which this study took place is located in a rural area of Appalachia and serves primarily adult students (over age 22) in an accelerated program in which students take one course at a time and progress through their academic program as a cohort. The students in this program attend class one night a week (6pm-10pm) and are required to meet with their learning team (approximately 3-5 students) to work on homework assignments one additional night per week. Most of the students were working adults. They were predominantly White (91%) and female (71%); their median age was 33.

The accelerated course in basic research methods that was the focus of this study serves as a prerequisite for students pursuing a Bachelor of Science degree in organizational management and is one of the first courses students take after their general education requirements are completed. This research methods course provides knowledge and skills to help students in their subsequent coursework. For this particular course, on the first night, the first hour and a half of class consisted of lecture based on PowerPoint slides (students were provided with handouts of all PowerPoint slides from the course and encouraged to review them before quizzes.) The remainder of the first night's class time consisted of reviewing video tapes on the lecture content and working on group exercises focused on the lecture content. Research design, ethics in research, and literature reviews were the content focus of the first night. At the beginning of the second night of the course a short quiz on the first night's content was administered followed by an hour and a half of lecture with PowerPoint slides (followed later with video reviews and group exercises, similar to the first night). Sampling and measurement, including validity and reliability, were the focus of the second night's lecture. At the beginning of the third and last class session, a short quiz on the second night's content was administered followed by an hour lecture with PowerPoint slides (as well as video reviews and group exercises). The content focus of the last night was research project planning and basic data analysis (in the next course in these students' course sequence they carried out the research project they planned on the last night of this basic research methods course).

This was a retrospective study in that the students in the six courses that became the focus of the study had been taught and tested in the past. This design was used because the instructor, following a one hour professional development class which focused on using Foldables<sup>®</sup> as a way to help students retain information, subsequently introduced them into a few classes. This

instructor then noticed what seemed to be a greater understanding of key concepts in the courses when students had constructed Foldables<sup>®</sup> and thus decided to go back and quantitatively compare student performance in courses taught with and without using Foldables<sup>®</sup>. These courses were selected because they were the only sections of the basic research methods course taught by a single instructor from spring 2008 through spring 2009. In the last three of these cohorts, students (n = 34) had been taught with both the PowerPoint based lecture and Foldables<sup>®</sup> (the treatment group) while students (n = 33) in the first three cohorts had been taught with the PowerPoint lecture only (control group). The three treatment group cohorts included one on-campus section (n = 12) and two off-campus sections (n = 22). The three control group cohorts included two on-campus sections (n = 24) and one off-campus section (n = 9).

For the treatment group, during the first night’s lecture, Foldables<sup>®</sup> had been made for three topics (experimental v. non-experimental designs; ethics in research; and elements in research reports). On the second night of class Foldables<sup>®</sup> had been made for two topics (sampling designs and validity v. reliability). These Foldables<sup>®</sup> topics had been selected because students seemed to have the most difficulty understanding these particular concepts. During the instructor’s PowerPoint lecture on these topics the students created a Foldable<sup>®</sup> as described on the PowerPoint slide. For example, to create the 4-tab hotdog Foldable<sup>®</sup> on elements in research reports, students picked up a piece of colored paper, folded it long-ways (like a hot dog bun), cut tabs, and then filled in the information provided (see Figure 1).

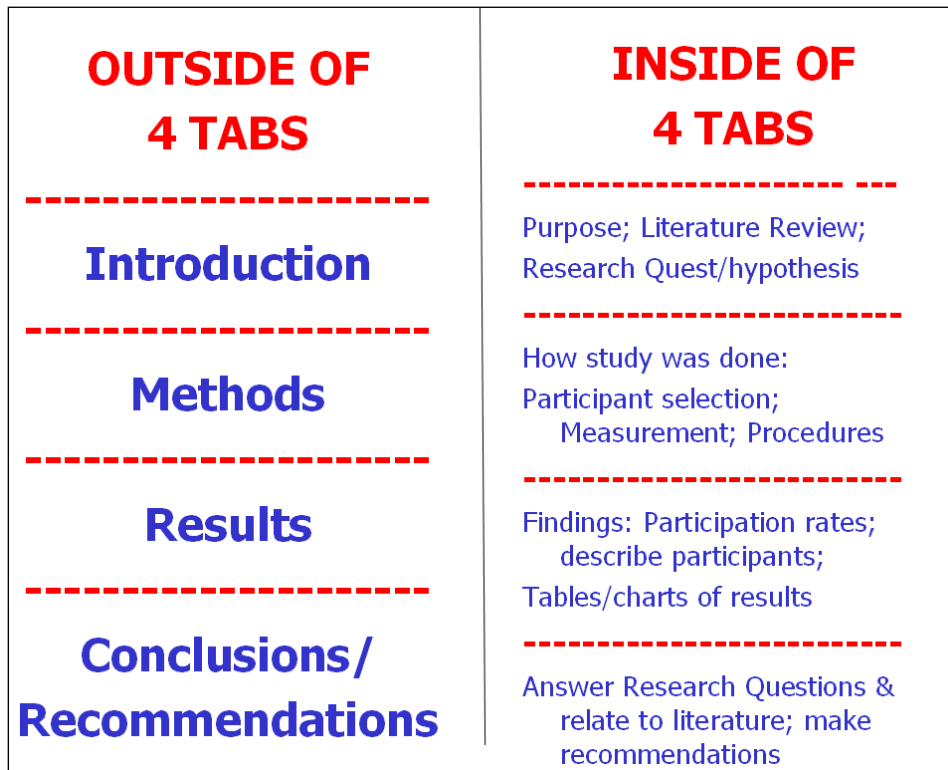


Figure 1. Four-tab hotdog Foldable<sup>®</sup> on elements in research reports

The data analysis consisted of retrospectively comparing treatment group students' performance to the control group students' performance (percentage right versus wrong) on three quiz questions that directly related to the topics on which Foldables<sup>®</sup> had been made. On Quiz 1 one question asked students to explain the ethical obligations of researchers toward their subjects, including the elements of informed consent, while another question asked students to detail the four main elements that are discussed in research reports. Quiz 2 contained a question that asked students to explain the difference between validity and reliability. The three quiz questions used for this analysis were reviewed by an expert in research and assessment who indicated they had adequate facial validity for assessing the topics covered. The quizzes had been graded several months before this study was undertaken and at the time of grading, if any information was incorrect (even partially), the question was counted as wrong. All three quiz question topics had been covered in the lecture and appeared on the PowerPoint slides shown in class as well as on the PowerPoint handouts the students were given. In the treatment group, however, students additionally made Foldables<sup>®</sup> on these three topics.

### Results

To examine the relative performance of the treatment and control groups the percentages right versus percentages wrong were compared (using a contingency table and chi-square test of association) on the three quiz questions that had been asked pertaining to the topics on which Foldables<sup>®</sup> had been constructed. All three questions were considered together to yield a total of 98 question responses in the treatment group and 95 question responses in the control group (these numbers were slightly less than 3 times the number of students in the treatment or control group because some in each group missed quizzes). As shown in Table 1, of those who constructed Foldables<sup>®</sup>, 65% gave correct answers to the quiz questions while of those who did not construct Foldables<sup>®</sup>, 43% gave correct answers. This was a significant difference (chi-square = 9.539;  $p = .002$ ;  $df = 1$ ).

Table 1  
*Chi-square Comparison of Treatment (Foldables<sup>®</sup>) and Control Group Responses on Three Quiz Questions*

Group	Correct	Incorrect	Total
	<i>Observed Frequency (Percent) Expected Frequency</i>	<i>Observed Frequency (Percent) Expected Frequency</i>	
Control	41 (43.2) 51.7	54 (56.8) 43.3	95
Treatment (Foldables <sup>®</sup> )	64 (65.3) 53.3	34 (34.7) 44.7	98
<b>Total</b>	105 (54.4)	88 (45.6)	193

*chi-square = 9.539;  $p = .002$ ;  $df = 1$ ; phi coefficient = .222*

## Discussion

This study focused on the use of Foldable<sup>®</sup> graphic organizers in an accelerated basic research methods college course. The purpose of the study was to see if those taught with PowerPoint based lecture supplemented by Foldables<sup>®</sup> performed better on quizzes than those taught with lectures, but without the Foldables<sup>®</sup>. As indicated, those taught with Foldables<sup>®</sup> got 65% of the related quiz questions correct while those taught without Foldables<sup>®</sup> got 43% of the quiz questions correct (*chi-square* = 9.539; *p* = .002; *df* = 1). These preliminary results provide some evidence that the use of Foldables<sup>®</sup> in the accelerated college class format could be an effective tool for enhancing students' retention of course material. Foldables<sup>®</sup> require the use of visual and kinesthetic learning styles and thus those with learning styles other than auditory (which the lecture relied upon) found that their style had also been addressed. Another advantage with the Foldables<sup>®</sup> was that they allowed a break so that the one and a half hour lecture actually became a series of mini-lectures of about 15-20 minutes each. Previous research has indicated that it is difficult for students to pay attention to a lecture for much longer than 15 minutes at a time (Lake, 2001). A simple pause of a few minutes to construct a Foldable<sup>®</sup> allowed students to refocus their attention for several minutes before moving back to the lecture. The students visibly perked up (asking more questions, paying more attention, not yawning) and were more focused on the lecture following construction of the Foldable<sup>®</sup>. The Foldables<sup>®</sup> used in the study were inexpensive (only colored paper and a few pairs of scissors were required) and could be incorporated in any discipline. The Foldables<sup>®</sup> constructed by the students involved both 4-tab hotdog Foldables<sup>®</sup> and 2-tab hamburger Foldables<sup>®</sup> (Dinah-Might Adventures, LP, n.d.) on different colors of paper. Some students mentioned they remembered information based on the color of the Foldables<sup>®</sup>.

Some limitations to these findings bear mentioning. These groups were intact groups and not randomly assigned, so there may have been unidentified differences between the groups that were related to the use of the Foldables<sup>®</sup>. Another limitation is that these were older adult students studying in a business discipline, many of whom worked during the day and attended classes at night. Thus these students may not well represent traditional aged students although previous research has indicated the effectiveness of graphic organizers in multiple ages and disciplines (DeMeo 2007; Hall & Strangman, 2002; Katayama & Robinson, 2000; Schau & Mattern, 1997). Also, this study did not specifically measure students' attitudes toward using the Foldables<sup>®</sup> and relied on the instructor's observations regarding students' responses to constructing the Foldables<sup>®</sup> in the classroom. Finally, due to the retrospective nature of this study and its reliance on quizzes previously developed and administered, limited validity and reliability investigation of the quiz items was possible.

It is recommended that teachers who are struggling with keeping students' attention during lectures consider incorporating a few Foldables<sup>®</sup> into their courses. These inexpensive, low-tech devices provide an opportunity to break up the lectures into smaller segments and provide useful study guides for the students especially in times when high-tech options may not be available. Previous research has indicated that graphic organizers were found to be helpful for students from primary school to medical school as well as in third world countries with limited technological access (Casteel & Narkawicz, 2009; DeMeo, 2007; Hall & Strangman, 2002; MacKinnon & Keppell, 2005; Katayama & Robinson, 2000; Schau & Mattern, 1997).

Other faculty members teaching at the college where this study took place have reported successfully using Foldables<sup>®</sup> among both traditional-aged students as well as adult students and in diverse disciplines ranging from education, psychology, and statistics, to English. Additionally, these faculty members indicated both graduate and undergraduate students have successfully used Foldables<sup>®</sup>.

Future research is recommended regarding the efficacy of Foldables<sup>®</sup> in accelerated and other lecture-based courses. Specifically, other academic disciplines and specific aged students would be useful variables to consider as well as whether graphic organizers work better for males or females. Research into the impact of graphic organizers on student engagement is also recommended. Finally, attention to some of the limitations of this study, particularly the need for a true experimental design, is recommended when conducting research on this topic.

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