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ABSTRACT

Whether graphic organizers were superior to outlines when students were provided with all, some, or none of the information when studying for factual and transfer tests was studied with 117 undergraduates provided with graphic organizers or outlines. Both were provided in three forms: a complete set, a partial set, and a skeletal set of major headings. Results indicate that graphic organizers were more effective than outlines, and partial notes were more effective than complete notes for helping college students transfer text knowledge. However, there was no effect for study note format or amount of provided information for learning text facts. Therefore, in a practical educational setting, results suggest that if teachers just want students to learn facts, there are no advantages to study note formats or amounts of information provided. If, however, teachers are interested in testing transfer of knowledge, there are advantages to graphic organizers and partial notes. Active involvement of students in the note-taking process enhances transfer of knowledge. (Contains 2 figures, 4 tables, and 19 references.) (SLD)

Getting Students Involved in Note Taking: Why Partial Notes Benefit Learners More Than Complete Notes

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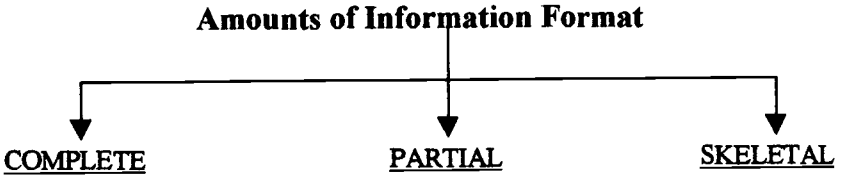
Introduction

When students construct their own study notes to accompany text, they often perform better than students who studied from the notes provided by their instructor. (Armbruster & Anderson, 1982; Russell, Caris, Harris, & Hendricson, 1983). The activity of taking notes serves as an encoding function (DiVesta & Gray, 1972; Kiewra & Frank, 1988; Mayer, 1989) in that information is "encoded" in a more permanent fashion rather than a temporary fashion (e.g., reading over instructor provided notes). The present study also investigated the effectiveness of providing three amounts of information: A complete set of notes, a partially complete set of notes (approximately half of the information is left blank), and a skeletal set of notes (blank with only the major headings and categories provided). Figure 1 describes the differences of each of these three amounts of information provided for students.

Figure 1



	COMPLETE	PARTIAL	SKELETAL
Definition:	Notes that are fully completed with headings, categories, and relevant information.	Notes that are partially completed (Approximately 50%).	Notes that are blank except for the headings and categories.
Task:	Students study set of notes that corresponds to the text.	Students search for and extract The missing information from the text and place on their notes.	Students search and extract all the missing information from text.

The use of skeletal and partial outlines were found more beneficial for medical students in a study by Russell et al. (1983) because it allowed students to incorporate their own experiences and to help elaborate the new information. In response to questionnaires, students found the skeletal notes advantageous for review, prior to the test and encouraged students to concentrate on their own note-taking strategy within the provided guidelines. Furthermore, it was concluded that the amount of information provided for students did make a difference on how students performed on tests and how much information they remembered as they completed their notes respectively.

Similarly, the nature of the notes (linear or spatial) provided for students by the instructors can make a difference. Spatial displays and diagrams have undergone a great transformation as a result of their effectiveness on learning. Generally speaking, these displays have been viewed as formal study notes that may accompany text. Some displays, such as matrix notes contain more visual organization of the information, creating figures without a basic format

(Winn & Holliday, 1982). One constant belief has been that spatial notes differed from texts in that the logical or syntactical relationships that exist among the concepts are presented spatially on the page rather than in sentence form (Winn, 1980).

Two types of study notes that have received much attention are outlines and graphic organizers (Robinson & Kiewra, 1995). Current research has begun to consistently describe how outlines (Bean, Singer, Sorter, & Frazee, 1986; Guri-Rozinblit, 1988a; Kiewra, Dubois, Christian,& McShane, 1988) and graphic organizers (Bernard, 1990; Kiewra, 1989; Lehman, 1992; Robinson, Katayama, & Fan, 1996; Simmons, Griffin, & Kameenui, 1988) can be used as effective study notes when they accompany text. The research has described how study notes such as outlines and graphic organizers aid in comprehending information from written text and enable students to recall facts and concepts in a more effective way than with text alone. The present study examined the commonly used outlines (linear study notes) and the less commonly used graphic organizer (spatial study notes). Figure 2 provides an example of the differences between these two types of study notes.

Figure 2

Study Note Format

	OUTLINE	GRAPHIC ORGANIZER
TYPE:	Linear One dimension	Spatial Two dimensions
FORMAT:	Indentation	Matrix: Rows & Columns
ATTRIBUTES:	Roman numerals Arabic Letters Arabic Numbers	Major headings (superordinate) Minor headings (coordinate) Categories for descriptions
ADVANTAGE:	Allows for order and structure in a hierarchy	Allows for comparisons and relationships across rows and down columns

Methodology

The present study was designed to investigate whether graphic organizers are advantageous to outlines when students are provided with all, some, or none of the information when studying for factual and transfer tests. Both the study note format (graphic organizer vs. outline) and the amount of information (complete vs. partial vs. skeletal) were between-subjects factors. A 2 (study note format) by 3 (amount of information) factorial design was used.

Participants

One hundred seventeen students from two undergraduate education courses at a large state university in the south volunteered to participate in exchange for course credit. Of the 117 students, sixty-five were female and fifty-two were male. Eighty-five students reported an ethnicity of White-American, 24 reported African-American, and eight reported an ethnicity different than either White-or African-American. For year in school there were four freshmen, 11

sophomores, 57 juniors, 44 seniors and one graduate student. Of the 113 students who reported their grade point average, the mean GPA was 3.0. Of the 111 students who reported an ACT score, the mean score was 21.The students' ages ranged from 18-40 with a median age of 24.

Materials

The materials used in this study included a short chapter-length text taken from Adams' (1981) abnormal psychology textbook, six sets of study notes, two tests, and a questionnaire.

Procedure

The experiment was conducted during three regularly scheduled, 50-minute class periods (Monday, Wednesday, and Friday) in the regular classrooms in which these classes met.

Monday. Students were seated at their desks and the experimenter explained the purpose of the study. After the instructions were given, students were randomly assigned to one of six conditions by receiving a 9" x 12" manila envelope that contained the text and a set of either (a) complete outlines, (b) partial outlines, (c) skeletal outlines, (d) complete graphic organizers, (e) partial graphic organizers, or (f) skeletal graphic organizers. Students were given approximately 40 minutes to read the text and perform their assigned study activity (i.e., study their complete notes or fill in and then study their partial or skeletal notes). The two complete notes groups were given additional written directions stating that they may take additional notes on a provided blank sheet of paper. Students were given 40 mins. to read and fill out their notes. At the end of the period, students were asked to put their materials into their envelopes, instructed not to discuss the study with anyone and were dismissed.

Wednesday. At the beginning of the class periods, students were given their envelopes and told to continue their study activities for approximately 40 mins. At the end of the class period, students were again asked to put their materials back into their envelopes, instructed not to discuss the study with anyone, and reminded to bring a number two pencil to class on Friday. Envelopes were collected by the experimenter and students were dismissed.

Friday. When students received their envelopes, they were instructed to review their materials (text and study notes) as they typically would for a test. After the 10 minute review period had expired, students were instructed to return their materials back into their envelopes and to place the envelopes under their seats.

At this time the students engaged in a testing session which lasted approximately 35 mins. A 30-item, four-option, multiple choice test was administered to measure students' factual knowledge of information explicitly stated in the text. Also, a 10-item transfer (matching) test was administered to measure students' ability to apply the information to a novel situation. The transfer test listed the names of 12 sleep disorders (a-l) that could be used once, more than once, or not at all. An 11-item questionnaire was administered to gather demographic information about the students (e.g., sex, year in school, ethnicity, age, ACT score, and GPA) as well as students' perceptions of (a) their previous knowledge of sleep disorders, (b) the study friendliness of the study notes, (c) the amount of effort they put into studying the material, (d) their interest in the topic, (e) whether they had enough time to study, and (f) whether they had enough time to review. The questionnaire was distributed to each student at the end of the testing session. At the end of the period, students turned in their materials and tests. Because there were no names on any of the materials and tests, no connections could be made between students and scores on the tests. The factual tests were electronically scored by the testing service provided by the University testing center. An internal consistency measure of .91 was computed using the

Kuder-Richardson formula (KR-20). The transfer tests were scored by hand using a predetermined key

Results and Discussion

Separate 2 (study note format) by 3 (amount of information) factorial analyses of variance (ANOVA) were conducted on the factual and transfer test scores. All tests were conducted at the alpha = .05 level of significance. The assumption of homogeneity of variance was supported for the factual test, $F(5, 15754) = 1.46$, $p = .199$, and for the transfer test, $F(5, 15754) = 1.68$, $p = .136$ according to the results of Bartlett-Box F tests.

Factual Test

Table 1 presents the means and standard deviations for each of the six groups on the factual test. The main effect of study notes format was not statistically significant, $F(1, 111) = 2.01$, $MSE = 27.06$, $p = .16$. This null finding was due to a small effect size (.13) rather than a small sample size (n's = 60 and 57). This result simply indicates that the type of study notes format (graphic organizers or outlines) did not affect students' scores. The main effect of amount of information was also statistically nonsignificant, $F, (2, 111) = .04$, $p > .99$. This result indicates that the amount of information (complete, partial, or skeletal) did not affect students' scores. The interaction effect of study note format by amount of information was not statistically significant, $F (2, 111) = 1.11$, $p = .33$. A power analysis yielded a small effect size (.14). Table 2 presents the results for the two main effects and interaction effect.

Transfer Test

Table 3 presents the means and standard deviations for each of the six groups on the transfer test. The main effect of study notes format was statistically significant, $F(1, 111) = 21.09$, $MSE = 1.69$, $p < .01$. Students who studied graphic organizers ($M = 8.18$, $SD = 1.44$) performed better than those who studied outlines ($M = 7.08$, $SD = 1.52$). The main effect of amount of information was also statistically significant, $F, (2, 111) = 17.47$, $p < .01$. A Tukey HSD test was used to follow up this effect. Students who studied partial notes ($M = 8.43$, $SD = 1.36$) scored higher than those who studied complete notes ($M = 6.68$, $SD = 1.51$).The interaction effect of study note format by amount of information was not statistically significant, $F (2, 111) = 1.64$, $p = .20$. This null finding was due to a combination of a small to medium effect size (.17) and a rather small sample size (about 20 per cell). Thus a replication study using larger cell sizes may provide sufficient statistical power to detect a significant interaction effect. Table 4 presents the analysis of variance results for the transfer test.

Conclusion

The purpose of this study was to investigate the relative effectiveness of two study note formats (outlines and graphic organizers) across three amounts of provided information (complete, partial, and skeletal). Results indicated that graphic organizers were more effective than outlines and partial notes were more effective than complete notes for helping college students transfer text knowledge. However, there was no effect for study note format or amount of provided information for learning text facts. Therefore, in a practical educational setting, these

results suggest that if teachers want students to simply learn facts, there are no advantages among study note formats or amounts of information provided. However, if teachers are interested in testing transfer of knowledge, there are advantages among study note formats and the amounts of information provided. In the present study, students who studied the graphic organizers outperformed those who studied outlines. Also, when students are provided with partial notes, they are better able to transfer information.

A Need For Training

Because much of learning involves taking and reviewing notes, teachers need to be aware of the impact of student involvement in the note taking processes. Hidi and Anderson (1986) and VanDijk and Kintsch (1983) have suggested that many students lack the search proficiency to identify main points in text, but little has been found on why they seem to lack this skill. Perhaps the answer resides in the training of how to construct an effective graphic organizer. It would be similar to the training of how to construct an outline with an added dimension.

Implications For Teachers

Teachers can help students learn to transfer and apply information more effectively by implementing the following:

(1) Educate students about the relationship between taking and reviewing effective notes and increasing their achievement levels. Make it a common goal to actively involve the students' in the note taking process.

(2) Teach students how to construct, complete, and study their own graphic organizers instead of using the common outline. Use alternate formats of note taking in class to demonstrate how to construct an effective graphic organizer. Also, the teacher should demonstrate the advantages of graphic organizers by showing them how they can draw inferences and relationships from the end product. This would involve a training process that would allow students to observe, practice and master the process of constructing their own notes. This could be done with lecture or from extracting information from a text.

(3) Pre-inform students about the nature of the tests that will be administered in class. If you are a teacher that likes to assess learning beyond basic knowledge and comprehension, then it would be important to inform your students that they will be assessed in such a manner (e.g., application, analysis, synthesis, and evaluation). Make it known that they will be presented with a novel and/or hypothetical situation and expected to apply what they have learned to the situation. This will help them better prepare for such higher thinking tests.

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Table 1
Means and Standard Deviations For The Six Groups On The Factual Test

Group	M	SD	n
Complete Outline	21.84	5.45	19
Partial Outline	20.33	5.60	21
Skeletal Outline	21.80	4.69	20
Complete Graphic Organizer	22.06	6.83	18
Partial Graphic Organizer	23.68	4.41	19
Skeletal Graphic Organizer	22.25	3.85	20
For Total Sample	21.97	5.18	117

Table 2
Analysis of Variance for the Factual Test

Source	SS	df	MS	F	p
Study Note Format (S)	54.48	1	54.48	2.01	.16
Amount of Information (A)	0.22	2	0.11	.99	.99
(S) x (A)	59.97	2	29.99	.33	.33
Error	3003.19	111	(7.06)		

Table 3
Means and Standard Deviations For The Six Groups On The Transfer Test

Group	M	SD	n
Complete Outline	6.11	1.29	19
Partial Outline	7.67	1.32	21
Skeletal Outline	7.40	1.54	20
Complete Graphic Organizer	7.28	1.53	18
Partial Graphic Organizer	9.26	0.81	19
Skeletal Graphic Organizer	7.95	1.19	20
For Total Sample	7.62	1.57	117

Table 4
Analysis of Variance for the Transfer Test

Source	SS	df	MS	F	p
Study Note Format (S)	35.625	1	35.625	21.09	.00 *
Amount of Information (A)	59.034	2	29.517	17.47	.00 *
(S) x (A)	5.532	2	2.766	1.64	.20
Error	187.501	111	(1.689)		

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