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Should Middle School Students with Learning Problems Copy and Paste Notes from the Internet? Mixed-Methods Evidence of Study Barriers

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Abstract

In the experimental phase of this mixed-methods study, 49 middle school students receiving special education services took notes from the Internet under either a written notes or a copy-and-paste notes condition. Immediate, cued-recall measures of factual learning showed that students who wrote their notes were better able to recall what they had noted, although recall was low for all students. However, after a one-week delay (which included two classroom opportunities to study their notes), students who pasted their notes performed significantly better on two different measures of factual learning than students who wrote their notes. Follow-up student interviews and analyses of notes revealed a robust explanatory theme: many written notes contained barriers to learning (e.g., illegible handwriting, spelling errors, and/or indecipherable paraphrases), which likely reduced the benefit of study time. Implications for instructing this population of students to use copy and paste while gathering information on the Internet are discussed.

Introduction

Students more often are using the Internet as a significant information source (Dabbagh & Bannan-Ritland, 2005; Davidson-Shivers & Rasmussen, 2006). In a recent article published in *Middle School Journal*, Jackson (2009) described the need for middle school students to be able to use the Internet to gather and synthesize information relevant to learning. However, while the Internet can speed students' access to varying sources of information, it may also present new challenges to learning. In anticipation of one particular challenge, researchers have begun to identify effective Internet note-taking techniques (see e.g., Igo, Bruning, & McCrudden, 2005a; Igo, Riccomini, Bruning, & Pope, 2006; Pardini, Domizi, Forbes, & Pettis, 2005). To date, the vast majority of the extant research has focused on high school and college students in general education settings. Because educational practitioners must make critical decisions regarding how Internet technologies are used within middle schools (Consortium for School Networking, 2006), the present study sought to explore Internet note taking with middle school students who are learning disabled, mildly mentally retarded, or from the general education population but who need reading support.

Note Taking and the Internet

Taking notes is a common student behavior in academic settings (Kobayashi, 2005). However, students' note-taking strategies vary, with better learning being associated with students who are better note takers (Peverly, Brobst, Graham, & Shaw, 2003). Most students' default note-taking strategies can be categorized on the ineffective end of this continuum. For instance, many students fail to process ideas deeply as they take notes (Igo et al., 2005a). Creating an incomplete set of notes also is a typical problem for students (Kiewra, 1985, 1989). For no other population are these flaws more evident than for middle school students, whose inexperience with note taking compounds the inadequacies of their note-taking approaches (Rinehart & Thomas, 1993). Recent middle school research has documented this phenomenon with general education students (Brown, 2005) and students with learning disabilities (Igo et al., 2006).

For middle school students with learning disabilities (MSSLD), there may be even more problems associated with note taking. In addition to being novice note takers, MSSLD (in grades six, seven, and eight) can experience pressure and distraction stemming from spelling and grammar monitoring as they take notes (Igo et al., 2006; Hughes & Smith, 1990; Poteet, 1979). Further, creating a legible and comprehensible set of notes might be difficult. For example, the legibility of students' handwriting seems to plateau during the early middle grades (fifth and sixth) and plummet during the remainder of middle school (Graham, Beringer, & Weintraub, 1998; Graham, Weintraub, Beringer, & Shafer, 1998). In fact, many *college* students with learning disabilities struggle to create comprehensible and legible notes (e.g., Mortimore & Crozier, 2006; Smith, 1993; Suritsky, 1992), creating the potential for MSSLD to struggle with these same barriers.

The popularity of using the Internet to gather information, coupled with the aforementioned problems associated with student approaches to note taking, led Igo, Riccomini, and Bruning (2006) to ask a basic research question: How should MSSLD approach note taking when they gather information from Internet sources? Their subsequent study attempted to find an answer. Each of 15 MSSLD were assigned to take notes in three ways (type, paste, and write) from an Internet source. Immediate and delayed measures of learning indicated that students could recall little of the information they had noted, irrespective of note-taking style. Follow-up interviews with the students revealed more enlightening data. The students described typing notes as an especially unnerving task, attributing it to a troubling degree of anxiety. They described attempting to monitor spelling and searching the keyboard for the appropriate letter keys while typing notes. Further, an analysis of students' notes showed that when students wrote or typed their notes, they did so in verbatim fashion, which has been linked to shallow mental processing. When the students attempted to type or write paraphrase notes, however, they tended to omit certain important details from the text. Subsequently, their paraphrase notes often were incomplete.

In short, typing notes was too anxiety provoking, and writing notes yielded inferior sets of notes. Igo and colleagues (2006) thus concluded their study with a recommendation that MSSLD be instructed to use the copy and paste method to gather notes from the Internet. Based on the results obtained from their data, this instructional advice might seem reasonable. On the other hand, particular aspects of their study's design necessitate further investigation before any instructional implications could be considered valid in actual school settings. For example, only 15 students participated in that particular study. Second, only students with learning disabilities participated in that study; the findings might not be relevant to teachers of students who display several kinds of learning problems. Finally, students were not permitted to study their notes before delayed measures of learning were administered. In developing generalizations about school-based learning, the study of notes should be considered a vital part of note learning and, therefore, included in an investigation. Additional research needs to address the inadequacies of the earlier study in an effort to provide more robust empirical backing for any instructional implications related to Internet note taking for middle school students with varied learning problems.

Two Phases of Note Learning

Ideally, note learning happens in two sequential phases: the encoding phase and then the external storage phase (Divesta & Gray, 1972; Kiewra et al., 1991). In the encoding phase, students learn text or lecture ideas *as they are noted* (see Kobayashi, 2005). For example, a graduate student might remember more from a research article if she takes notes as she reads the article than if she reads it alone. Documented benefits of the encoding phase include better comprehension of ideas (Kiewra, 1985) and memory for a greater number of ideas (Aiken, Thomas, & Shennum, 1975) when notes are taken. But a great deal of research indicates that students might not learn much during the encoding phase if they do not engage in deep mental processes as they take notes (Igo et al., 2005a, 2006; Kiewra, 1989; Kobayashi, 2005). In such cases, the study of notes becomes critical to learning. In the external storage phase of note learning, students learn as they study a set of notes that already have been created (Kiewra et al., 1991). In previous research investigating MSSLD's note taking from Internet sources, only the encoding phase was tested. Thus, the present study sought to address both phases of note learning by employing a student sample greater than triple the size of Igo and colleagues' sample and by including students with varied learning problems.

The Present Study

Recently, researchers have called attention to the need for differing methods in educational research, in general (McKeown, Crowley, Forman, & O'Connor, 2002), and special education research, specifically (Odom et al., 2005). The purpose of this sequential explanatory mixed-methods study (Creswell & Plano-Clark, 2006) was to explore the encoding and external storage functions of note taking when middle school students with learning problems write and copy and paste notes from Internet sources. A typed-notes condition was eliminated from the present study based partly on the findings of Igo and associates (2006), which suggested that most MSSLD were anxious while typing notes from Web-based sources. Further, Strum and Rankin Erickson (2002) documented that MSSLD have a relatively low words-per-minute typing speed. In an effort to reduce the discomfort associated with participation in the study, a typed-notes condition was dropped.

In the quantitative first phase of the present study, 49 students read a Web-based text covering three topics and took notes by either writing or by copying and pasting. After taking notes, students were (a) immediately tested to examine any differences in encoding prompted by the two note-taking techniques, (b) prompted to study their notes on two separate days during the school week, and then, (c) given one-week-delayed measures of factual learning. In the qualitative phase of the study, 24 students (12 from each condition) were interviewed to help explain the experimental findings. Finally, an analysis of student notes was conducted to provide further evidence of student learning.

Quantitative Method

The experimental method of the present study closely mirrored the Igo and colleagues study (2006). The same experimental text was targeted for students' note taking, and identical dependent measures were employed. The procedure of the experiment was similar, albeit with a few variations related to student access to computers and the inclusion of study periods. A new, larger sample of students participated, however, and the present experimental design (two-cell design) differed considerably from the previous research (Latin square).

Participants

The study took place at a large Southeastern middle school serving a majority of Caucasian students, with minority populations of African American (18%), Hispanic (9%), Asian American (2%), and multiracial (2%) students. Forty-nine seventh and eighth grade students (one English class from each grade) participated in the study. The average age among seventh grade participants (n = 26) was 12 years 7 months (SD = 7 months), and among eighth grade participants (n = 23), it was 14 years 1 month (SD = 10 months). Across grades, an average of 50% of the special education participants' school time was spent in special education environments, with the majority of their non-special education time being spent in elective courses and homeroom.

Students who participated were identified as learning disabled (n = 27), mildly mentally retarded (n = 7), or as no disability/needing reading support (n = 15). Full Scale IQ scores (based on WISC-III, 1991) for seventh grade students with appropriate records ranged from 79 to 109 (M = 87; SD = 12.1), with Verbal and Performance IQ averaging 82 and 93.3, respectively. Full Scale IQ scores for eighth grade students with appropriate records ranged from 70 to 105 (M = 88; SD = 13.1), with Verbal and Performance IQ averaging 83.6 and 95.4, respectively.

Grade equivalent scores for students with learning disabilities (obtained from Woodcock Johnson, Revised, 1989) ranged from 1.6 to 7.7 (M = 3.8, SD = 2.2) for reading comprehension, whereas vocabulary achievement ranged from 1.5 to 6.1 (M = 3.4, SD = 2.0). Scores for students with mild mental retardation ranged from 1.9 to 3.7 (M = 3.1, SD = 1.1) and 1.7 to 3.5 (M = 3.4, SD = 1.2) for reading comprehension and vocabulary achievement, respectively. Students were assigned randomly to either a writing notes (n = 25) or copying and pasting notes (n = 24) condition.

Materials

Text. The text passage used by Igo and colleagues (2006) was also used in the present study. Describing three native Australian minerals, the text was designed to provide (1) content with which students would have little to no prior knowledge (which was confirmed with a brief pretest) and (2) a manageable length (763 words long) that could be addressed in one class period (1 hour and 5 minutes). Descriptions of coal, bauxite, and uranium were presented on a single, continuous web page (HTML document) and accessed through Microsoft Internet Explorer. The text described each mineral along parallel lines, identifying each mineral's (a) supply, (b) production, (c) uses, (d) geographic location, (e) first characteristic, and (f) second characteristic.

Note-taking frameworks. Students took notes in a matrix-formatted chart presented in either paper or electronic form (depending upon assigned conditions). In each condition, the note-taking chart was designed to fit the text's structure and cued so that students were guided to note the correct information, allowing the researchers to test for the learning effects related to specified text ideas. The chart's three columns were cued from left to right as *bauxite, coal,* and *uranium*. Cues in the six chart rows guided students to note the *production, supply, uses, location, first characteristic,* and *second characteristic* of each mineral. Ultimately, then, 18 blank cells—6 for each mineral addressed in the text—were targeted for note taking and testing.

The electronic chart (a kind of word-processing tool, see Igo, Bruning, & McCrudden, 2003) could be minimized, maximized, or reduced in the same fashion as other computer programs. Students could choose to have the tool appear on the screen as they engaged in note-taking decisions with the text, or they could expand the text to cover the screen and hide the chart. The researchers disabled the typing feature of the tool, leaving copy and paste as the sole data-entry function available for use. The paper note-taking chart was simply a paper version of the note-taking tool. It presented students with the same cues and blank cells, but students filled in the cells by writing.

Dependent measures. Two tests assessed learning of facts from the text. The *cued recall of facts* test was an 8 ½" by 11" sheet of paper, identical to the paper note-taking chart. The columns and rows were labeled in the same way that the electronic and paper note-taking charts were labeled; the cells were blank. Students were asked to fill in the cells with all, or any part of, the information that they could remember from their notes. The test was scored by awarding one point per idea recalled and placed in the correct, cued cell corresponding to an idea from the text, whether the idea was originally noted or not. Two raters scored the quiz, blind to experimental conditions, with a clearly acceptable level of inter-rater reliability (Cohen's K = .97).

An 18-item, multiple-choice test (α = .76) required students to recognize factual information presented in the text. For each item, students read a fact and then decided to which of the three minerals (a–c) the fact corresponded. Because each item contained only three options, and in an effort to more closely approximate what students actually learned, the students were instructed to answer only the items they knew and to refrain from guessing. One point was awarded for each correct response.

Procedure

The experiment occurred over one week. On Day 1, a Monday, laptops reserved from the school's media lab were transported to the classroom prior to each period. Each laptop was equipped with an external mouse. Students met in their usual classroom where class roll was taken, and then students were assigned randomly to one of two different note-taking conditions (writing or pasting). Next, students were given an overview of the note-taking task, they were informed that they were going be asked to study the notes they created on Days 2 and 3 (Wednesday and

Friday, respectively, of the same week), and that they would be quizzed "later this period" and also on the following Monday. The classroom teacher reminded the students that they were going to read material on a preloaded web page (text about Australian minerals described above) and take notes over the text as per their assigned condition.

Students then logged on to their computers and created user names and passwords, permitting their notes to be saved and printed for later study. Instructions to use the note-taking cues provided in the chart were provided by the teacher, as was a reminder to read and take notes at a comfortable pace. Students began the note-taking task, saved their notes on the computer (in the copy and paste condition) or turned in their paper note sheets (in the written notes condition), and completed a 5-minute word-association distraction task on a piece of paper (to prevent cognitive rehearsal of the text ideas). Consistent with previous research (Igo et al., 2006), most students completed the note-taking task in approximately 18–24 minutes.

After the distraction task, students completed the cued-recall test and then the multiple-choice test. Cued-recall was given first because it contained far fewer retrieval cues than the multiple choice measure. When students were finished, their teacher collected the cued-recall test. Then, the multiple-choice test was distributed, completed, and collected. Finally, at the end of Day 1, the tests were collected, the students' electronic notes were printed, and all the notes were placed in the teacher's desk.

On Day 2, that Wednesday, students were given their notes and asked to study them for 10 minutes. This occurred at the beginning of the period, when, presumably, the students would be freshest. No instructions were given in *how* to study the notes; students simply were told to study them in preparation for the upcoming delayed tests. At the end of the 10-minute study period, students' notes were again collected and stored in their teacher's desk until Day 3, at which time the note-study procedure was followed again.

On Day 4, the following Monday, students were asked to "retake" the cued-recall and multiple-choice tests. The procedure for completion of the tests mirrored the first administration, with students completing cued recall before the multiple-choice measure was administered.

Quantitative Results

Immediate Learning

ANOVA results indicated a significant effect on students' immediate cued-recall test performances, $F\,(1, 47) = 6.47$, $p < .05$. Students who wrote their notes recalled more text ideas than students who copied and pasted their notes. The relationship between kind of notes and cued recall was strong as assessed by eta square, with note-taking method accounting for 12% of the variance in cued recall. The ANOVA for the multiple-choice measure showed no main effect, although students who copied and pasted their notes performed marginally better than students who wrote their notes. These effects are generally consistent with the Igo and colleagues study (2006). See Table 1 for means and standard deviations.

Delayed Learning after Study

ANOVA results indicated a significant effect on students' delayed cued-recall test performances, $F\,(1, 47) = 4.98$, $p < .05$. Students who pasted their notes recalled more text ideas than students who wrote their notes. The eta square measure of effect size indicated a moderate effect associated with note-taking method on delayed cued-recall, with note-taking method accounting for 9.6% of the variance in recall. The ANOVA for the multiple-choice measure showed a similar main effect, $F\,(1, 47) = 5.78$, $p < .05$. Again, students who pasted their notes performed better than students who wrote their notes. The effect of note-taking method on delayed multiple-choice test performance was moderate (eta square = .11).

Table 1
Immediate and Delayed Test Performance

	Written Notes	Copied and Pasted Notes
N	24	25
Immediate Cued Recall		
M	3.95	3.04
SD	1.51	.91
Immediate Multiple Choice		
M	8.32	9.08
SD	2.92	3.17
Delayed Cued Recall		
M	5.32	7.50
SD	2.85	3.94
Delayed Multiple Choice		
M	10.47	13.30
SD	4.42	3.37

Preliminary Discussion

Based on the results above, two general categories of findings are apparent: immediate learning effects (following the encoding phase of note learning) and differing delayed-learning effects (following the external storage phase). First, students who wrote notes during the experiment performed better on an immediate, cued-recall test of facts. But the same cannot be said for a multiple-choice measure of facts, where the copy and paste group performed somewhat, but not statistically higher. Similar results were obtained in a previous experiment by Igo and colleagues (2006), who explained this phenomenon as a transfer-appropriate-processing effect. In short, students who *wrote* notes in the cells of a cued chart may have been primed, mentally, for the test that required them to *write* ideas in cells of another cued chart. Although this explanation is interesting from a theoretical point of view, students' scores on the two immediate tests in the present study indicate another and perhaps more important finding: students initially learned very little in either note-taking condition. This result suggests that students in each condition processed the text ideas at shallow levels as they took notes. Ultimately, then, the efficacy of note learning's encoding phase is suspect for MSSLD, as students in the present study—and indeed in the previous research—did not learn much as they took notes. The *studying* of notes seems to be especially important for this population.

The second general finding relates to students' delayed-test performances after two periods of study (external storage phase of note learning). Surprisingly, the copy and paste note takers performed considerably higher on each of the delayed tests than did the written notes group. Beyond mere statistical differences, the means of student scores indicate that substantially more learning occurred when students studied copied and pasted notes rather than written notes (roughly 25–30% higher, although all performances were quite low). Based on these results, the external storage function of note learning seems tied to the kind of notes that MSSLD study, a finding potentially of practical use to teachers and students.

A particularly important question remains unanswered by the present experimental findings, however: *Why did the pasted notes group outperform the written notes group on the delayed tests?* The answer to this question is elusive given only the experimental results, so we chose to follow up the experiment with a qualitative investigation.

Qualitative Follow-up

Because our experiment yielded an unexpected and unexplainable finding, we continued the investigation using a sequential explanatory mixed-methods approach (Creswell & Plano-Clark, 2006). Creswell and Plano-Clark suggest this "follow-up explanations model" be used when a quantitative investigation yields puzzling results. Our unexplained result was the difference in learning between the two note-taking groups on the delayed tests. In an effort to generate a plausible explanation for this effect, two types of data were collected, analyzed, and synthesized: student interviews and student notes.

Interviews

Two to four days after the delayed measures were administered and collected, 24 students participated in semi-structured interviews addressing their perceptions related to the note-taking activities Twelve students from each grade level (seventh and eighth) equally representing the two note-taking conditions were interviewed. Steps were taken to ensure that the interviewees proportionally represented the student sample from the experiment (i.e., students with learning disabilities > students needing reading support > students with mild mental retardation).

Each student was given his or her notes for reference during the interviews, which were guided by a protocol developed by the lead researcher. The interview protocol focused on the *external storage function* of note learning (studying from notes), as this was the phase of the experiment (delayed tests) in which the unexpected results were obtained. However, during the interviews other informal questions were asked to prompt students to clarify vague answers or expand with more detail on especially salient answers. Also, additional questions were developed during the interviews when certain thematic consistencies or inconsistencies in students' answers seemed evident. Interviews lasted from two to six minutes, were recorded on a digital audio recorder, and were transcribed and printed.

Interview Data Analysis

The interview data were analyzed by the primary researcher with a phenomenological technique adapted from Groenewald (2004) and Moustakas (1994). This technique included five steps. First, a phenomenological reduction was performed. In this step, the primary researcher listened to the recorded interviews three times in an effort to gain both a "holistic sense" of the data (Shank, 2006), and to alert the researcher to any particularly interesting phrases. No sorting or coding of data occurred in this first step. Rather, the phenomenological reduction allowed the researcher to orient himself toward the nature of the data as a whole.

In the second step of data analysis, *meaning units* were identified from transcripts of the data. In this step, all significant phrases were extracted from the text, and then those statements were examined for repetition of ideas and relevance to the phenomenon of interest (study of notes/delayed test performance). For example, one student stated, *"Sometimes it's hard to tell what I write."* When asked to further explain what he meant, he responded, *"I can write really fast, but sometimes… it's messy."* In another significant phrase, a different student (when asked to read part of his notes) referenced his handwriting, as well, saying uncomfortably, *"It's not usually this hard to read."* After identifying these significant statements, the primary researcher examined the students' notes. He confirmed that the former student's handwriting was, in fact, very difficult to read and that the latter student's handwriting was excruciatingly small. Given these and other significant statements and supporting evidence from the note documents, the researcher created a *meaning unit* labeled 'legibility of written notes.' Other preliminary *meaning units* included 'comprehensibility of notes' (including 9 statements addressing the clarity of pasted notes) and 'organization' (including 17 statements favoring the graphic organizer/chart).

The third step in the data analysis was the formation of *meaning clusters*. Comparing and examining the meaning units, the researcher identified relevant relationships across units. In this step, sorting the subordinate meaning units into superordinate clusters allowed for the emergence of possible explanatory themes. For example, the meaning units 'legibility of written notes,' 'incomplete propositions,' and 'misspellings' were clustered under the superordinate thematic label *study barriers*. The second superordinate meaning cluster identified was labeled *efficient external store*.

Following the identification of the two major themes, above, the researcher performed the fourth step of analysis: *comparison to original data*. The transcripts were revisited with the goal of comparing the meaning clusters (themes) to the raw data. The researcher sought to uncover inconsistencies between the themes generated in the analysis and the original statements made by the interviewees. Two major inconsistencies were identified, summarized, and then used in the final step of data analysis. In this final step, the researcher constructed a "composite summary" (Shank, 2006) of the qualitative data, which included the themes from steps one through three as well as the inconsistencies found in step 4. Then, in mixed-methods fashion, findings from the experimental phase of the present study were mixed with the composite summary to create an explanation of the learning effect found on the delayed tests, and relevant learning theory and empirical findings from previous research were incorporated into the qualitative and quantitative results.

Composite Summary, Quantitative-Qualitative Mixing, and Explanation of Effects

In the present study, some sets of notes were more efficient study aides than others. Although students in each experimental condition believed the graphic organization of the notes was beneficial, certain qualities of the text contained within the charts differed among sets of written notes and between written notes and pasted notes. Some students who produced written notes experienced barriers to study that were imposed by physical characteristics of their own handwriting. Other students wrote notes that included comprehension barriers such as gross misspellings and incomplete ideas. Although misspellings and incomplete ideas were not present in every cell of those students' note charts (indeed, not even in the majority of the cells), the quality of their notes suffered, nonetheless. Previous research has identified the barriers of legibility and comprehensibility in the writing of middle school (Graham, Harris, & Larsen, 2001) and college students with learning disabilities (Smith, 1993). Given these barriers, the learning differences resulting from the external storage phase (periods of note study) can be explained in terms of cognitive psychology. Illegible handwriting, gross misspellings, and incomplete ideas within certain students' notes forced those students to perform two tasks simultaneously during the study periods:
(1) learning the noted information while
(2) deciphering their notes. Deciphering the text in their notes likely required those students to allocate some of their limited, cognitive resources to a task unrelated to the acquisition of knowledge

(see Paas, Renkl, & Sweller, 2003; Sweller, van Merrienboer, & Paas, 1998). Thus, splitting their mental efforts between two tasks may have diminished the potential for those students to learn the information (Igo, Bruning, & McCrudden, 2005b), and their performances on the delayed tests suffered. Other students—especially those in the copy and paste notes group, but also many in the written notes group—created study aides that were more efficient. The clarity of those notes allowed students to focus their mental efforts more directly on one task—learning the ideas. In sum, (1) copied and pasted notes were, in general, clearer; (2) students with clearer notes were able to learn more while studying; and (3) students in the copy and paste condition recalled and recognized more facts on the two delayed tests than students in the writing condition.

Implications for Teaching and Learning

The major findings of the present study are that when middle school students with learning problems take notes from the Internet, those who copy and paste notes tend to create more effective study aides than many of those who write notes. One explanation for this phenomenon is that many of these students may be inexperienced note takers, and they have not yet learned how to generate written notes in clear and succinct ways. A more specific explanation backed by the present study is that fundamental flaws in the students' note-writing behavior impede the creation of effective study aides.

Whatever explanation one chooses for the flaws in these students' written notes, both the present study and previous research (Igo et al., 2006) suggest that this population of students might profitably copy and paste notes while gathering information from the Internet. Several reasons now support this suggestion. First, the previous research showed that MSSLD were anxious and stressed while typing notes, but less so while pasting them. Such anxiety can negatively affect student motivation (Barlow, 2000). Second, both the present and previous research indicated that this population of students learn little during the encoding phase (creation of notes), which makes the study of notes critical to learning. Third, the present showed that some students created written notes with flaws that were barriers to the effective study of notes. And finally, students in the present study learned more when they copied and pasted notes and then studied those notes.

If this population is to copy and paste notes from the Internet, however, they might benefit further from instruction in *how* to paste effectively. For example, in a study by Igo and colleagues (2005a), college students were able to learn more from Web-based text when they were prompted to paste more selectively (i.e., when they literally chose their words wisely and economically). Lessons designed to teach students how to evaluate which ideas to include in their notes could have positive consequences for both the encoding and the external storage phases of note learning.

Future Research

This study focused on the benefits of copy and paste note taking for middle school students with learning problems. However, because older students might experience many of the same learning challenges stemming from note taking, more research addressing how high school and college students with learning problems gather and then study information from the Internet is warranted. Also, future research might address the impact of certain instructions on *how students use* copy and paste to gather notes. In the present study, the cued chart guided students' note-taking behavior, but instructions prompting students to paste main ideas, supporting statements, or other specific pieces of text might prove beneficial to learning. Finally, research could address how copied and pasted notes could be gathered and then transformed. That is, students initially could be guided to paste the appropriate information into their notes, but then lessons addressing how to appropriately paraphrase ideas they pasted could help them learn to process the gathered text ideas more deeply as they study.

Limitations

Aspects of the current research limit the extent of our findings. During the experimental phase of inquiry, for example, students were prompted to study their notes, but they were not shown *how* to study their notes. Similarly, no observations were made of student study behaviors. Although student interviews provided important insights into their study behavior, direct observations of the students studying—or possibly think-alouds gathered as they study—could yield rich, additional data.

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