Differences in the note-taking skills of students with high achievement, average achievement, and learning disabilities

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A B S T R A C T

Students with learning disabilities (LD) experience problems recording notes from lectures, yet, lectures serve as one of the major avenues of learning content in secondary classes. Despite the importance of note-taking skills for students with LD, few if any studies have examined the differences in note-taking between students with LD and students with high and average achievement. In this study, the note-taking skills of middle school students with LD were compared to peers with average and high achievement. The results indicate differences in the number and type of notes recorded between students with LD and their peers and differences in test performance of lecture content.

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1. Introduction

Note-taking is a critical skill for students in middle and high school, and eventually becomes the primary means of learning content in post-secondary settings, such as colleges and universities (Buttrill, Nizawaw, Biemer, Takahashi, & Hearn, 1989). Approximately one-third to one-half of the time students spend in general education or inclusive content classes is spent on teacher-led lectures with note-taking (Johnson, 2008; Moin, Magiera, & Zigmond, 2009; Putnam, Deshler, & Schumaker, 1993). During lectures, teachers also expect students to discern important from unimportant information, record notes in sync with the lecture, and use notes as a method of learning content (Badger, White, Sutherland, & Biemer, Takahashi, 1989). It is as a generative activity (Stefanou, Hoffman, & Vielee, 2008), whereby students continuously encode and update their existing knowledge on a topic (Armbruster, 2000). In addition, according to Kobayashi (2005), among younger and less skilled students, recording notes serves as a scaffold to assist them with processing content that is presented in lectures. In turn, the more efficient processing of lecture information leads to subsequent gains on recall and comprehension measures.

These tasks require students to utilize metacognitive and executive skills, including, but are not limited to: metacognitive and strategy use, regulation of attention, and memory mechanisms, such as working memory (Anderson, 2002; Eslinger, 1996). From this perspective, executive processes are primarily responsible for directing and regulating attention during learning tasks. Once directed, students utilize metacognitive monitoring and regulation to select, monitor, and evaluate strategy use during note-taking. Students with good metacognitive self-regulatory skills tend to change their strategies based upon their success or failure on the task.

Studies have indicated that certain aspects of lectures better facilitate the use of these skills. Cued lecture points, or pieces of information that are highlighted through organizational or emphasis verbal cues, alert students to key lecture content. Emphasis cues have a verbal cue to stress its importance (e.g., “Please write this in your notes: A plasma engine uses only one tenth of the fuel that a chemical rocket engine would use.”). Organizational cues help organize chunks of related information (e.g., “There are three kinds of plasma engine rockets: Ion drive, Hall thruster, and MPD thruster.”). Conversely, non-cued lecture points are pieces of information that did not have a prompt or cue before their presentation. Titsworth (2001) and Titsworth and Kiewra (2004)
revealed that college students who recorded more organizational cued lecture points in their notes demonstrated superior performance on comprehension measures. Recorded lecture points also aids later retrieval of information. Einstein, Morris, and Smith (1985) found information recorded in notes also aided retrieval of lecture information, with college students remembering 40% of the lecture points found in their notes and only 7% of the lecture points that were not in their notes. Finally, vocabulary knowledge positively influences both language and broader academic achievement (Beck, McKeown, & Kucan, 2002; Marzano, 2003), where it has demonstrated clear links to comprehension, fluency, and achievement (Ehri & Rosenthal, 2007). Despite the importance of vocabulary during science lectures (Flowerdew, 1992), there is little evidence about the role that vocabulary plays in note-taking and lecture comprehension.

Efficiency of notes recorded has been suggested as an indicator of performance good note-taking skill. Howe (1970) reported that efficient notes have the maximum number of lecture points recorded using the minimum number of words and found that college students recorded an average of 32.11 words and 10.88 lecture points per lecture, resulting in an average lecture point being 3.02 words in length. Furthermore, Howe (1970) reported that note-taking efficiency was moderately positively correlated with recall (i.e., .53). Conversely, Kiewra (1984) demonstrated that among college students, the note-taking efficiency was inversely related to performance (r = −.38); students who recorded short, terse notes performed poorly on measures of lecture comprehension. Of interest in the current study is the question of whether the length of lecture points varies among middle school students who perform at different achievement levels.

Recording notes is a cognitively demanding task that requires students to recognize and utilize strategies. Students without disabilities report strategy use with varying effectiveness, where recording main ideas is more effective than writing every word from a lecture down (Sutherland, Badger, & White, 2002). In fact, when students use typical note-taking skills, studies have shown that they generally record less than 45% of the information from a lecture, even among high achieving college students (Kiewra, Benton, Kim, Risch, & Christensen, 1995; Kiewra et al., 1991). For example, Einstein et al. (1985) examined the difference in ability between successful and less successful college students, based on GPA derived from introductory courses to learn and record notes during a lecture. These researchers reported that successful students recorded more notes and recalled more information than less successful college students; however, these successful college students only recorded between 25 and 33% of the total ideas presented in the lecture. Notwithstanding, this study did illustrate that successful college students differ from less successful students in terms of the organization and structure of lecture information found in their notes. No studies have examined differences between high achievers and other groups of students (e.g., students with average achievement or LD) among the middle school population in terms of notes recorded during lectures and subsequent test performance on lecture content.

Unfortunately, students with disabilities have difficulties naturally deploying and using strategies during learning tasks (Evers & Spencer, 2007). Mortimore and Crozier (2006) found that college students with disabilities have reported numerous problems at recording notes during lectures; a large percentage of them report problems with note-taking in secondary (59%) and postsecondary settings (78%). Furthermore, Suritsky (1992) found that college students with LD had self-reported difficulties in: writing fast enough to keep up with the pace of the lecture, paying attention during the lecture, making sense out of their notes after class (i.e., notes were not legible), and deciding what was important to record during the lecture.

Many of these note-taking difficulties often result in notes with either partial or incomplete lecture points. Among college students, Hughes and Suritsky (1994) revealed that students with disabilities recorded fewer total lecture points (36% for students with LD versus 56% for students without LD) and fewer cued lecture points (46% for students with LD versus 77% for students without disabilities). Likewise, Boyle (2010) found that both general education middle school students recorded fewer notes during lectures (i.e., 25%), with middle school students with LD performing much worse, recording only about 13% of the total lecture points (Boyle, 2010). Similarly, this study also reported that students with LD only recorded 18% of cued lecture points compared to their peers without disabilities who recorded 42%.

Overall, note-taking has clear advantages to increase students’ learning. Students who can record quality notes demonstrate increased comprehension of material and later recall of information. However, it requires higher cognitive abilities, such as utilizing metacognitive and executive skill to continually update new information. Students with disabilities are at a clear disadvantage to utilizing these skills and demonstrate poorer performance. Furthermore, there is limited research on the note-taking performance of middle school students with LD to peers without disabilities (Boyle, 2010). As such, there are a number of unanswered questions about the nature and quality of secondary students’ notes when examined from different achievement levels.

This study, therefore, seeks to address the following questions: First, how do middle school students with LD perform on cued lecture points and total lecture points compared to average and high achieving students? Second, how do these students compare on the average length of total lecture points and cued lecture points that are recorded in their notes? Third, how do middle school students with LD perform on the amount of key vocabulary words found in their notes compared to average and high achieving students? Fourth, what is the relationship between information (e.g., vocabulary, cued lecture points, total lecture points, and total words) recorded in notes and performance on a test without the benefit of studying?

2. Method

2.1. Participants

After University level Institutional Review Board (IRB) approval, recruitment of participants was drawn from several science inclusive classes in an urban middle school of approximately 900 students, located near a large metropolitan city in the Mid-Atlantic region of the country. The principal from the target school was contacted and agreed to allow research to take place in his school. The primary investigator worked with the school’s science curriculum director to solicit interest among the school’s science teachers. Science teachers were then provided with parental consent and student assent forms that were sent home with students. After two weeks, only students who returned both signed forms were permitted to participate in the study.

Figures in Table 1 reports a breakdown of various dimensions by group. Ninety-three middle school students in sixth, seventh, or eighth grade participated in this study. This sample reflects the actual student

<table>
<thead>
<tr>
<th>Grade</th>
<th>LD</th>
</tr>
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<tbody>
<tr>
<td>Sixth</td>
<td>13</td>
</tr>
<tr>
<td>Seventh</td>
<td>11</td>
</tr>
<tr>
<td>Eighth</td>
<td>7</td>
</tr>
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</table>
population which is: 61% African American, 26% European American, 10% Hispanic American, and 1% Asian American.

To determine rank (e.g., AA or HA), teachers were asked to examine students’ grades in science and then provide a ranking of HA or AA. Students who earned an 80% or higher or were in honors science classes (i.e., where students had to maintain at least an 80% grade average) were given a rank of HA. Students who earned a C grade or lower were given a rank of AA. No IQ scores were obtained for HA or AA groups. Differentiating students by course grade was similar to the procedure used in past note-taking research among college students (e.g., Einstein et al., 1985). In addition, cognitive abilities have been shown to correlate moderately to high with academic achievement measures, such as math and science grades (Deary, Strand, Smith, & Fernandes, 2006; Furnham & Monsen, 2009).

Students with LD were identified through school and state identification procedures that used a severe discrepancy method, whereby students had to exhibit a severe discrepancy between achievement and intelligence test scores. When all three groups were examined in terms of average grades (i.e., scores), students in the HA group had an average science course grade score of 90.44% (SD = 5.91), students in the AA group had an average course score of 82.10% (SD = 6.00) and students with LD had an average course score of 75.05% (SD = 11.11). These findings mirror results from other studies. For example, Deshler et al. (2004) examined the grades of secondary students with and without disabilities who were in content-area courses and found that 51.3% of students with disabilities earned D or F grades, while 44% of students with disabilities earned C grades in their content-area classes. This represents approximately 95% of students with disabilities in their sample who earned either C, D, or F grades.

Although the sample chosen to participate in the study was a convenience sample, Pearson’s chi-square analyses were conducted between groups on demographic variables and found no significant differences related to gender or grade level. Results indicated no statistical significant differences between the three groups (i.e., high achievers, average achievers, and LD) related to gender \( \chi^2(2, N = 93) = 3.49, p = .18 \) or grade level \( \chi^2(4, N = 93) = .15, p = .99 \). Due to low cell sizes, chi-square analysis of ethnicity among the groups was not possible.

### 2.2. Materials

A videotaped lecture was used in this study and has been used in several other studies (Einstein et al., 1985; Hughes & Suritsky, 1994; Ward-Lonergan, Lilies, & Anderson, 1998, 1999), proving advantageous in the ability to present the same content to multiple groups of students while controlling for extraneous variables (e.g., pauses, feedback) that might have occurred. The topic was drawn from a Scientific American article titled: “New Dawn for Electric Rockets” and resulted in a videotaped lecture that was 19 min in length and was presented at an average rate of 109 words per minute (WPM). This WPM rate falls within the range of WPM rates that have been used in past research, with 75 WPM (Bretzing, Kulhavy, & Caterino, 1987) and 122 WPM (Titworth, 2004). In all, the lecture contained a total of 78 total lecture points, with 13 cued lecture points and 65 non-cued lecture points (i.e., details without a verbal cue). Finally, 19 key vocabulary words (e.g., asteroids, delta-v) were identified as being essential to understanding the lecture content.

### 2.3. Procedures

Prior to the experimental session, students were asked to complete a three-minute writing task to assess any writing fluency differences between the three groups. It is similar to tasks used in other studies (Boyle & Weishaar, 2001; Ganse, Noell, VanDerHeyden, Naquin, & Slider, 2002; Hughes & Suritsky, 1994). Writing fluency was chosen due to claims that fluent handwriting, writing speed is a key determinant of efficient note-taking (Peverly, 2006). During this three-minute writing task, students were asked to write their first name continuously until told to stop. Student’s performance was assessed by counting the number of letters written per minute. An analysis of variance (ANOVA) revealed no significant differences between the three groups (i.e., HA, AA, LD).

During the 40–45 minute experimental session, students watched the videotaped lecture while recording notes, and then took a 10-point quiz. In each classroom at the start of the session, students were asked to watch and listen carefully to a 19-minute videotaped lecture entitled Electric Plasma Rockets and Vesta and Ceres and record as many notes as they could throughout the lecture. All students were supplied with three sheets of lined paper and were asked to write their name and date on each page. Immediately following the lecture, students’ notes were collected and asked to take a 10-question test. The test was distributed to students and when they completed it, they were asked to remain quiet until the session ended. The test was then collected and scored.

### 2.4. Measures

In this study, undergraduate and graduate level students scored students’ notes across five variables: cued lecture points (CLP), total lecture points (TLP), total words (TW), vocabulary (VOC) and test score (TS). Using previous studies (Brown, 2005; Hughes & Suritsky, 1994; Risch & Kiewra, 1990), a lecture point found in students’ notes was defined as a complete idea or block of information, such as a sentence, sentence clause, or phrase from the lecture. TLP represented the raw overall lecture (both cued and non-cued) points that were recorded by the student. CLP represented the number of cued lecture points verbalized during the lecture (e.g., “This is important to remember;” “There are three types of plasma engines”) that the student recorded; Non-cued lecture points (NCLPs) were the score of details that were not preceded by a cue. VOC represents the raw number of instances the student wrote down one of the vocabulary words within the lecture.

An answer key highlighting CLP in yellow was provided to facilitate the scoring of these types of lecture points. Along with this, the total number of words used for all CLP was counted to determine the average number of words of each CLP. VOC was calculated by number of 19 vocabulary word instances that were found in the lecture. Students were awarded one point per vocabulary word; no additional points were provided for repetitions. Students’ notes were also counted for the total number of words (TW). This final count determined the average length of each lecture point written in notes. Finally, 10-point multiple-choice test score assesses student comprehension. The test was developed from the content from the lecture, “Electric Plasma Rockets and Vesta and Ceres” and has been used in other studies (Boyle, 2010, 2013). Students’ TS was used to assess how performance would vary between the groups and to see which factors (i.e., CLP, VOC, TLP and TW) were correlated to student performance on the test. It is interesting to note that students’ TS were found to be significantly, positively correlated \( r = .71, p < .01 \) with student rank (e.g., AA, HA, & LD).

### 2.5. Interobserver agreement

An independent rater scored all notes and the test. All of the students’ notes were also rescored by a second graduate-level student rater in the same manner as the first rater. Inter-rater reliability was calculated to be .98 for TW, .97 for CLP, .95 for TLP, .97 for VOC, and .99 for TS. Finally, the content of the quiz was confirmed by the second rater when this rater located and found the content pertaining to all of the questions and correct answers (i.e., 100%) in the lecture notes of the presenter from the script of the videotaped lecture.
2.6. Experimental design and data analysis

Multivariate analysis of variance (MANOVA) was used for the analyses and probability values were set with α at .05, unless otherwise noted. Further, when a significant overall pairwise MANOVA result is found, Tukey procedures were used to determine which individual variables are contributing to each pairwise significant result. Using these procedures, students in each group were compared to one another in this analysis using CLP, TLP, TW, VOC, and TS, with a second MANOVA conducted using: words per lecture point (WPLP), words per cued lecture point (WPCLP), and vocabulary per lecture point (VPLP). Finally, five variables (CLP, TLP, TW, VOC, and rank) were compared to the test score (TS) to examine the correlation between the variables. Rank (e.g., HA, AA, & LD) was also used to examine the relationship between the test and teachers’ ranking by grades using Pearson r.

3. Results

Using the variables TS, TLP, VOC, CLP, and TW in the analysis yielded statistical significance with Wilks’ Λ = .37, F(10, 172) = 11.00, p < .001, η² = .39. Subsequent pairwise univariate tests indicated that there were significant effects between the three groups on all of the variables: TS, F(2, 90) = 53.23, p < .001, η² = .54; TLP, F(2, 90) = 23.17, p < .001, η² = .34; VOC, F(2, 90) = 21.34, p < .001, η² = .32; CLP, F(2, 90) = 25.66, p < .001, η² = .36; and TW, F(2, 90) = 21.53, p < .001, η² = .32. See Table 2 for mean scores per group. Tukey HSD tests indicated significant differences (p < .05) between all of the groups on the TS, with students with HA performing better on the test than students with AA and LD. Likewise, students with AA outperformed students with LD on TS. Tukey HSD tests also found significant differences (p < .05) between all of the groups on the TLP, with students with HA recording more TLP in notes than students with AA and students with LD. Similarly, students with AA outperformed students with LD on TLP. Tukey HSD tests also indicated significant differences (p < .05) between all of the groups on the VOC, with students with HA recording more vocabulary in notes than students with AA and students with LD. In a similar vein, students with AA outperformed students with LD on VOC. Tukey HSD tests also indicated significant differences (p < .05) between all of the groups on the TW, with students with HA recording more words in notes than students with AA and students with LD. Also, students with AA outperformed students with LD on the number of words recorded in notes. Finally, Tukey HSD tests also indicated significant differences (p < .05) between students with HA recording more CLP in notes than students with AA and students with LD; however, there was no significant difference between students with AA and student with LD on the number of CLP recorded in notes.

Using the variables words per lecture points (WPLP), words per cued lecture point (WPCLP), and vocabulary per lecture point (VPLP) in the analysis, yielded significant differences Λ = .86, F(6, 176) = 2.37, p < .05, η² = .08. However, pairwise univariate tests revealed no significant differences on the three variables between the different groups of students.

Correlations were computed to examine the relationships between students’ notes and test scores. All of the variables were significant at the .01 level. As shown in Table 3, all four variables had a positive moderate correlation with students’ test scores, with vocabulary exhibiting the strongest correlation.

4. Discussion

The current study extends note-taking research among both general education and special education populations in several important ways. First, it demonstrated that middle school students demonstrate significant differences between the number of TLP recorded and CLP recorded according to achievement level; that is, high achieving middle school students recorded more important lecture points than other middle school students. This finding extends Einstein et al. (1985) study of differing achievement level among college students relation to lecture points to the middle school population.

Second, this study confirms results from the Boyle (2010) study that found significant differences between students with and without LD. Interestingly, there were significant differences between the CLP of students with HA and the other two groups (students with AA and LD) but no significant differences between students with AA and LD. In terms of the percentage of CLP recorded in notes, students with HA recorded an average of 52% of the total CLP, and students with AA recorded an average of 27% of CLP in notes, and students with LD recorded only 15% of CLP in notes. From a statistical point of view, this data indicates that both groups (i.e., students with AA and LD) had a difficult time discerning important from less important lecture content or recording the important information in their notes. This is supported by past research indicating that selecting important from less important lecture content is a problematic area for college students with LD (Hughes & Suritsky, 1994; Suritsky, 1992).

Third, the current study extends previous note-taking research by being the first to examine the role of vocabulary in note-taking. While research demonstrates vocabulary’s importance in other areas (e.g., Pearson, Hiebert, & Kamil, 2007), no research studies have examined the impact of vocabulary in students’ lecture notes. In this study, students with HA recorded on average 71% of the 19 key vocabulary words from the lecture, while students with AA recorded an average 46% and students with LD recorded an average 28% of key vocabulary in notes. Furthermore, the results show that vocabulary had the highest correlation (e.g., .62) with test scores.

Fourth, the results of the current study provides support for the note-taking difficulties experienced by students with LD. Students with LD recorded fewer words and TLPs than HA students. The lack of significant difference between groups on the three-minute writing task suggests that note-taking efficiency is less closely related to writing fluency, alone, and may be more related to higher cognitive skills, such as listening and cognitive processing skills. These findings support Suritsky’s (1992) hypothesis that students with LD reported having difficulty writing fast enough when recording notes during lectures because when combined with higher cognitive processing of information, low level writing fluency task transforms into a higher cognitive load task.

Table 2

<table>
<thead>
<tr>
<th>Groups</th>
<th>High ach. (N = 31)</th>
<th>Avg. ach. (N = 32)</th>
<th>LD (N = 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Test score</td>
<td>75.48* (15.02)</td>
<td>45.94* (11.60)</td>
<td>36.33* (19.21)</td>
</tr>
<tr>
<td>Cued lecture points</td>
<td>6.77* (3.14)</td>
<td>3.53* (2.68)</td>
<td>1.97* (2.11)</td>
</tr>
<tr>
<td>Total lecture points</td>
<td>21.52* (9.80)</td>
<td>13.03* (7.67)</td>
<td>7.93* (5.54)</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>13.48* (6.31)</td>
<td>8.75* (4.66)</td>
<td>5.27* (3.34)</td>
</tr>
<tr>
<td>Total words</td>
<td>130.48* (54.48)</td>
<td>85.75* (60.40)</td>
<td>44.97* (32.82)</td>
</tr>
</tbody>
</table>

* Significant at .05 level

Table 3

<table>
<thead>
<tr>
<th>Test</th>
<th>Pearson's r</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLP &amp; TS</td>
<td>.56*</td>
</tr>
<tr>
<td>TLP &amp; TS</td>
<td>.52*</td>
</tr>
<tr>
<td>VOC &amp; TS</td>
<td>.62*</td>
</tr>
<tr>
<td>TW &amp; TS</td>
<td>.50*</td>
</tr>
</tbody>
</table>

* Significant at .05 level
Fifth, among the three groups, this study found no significant differences in the average number of words per lecture point, the average number of words per cued lecture point, or the average number of vocabulary words per lecture point. At first, this finding was surprising because it was anticipated that there would be differences between groups in terms of the number of words recorded per lecture point. However, upon further examination, the average number of words per lecture point may not be a reliable measure because even though some students record fewer lecture points (e.g., 6 TLP) and few words (e.g., 30 TW), other students may record more lecture points (e.g., 20 TLP) and more words (e.g., 100 TW), yielding the same result (e.g., 5 words per lecture point). In this study, the results of students in different groups were similar. This may suggest that other processes, such as semantic clustering of information, influence note-taking efficiency during learning of verbal information (Bruce & Echemendia, 2003). That is, the number of words recorded is not as important as the semantic relationships between those words.

In summary, there are considerable differences between the notes of students with different ability levels. While the present study found no differences between the average number of words per lecture point, there were distinct differences in the total number of lecture points, cued lecture points, and vocabulary recorded by students. These differences support the notion that the more notes that students can record, particularly cued lecture points and vocabulary words, the better they should perform on comprehension measures of the lecture. Moreover, the present study supplements prior studies on the note-taking of students with disabilities and provides support for the fact that note-taking is a challenging cognitive task for students with LD, as evidenced by differences in notes produced.

4.1. Educational implications

This study suggests that note-taking efficiency is more accessible to higher achieving students than average students or students with disabilities. This may indicate a need to explicitly teach these latter two groups of students note-taking strategy or provide students with compensatory supports to scaffold this activity. Past studies have demonstrated that explicit teaching of note-taking skills has improved the quality and quantity of notes (Boyle, 2010, 2013). Therefore, teachers should consider embedding note-taking skills within the curriculum (Evans, Pelham, & Grudberg, 1995). For example, when teachers present cued lecture points, they should also tell students to highlight or star that content, and since it is deemed important by the teacher, they should also explain why that particular lecture content is important. In this way, students can begin to learn that certain lecture points are more important than others and can begin to understand why certain lecture content is essential to record in notes and learn. Moreover, teachers themselves should have a set of model notes that students could compare to their own notes in order to see the differences between expert notes versus their own notes. In this way, students can begin to learn what good notes look like.

For students with that more difficulty engaging in higher cognitive tasks (i.e., students with LD), concrete tools should be provided to students to facilitate note-taking. In one study by Boyle (2010, 2013), a note-taking mnemonic (CUES+) and note-taking paper were provided to students with disabilities. In addition, students with motor or writing difficulties may still benefit from remaining active during note-taking activity with the support of a scribe to record class notes or a set of teacher’s notes.

4.2. Limitations of the research and future directions

There were several limitations to this study. First, this study examined students from one urban school. The results may have been different had the sample been derived from several schools or a different school. Second, the sampling method used in this study represents a convenience sample (Keppel, 1991) and caution should be exercised when generalizing the sample to larger populations. Third, the lack of a clear definition or breakdown of the LD group (e.g., reading disability, math disability) does not allow a consideration for heterogeneity of presentation of LD. Further, it is hard to ascertain if poor note-taking in this sample is due to a students’ learning disability or other possible emotional factors, such as motivation. Since both the LD and AA groups both improved after the implementation of the intervention, it may be an overall lack of motivation and not a processing difficulty. This should be investigated in future studies. Fourth, another limitation was the use of only one lecture. It is possible that a different lecture would have led to different results. Fifth, the use of a videotaped lecture itself may have been a limitation. Although videotaped and audiotaped lectures have been used in past research (Hughes & Suritsky, 1994; Tisworth & Kiewra, 2004), it is possible that live lectures may have led to different results due to it being more interactive for students.

Future research should examine the relationship between immediate and delayed effects of note-taking, similar to work by Tisworth (2001). Additionally, future studies should seek to discern listening skills from note-taking skills. First, since most students are assessed a few days or weeks after notes were taken in a typical classroom, a more realistic assessment of the effects of note-taking would be to assess students using a delayed test. It would be interesting to examine the effects on note-taking among students with and without disabilities to see how the delay affects these different groups of students. This measure might also be used to assess the broader effects of the process of note-taking/studying, since students often record notes to not only learn during lectures, but also use the same notes to prepare to tests and quizzes. Second, researchers should examine the effects of note-taking over multiple lectures, again to assess the effects of notes in more realistic situations and to examine the cumulative effect of notes over time. Another area that should be examined is the effects of student note-taking with different content-area lecture activities, particularly in content areas that are often overlooked in note-taking research, such as math. Future research should examine the effects of listening skills compared to note-taking skills of students with and without disabilities to better understand the role that these skills play in student learning during note-taking. Furthermore, the impact of technology on note-taking skills should be investigated.

In conclusion, as students move from elementary grades to secondary grades, classroom lectures with note-taking become more common and teachers rely upon students to have good note-taking skills to learn content (Fulp, 2002a, 2002b). Furthermore, these skills become necessary as students transition to post-secondary settings, such as colleges and universities. Because of the importance of developing these skills in students, particularly for students with disabilities, content area teachers should examine students’ notes for missing components and then teach note-taking skills through their lectures, helping students to understand the purpose and usefulness of note-taking skills for learning content.

References


