

**IMPACT OF GUIDED NOTES ON ACHIEVEMENT IN K-12 AND SPECIAL EDUCATION STUDENTS****Karen H. Larwin****Daniel Dawson***Youngstown State University***Matthew Erickson***Slippery Rock University***David A. Larwin***Kent State University Salem*

*The common practice of using of guided notes in the K-12 and special education classroom is not fully appreciated or understood. In an effort to add to the existing research about this phenomenon, the current investigation expands on previously published research and one previously published meta-analysis that examined the impact of guided notes on K-12 and special education student achievement. Specifically, this study examines the different variables that moderate the effect of using guided notes in the classroom, the impact of guided notes relative to student generated notes, random study checks, and peer tutoring. And, unlike the one previous meta-analysis examining the impact of guided notes with this student population, this investigation includes both published and unpublished research, and some previously unexamined variables. Results indicate that overall, guided notes can produce a strong impact on student achievement. The study discusses the implications and limitations of this research.*

The concept of student engagement has received considerable attention in the last two decades in response to declines in academic achievement and student motivation (Fredricks, Blumenfeld & Paris, 2004). Engaged students can be described as students who are actively participating in their learning experience (Bomia, et al., 1997). Astin's (1984) Theory of Student Involvement suggests that students who are actively engaged in the learning process experience greater learning, more personal growth, increased satisfaction and higher retention rates.

*Federal legislation mandates that all students with disabilities have meaningful access to the general education curriculum and that students with and without disabilities be held equally accountable to the same academic standards (No Child Left Behind Act of 2001: Elementary and Secondary Education). With greater emphasis on standardized test scores in hopes to make adequate yearly progress according to No Child Left Behind legislation, high stakes testing fuels the inclusion of special needs students into the general education setting.*

*The right to a free, appropriate public education (FAPE) and an education in the least restrictive environment (LRE) are two of six guiding principles of the Individuals with Disabilities Education Act (IDEA) that drive special education practice. Implicit in these principles is the right of all students with disabilities, regardless of their severity, to have an opportunity for meaningful access to the general education curriculum (Wood, 2005, p.7).*

To provide students with disabilities the appropriate accommodations and modifications to the general education curriculum, teachers strive to find resources and supports to help these students be successful. A review of the existing literature reveals that *many students with disabilities perform poorly in academic content courses, especially at the middle and secondary school levels. Previous research has*

*reported increased note taking accuracy and quiz scores over lecture content when students completed guided notes compared to taking their own notes (Wood, p.7).*

*Teachers, particularly at the secondary level, use lecture formats to deliver instruction (Hawkins, Brady, Hamilton, Williams, & Taylor, 1994, p. 4). Although some students have the ability to acquire and synthesize important information obtained from lectures, others struggle with this and need additional support. Typically, the needed support involves strategies to promote active student engagement rather than passive listening. Since many special education students are passive learners, success and achievement often depend on the teacher's ability to facilitate interaction and active learning to meet the needs of a diverse student population (Stringfellow & Miller, 2005, p.2).*

Wood's study (2005) found that the mean note taking accuracy of middle school special education students was 75% when taking notes on their own for twelve science terms and definitions. When using their own notes, and incorporating random study checks where students used write-on response cards to answer two teacher-posted questions over randomly selected vocabulary terms from the previous day's lecture, the mean accuracy increased to 89%. When students were given guided notes study cards, as well as the random study checks, the mean accuracy score increased to 99.5%. Results for five of the seven students provided convincing evidence of functional relationships between middle school special education students taking their own notes plus the random study checks and higher quiz scores compared to taking their own notes and between guided notes and random study checks and higher quiz scores compared to taking their own notes and random study checks (Wood).

Guided notes offer cues to students and are prepared by the teacher ahead of time. Stringfellow and Miller (2005) explain that guided notes consist of lesson outlines that provide main ideas and blank spaces for students to write in definitions, key concepts, and additional information. They may include questions that will be answered during lecture time. Considering the individualized plans required by the Individuals with Disabilities Education Act, guided notes can be individualized depending on each student's ability level by providing more or less content or spaces for students. Blackwell and McLaughlin (2005) consider the benefits of guided notes for students with motor deficits who may require more supplied information to reduce writing, or simpler terms may be used for students with developmental delays. Also, one could employ streaming video and have guided notes available on a student's computer so they could watch and take notes at the same time. *Guided notes are typically two or three pages in length, and the teacher often simultaneously uses transparencies that contain the main points listed in the guided notes (Boyle, 2001, p.4).* Heward (1994) explains that guides are provided to students as handouts, electronically, or as PowerPoint slides (p.304).

Boon, Cecil, & Saleem (2007) examined the attitudes and perceptions toward the use of technology-based instruction (i.e., Inspiration 6.0 software) and a guided notes format as an instructional strategy in inclusive world history classrooms. Students completed a six item three choice student satisfaction survey (agree, undecided, disagree) related to the use of the Inspiration software, as a graphic organizing tool, and guided notes instruction to increase content-area learning of the world history information. Results revealed that both students with (75%) and without (79%) disabilities were positive about the use of the software and the guided notes format stating that the graphic organizer was easy to read, understand. They concluded that these results had the potential to increase content learning across the curriculum in classes such as Chemistry, Biology, Foreign Language, and English as a second language classes (ESL) classes (Boon, et al.).

Lazarus (1991) examined the impact of guided notes with six students with Learning Disabilities. All of the students improved over baseline levels, and students' scores on the chapter tests were nearly equivalent to nondisabled, peer scores (p.4). Similar results were obtained in another study conducted by Lazarus (1991), in which students were taught to use guided notes while listening to tape recorded lectures. The students who used the guided notes performed better on class tests when guided notes were used as compared to conventional note-taking methods. Similarly, Stringfellow and Miller (2005) state that a later study (Lazarus, 1993) found that the use of guided notes with and without review were both effective when teaching students with learning disabilities and behavior disorders history in general education classes.

Finally, in a study involving twenty-six high school students with high incidence disabilities (Learning Disabilities or Emotional/Behavioral Disorders), strategic note taking was found to be effective (Boyle & Weishaar, 2001). In this study, guided notes in the form of written cues to promote the use of meta-

cognitive skills were provided to help students identify lecture topics, link topic to prior learning, summarize, and reflect on key points throughout the lecture. This study revealed that students in the experimental group who were taught strategic note taking scored significantly higher than students in the control group on measures of immediate free recall, long-term free recall, comprehension, and number of notes recorded (Boyle & Weishaar).

Several studies support the use of guided notes with high school students who have Learning Disabilities. In one study, Hamilton, Seibert, Gardner, & Talbert-Johnson (2000, as cited by Stringfellow et al., 2005), tested the hypothesis that providing guided notes to supplement lecture instruction would have an effect on student performance. Seven students ages 13 to 18 years and identified with a Learning Disability were given instruction in a class for incarcerated juveniles. The instruction was provided using a lecture format and guided notes. Student performance was judged on the accuracy of the note-taking and scores on a comprehension quiz. Six of the seven students improved their academic performance though the use of the guided notes (Stringfellow et al. 2005, p.4).

Multiple research studies have found that the quality of note-taking has been found to be related to increased student achievement (Hamilton, et al., 2000; Neff, McCord, & Ferreri, 2006; Peverly, et al., 2007; Williams & Eggert, 2002). Boyle (2001) concluded that teachers can improve note-taking skills of students with mild disabilities by either modifying their presentation during lectures or teaching students how to use note-taking techniques to students. Students with disabilities are often unable to identify the important information to note; are unable to write fast enough to keep up with the lecturer; and, even when they do record notes, are frequently unable to make sense of their notes after the lecture, mostly because their notes are illegible. Boyle states that difficulties with note-taking presents a major problem for students' success in the general education classroom, especially in content area classes, where instructors often use their notes to develop tests, which in turn serves as the basis for grades.

However, not all of the research on the use of guided notes has presented equally positive results. Mastropieri, Scruggs, Spencer, and Fontana (2003) conducted a study with sixteen high school students with mild disabilities, (fifteen of whom had learning disabilities) who participated in a nine-week quarter of the two instructional conditions. One condition used guided notes with the other conducting peer tutoring with the same special education teachers provided instruction for a World History class. The measurements for the study included a pre and posttests for reading fluency, comprehension strategies, and content tests. Qualitative procedures were also employed, including interviews of teachers and students regarding their instructional preferences. The study's findings indicated that students who participated in peer tutoring significantly outperformed those who participated in the guided notes condition on content-area tests, however, the researchers found that students in both conditions demonstrated improvement.

Specifically, Mastropieri et al. (2003) found that students in the tutoring condition performed significantly better at using a reading comprehension summarization strategy independently, and at remembering the strategy steps. According to the interviews, students responded positively for both methods of preparation, but felt that the peer tutoring condition seemed to make time go by faster. Interview results indicated that students seemed more interested in collaborating with their peers than reading the text and completing the guided notes. Interview responses collected regarding the guided notes condition were brief and simply stated including responses such as, *make it short and simple, to put pictures in study guides and give multiple choice options, to make it harder*(p. 63).

Although guided notes have been found to have a positive effect in most studies, the impact of guided notes is not always found to be significant or positive, and much of the research examining the use of guided notes is based on very limited samples. This makes it very difficult to draw clear-cut conclusions about the impact of guided notes in K-12 education. A review of the existing literature reveals that only one study attempted to synthesize the existing research examining the impact of guided notes on K-12 student achievement (Konrad, Joseph, & Eveleigh, 2009). The Konrad et al. investigation of K-12 data was limited to five published studies; however these five studies revealed a relatively positive impact.

The current investigation will expand on the above mentioned Konrad et al. (2009) investigation by incorporating all available research (published and unpublished) examining the impact of guided notes on K-12 student achievement. Incorporation of both published and unpublished studies is necessary to avoid potential publication bias that can occur when performing a meta-analysis (Wolf, 1986). Publication bias occurs when studies that find significant results for an effect being investigated are more

likely to be published than studies that do not find significant findings. Publication bias has the potential of inflating the effect size estimates (Glass, McGaw, & Smith, 1981; Hedges, 1986; Hunter & Schmidt, 2004; Rosenthal, 1979), and therefore it is important that unpublished information be included when conducting a meta-analysis.

#### *Research Questions*

The present meta-analysis examines the following primary research questions:

1. What is the impact of the use of guided notes on student achievement grades K-12 compared to students who do not receive guided notes?
2. Does the impact of guided notes differ for student with special needs?
3. Does the impact of guided notes differ across the different grade levels (i.e., elementary school, middle school, high school).
4. Does the impact of guided notes differ depending on the intervention type (student notes vs. guided notes; random study checks vs. guided notes, tutoring vs. guided notes)?

The current investigation will also examine the following secondary research questions:

1. Does the impact of guided notes differ by the *publication* year of the study?
2. Does the level of impact of guided notes differ by the source of the study (dissertation or theses, journal article, presentation, internet posting, project report)?
3. Does the impact of guided notes differ by type of achievement measure used (final course grade, final exam, unit quiz, pre-post test change)?

#### **Methods**

Glass, et al. (1981) defines meta-analysis as the *analysis of analyses*. Glass et al. proposes the use of meta-analysis as a means for effectively aggregating any number of studies in the research literature. With this technique, the findings of a number of smaller research studies can be pulled together to enhance the overall sample size and statistical power. It is a method by which studies that might not otherwise be easily integrated can be compared and contrasted with each other. A meta-analysis of all of the existing research on the impact of guided-notes in K-12 student achievement would be an appropriate and effective approach to synthesizing and integrating the multiple studies examining guided-notes that are based on limited sample sizes and conflicting results. The current investigation seeks to conduct a meta-analysis to provide both a *general measure* of the impact of guided notes on student achievement and expand the *overall understanding* of the impact of guided notes on student achievement.

There are a number of recommended procedures for conducting a meta-analysis (e.g. Glass et al., 1981; Hedges, 1986; Hunter & Schmidt, 2004; Rosenthal, 1991; Wolf, 1986) which offer slight variations from one another but essentially share much in common. Glass et al. (1981) recommends the following steps for conducting a meta-analysis. First, studies should be gathered on the topic or phenomena of research. The studies which can be included in the meta-analysis must fit within the defined parameters for analysis, while representing as much of the population of data available on the research area. The research must be quantitative. Glass et al. maintain that a thorough search must be conducted of the subject area. This step of the meta-analysis can potentially introduce the *most serious form of bias* (p.57) into the meta-analysis, because it is difficult to evaluate the impact of the search bias. The more exhaustive the search, the more likely it is that search bias will be minimized.

The next step, according to Glass et al. (1981), is to describe, classify and code all the research studies to be included in the meta-analysis. In this step, measurement consistency is imperative. Glass et al. suggest that studies should be coded independently, so that inter-rater agreement can be established. The moderator variables that have been included for consideration must be clearly defined so that raters are able to make clear distinctions between the various classifications. For the purposes of this meta-analysis, a random sample of studies was coded at least twice, in order to establish the reliability of the coding procedures. Moderator variables have been tested for inter-rater reliability, and were found to be reliable classifications  $\kappa = .95$  of the time.

The final step in performing the meta-analysis, according to Glass et al. (1981), is the analysis of the overall mean effect size measures, and the mean effect size measures for each moderator being examined. Once the effect size measures have been calculated, interpretation and reporting of results follows.

### *Sample of Studies*

Studies included in this meta-analysis were obtained initially through an extensive electronic search. Various electronic data bases were searched over a six month period of time. These include Academic Search Complete, Digital Dissertations, Educational Resources Information Circuit (ERIC), EBSCO, Electronic Journal Center (EJC), JSTOR, GoogleScholar and PsychInfo. The search examined research spanning the years 1980-2011. The descriptive search criteria employed to identify related materials included such combinations as *guided notes*, *partial notes*, and *note guides*, as well as each of these criteria with the addition of *special education and K-12 students*. Similar to the Konrad, et al. (2009) meta-analysis, an article did not have to use the term *guided-notes* specifically, however the article was included only when the notes being used adhered to the definition by Heyward (1994, p. 304). Abstracts of articles were inspected, and those articles which did not appear to meet the initial inclusion criteria were discarded. The inclusion criteria were: (1) articles examining the use of guided notes with K-12 students, (2) research that includes a measure of academic performance, and (3) research focused on the use of guided notes in comparison to no guided notes, random study checks, or peer tutoring, and finally, (4) the research makes use of some form of experimental or quasi-experimental design.

The literature meeting the criteria that was electronically available was printed, and other sources were ordered through the Youngstown State University library system. Next, the *reference list* of each article was searched in an effort to find any additional pertinent studies. All obtained articles, dissertations, presentations, and project reports were reviewed, and those primary-level studies which included the participant population and treatment population of interest, as well as the necessary statistical information, were included in this meta-analysis. In all, more than thirty studies were identified by these methods, and examined for possible inclusion in this meta-analysis.

There were a few studies obtained through this search process that initially appeared as suitable candidates for inclusion, but careful inspection revealed that they did not meet the criteria discussed above. Many of the articles simply did not provide any usable data, and simply presented results qualitatively. For example, these articles may have simply been based on ABAB designs, and no raw data was provided. In order to include studies in a meta-analysis, data must be sufficiently reported so that an effect size can be calculated. If the necessary descriptive and inferential data were not provided, an attempt was made to contact the author of the study in an effort to acquire such information. Studies which failed to provide the necessary information, either in the original form or via supplemental data provided by the author were excluded from the meta-analysis. Once studies were examined, and studies were eliminated for insufficient data, total of 11 useable studies. From these eleven studies, thirty-seven independent effect sizes were calculated. These studies comprise a total of 412 participants.

### *Coding of Studies*

Each study was coded according to the following information:

- a) Type of student (special needs or not special needs),
- b) Grade level (elementary, middle school, or high school),
- c) Intervention type (guided notes vs. student generated notes, random study checks, tutoring),
- d) Publication year of study (by decade),
- e) Source of study (journal article, thesis, dissertation, conference presentation), and
- f) Achievement measure used (quiz, exams, GPA, accuracy)

The primary data and study characteristics are maintained in The Statistical Package for the Social Sciences, (SPSS 18). The analyses for this study were completed in Comprehensive Meta-Analysis, a dedicated meta-analysis software program.

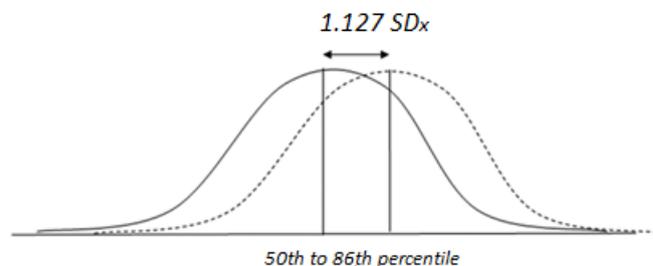
### *Analysis of Effect Sizes*

There are a number of different approaches to interpreting effect size measures (Glass, et al., 1981; Hedges, 1986; Wolf, 1986). For the purpose of this meta-analysis, studies with several independent effect sizes were calculated as several individual samples (Glass, et al., 1981, Kulik, 1983). This approach allows the researcher to integrate all of the available effect sizes in the meta-analysis, thus including as much information as possible in the final analysis. Effect size measures were calculated for each study. An overall mean effect size measure was calculated for the group of studies in the meta-analysis, and mean effect size measures were computed for each research category. Post hoc analyses were conducted in order to examine specifically where significant differences exist between the mean effect size measures for each level in each research category. Post hoc analyses were also conducted to determine if significant differences exist within each of the levels of the categories.

## Results

The purpose of this meta-analysis was to investigate the impact of guided notes on student achievement in the K-12 educational arena, including students who are classified as *special education*. The study also examined a number of variables that could potentially impact or moderate this relationship. This meta-analysis included a number of studies identified by a computerized literature search across many disciplines. With a total of 11 useable studies, we calculated 37 independent effect sizes. These studies comprise a total of 412 participants. The range of the effect sizes is 12.614, with a minimum effect-size measure of -2.213 and a maximum effect-size measure of +10.391. The overall mean effect measure for this group of effect sizes was  $d = 1.127$ ,  $p < .001$ , a large effect sized according to the rough standards established by Cohen (1977).

These findings indicate that the use of guided notes can have a moderate impact on student achievement in postsecondary coursework. A 95% confidence level ranges from 0.614 to 1.640. This confidence interval does not contain the value of zero, implying that the treatment of using guided notes had a significant impact (Johnson, 1989). This effect size suggests that the average student participating in the guided notes conditions exceeds the academic achievement of approximately 86% of the students in the non-guided note conditions. Figure 1 presents a graphical representation of this impact of guided notes on student achievement.



**Figure 1. Graphical Representation of the Impact of Guided Notes on Student Achievement**

Twenty-nine of the thirty-seven effect sizes (78.37%) included in these analyses were positive, indicating that guided notes had a positive impact on student learning. These analyses also reveal that 25 (67.56%) of the 37 effect size measures had an effect size of 1.0 or greater. One study demonstrated neither a positive or negative effect. The remaining 8 effect size measures (21.6%) revealed a negative effect, indicating that traditional approaches of having students generate their own notes, random study checks, or tutoring, produced a greater impact on learning than the guided notes. Table 1 provides a breakdown of the studies meeting the inclusion criteria.

**Table 1: Studies Included in Meta-Analysis**

Study	n of ES	ES range
Boyle & Weishaar (2001)	4	0.843 to 3.158
Courson (1989)	4	0.195 to 2.535
Hamilton et al. (2000)	2	1.850 to 2.065
Kline (1986)	2	1.621 to 2.070
Lazarus (1991)	2	7.398 to 10.391
Mastropieri et al (2003)	7	-2.213 to -0.057
Pedos (1989)	4	1.200 to 1.352
Patterson (2005)	2	2.036 to 7.538
Sweeney et al (1999)	4	-0.259 to 1.354
Wood (2005)	2	0.563 to 1.487
Yang (1988)	4	1.11 to 2.376

The grand mean analyses also revealed a  $Q(37) = 348.02$ ,  $p < 0.001$  statistic, indicating significant heterogeneity across the 37 effect size measures included in this investigation. Therefore, further analyses are necessary to understand the variegation in effect sizes across the different studies.

Specifically, further analyses were conducted to explore the individual research characteristics and their potential influence on effect-size measures in an effort to explain this inconsistency across the individual effect-size measures.

#### *Impact of Moderators*

This additional analysis revealed no significant variation in the primary variable *type of student* (classified as special needs or not),  $Q = 0.077, p = 0.782$ . Specifically, there is statistically no difference in the impact of guided notes for students classified as special needs ( $d = 1.139$ ) relative to students who classified as general education ( $d = 1.242$ ). This same pattern of results is seen for the primary moderator *grade level*. The impact of guided notes for student in elementary school ( $d = 1.982$ ), middle school ( $d = 1.369$ ), and high school ( $d = 0.769$ ) are statistically equivalent ( $Q = 3.50, p = 0.173$ ). However, the analyses revealed that significant differences exist within the moderator *Intervention Type* ( $Q = 81.68, p < 0.001$ ). Students who participated in random study checks ( $d = 2.449$ ) demonstrated a higher impact when compared to students using guided notes, relative to student who generated their own notes ( $d = 1.60$ ) or students who were tutored ( $d = -1.29$ ) relative to students using guided notes. Potentially, this significant result is impacted by the divergent sample sizes across these three groups, with  $n = 4$  effect size measures with random study checks, with  $n = 7$  effect size measures with tutoring sessions, and with  $n = 26$  effect size measures with student generated notes. Both the random study checks group and the tutoring session group included only students classified as special needs.

The secondary moderator, *year of study*, revealed significant within group differences,  $Q = 6.835, p = 0.033$ . Specifically, this moderator indicated that the impact of guided notes for the K-12 students included in these studies was greatest during the 1990-1999 period ( $d = 2.324$ ) relative to the 1980-1989 period ( $d = 1.446$ ) or 2000-2009 period ( $d = 0.403$ ). While all time periods suggest a positive impact of the use of guided notes, the impact for the 2000-2009 time period was not found to be a significant impact ( $p = 0.354$ ).

There was also significant variation revealed for the secondary moderator, *achievement measure used*,  $Q = 24.714, p < 0.001$ . In particular, the greatest impact was seen for measures of note-taking accuracy ( $d = 1.882$ ), and when measured with quiz scores ( $d = 1.632$ ), whereas the impact of guided notes was not positive when measured with exam score achievement measures ( $d = -0.745$ ). Both the note accuracy measures group and the exam achievement measures group included only students classified as special needs.

Finally, the secondary moderator source of study (dissertation, thesis, or journal publications) revealed no significant within group variation,  $Q = 1.469, p < 0.480$ . Specifically, this indicates that there were statistically no difference in the impact of guided notes if the impact was reported by a dissertation study ( $d = 1.293$ ), a Master's thesis ( $d = 1.486$ ), or if the study was a peer reviewed publication ( $d = 0.940$ ). These results suggest that publication bias is not a concern for the current investigation. Table 2 presents the summary of these analyses.

#### **Discussion**

The purpose of the current investigation was to examine the impact of the use of guided notes on students in grades K-12, including students with a special needs classification. This was accomplished by incorporating all available quantitative data through a meta-analytic synthesis of existing research. To date, only one other meta-analysis has examined this research question, and as such, these researchers only incorporated five published studies into their analysis (Konrad, et al., 2009). Thus, the present study significantly expands the scope of what was examined, both in terms of research reviewed and moderator variables considered, over and above the prior meta-analytic investigation of the impact of guided notes on student achievement in K-12 general and special education students.

One key addition of this meta-analytic investigation beyond the previous meta-analysis is the inclusion of non-published research. The Konrad et al. (2009) meta-analysis incorporated only five research studies that appeared in peer-reviewed journals. Thorough inspection of the existing research revealed that there were not only more peer-review studies, but additional research studies that were not incorporated into the prior meta-analysis, and six additional research studies that, while subjected to considerable review (dissertations and Master's theses), were not published. As indicated above, it is problematic to include only published research (i.e., publication bias), as doing so will generally include only research that has shown to have significant impact, and can potentially inflate the resulting effect size measures (Glass et al., 1981; Hedges, 1986; Hunter & Schmidt, 2004; Rosenthal, 1979). The

present study corrects for this potential bias by including both published and non-published studies. The analysis for the impact of guided notes on post-secondary student achievement was found not to be significantly different whether reported by published or non-published research,  $Q = 1.469$ ,  $p < 0.480$ , so this inclusion indicates that when all available research is included, publication bias does not present a significant threat.

**Table 2. Summary of Analysis Results Across Study Characteristics**

Variable and Categories	Number of Effect Sizes (n)	Group Effects	Mean Effect Size <i>d</i>
Type of Student		0.782	
Special Education Classification	30		1.139*
General Education Classification	7		1.242*
Grade Level		3.508	
Elementary	6		1.982*
Middle School	10		1.368*
High School	21		0.769*
Intervention Type		81.68*	
Guided Notes vs. Student Notes	26		1.600*
Guided Notes vs. Random Study Checks	4		2.449*
Guided Notes vs. Tutoring Session	7		-1.290*
Publication Period		6.895*	
1980-1989	14		1.446*
1990-1999	8		2.324*
2000-2009	15		0.403
Type of Assessment		24.71*	
Accuracy	7		1.882*
Quiz	21		1.632*
Exam	9		-0.745
Source of Study			
Dissertation	6	1.469	1.293*
Thesis	10		1.486*
Peer Reviewed Publication	21		0.970*

Note: \* $p < 0.05$

A substantial addition of the current investigation to the existing research is the ability to evaluate the impact of the use of guided notes with students classified as special education relative to student classified as general education. This is the only known existing study that makes this direct comparison. Interestingly, the current investigation revealed that guided notes can have an equally positive impact for special education students and general education students. The implication of this finding is that the use of guided notes can be beneficial to both student populations, and as such, can be a low cost, low tech achievement advancing tool for blended classrooms.

As many schools battle budget cuts and financial uncertainty, high-stakes testing scores continue to drive instruction and administrative decisions. Teachers are expected to continually educate students at a high level and make the marks for NCLB despite limited monetary and technological resources. The federal mandate that schools provide a free and appropriate public education for all students is evident with *schools focusing on the performance of specific groups of students such as those who are from low-income families or ethnic and racial minorities, those who are learning English, or those who have a disability* (Jennings & Stark, 2006, p.112). The current research suggests that guided notes can offer a

viable solution to meet the increased pressure to reach standards for all students, in spite of decreasing budgets.

Another considerable contribution of this meta-analysis is the direct comparison of the use of guided notes across elementary, middle school, and high school level students. Again, this is the only existing study that has made the comparison across the K-12 grade levels. As indicated by this research, the use of guided notes can have a strong significant impact on student achievement for students at all levels of K-12 education. And, although no differences were found across these three grade categories, the strongest impact was seen for when guided notes are incorporated for elementary students who were classified as special education.

At first look, the impact of guided notes on student achievement seems to wane across time. The effect size measure for the 1980's and the 1990's time period is significantly higher than the impact reported for the 2000's. Careful examination of the data reveals that the lower effect size measures for the 2000 decade are strongly influenced by one study, Mastropieri et al. (2003). In this study, the researchers compared the achievement results of special needs students in a world history class, when exposed either to a peer tutoring condition or a guided notes condition. Mastropieri et al. conclude that both the quantitative data and the qualitative data indicated that students responded positively in *both* conditions, however, students responded more positively to the peer tutoring. One potential reason for this outcome is that the students in the *tutoring* condition were overall the weaker students (based on reported prior academic performance and IQ), which potentially would account for the higher gains by that group. Another noteworthy fact is that all the data for the Mastropieri et al. investigation came from examination scores, which do not always capture student learning as well as quizzes (Larwin & Larwin, 2011).

In an effort to assess the impact of this study, the study was removed from the analysis for the 2000-2009 decade results in an increase of 1.437 (from  $d = 0.403$  to  $d = 1.840$ ), potentially suggesting that the Mastropieri et al. (2003) study could be considered an influential outlier. Either way these results are considered, they seem to suggest that the impact of guided notes remains to be a strong positive impact, across three decades of research.

Finally, the current investigation added the impact of guided notes on accuracy checks, a variable not synthesized in the previous meta-analytic research. As indicated above, the use of guided notes revealed a significant positive impact on student accuracy in taking notes. These results were found to be stable for students across all grade levels, and specifically for students with special needs. Consistent with the research of Kiewra, Benton, Kim, Risch, & Christensen (1995) note-taking on an outline framework can increase the completeness of students' notes and fostered more internal connections among ideas. Building connections through guided notes enhances student confidence and comprehension while providing a useful study tool. As instructional obstacles are removed for students with disabilities with the implementation of guided notes in the classroom, difficulties commonly associated with note taking, pacing, and comprehension become minimized with simple, cost efficient strategies. Small accommodations such as this can mean the difference between academic success and failure for many students struggling with disabilities. This finding further supports the potential value of this inexpensive intervention in supporting the learning activities of special needs students.

#### *Limitations*

There were several limitations associated with the present research study. A number of the individual constructs were represented in a small sample of studies. Although this might have occurred as the result of an insufficient computer literature search strategy, that is not the case for the current investigation. The literature search process was thorough and exhaustive and turned up a number of additional empirical research studies not included in the past meta-analytic review of this subject area.

All of the available research on guided notes' impact on K-12 and special education students' achievement included research on students who were predominantly identified as special needs, and some of the studies indicated the gender breakout of their student samples, however most did not. As a limitation of the present study it is difficult to break moderator categories down enough to examine as much information as possible without creating too much overlap in the results. For example, with the meta-analytic approach, the meta-analytic researcher is at the mercy of the authors who have conducted research in the area. The researcher has to rely on the authors or individual researchers to report results accurately, describe the studies well, report statistics appropriately, and respond to inquiries about their

research if there are any questions or discrepancies. (Larwin & Larwin, 2011). It would have been interesting to investigate variables such as gender or student characteristics and the examination of these kinds of variables may have revealed additional insight, complexities, and moderator effects about the effectiveness of guided notes on student performance. However, that data is not available so these variables could not be examined.

Similarly, interpreting the results of meta-analytic studies such as this one can be challenging when the content area is not the focus of a lot of quantitative research. There were a number of studies on the use of guided notes that examined their impact qualitatively or which included very limited quantitative information. There are studies that found that students have very positive perceptions regarding guided notes (e.g., Boon, et al., 2007) or find that guided notes are beneficial when used with low-performing students (Rindfuss, 1997) or as a mechanism to encourage increased class participation (Allen, 2005). While all of this research provides valuable insight as to the use of guided notes, these studies did not provide enough or appropriate data for inclusions.

Finally, the current investigation was able to rectify one limitation that was systemic in all of the studies that were found in the available research: sample size limitations. Most of the prior research is based on data drawn from one classroom at one point in time, potentially leaving the possibility of classroom effects or instructor effects which create the outcomes that were observed. Many of the studies included in the current investigation are based on very limited sample sizes. As a strength of meta-analysis, the current investigation synthesizes data from three decades, and has a sample size of  $n = 412$  participants across thirty-seven separate effect size measures. As such, it provides K-12 educators and practitioners with a research study that has application to their own educational arena.

In spite of the challenges in conducting the current investigation, the results of this study, which is based on a very current body of research is noteworthy. The 'bw-tech' inclusion of guided notes into the post-secondary classroom can have a strong significant impact on student achievement. Many researchers have suggested that increase in student achievement is due to an increase in student engagement. And, while it would seem that engagement may be the mechanism by which guided notes do produce a positive impact on student achievement (Heward, 1994), additional research is needed to further understand the relationship between guided notes, student engagement, and how these are potentially working to impact student achievement.

## References

*References marked with an asterisk indicate studies included in the meta-analysis.*

- Allen, N.J. (2005). *The effects of a story fact recall quiz and game on off-task behavior during sustained silent reading (SSR) and the number of story facts recalled following SSR for secondary students with disabilities*. (Doctoral dissertation). Retrieved from [http://etd.ohiolink.edu/view.cgi?acc\\_num=osu1124128560](http://etd.ohiolink.edu/view.cgi?acc_num=osu1124128560)
- Astin, A.W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Personnel*, 25, 297-308.
- Blackwell, A. J., & McLaughlin, T. F. (2005). Using guided notes, choral responding, and response cards to increase student performance. *The International Journal of Special Education*, 20(2), 1-5.
- Bomia, L., Beluzo, L., Demeester, D., Elander, K., Johnson, M., & Sheldon, B. (1997). *The impact of teaching strategies on intrinsic motivation*. Champaign, IL: ERIC Clearinghouse on Elementary and Early Childhood Education. p. 290-294.
- Boon, R. T., Cecil, III, F., & Saleem, R. (2007). Students' attitudes and perceptions toward technology-based applications and guided notes instruction in high school world history classrooms. *Reading Improvement*, 44(1), 23-31.
- Boyle, J. R. (2001). *Enhancing the note-taking skills of students with mild disabilities*. Retrieved from <http://www.ldonline.org/article/6210/>
- \*Boyle, J. R. & Weishaar, M. (2001). The effects of strategic note taking on the recall and comprehension of lecture information for high school students with learning disabilities. *Learning Disabilities Research & Practice*, 16, 133-141.
- Comprehensive Meta-Analysis. (2009). Retrieved October 20, 2009, from <http://www.metaanalysis.com>
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (2nd ed.). NY: Academic Press.
- \*Courson, F. H. (1989). *Comparative effects of short- and long-form guided notes on social studies performance by 7<sup>th</sup> grade learning disabled and at-risk students*. (Unpublished doctoral dissertation). The Ohio State University, Columbus, Ohio.

- Fredricks, J., Blumenfeld, P., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74, 59-109.
- Glass, G. V., McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research*. London: Sage Publications.
- \*Hamilton, S. L., Seibert, M.A., Gardner, R., & Talbert-Johnson, C. (2000). Using guided notes to improve the academic achievement of incarcerated adolescents with learning and behavior problems. *Remedial and Special Education*, 21, 133-140.
- Hawkins, J., Brady, M.P., Hamilton, R., Williams, R.E., & Taylor, R.D. (1994). The effects of independent and peer guided practice during instructional pauses on the academic performance of students with mild handicaps. *Education and Treatment of Children*, 17, 1-28.
- Hedges, L. V. (1986). Issues in meta-analysis. In E. Z. Zothkoph (Ed.), *Review of Research in Education* (pp. 353-398). Washington, DC: American Education Research Association.
- Heward, W.L. (1994). Three *low-tech* strategies for increasing the frequency of active student response during group instruction. In R. Gardner, D.M. Sainato, J.O. Cooper, T.E. Heron, W. L. Heward, J. Eshleman, & T.A. Grossi (Eds.), *Behavior analysis in education: Focus on measurably superior instruction* (pp. 283-320). Monterey, CA: Brooks/Cole.
- Hunter, J. E., & Schmidt, F. L. (2004). *Methods of meta-analysis: Correcting error and bias in research findings*. London: Sage Publications.
- Jennings, J., & Stark, D. (2006). Ten big effects of the no child left behind act on public schools. *Phi Delta Kappan*, 88(02), 110-112. Retrieved from [http://www.pdkmembers.org/members\\_online/publications/Archive/pdf/k0610jen.pdf](http://www.pdkmembers.org/members_online/publications/Archive/pdf/k0610jen.pdf)
- Johnson, B. T. (1989). *DSTAT: Software for the meta-analytic review of research literatures*. Mahwah, NJ: Erlbaum.
- Kiewra, K., Benton, S., Kim, S., Risch, N., & Christensen, M. (1995). Effects of note taking format and study technique on recall and relational performance. *Contemporary Educational Psychology*, 20, 172-187.
- \*Kline, C.S. (1986). *Effects of guided notes on academic achievement of learning disables high school students*. (Master's Thesis) Retrieved from [http://etd.ohiolink.edu/view.cgi?acc\\_num=osu1134064996](http://etd.ohiolink.edu/view.cgi?acc_num=osu1134064996).
- Konrad, M., Joseph, L.M., & Eveleigh, E. (2009). A meta-analytic review of guided notes. *Education and Treatment of Children*, 32(3), 421-444.
- Larwin, K.H., & Larwin, D.A. (2011). Meta-analysis examining the impact of computer-assisted instruction on post-secondary statistics education: 40 years of research. *Journal of Research on Technology in Education*, 43(3), 253-278.
- \*Lazarus, B. D. (1991). Guided notes, review, and achievement of secondary students with learning disabilities in mainstream content courses. *Education and Treatment of Children*, 14, 112-127.
- Lazarus, B.D. (1993). Guided notes: Effects with secondary and post-secondary student with mild disabilities. *Education & Treatment of Children*, 16, 272-290.
- \*Mastropieri, M., Scruggs, T., Spencer, V., & Fontana, F. (2003). Promoting success in high school world history: Peer tutoring versus guided notes. *Learning Disabilities Research & Practice*, 18(1), 52-65.
- Neef, N. A., McCord, B. E., & Ferreri, S. J. (2006). Effects of guided notes versus completed notes during lectures on college students' quiz performance. *Journal of Applied Behavior Analysis*, 39, 123-130.
- No Child Left Behind Act of 2001: Elementary and Secondary Education, U.S.C. § 6319 (2008). Retrieved from <http://www2.ed.gov/policy/elsec/leg/esea02/index.html>
- \*Pados, G. E. (1989). A comparison of the effects of students' own notes and guided notes on the daily quiz performance of fifth-grade students. (Master's Thesis). Retrieved from [http://etd.ohiolink.edu/view.cgi?acc\\_num=osu1163007290](http://etd.ohiolink.edu/view.cgi?acc_num=osu1163007290)
- \*Patterson, K. B. (2005). Increasing positive outcomes for African American males in special education with the use of guided notes. *Journal of Negro Education*, 74, 311-320.
- Peverly, S., Ramaswamy, V., Brown, C., Sumowski, J., & Alidoost, M. (2007). What predicts skill in lecture note taking? *Journal of Educational Psychology*, 99, 167-180.
- Rosenthal, R. (1979). The *file drawer problem* and tolerance for null results. *Psychological Bulletin*, 86, 638-641.
- Rosenthal, R. (1991). *Meta-analytic procedures for social research*. Newbury Park, CA: Sage.
- Statistical Package for the Social Sciences (Version 18)[Computer software].Chicago, IL: IBM.
- Stringfellow, J. L. & Miller, S. P. (2005). Enhancing student performance in secondary classrooms while providing access to the general education curriculum using lecture formats. *TEACHING Exceptional Children Plus*, 1(6), Article 1.

- \*Sweeney, W. J., Ehrhardt, A. M., Gardner, R., III, Jones, L., Greenfield, R., & Fribley, S. (1999). Using guided notes with academically at-risk high school students during a remedial summer social studies class. *Psychology in the Schools, 36*, 305-318.
- Williams, R. L., & Eggert, A. (2002). Note taking predictors of test performance. *Teaching of Psychology, 29*, 234-237.
- Wolf, F. M. (1986). *Meta-analysis: Quantitative methods for research synthesis*. London: Sage Publications.
- \*Wood, C. L. (2005). *Effects of random study checks and guided notes study cards on a middle school special education students' note taking accuracy and science vocabulary quiz scores* (Doctoral dissertation). Retrieved from <http://etd.ohiolink.edu/send-pdf.cgi/Wood%20Charles%20Lloyd.pdf?osu1123704588>
- \*Yang, F. M. (1988). *Effects of Guided Lecture Notes on Sixth Graders' Scores on Daily Science Quizzes*. (Master's Thesis). Retrieved from <http://etd.ohiolink.edu/send-pdf.cgi/Yang%20Feng%20Mei.pdf?osu1248383810>