The Benefits of Guided Note-Taking in the High School Classroom

SUMMARY

Educators are finding themselves working with identified students in content area classrooms and having to navigate the instructional accommodations of the IEP. Guided notes can offer a way to involve the identified learner, help them focus on what is important, remove negative stigma for accommodations, and allow the identified learners to practice their note-taking skills.

Notebooks, paper, pens, and pencils are often at the top of the supply list teachers put together for students each year. The implication is that the writing utensils will be used to fill the pages of the notebooks and the paper. This is especially true in middle school and high school settings. Note-taking becomes the main way in which a student interacts with and processes the information being presented. It is a key learning activity that stimulates constructive learning.

The Note-taking Process

During the process of note-taking, the student responds to some form of sensory input (digital, written, lecture) and organizes the information to create meaning from it. Notes can be taken verbatim or by individualized, meaningful shorthand. In the case of mathematics, shorthand can include symbols and abbreviations. For example, "mult," "sqrt," and "=" would be meaningful shorthand in a math class. Notes can be taken with or without the assistance of technology. Whatever mode is utilized, the note-taker must identify and assign some structure to the new information (Tinajero et al., 2012). This involves comprehension, verbal working memory, background knowledge, transcription fluency, and attention (Peverly and Sumowski, 2012).

Listening comprehension is employed in that students must decode the auditory information, understand what is being said, identify the main ideas, determine when to record information, and write quickly so as not to

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Rebecca Greenfeld, Brewster Teachers Association

miss incoming relevant information (Aragon-Mendizabal et al. 2016; Gur et al., 2013). This requires information to be held in working memory, an application of higher-level cognitive skills (Nakayama, et al., 2013) that students are expected to have upon entrance to high school.

Working memory is a type of short-term memory and refers to a limited space in the mind where we temporarily store and manipulate information. It is these spaces in which students must choose what is important, decide how to record it, and determine if the concepts need elaboration. Consider taking an empty candy box to a conveyor belt where different sized and decorated candies are traveling by. The box has a label on it, and it is your job to fill it accordingly. The belt is the lecture, it can go fast or slow. It is filled with nuggets of information that may or may not be important for later retrieval based on the label or title of the lecture. Students must split their focus time between listening to understand and grabbing information to record.

Unfortunately, the number of students enrolled in high school content courses who are identified as requiring special supports to access the information is on the rise (Boyle, et al., 2015). Note-taking is an area of support that can assist the identified student in accessing the content area course material. Notes can be electronically recorded, taken by a scribe, handed to the student by the teacher, or partially filled in by the student. Recording a lecture, using a scribe, and receiving a copy of class notes have been identified as placing the student in a passive role (Boyle, et al., 2015).

Benefits of Note-taking

Notes ultimately serve as a reminder of what happened in class. They are expected to be a resource that students can use to study from or do homework with. The actual notes a student takes can also serve as a formative assessment where teachers review them for neatness and accuracy.

Notes have been linked to academic achievement in terms of exam scores and grades. In 2016, researchers Amini and Kheirzadeh reviewed the notes of 44 college students and compared their test scores. The

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participants with the highest test scores used abbreviations and paraphrasing to write down key points from the lecture (Amini & Kheirzadeh, 2016).

Boyle (2013) reported a moderate 53 percent positive relationship between lecture notes and performance on assessments. The study controlled the variable of notes by providing students with training in a specific form of note-taking. Students, both identified and non-identified, had combined test averages of 74.25 as compared to their control group counterpart with a test average of 60.69. The overall act of taking notes was correlated to high academic achievement scores in this study.

Student engagement

The physical act of taking notes assists students in learning by engaging them with the material. Students are required to make meaning out of the perceived audio input through listening and recording the important information. Academic listening is a one-way activity when the action of note-taking is removed (Gur, et al., 2013). The instructional accommodations of a copy of class notes and scribe removes student engagement.

Engaged students can use their notes to raise questions, study, and participate (Reeve and Lee, 2014) thus furthering their engagement in the learning process. Reeve and Lee (2014) pointed out that this is a

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Figure 1: Note-taking Styles

Students and teachers can choose from a variety of note-taking styles:

Linear

Verbatim
Handwritten
Computer typed
Outline

Cornell

| Questions/Keywords	Notes
Summary	

Pattern

Concept map
Mind map

reciprocal relationship. The better grades can lead to better conduct as well as an increase in self-esteem and socially acceptable behaviors (Lam et al., 2014; Larwin, et al., 2012).

Cognitive engagement in school includes the strategies a student uses to learn. Note-taking is one such strategy and there are many choices to choose from. Figure 1 shows how note-taking styles can be broken down into three main categories: linear, Cornell, and pattern. Linear notes are straight for-ward and follow the flow of a lecture without any form of organization. They are more of a transcription of the lec-ture. Without added organization they lack any clues as to what was empha-sized or deemed important by the student.

On the other hand, Cornell notes explicitly add in structure by splitting the page into three distinct segments. Students take notes on a lecture or reading with notes on the right side of the page. Review of notes is built in by requiring students to read their own notes, after the class, and summarize the contents of the page in the bottom section.

As students review their notes, they can ask questions on the left-hand side of the page. This is a space where students can pretend to be the teacher and cre-ate questions about the material on the page or ask any questions they need

Figure 2: Student Cornell Notes

This figure shows a student explaining how to take Cornell notes while using the Cornell notes style.
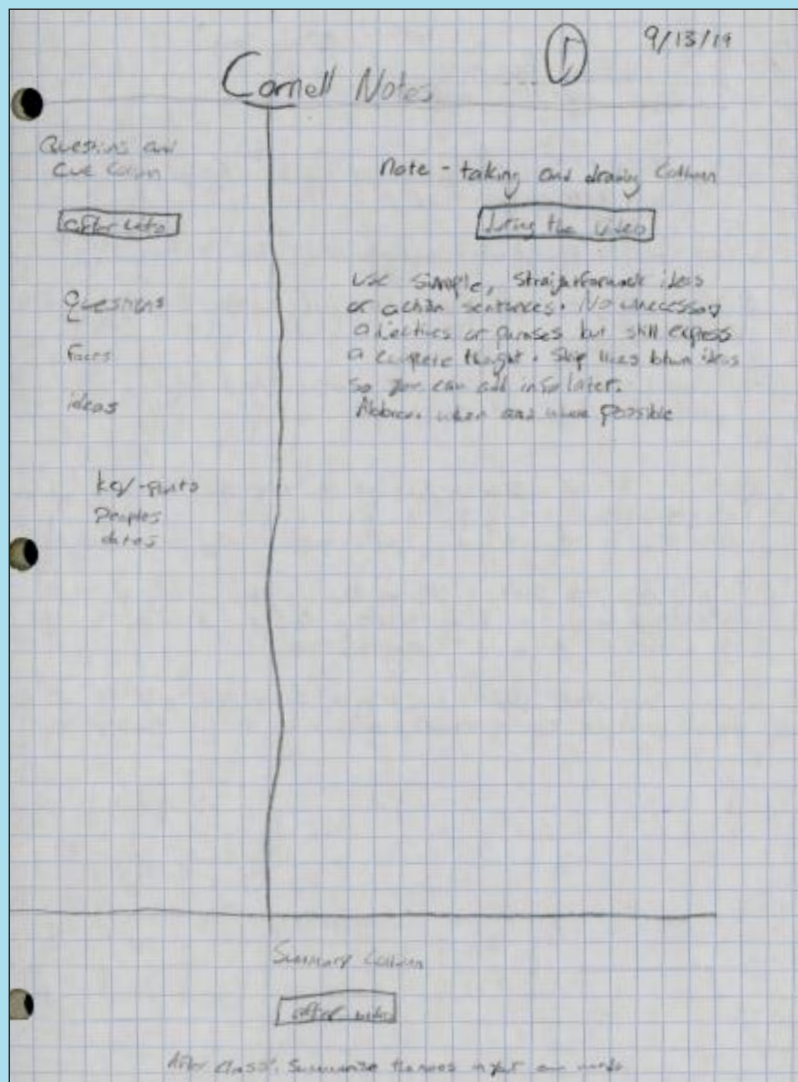
answered for further clarification. These notes work very well for assigned reading passages in secondary level con-tent areas like English or social studies. Figure 2 shows a student taking notes in the Cornell style.

Guided notes are a sub-category of the outline method under the linear style. Basically, they are an advance organizer

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that allows students to follow the flow of a lecture and fill in the blanks by hand. Students follow along with the lecture and fill in the missing information. These notes are already organized in a structure that indicates importance thus relieving the student of precious working memory space.

The figure below demonstrates the use of guided notes in a special education math class.

Figure 3 shows a copy of guided notes from a self-contained math class taught solely by a special educator.
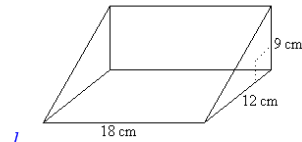
Returning to the conveyor belt analogy, the box has been partially filled in with spaces left for the missing pieces. These missing pieces are further defined by how much space is left. If a definition is asked for, a line might be left for the students to fill in. A missing word, variable, or number would require less space. These cues help the student determine how much to write. Figure 4 at right shows examples of guided notes that students receive at the start of a quantitative geometry lecture at the high school level.

In guided notes, space can also be left for pictures to be taped or drawn in (see Figure 5). This turns the act of note-taking into a multisensory activity. Having the picture present can relieve the stress of having to copy a drawing accurately from the board, a device, or a book. Allowing students to cut and paste a picture or diagram into their notes can offer some relief to their working memory in the act of a planned pause.

Moving to a different activity that uses the hands in an alternate way also provides for a break in the stress of having to pay attention and write. In science, it is extremely important that students get the diagrams

Figure 3: Sample of Guided Notes

Title: _____ Date: _____
Objective(s): To be able to translate word phrases into mathematical form.

Do Now
1. Think of as many words as you can that mean positive or negative. Place these in the table.

Positive	Negative

Example #1 Pick one word from each column and create a math phrase using it.

Positive_____

Negative_____

Example #2 Listen to the phrase and translate it into a mathematical expression.

1._____

2._____

Example #3 Match the correct phrase with the correct expression.

1. a number increased by eight	a.	X + 4
2. a number decreased by eight	b.	X − 4
3. a number multiplied by two	c.	X − 2
4. four subtracted from a number	d.	2x
5. Tom gained four pounds	e.	X − 8
6. Mary weighs two pounds less	f.	X + 8

Figure 4: Guided Notes Examples

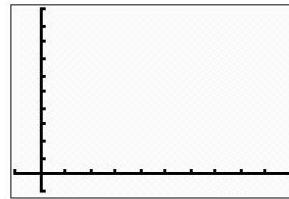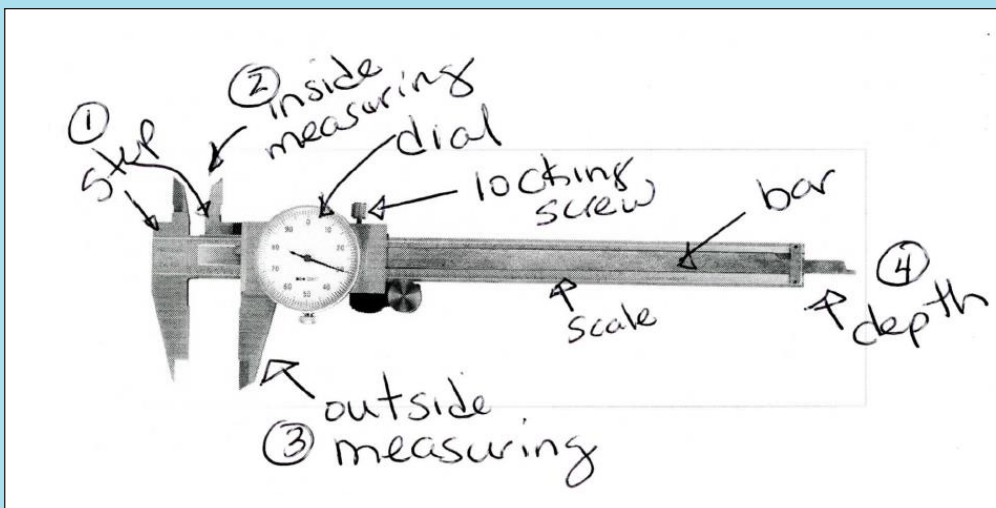|	
Spaces defined to assist students with organizing their work	1. <table><tr><td>Formula</td><td></td></tr><tr><td>Plug in</td><td></td></tr><tr><td>Solve</td><td></td></tr></table>
Calculator cues and blank lines to assist students in creating, documenting, and analyzing a graph	Clear any functions out of y = 2nd → y = (STATPLOT) 1: Plot 1 ... Off ENTER ZOOM 9:ZoomStat Sketch the scatterplot here 1 sentence that describes this data: _____ _____

Figure 5: Taped-in Figures

The figure above shows how cues can be embedded into guided notes.

The figure at left shows how taped-in figures can be used to help students convey accurate information in notes.

correct. With everyone having the same picture, the teacher can move on to label what is important or explain why it is important.

Figure 5 shows an example of a dial caliper that a student had to tape into their notebook and then identify the key parts.

Aragon-Mendizabal, et al. (2016) found that students who took hand-written notes scored higher on memory tasks. The third task in their experiment of 251 college social and health science students involved the participants either hand copying 35 words or typing the 35 words in a document. The paper and document were then removed, and a distractor task was implemented. After five minutes, the participants were asked to write as many of the words as they recalled. To further test memory, a five-minute break was given and then a word recognition task was administered. The handwriting group recalled more words with a mean of 8.71. They also had fewer recall errors with a mean of 0.95. The computer group means were 7.22 and 1.40, respectively.

Challenges in Note-Taking

Note-taking involves the ability to listen, make decisions, and physically write. Boyle, et al., (2015), found that teachers present information at a rate of 110 words per minute in the lecture setting while identified students can only write about 17–20 words a minute. Return to the conveyor belt analogy, turn that belt on high speed, and you are instructed to fill the box in under one minute. That stress can lead to an unfinished task or missing critical pieces. In the classroom, the

This figure shows the difference between lecture notes that the instructor used and the notes an identified learner recorded.
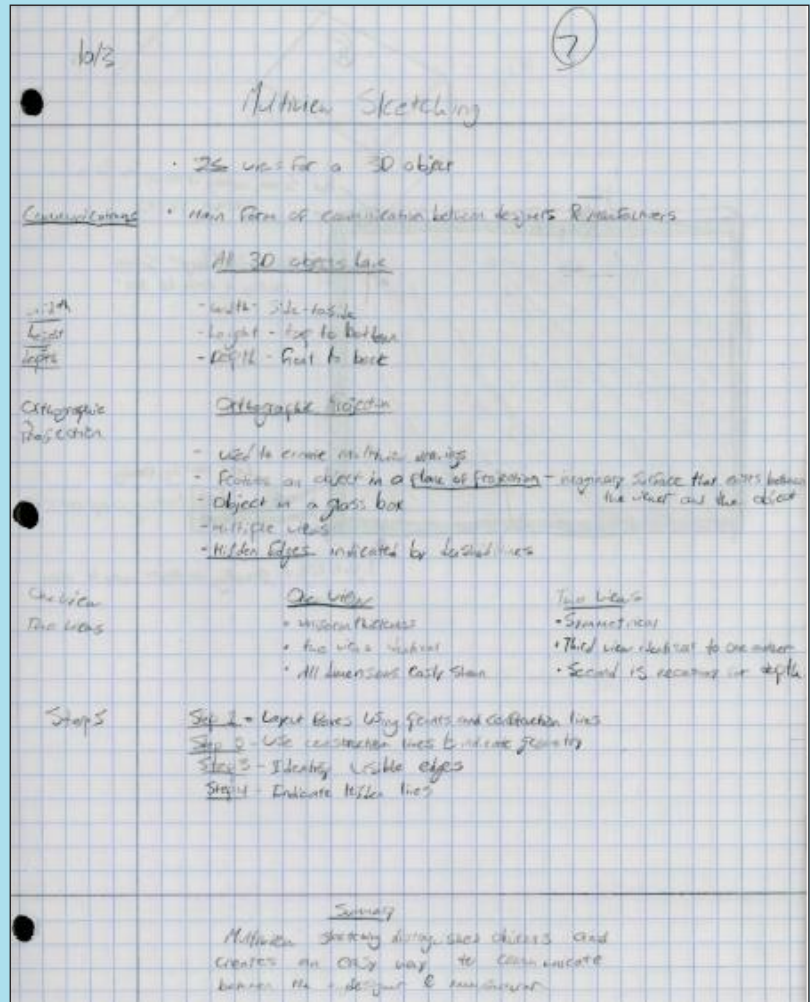
Figure 6: Sample Notes

Teacher Lecture Notes	Identified Learner Notes

combination of listening to a lecture and determining what to record leads to approximately 30 percent of the main ideas presented in a content area lecture to be recorded in the form of notes (Crawford, 2016). Figure 6 at left compares an identified learner's notes and the lecture notes the teacher uses.

As one can see, note-taking is a cognitively demanding process. It involves listening, processing, organizing, and writing. The process of taking notes based on a lecture requires that students be able to discern what is important, listen to the information, process the information, and record the information. Rosen et al. (2014) refer to note-taking as a form of data processing where students must sort, record, practice, process, retain, and possibly discard extraneous information. Deficits in writing and verbal language for some identified students make this challenging (Lazarus, 1991, 1993; Larwin, et al., 2012).

Identified students can exhibit a wide range of writing challenges in addition to writing speed. This can include a lack of fine motor skills that are necessary for holding a pencil correctly. Forming numbers and letters then take time and hyper-focus for these students. Add in the stress of recording notes and the handwriting becomes indecipherable for the student and anyone else trying to read

Figure 7: Student Notes

Student notes on Mechanical Advantage show how an identified student can take notes when speed of lecture is not an issue.

them. These notes then become useless for later review and recall of the presented information as preparation for a teacher-made assessment, as can be evidenced in Figure 6.

Verbal language adds another layer of possible misinterpretation for some identified students. They can struggle with understanding which word was used and how to record it correctly.

An identified student can then lose time trying to figure out how to spell the word thus decreasing their focus on the lecture and their recording time. This then translates to misspellings, misinformation, and notes that are not useful as study aides.
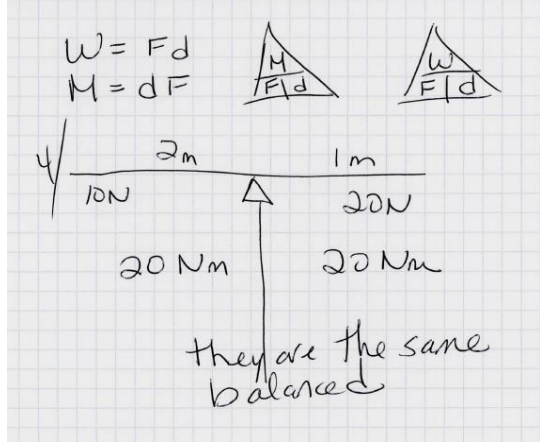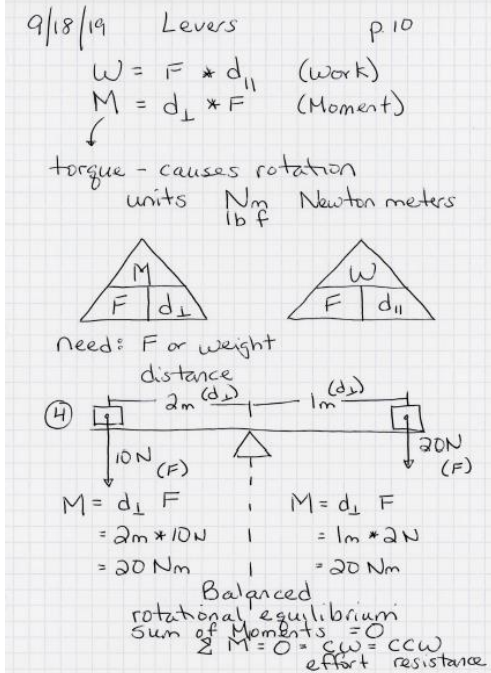
In a 2015 study, 37 eighth-grade identified students were asked to retell a lecture after they were given the opportunity to take notes. They found that these identified students recorded fewer linguistic units, scored lower on comprehension questions and answered inferential and literal questions with less accuracy (Boyle et al., 2015). The students themselves reported five main areas of notetaking difficulty. These were, writing fast enough, paying attention, making sense of notes after the lecture, deciding which information is important enough to record and understanding the professor (Boyle et al., 2015).

Recall that Boyle et al., (2015) discovered a discrepancy between the number of words spoken per minute by a lecturer (110) and the number of words an identified student can write per minute (17–20). This discrepancy can result in missing information. According to Nick B., an identified student in an unsupported

This figure shows how an identified learner notes can be lacking in information and challenging to read.

Figure 8: Missing Information

Identified learner Notes	Teacher Lecture Notes

math elective, he sometimes writes too much information or does not get everything down. Figure 7 (p. 25) shows how Nick was able to take neat notes when time was not an issue because he was watching a presentation that he could pause. He used the Cornell note-taking style. A high school counselor at the same school teaches this method in her organizational skills group that meets at the beginning of each school year to support students.

Figure 8 at left is a prime example of a student missing information. They should contain the same notes but the identified student is missing much of the information and it is challenging to read. Considering that all assessments in this math class were open notes, this student's notes will be useless.

The student in Figure 9 at right was diligent enough to write down all the information and use the color-coding instructional aids that the teacher used. There appears to be some structure to the notes. The question remains as to whether the student will be able to read this to study from or even understand what they wrote. Teacher cues are missing. What does the blue represent? The yellow? Where did the equation come from? Why is that a check? These are all questions the teacher asked and answered in the lecture. The student just focused on the "math" parts.

Figure 9: Sample Notes
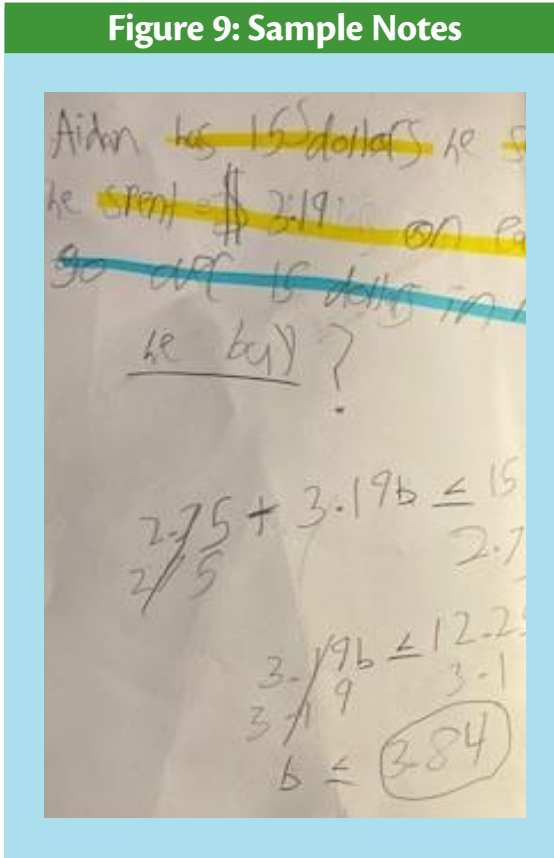
Special Education

Identified students can lose the benefit of handwriting notes when a scribe is assigned, or a copy of class notes is given. This type of instructional accommodation is put in place once a student is identified. The Committee on Special Education determines if the student will benefit from these specific interventions once the student is identified.

Students are identified in education based on the 13 categories proposed by the Individuals with Disabilities

The 13 categories under IDEA include autism, deaf-blindness, deafness, emotional disturbance, hearing impaired, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury and visual impairment.

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Education Act (IDEA). Today students that are identified within these categories learn alongside their peers either in the same classroom or in the same building. Identified students may use instructional accommodations and modifications to gain access to the same standards that apply to the general education population.

Inclusion

A major theme in the field of special education has been the desegregation of identified students. IDEA requires that identified students be taught in the least restrictive environment (LRE). This means that the student should be placed with their same-age peers. LRE is a continuum. On one end are small self-contained classes where the students are taught solely by a special educator. This can include teacher aides in the room and a modified curriculum. At the other end, an identified student is enrolled in the same class as their peers. They are given instructional accommodations like preferential seating or clarified instructions. The support is basically brought to the student in the general education environment. This model is not for every identified student. It is the responsibility of the committee on special education to determine if it is appropriate on an individual basis.

The inclusion model allows for identified students to join their same-grade peers in the activity of learning. It

meets the criteria of LRE when these students can achieve success in the general education setting when supports are brought to them. The decision to place a student in inclusion for all or part of their academic schedule is one that is made by the special education committee (CSE) when they are developing IEP and the student learning objectives.

The CSE works to remove instructional barriers. These barriers include attitudinal, architectural, information/communicational, physical, policy/practices, and technology (Watt et al., 2014). Inclusion allows the education system to achieve equal outcomes for all students by being sensitive to the individual needs of identified students. It is important to convey the image of inclusion as "supported education" (Polloway et al., 2013, p. 6) so that all stakeholders can work together to create a productive learning environment for all students.

Inclusive models at the secondary level are confronted with an increase in curriculum and accountability. General education teachers are finding themselves in a position to implement effective accommodations, interventions and modifications. In fact, Harrison et al. (2013) reported that in response to high stakes testing, state objectives, and inclusion, multiple accommodations were being recommended by the committee on

special education without evidence of effectiveness. Harrison et al. (2013) cite that ineffective definitions of accommodations and modifications are partly to blame. They found that in the inclusive setting it can sometimes be difficult to distinguish the two.

Instructional accommodations

Accommodations are intended to reconcile the impact of a given disability as well as address the specific areas of deficiency. Instructional accommodations can include changes in presentation, response, timing, scheduling and setting. General education teachers need to support all students in order to attain equal outcomes. Individual needs and differences must be accounted for so that students do not suffer from what John, Joseph, and Sampson (2014) refer to as "instructional disability."
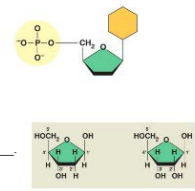
Complete copy of class notes, outlines for lectures, peer note taker, and scribe are some instructional presentation accommodations that can be written into the individualized education plan. According to Harrison et al. (2013), organizational devices such as outlines for lectures or guided notes are used by the student to promote active engagement. They classify these as response accommodations since the students are responding to the lecture through the action of taking notes (Harrison et al., 2013).

The changes to practices classified as accommodations are intended to hold students to the same expectations as their general education peers. The differential boost they provide is only to mediate the impact of the disability on access to the general education curriculum. When chosen and implemented correctly, accommodations can increase the elements of

This figure shows guided notes from math and science classes.

Figure 10: Guided Notes

equity and inclusiveness (Watt et al., 2014).

Guided Notes

Guided notes are a form of pattern note. They provide organization like a graphic organizer with spaces for students to fill in information during the lesson (Bui et al., 2013). Figure 10 shows an example of guided notes in math and science. Guided notes have been shown to improve test scores in elementary, secondary, and graduate education studies. The perception is that guided notes increase learning by organizing material for deeper processing.

Research

Lazarus (1991, 1993) utilized guided notes with a mandated in-class review in science, social studies, and a post-secondary psychology class in her seminal research. Both studies reported improved test scores. A 2012 meta-analysis of the literature increased the sample size to over 400 participants with mixed results. Student learning was reported to be negatively impacted by note-taking styles in seven of the 37 effect sizes reviewed, one having a neutral impact, and 29 positively impacting student learning (Larwin, et al., 2012). After reviewing studies centered around note-taking style, Jansen et. al (2017) concluded that "structured note-taking leads to

better memory for lecture content" (Jansen, et al., 2017).

This author researched the impact of the note-taking styles of guided notes and student generated notes on achievement. Archival data was used from the high-stakes mathematics end of course New York State exam known as the Integrated Algebra Regents. The study found that, in general, when achievement is determined to be a passing grade of 65 percent or higher, there was no significant difference between the schoolyear long use of guided notes and student-generated notes. However, when achievement was examined at the level of distinction, 85 percent or higher, the data from the entire sample population and the sample of identified learners reported significant findings such that guided notes results were not similar to the results obtained from the use of student-generated notes.

Benefits of Guided Notes

Knowing that guided notes and student-generated notes produce not so dissimilar results at the end of a school year on a cumulative assessment prepared by New York State offers educators the choice to use guided notes solely or a combination thereof. It is possible to tailor lessons to use guided notes thus assisting

students in structuring the information they are being presented. Additionally, the technologies available today make it easier to create notes with blanks missing. Word, PowerPoint™ and other tools allow educators to match their presentation of new material with the note structure. This will allow students to maintain better notes for later recall.

The recording of lecture key notes decreases for those students who have been identified with the use of guided notes. The fact that significance was determined at the distinction level for all identified students in this author's research offers new choices for educators as they incorporate identified students into unsupported courses as the least restrictive environment. Guided notes can be viewed as an intermediary instructional accommodation between providing a scribe or a complete copy of class notes. Both options were found by Boyle, et al. (2015) to put the identified learner in a passive role. The guided notes would allow the student to be an active learner in the mainstream environment.

Student Perspectives

According to Smith and Clason (2017), students have reported that they prefer guided notes (53 percent) and that the use of guided notes improves problem solving skills (43 percent). This author

Figure 11: Guided Notes on Moments

This figure shows page 1 of the giuided notes students used while engaging with a PowerPoint™ on Moments.

has been using guided notes since 1993 in math classes to engage students and assist them in organizing information with no distinction being made between identified and non-identified students. Morton (2013), who used guided notes in a high school science class co-taught with a special education teacher, reported that all the students made academic gains.

At the end of a recent set of guided notes this author used in a high school Principals of Engineering class, students were asked if they liked this note-taking style. It is important to note that there was no lecture. Students engaged

with a PowerPoint™ presentation and filled in the guided notes. Figure 11 shows a snapshot of page one of the notes that a student filled in.

One student of the 24 surveyed indicated that he did not like the guided notes. This student wanted more of a walkthrough on some of the things in the slides. He did admit that guided notes could be used as an "introduction so that we are familiar with the topic and then do a walkthrough the next day." Most of the remaining students reported that the guided notes were easy to fill in. Comments included that the organization made these notes a "good reference" and "easy to refer back to." Several students also commented on how they were able take in the information at their own pace, how they were "forced to read everything," and learned because they were not "mindlessly following a lesson."

In another class, Aerospace Engineering, students were asked to engage with a PowerPoint™ about propulsion and take their own notes in their engineering notebook. This process took three class periods with students completing the task at varying paces. Students requested certain pictures to be printed out for clarity purposes. Approximately two weeks later, students were given guided notes to fill in while engaging with the same PowerPoint™. Interestingly, it took only one period and only one student recognized that she had taken notes from this PowerPoint™ previously.

Recognizing a teachable moment, this author generated a pro/con chart so that students could compare taking independent notes with filling in

The figure below shows how students analyzed their notes they took while engaging with a PowerPoint.

Figure 12: Student-Generated Notes Comments

Student-Generated Notes

PROS		CONS	
Write down only what you do not know	3	Unsure what the most important information is	5
You decide the structure	7	Can take longer if you try to write everything	9
Notes are all in a notebook	2	Diagrams and pictures must be taped in	2
Not limited by blanks left – more room	3	Less pictures	1
Get a better understanding from writing everything	2	Less focus on the material – more focus on writing	1
Caters more to the students' needs	1	Requires more thought and energy	1
Quick	2	Can be useless if not organized	5
Less stress	1		
Remember more since I write more	2		
I can see my own thought process	2		

guided notes. Figures 12 and 13 summarize this qualitative data. The interesting aspect of their analysis of the student-generated notes (Figure 12) is that many of them liked deciding their own structure but many also reported the notes could be useless if not organized. Two other reported cons of note are the time component if they wrote everything and the fact that they were not sure what was important. Time, organization, and knowing what was important turned quickly into pros when the students analyzed their guided notes for the same topic.

Teacher Perspectives

Teachers also seem to have mixed feelings about notes. The higher the level, the more it is expected that students can take notes, organize materials and prepare for tests. One high school Advanced Placement Social Studies teacher allows his students to choose the style of note-taking that best suits them. First, he has them use four different styles for taking notes as they independently read chapters. Those styles include Cornell, graphic organizer, outline and a reading guide prepared by him. According to this teacher, these are advanced students, so he can let them choose the style that suits them after they practice linear, Cornell, and pattern styles of notes.

Differentiation or creating a level playing field for students is another reason some educators believe in and use guided notes. Two high school special educators use these notes so that students can access accurate representations of what is being taught. Here are perspectives from three teachers who chose to use guided notes in their classes:

The figure below shows how students analyzed the guided notes they took while engaging with a PowerPoint.

Figure 13: Guided Notes Comments

Guided Notes

PROS		CONS	
Easy	5	Less thinking	
Less time	7	Too structured	2
More organized	6	Don't read everything	2
Still room to add	1	Less focus on the smaller details	3
Shows exactly what is important	7	Can be boring	1
Nothing left out		Uses a lot of paper	1
Diagrams and pictures are built in	3	Don't retain as much since don't write as much	1
Less writing	2	Time consuming	1
Looks like a lot of work but it is not	1	All notes not together in a notebook	2
		No individuality – organizing and writing what you already know	2

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Co-Taught Math

I use guided notes as a method to ensure that students have all the important information of the lesson. It reduces the amount of writing they must do, and I find it more time efficient. As we know, some students write very slowly, and they miss key points in lessons because they are trying to write so feverishly that they cannot listen and write at the same time.

ENL Science

I also use guided notes to increase note taking skills, and help students to identify important content, terms, concepts on their own without me telling them this is important, etc. I use them especially for diagrams and the visual learners as it is a great way to not just only see the diagram, but they are active in labeling and chunking/ annotating important information they see in the diagram.

Special Education

I use guided notes for several reasons:
1) *Less writing for students with motor difficulties.*
2) *Reduces time for students to take notes.*
3) *Important vocabulary is stressed and can be presented as fill in the blanks different ways (differentiation).*
4) *Gives students an accurate representation of what is being taught and learned.*
5) *I get to control font size. Many worksheets are too busy.*

At the college level, Sujarittham, et al. (2016) created guided notes with embedded problems for their physics courses. They wanted to make the abstract concepts of physics available to all students. Ultimately, using test data and interviews, they found that student learning could be made more effective with the use of these notes.

Likewise using guided notes saves instructional time since students do not need to write as much. This was also found to be the case in a 2017 research study at the college level by Boulanger and Johnstone. They were able to identify a savings of 600 lecture minutes by using pre-made guided notes in their

This figure shows how questions and tables can be placed into notes to save time for analysis versus copying.

Figure 14: Guided Notes

Title: _____   Date: _____

DQ

ORDER OF OPERATIONS Use each of the symbols +, −, ×, and ÷ to make the following math sentence true.

12 ____ 3 ____ 7 ____ 1 ____ 11 = 0

http://glencoe.mcgraw-hill.com/sites/dl/free/0078740428/589238/m1_nat_wpwb.pdf

CARIBOU	Height at the Shoulder		Weight	
	inches	centimeters	pounds	kilograms
Cows (females)	43	107	220	99
Bulls (males)	50	125	400	180

Make up and answer two questions based on the above chart:

1 _____

engineering course. Figure 14 at left shows an example of guided notes where the question and table are already typed into the notes to save time.

Digital Learning

Using guided notes as a homework assignment is one way to flip the classroom and provide more time for students to practice concepts. Notes can be created using technology. One method is to create lessons, insert what you want students to write in a different color, make a copy, and then replace the color with blank lines. Figure 15 below shows how a set of guided notes is developed.

In addition to using technology to create guided notes, teachers can use a variety of other tools to create meaningful content for students. Instructional videos on specific content are filling the internet.
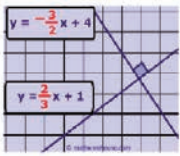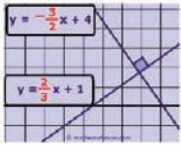
Questions can be embedded into instructional videos thus creating another form of guided notes. Students can view the content prior to the question as many times as they like to answer the question. Digital learning like this is often assigned outside of class time to either present a subject or review one. Teachers can also make their own videos of a lecture and require students to watch it prior to attending class. This is often used in the Flipped classroom model where more time in class is used for practicing the content the student first engages with at home. Again, students can pause or rewatch a video thus alleviating the stress of a lecture that is only a class period long at the secondary level.

By adding guided notes to an instructional video, teachers can scaffold another layer of support for the identified student. The notes provide the structure and organization based on

> Using guided notes as a homework assignment is one way to flip the classroom and provide more time for students to practice concepts.

The figure below shows how guided notes are created in a Geometry course.

Figure 15: Guided Notes Construction

Teacher Notes

If lines are **parallel**, they have SAME slopes.

$y = -\frac{3}{2}x + 4$

$y = \frac{2}{3}x + 1$

If lines are **perpendicular**, they have NEGATIVE RECIPROCAL slopes.

5) If line l has an equation of y = 5x - 12:

a) What is the slope of a line that is parallel to line l ?

Student Guided Notes

If lines are **parallel**, they have _____ slopes.

$y = -\frac{3}{2}x + 4$

$y = \frac{2}{3}x + 1$

If lines are **perpendicular**, they have _____ slopes.

5) If line l has an equation of y = 5x - 12:

a) What is the slope of a line that is parallel to line l ?

importance of material. The student can then watch the video at their own speed to fill in the notes. Questions can be embedded into the notes, asking the student to process the information at their level.

Conclusion

The use of guided notes compared with student-generated notes helps identified students with the five main areas that research has deemed important for successful note-takers. Recall that these are what Flowers refers to as his five steps to note-taking: decoding, understanding, identifying main ideas, deciding when to write, and speed writing. Students no longer must identify the main idea or decide what to write. By filling in most of the notes, the teacher also reduces the stress of speed of writing for the identified student. They remove some of the decision process by providing the clear organization of material. The fact that students can only record 17–20 words per minute of lecture becomes a moot point.

This style of notes can be individualized by ability level, spacing, and the amount of pre-filled information. Teachers can prepare them ahead of time to follow the lesson format and provide main ideas. The fact that guided notes also provide key lecture point cues in the information that is left for the student to fill in frees up working memory space saved for decoding and

understanding. Students no longer need to focus on things like words that may be challenging or new. Add in the use of instructional videos that students can watch at home, and students are further freed up to watch the lecture at their own pace or rewatch it, as necessary.

It is evident that guided notes offer educators and students the flexibility of design and use in the classroom and at home. They are a tool that is easy to implement while providing the supports our identified students need.

REFERENCES

Amini Asl, Z. & Kheirzadeh, S. (2016). The effect of note-taking and working memory on Iranian EFL learners' listening comprehension performance. *International Journal of Research Studies in Psychology*, Vol. 5, No. 4, 41 – 51. http://doi.org/10.5861/ijrsp.2016.1583

Aragón-Mendizábal, E., Delgado-Casas, C., Navarro-Guzmán, J. I., Menacho-Jiménez, I., & Romero-Oliva, M. F. (2016). A Comparative Study of Handwriting and Computer Typing in Note-taking by University Students, Análisis comparativo entre escritura manual y electrónica en la toma de apuntes de estudiantes universitarios. *Comunicar, 24*(48), 101-107.

Boyle, J. R. (2012). Note-taking and secondary students with learning disabilities: challenges and solutions. *Learning Disabilities Research & Practice* (Wiley-Blackwell), 27(2), 90-101. http://doi.org/10.1111/j.1540-5826.2012.00354.x

Boyle, J. R. (2013). Strategic notetaking for inclusive middle school science classrooms. *Remedial and Special Education, 34*(2), 78-90.

Boyle, J. R., Forchelli, G. A., & Cariss, K. (2015). Note-taking interventions to assist students with disabilities in content area classes. *Preventing School Failure, 59*(3), 186–195. http://doi.org/10.1080/1045988X.2014.903463

Bui, D. C., Myerson, J., & Hale, S. (2013). Note-taking with computers: Exploring alternative strategies for improved recall. *Journal of Educational Psychology, 105*(2), 299-309. http://doi.org/10.1037/a0030367.

Crawford, M. J., (2016). Lecture notetaking: questions and answers. *The Language Teacher*, 40.2.

Greenfeld, R. B. (2019). *A Causal-Comparative Study on the Equivalence of Algebra Notetaking Styles and Academic Achievement* (Doctoral dissertation, Grand Canyon University).

Gur, T., Dilci, T., Coskun, I., & Delican, B. (2013). The impact of note-taking while listening on listening comprehension in a higher education context. *International Journal of Academic Research, 5*(1), 93-97. http://doi.org/10.7813/2075-4124.2013/5-1/B.16

Harrison, J. R., Bunford, N., Evans, S. W., & Owens, J. S. (2013). Educational accommodations for students with behavioral challenges: A systematic review of the literature. *Review of Educational Research, 83*(4), 551-597.

Jansen, R. S., Lakens, D., & IJsselsteijn, W. A. (2017). An integrative review of the cognitive costs and benefits of note-taking. *Educational Research Review, 22*, 223-233.

John, Y. J., Joseph, S., & Sampson, A. (2014). Prospective teachers using guided math notes to differentiate mathematics instruction. *International Journal of Research in Social Sciences*, Vol. 4, No. 1, 64 – 76.

Lam, S. F., Jimerson, S., Wong, B. P., Kikas, E., Shin, H., Veiga, F. H., ... & Stanculescu, E. (2014). Understanding and measuring student engagement in school: The results of an international study from 12 countries. *School Psychology Quarterly, 29*(2), 213.

Larwin, K., Dawson, D., Erickson, M., & Larwin, D. (2012). Impact of guided notes on achievement in K-12 and special education students. *International Journal of Special Education, 27*(3), 108-119.

Lazarus, B. (1991). Guided notes, review, and achievement of secondary students with learning disabilities in mainstream content courses. *Education & Treatment of Children (ETC), 14*(2), 112.

Lazarus, B. (1993). Guided notes: effects with secondary and post-secondary students with mild disabilities. *Education and Treatment of Children, 16*(3), 272-289. http://www.jstor.org/stable/42899317

Nakayama, M., Mutsuura, K., & Yamamoto, H. (2013). Effectiveness of instructional suggestions for note-taking skills in a blended learning environment. *Proceedings of the International Conference on E-Learning*, 333-339.

Nakayama, M., Mutsuura, K., & Yamamoto, H. (2016). Lexical analysis of student's learning activities during the giving of instructions for note-taking in a blended learning environment. *International Journal of Educational Technology in Higher Education*, Vol. 6, No. 1. http://doi.org/10.7763/IJIET. 2016.V6.648.

Nakayama, M., Mutsuura, K., & Yamamoto, H. (2017). The possibility of predicting learning performance using features of note-taking activities and instructions in a blended learning environment. *International Journal of Educational Technology in Higher Education*, 14:6. http://doi.org/10.1186/s41239-017-0048-z, 333-339.

Peverly, S. T., & Sumowski, J. F. (2012). What variables predict quality of text notes and are text notes related to performance on different types of tests? *Applied Cognitive Psychology, 26*(1), 104-117. http://doi.org/10.1002/acp.1802

Polloway, E., Patton, J., Serna, L. & Bailey, J., (2013). *Strategies for teaching learners with special needs* (10th ed.). Upper Saddle River, NJ: Pearson. ISBN-13:97801326156.

Reeve, J., & Lee, W. (2014). Students' classroom engagement produces longitudinal changes in classroom motivation. *Journal of Educational Psychology, 106*(2), 527.

Rosen, S. M., Boyle, J. R., Cariss, K., & Forchelli, G. A. (2015). Changing how we think, changing how we learn: Scaffolding executive function processes for students with learning disabilities.

Smith, K., & Clason, D. (2017). Using Blanks in Guided Lecture Notes.

Sujarittham, T., Emarat, N., Arayathanitkul, K., Sharma, M. D., Johnston, I., & Tanamatayarat, J. (2016). Developing specialized guided worksheets for active learning in physics lectures. *European Journal of Physics, 37*(2), 025701.

Tinajero, C., Lemos, S. M., Araújo, M., Ferraces, M. J., & Páramo, MF (2012). Cognitive style and learning strategies as factors which affect academic achievement of Brazilian university students. *Psicol. Reflex. Crit.* [online]. 2012, vol.25, n.1, pp. 105-113. ISSN 0102-7972.

Watt, S., Vajoczki, S., Voros, G., Vine, M. M., Fenton, N., & Tarkowski, J. (2014). Lecture Capture: An Effective Tool for Universal Instructional Design? *Canadian Journal of Higher Education, 44*(2), 1-29.