THE EFFECT OF USING GUIDED NOTES FOR AT RISK HIGH SCHOOL SCIENCE STUDENTS

by

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July 2011

DEDICATION

I would like to dedicate this capstone to my husband, Dirk. It has been a difficult two years and he has been my rock when I have needed a solid place to land but also a stick when I have needed a nudge to get back to work. A project like this takes more than one person to be a success. He has been my silent partner that has listened, criticized, implored, and cheered me on.

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ABSTRACT

The Take Flight Program in Albion, NY had 20 students who took the Living Environment science class. This study examined the use of a guided note strategy to replace the traditional science notebook for these students. Over the course of three weeks the effectiveness of the guided note packet was measured with quiz scores, concept map preparation, student attitude and final test scores. Results suggested an improvement in attitude and improved test scores.

INTRODUCTION AND BACKGROUND

Project Background

Teaching Experience & Classroom Environment

I am one of four Living Environment teachers at Charles D'Amico High School in Albion, NY. Albion is a community of 14,000 people located between Rochester and Buffalo. There are 783 students in the high school. The demographics of the school are 85% Caucasian, 7% African American and 6% Hispanic (Education.com, 2009). The school day is divided by block scheduling, consisting of four blocks of 85 minutes. Science courses are either 20 weeks, which end in January or 40 weeks which end in June. Both courses end with students taking the New York State Regents Exam for Living Environment, which is required for graduation.

I currently teach two 40 week blocks of 36 students with a cultural make up of 75% Caucasian, 17% Hispanic, and 8% African American. The grades are mixed for science classes with the majority freshmen and sophomores but I also have a few juniors and a senior. The school district is considered by New York State to be a high needs school because 34% of our students receive free or reduced lunches (Education.com, 2009).

The Living Environment course is a mix of class work and a minimum of 1200 minutes of lab time, which is required by the state. The science department is driven by test scores. At my first school-wide faculty meeting to start the year each course in the high school science department had the previous year's test scores displayed on the

power point presentation given by the superintendant. Teachers are expected to turn in outstanding results with few failures.

Students are expected to do well and are assessed once during the year with a department common assessment in the form of a mid-term exam. While there are common tests and labs done by all four teachers who teach Living Environment, there is no common form of note taking used by all teachers during the class.

I became concerned regarding the use of science notebooks mid way through a 20 week course. When I discussed grades with each student, I asked if they used the notebook as a study tool. I was surprised when more than 80% of the students told me they did not. The attitude seemed to be that they would only take notes to satisfy my requirement for a notebook grade. Beyond the initial taking of the notes presented to them during class, they did not use the notebook to study or to do homework. I began examining how I could change the note taking style in the classroom by creating a better notebook that students could use as a study tool.

During the 2010-2011 school year I was asked to teach a select group of students in the Take Flight (TF) program. Established in 2005, this program was created for at risk freshman students. Previous data revealed that students coming into the ninth grade with low eighth grade test scores, failing grades and poor attendance were more likely to drop out of school early. This program was created to give these students more individualized attention in smaller classes with a core group of five teachers.

It has been found that as students make the transition into the high school, adolescents experience a large, impersonal, competitive, and grade centered environment

than they had in middle school. Mizelle and Mullins (1997) found that as students make the transition into high school, many young adolescents experience a larger, more impersonal, more competitive, and grade-oriented environment than they experienced in middle school. Together with low academic achievement, these factors put students at risk for dropping out of school early in their high school education.

There were 20 students in my TF class and I had a teaching assistant whose role was to help keep students on task. Of the 20 students, 70% were Caucasian, 20% were Hispanic, and 10% were African American. The males outnumbered the females five to one. These students were very immature and had difficulty sitting for an 80 minute block. Most students possessed few organizational strategies, did not fear failure, and generally did not come to school to learn but to socialize.

Content notes for science were given via power point and students were expected to copy down the information given. The notes were done in outline form and students could add relevant information as the material was discussed. All necessary diagrams were glued into the notebook. It became apparent quickly that on the subsequent class day the students could not find the notebook, not read their own hand writing and would not take any missing notes for absent days. More often than not I found the notes were not sequential even though I would require a specific notebook set up. This group of students needed an alternate method of note taking that was easy to read, useful for studying and that helped them to enjoy the class without being a stressing factor.

Focus Question

A desire for a note taking style that would match the needs of the TF students lead to the focus question for this research: What is the effectiveness of a guided note strategy for at risk high school science students? In looking at the main focus of this research I also examined the following sub questions:

Will guided notes contribute to short and long term retention of science material?

Will the use of guided notes increase comprehension of science content for low achieving students?

Does the notebook style contribute to a complete notebook useful for studying?

Does the notebook style improve student attitude toward note taking?

CONCEPTUAL FRAMEWORK

Note taking is synonymous with secondary education. It has long been the tradition for teachers to speak and students to write down those points. Stencel (2001) states that note taking helps students in any classroom to pay attention and concentrate on the presentation. The act of writing gives the student something to do instead of passively listening to the lecture being given. Gray and Madson (2007) state note taking is an engagement of the student with the material. A student will select what is important to write down as he listens to, or watches, a teacher present the content.

The content needs to go through the interpretive process of being stored within the framework of other knowledge. It can then be retrieved when needed. The classroom strategy of note taking is for the purpose of encoding and external storage. Encoding is the actual recording or committing to paper, the important details of the lesson, while storage is the result of reviewing the notes at a later time (Arslan, 2006; Katayama & Robinson, 2000; Kiewra & DuBois, 1991). If the purpose of note taking in science is to enhance recall of the important material taught by the instructor, then the act of encoding must be examined so that the student has the best material with which to engage in the storage process.

Research has shown that students can be taught the strategy of note taking with success. Pai-Lin, William, Hamman, and Hendricks (2008) tested the effectiveness of direct instruction of note taking with third grade students in science class. With oral and written cues from the teacher, students were able to take notes on the important information to increase their understanding of the science content. Abell (2006) wrote that fourth grade students engaged in reflective writing, reasoning, and comparing a science topic could express with greater understanding the science than those that did not write the information. A California school district, using Abell's research, instigated a science based instruction that included the use of a science notebook and saw scores increase on science writing proficiency tests.

Note taking has been the subject of several studies concerning learner disabilities. The encoding of material is a struggle for students with any learning difficulty. The note taker is an "independent and active processor who must bear adequate background

knowledge, engage memory processes, and deploy learning strategies if they are to maximize note taking and achievement" (Kiewra, 1988, p.40). This puts the special education student, who is integrated into the high school science class, at a disadvantage. In a study by Lazarus (1991) six learning disabled (LD) students were instructed in a specific note taking technique using a template and then they were given note review time. The test scores for these students improved significantly. It was concluded that the students with LD could score closely with their non LD peers when taught a note taking strategy. The issues faced by LD students in the upper levels, especially science classes, is the complexity of the material and the speed of the delivery, allowing little time to process the information. These students often became frustrated and aborted the note taking altogether (Konrad, Joseph, & Eveleigh, 2009). LD students are often allowed a set of printed notes directly from the teacher's presentation yet this often leads to student passivity in class. When not engaged directly with the encoding process, the student misses out on this first interaction with the material, thus hampering the external storage process (DeWinstanley & Bjork, 2002; Katayama & Robinson, 2000; Kiewra & DuBois, 1991). Students who were involved in the generative process of note taking using a directed framework showed increased recall abilities that did not occur for students who missed the encoding process and worked only at external storage of the provided notes (Kiewra & DuBois, 1991; Lazarus, 1991).

Direct instruction of note taking can produce a deeper understanding of the material, increase students' recall and retention of subject matter (Kiewra 1985; Kneale, 1998; Spires & Stone, 1989). Faber, Morris, and Lieberman (2000) used a controlled

experiment and gave direct instruction to one class of students on the process of note taking. This training was withheld from another class, and students were allowed to take notes however they chose. The research found that both high and low level students gained a stronger comprehension of material after deliberate instruction on note taking than did the non-trained group.

Research examining total student control in the encoding process, starting with lined paper has had mixed results. In early studies by Kiewra (1988), learners who had a large working memory capacity profited from note taking, no matter the method they employed. Students with a low memory capacity were "debilitated" by the prospect of note taking. Teaching students how to generate their own outline or knowledge map of the lectures was found to benefit learning as long as the student used the method taught (Foos, Mora, & Tkacz, 2004). Arslan (2006) found that when students were given only the headings of the lecture they could complete the outline correctly. When students took notes that required significant levels of engagement, the complete encoding process and external storage of the material was more effective (deWinstanley & Bjork, 2002). Although giving students a start on their notes by providing the headings worked for some of the students, there were still issues of incompleteness.

Students at the high school level are expected to come into class with the skill of note taking already mastered. This is not often the reality. Students who recorded their own notes typically wrote very incomplete notes, as little as 20% to 40% of the points considered important by the teacher (O'Donnell & Dansereau, 1993). A key finding in quantitative and qualitative analysis of note taking done by Baker and Lombardi (1985)

indicated that student generated notes contained only 25% of the material the instructor deemed important and only 50% of the targeted main points. A gender difference has also been observed in note takers. Junior high girls recorded significantly (32%) more of the important points than boys (23%) and girls outperform boys on various tests (Baker and Lombardi, 1985). The conclusion was that complete notes lead to a better test score (Risch & Kiewra, 2001).

One method of note taking that could ensure that students are engaged during the process and that notes are complete is the guided note (GN). This method was defined as "a teacher prepared handout that guides a student through a lecture with standard cues and prepared space in which to write the key facts, concepts, and/or relationships" (Konrad, Joseph, & Eveleigh, 2009, p.423). At the collegiate level, several studies have been carried out to examine the effectiveness of GN when compared to student prepared notes or complete teacher notes. Three research studies involved a total of 125 college students across several disciplines. The results were all similar. Students using guided notes scored higher on an assessment than did students with no notes or traditional, student derived notes (Austin, Lee, & Carr, 2004; Austin, Lee, Thibeault, Carr & Bailey, 2002; Neef, McCord, & Ferreri, 2006).

William Heward (2001) found that GN was a low cost and very efficient method to promote active engagement during class lectures. Stencel (2001) found the GN to be so successful that he printed and bound his in book form for his students to purchase at the college bookstore. It was found that students stayed engaged and on task using the GN because focusing techniques were built in. Students needed to underline, circle, label,

color code, answer questions, and add information as the lecture progressed (Stencel 1998). Keeping students engaged is the first key to their success at filling out any note taking framework. The interactivness of the GN allowed the students to participate in the class by listening, answering questions, observing instruction and still have them attentive to the note packet as the teacher moved through the material.

In a study of undergraduates, the effectiveness of students filling out partially completed notes (GN) as compared to students given a set of complete notes to study, found scores on an application test showed better comprehension when the partially completed notes were used. The conclusion stated partial notes allowed for the encoding effect, with students learning more because they were involved in the recording process. Researchers concluded that by actively generating some of the notes students deemed these notes to have more meaning and thereby more value when studying (Katayama & Robinson, 2000). Guided notes also forced the instructor to stay within the framework so students have the required information (Heward, 2001). The GN was found to focus the student's attention when prepared with material significance in mind (Konrad, Joseph & Eveleigh, 2009).

The advantage of the guided note is for the student to have a complete set of notes of the content. It has been shown that taking a complete set of notes correlates to better grades at the college level (Boyle 1996; Kiewra 1985; Larson 2009). The student who used structured notes in review sessions showed an increase in scores compared to those who did not have review time or used their own notes (Kiewra 1988; Larson 2009). Knight and McKelvie (1986) studied 144 college psychology students and found students

that reviewed their notes performed higher than those who did not review suggesting a strong support for the external storage function of note taking rather than the encoding function for the purpose of recall.

Summarizing has been found to be one method of increasing the retention of material. King (1992) and O'Donnell and Dansereau (1993) found that students recalled more of the lecture using a cooperative review summarizing technique rather than just reviewing the note content. Heward (2001) suggested imbedding supplemental activities into the GN to increase the external storage function of notes.

METHODOLOGY

Treatment

Parents received the Research Permission Form one month prior to the start of the treatment period (Appendix A). This form was mailed out through the district office and required a guardian signature and returned in the SASE provided. This allowed all students to participate in the unit and data collection process. The research methodology for this project received an exemption by Montana State University's Institutional Review Boards and compliance for working with human subjects was maintained.

One month before the start of the treatment period students in the Take Flight science class (N=17) were given the Pre-Treatment Survey to determine their personal attitudes and habits in keeping and using a science notebook (Appendix B). This survey at the beginning of the treatment provided a baseline of student attitudes toward note

taking that was used in the classroom from the beginning of the year until the treatment started in February. I used the guided note treatment at the beginning of the DNA unit.

The DNA chapter was taught with basic PowerPoint notes, activities, labs, and the Guided Note Packet (Figure 1). The packet was arranged to follow a simple power point presentation. Photographs and "extras" that I would have added for my other classes were left out for the Take Flight students. This was a recommendation from a colleague in the history department who noticed this group tended to be sidetracked by deeper explanations.

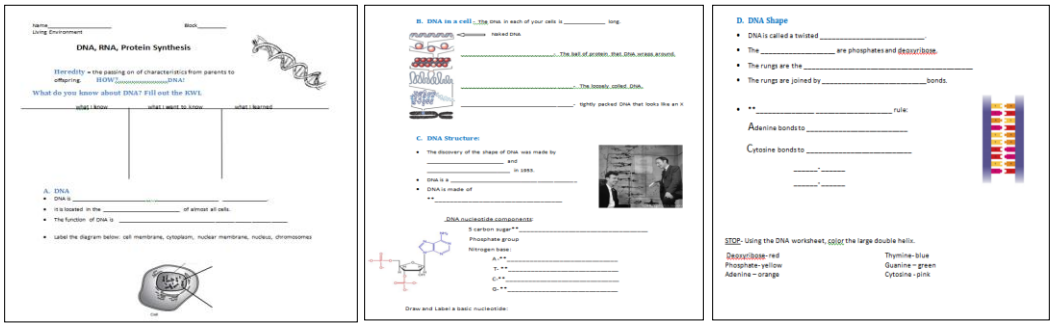

Figure 1. Guided Note Packet.

As the chapter progressed, students used the partially completed packet and filled out the appropriate information. As a slide came up I highlighted or underlined the word or phrase that they needed to fill in. Activities such as partner sharing, labs and summarizing were incorporated into the packet. These directly placed review techniques allowed students to interact with the material. Students used guided notes for the entire chapter.

Science vocabulary has traditionally been difficult for students to pronounce let alone remember definitions. I wondered if the guided note style would contribute to a complete set of notes that were useful for studying. Students used the packet to make flash

cards for the chapter in preparation for the vocabulary quiz. The DNA Vocabulary Quiz (Appendix E) was used to assess short term memory of the required words and was used again to evaluate long term retention of material. For review before the test, students created a concept map using only the information in the packet.

Data Collection

Both qualitative and quantitative data were gathered using a variety of sources. Student attitude and notebook habits were analyzed at the beginning of the DNA unit using the Pre-Treatment Survey (Appendix B). The anonymous survey was used to determine overall class thought, attitude, and use of the original style of notebook.

The Guided Note Packets were assessed for completeness at the end of the chapter, with the student receiving a satisfactory or unsatisfactory grade for the work done. To assess whether the guided note packet was useful for studying, students created a concept map using the note packet two class days before the scheduled test. The Concept Map Rubric was used to grade the maps (Appendix C). The work was examined for hierarchy of concepts and correct connections between words that were presented in the packet as well as map neatness. The maps were given a score up to nine for a correctly prepared concept map.

Comprehension of the material was determined by the DNA test score. This score was compared to previous tests that used the original science notebook. The ecology I and II tests were given in October and November. All three tests were based on 25-30 questions taken from previous NY State Regents exams.

Short and long term memory of the material was assessed using the DNA Vocabulary Quiz that students took at the end of the unit (Appendix D). The long term retention of the material was assessed seven weeks after the final test. Students were not given any notice of the quiz. Passing was determined by a score of 65 or higher. This data was compared to the original quiz to determine if the student retained the important unit vocabulary.

At the end of the unit, the students took the Post Treatment Survey to assess their attitude toward the Guided Note Packet (Appendix F). This was compared to the survey at the beginning of the treatment. Students were randomly selected to participate in an interview using the Student Interview (Appendix E). The students were selected based on their availability during the last block of the day. This interview was used to assess specific student's likes and dislikes toward the guided note. The students were also allowed to make any comments regarding the use of the packet versus the traditional notebook. All sub questions and matching data sources have been triangulated in Table 1.

Table 1
Data Triangulation Matrix

Question	Data source 1	Data source 2	Data source 3
Will the guided note packet contribute to short and long term memory?	Unit vocabulary quiz	Post unit vocabulary quiz	
Will the use of guided notes increase comprehension of science content?	DNA test score	Ecology test score	
Does the guided note style contribute to complete notes useful for studying?	Note Packet assessment	Concept Map	Post Treatment Student Survey
Does the notebook style improve student attitude toward note taking?	Pre Treatment Survey	Post Treatment Survey	Student interview

DATA AND ANALYSIS

The treatment began in February with the DNA unit. Students (*N*= 17) were given the Pre Treatment Survey (Appendix B) to assess thoughts on their current science notebook. The results stated less than half, 47%, of the students felt their science notebook was important and only 24% reported they used the notebook to review class material. A majority of the students, 70%, admitted taking the notes yet only 12%

enjoyed the note taking process. Students were asked in the Student Interview (Appendix E) what problems they encountered taking the notes in the original science notebook and 75% of the students answered the notes were too long and the wording was too difficult. The Pre Treatment Survey also showed 24% of students admitted to using the notebook for review. During the interview when asked about using the original notebook, two students said it just was not readable and as one student stated, the "topics felt jumbled." The Student Interview further verified that students didn't like taking notes in the original notebook. One responded in the interview that the original style of note taking took too long so she "only took some of the notes and would draw" during the explanations of the material. All the students interviewed stated that the words used in science class were too difficult and writing these out was too much work. Several admitted to "shutting down."

A majority of the students stated in the pre survey they took notes every time they were given, yet my observation of their notebooks revealed a different story. Several of the notebooks had missing sections and some were not legible. Most students did not follow the format given in class on proper note taking style. This was further proof that students did not see the notebook as important.

The DNA Guided Note Packet was implemented at the beginning of the DNA unit (Appendix G). After the treatment, students were more receptive to note taking. On the Post Treatment Survey (Appendix E) concerning the use of the note packet, 64% of the students agreed the packet was important, up from 47%, and 29% of the students stated they enjoyed taking notes with the guided packet, up from 12% (Figure 2).

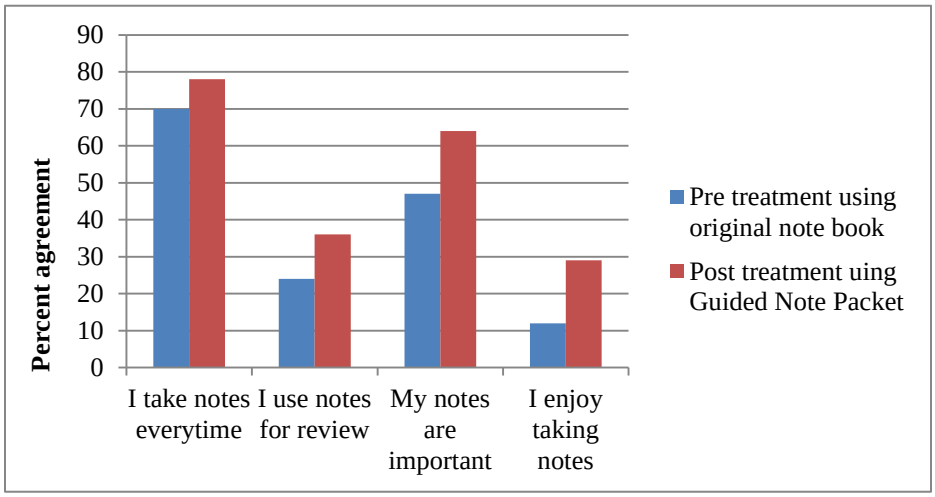

Figure 2. Student Survey Pre and Post Treatment Affirmative Answers, (*N*=17).

An adequate concept map, using the Concept Map Rubric (Appendix C) was created by 71% of the students. Clear connections were made for the components of the DNA structure in these maps. I observed students as they struggled to find the information in the packet, yet once the correct page was found, students could begin to set up the map independently. Each map was unique, but students were confident using the note packet to create appropriate maps (Figure 2).

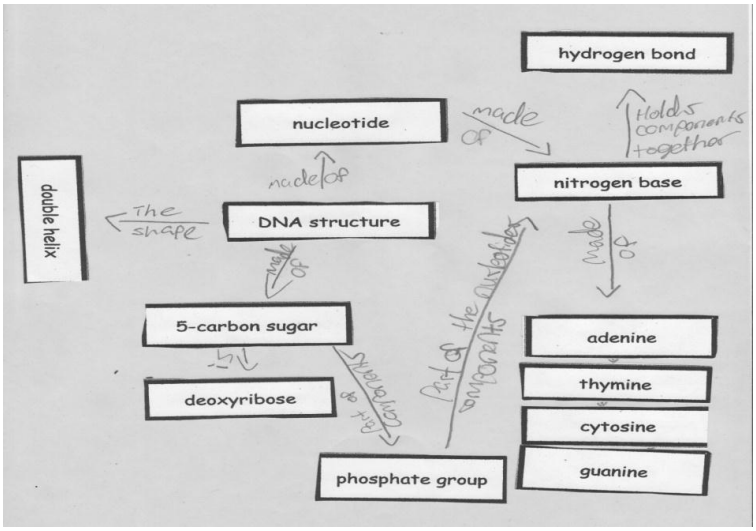

Figure 3. Student Concept Map created using the guided note packet.

The initial DNA Vocabulary Quiz (Appendix D) was given at the end of the treatment, before the chapter test. A majority of the students, 69%, scored above 90 percent and 15% of the students scored between 70% and 80%. Only two students failed the quiz. It was my hope that the use of the note packet would lead to long term retention of vocabulary. To determine long term retention of vocabulary, students were given the same vocabulary quiz seven weeks after the chapter test. Only 15% scored above a 90. While the majority, 69%, passed the quiz, only four students increased their score (Figure 4).

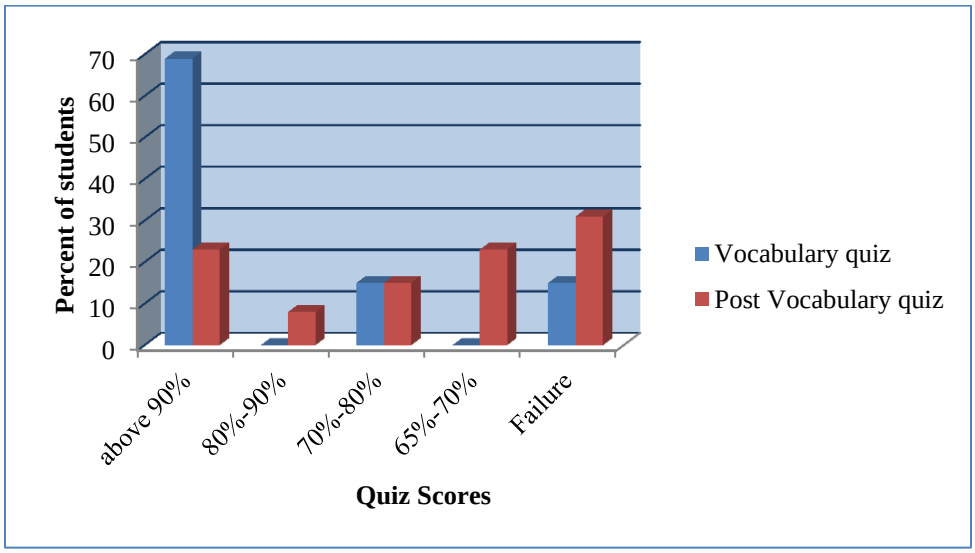

Figure 4. Student DNA Vocabulary Quiz Comparison, (*N*=13).

The final chapter test was given after spending nearly two weeks with the material, which was actually five class days since students are seen every other day. In order to study for the test students needed to have a completed packet (Figure 5). Only 75% of the students had a complete packet before the test. Most were missing only one or two items. Only one student had more than 15% of the material missing. I observed

several students offering to help him fill out his packet. The packets were used to complete a review sheet and all students were successful at completing this in class.

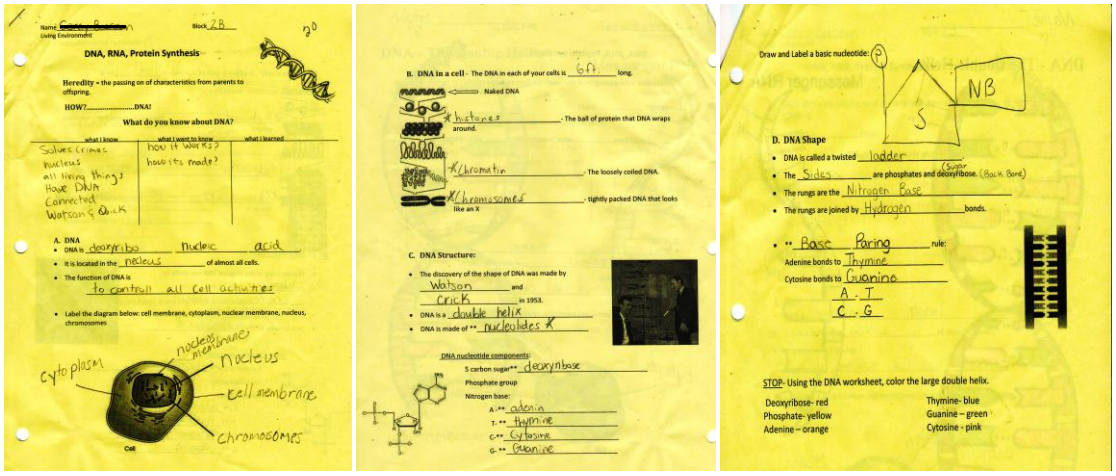

Figure 5. Student Completed Note Packet.

The test scores indicate a correlation between the guided note packet and comprehension of the material. The DNA test was compared to two ecology tests that were given in October and November when students were taking their own notes in their original notebooks. Overall the results showed students had a better understanding of the DNA material than the ecology material. The biggest difference in the two contents was the method of note taking. The majority of students, 74%, passed the DNA test while only 65% and 42% passed the ecology tests, I and II respectively (Figure 6).

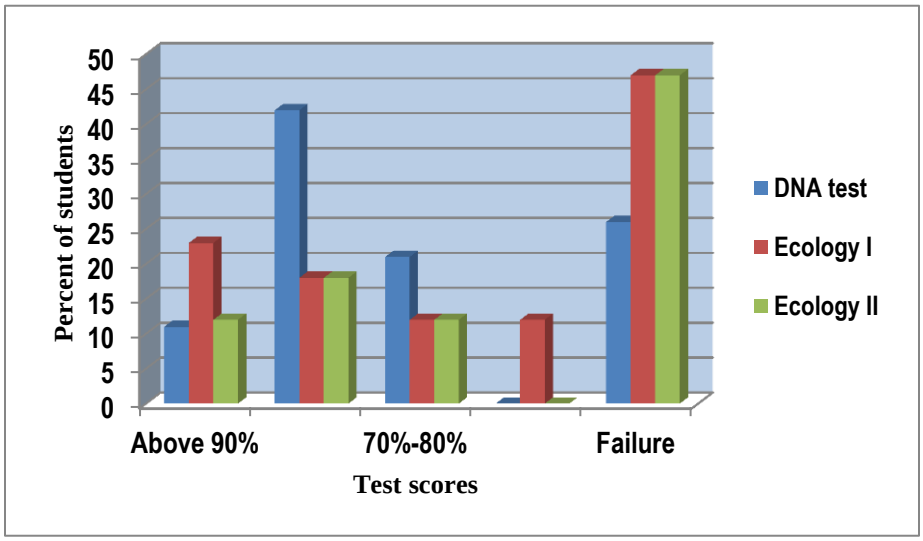

Figure 6. Student Test Comparisons, (*N*=17). DNA material taught with guided note and ecology material taught with the original notebook style.

INTERPRETATION AND CONCLUSION

After inspecting the original science notebooks, I found many problems. Most of them were not legible. Four of the students could not stay within the lines of the paper sufficiently to create a neat page of notes. One student actually said to me, "I can't really read this," referring to his own notebook. When asked what their thoughts were on notebooks overall, 33% stated they did not want to take any notes. Two students had alternative suggestions, "worksheets work better for me" and "print out the notes for us."

My observations on the use of the note packet clearly confirmed they were a welcome replacement for the notebook. Implementation of the guided note packet was met a sigh of relief. One of the students gave an audible, "thank you." On the first day of using the note packet, students were observed filling out the KWL on the first page

without the usual repeated prompting. Engagement with the material was evident. The student reflections on the Pre and Post Treatment Surveys showed clearly that this was an engaging style of note taking for these students. While all of the surveys questions showed a positive increase in their attitudes toward note taking, it was the enjoyment of note taking that increased by 59%. While these are not students that enjoy school, more of them enjoyed taking notes using the packet and considered the packet important (Figure 2).

The test scores were very heartening to me as a teacher. The Regents Exam in June covered a small part of every subject that was taught so consequently all of our chapter tests are based on old exam questions. The note packet proved very useful to the students, as they did worksheets and reviewed for the test by making a concept map. The passage of the test by 74% of the students was our best exam score all year. I attributed this to the note packet. As the research stated, students needed a complete set of notes that was useful for review (Larson, 2009). Due to the set up of the notes it was easy for students to see what was missing by the empty spaces. Students did not feel so overwhelmed with getting notes from another student if they were absent. Students helped each other to fill in missing pieces of information.

The concept map was a good indicator of the value of the note packet. Students were at first very put off with the idea of working to create a map. Any extra work they have to do that is not based on a set model is difficult. Using the packet proved easy as all the information was there and students needed to just organize it in a way they could understand. Of the 16 students that were in class to make the map, 11 had adequate maps

that demonstrated correct understanding of hierarchy of the concepts and correctly linked terms. The five students that failed this assignment were students not interested in working. Of those five, two did fail the chapter test. Concept maps have been shown to be successful tools for constructing knowledge but the students need a complete set of notes in order to do this. The guided note provided this.

VALUE

The implementation of the guided note packet for at risk students proved to be valuable in two respects. My students had struggled with note taking at the beginning of the year due to the overwhelming amount of information and the speed at which the class moved. This made for a difficult class when it came to note taking. Students were disruptive, argumentative and some even refused to take notes, slowing down the entire class. Kiewa (1988) reported that students with a low memory capacity were debilitated by the prospect of note taking. This was seen in the Take Flight students.

When I switched to the guided notes and allowed the students to fill in the missing pieces of information, the students had a complete set of notes in the end and this proved effective for good quiz and test scores. This confirmed the findings of Risch and Kiewa (2001) who concluded a complete set of notes leads to better test scores.

I have found that the transition for some middle school students to high school science class is difficult. If the use of a typical science notebook is too complicated for some students to handle, then it is my responsibility as a teacher to find a solution. After

seeing the results of using the guided note packet with my at risk students I believe this method should be an alternative for my regular classroom students.

The literature suggested that the student with divided attention resulted in poorer memory than full attention does (DeWinstanley, 2002). I found that the guided note kept students on task and their attention stayed on the note packet, thereby increasing understanding and memory. The lack of extras for these students worked well to keep them focused. They are students who cannot take a lot of stimulation and keeping the notes taking process simple kept their attention.

As a teacher I learned that less really can be more when working with at risk students in science. My practice as a science teacher was to accommodate the mid to advanced student. I gave these students the basics, then layered in material to offer depth to the topic. I have always felt this would give my students a stronger foundation and provide more interest for the science. This did not work for the at risk students; too much information made the topic overwhelming. As a teacher who believes in differentiated instruction, I now realize it may also mean differentiating the note taking style.

I have learned that a survey, anonymous or not, is helpful to understanding what students are thinking and doing in the classroom. The survey I used gave me good insight into the class as a whole and how they used the notebook. I will use a survey again but not anonymously. I really wanted the chance to give individual students help with keeping a notebook. I will be using this survey in late September to assess next year's students.

This is the last year for the Take Flight program. Beginning in September, at risk students will be in the classroom with the regular student population. While this will be difficult for both student and teacher, I believe I have discovered a better method of handling the overwhelming task of note taking. While I will not design a packet for every student, it would be beneficial for those that struggle severely. I will identify these students using the Student Survey and evaluating their notebook in late September. This will allow me to adjust to student needs, altering the way notes are taken in my high school science classes.

The process of conducting a classroom research project was very fulfilling to me as a teacher. I want to make decisions that will benefit my students and having concrete data to justify changing classroom strategy is important. I would like to conduct another research project in the future but I will do it with a colleague. Having online classmates during this process was helpful. Any future projects I undertake will be collaborative.

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APPENDICES

APPENDIX A

RESEARCH PERMISSION FORM

Appendix A
Research Permission Form

SUBJECT CONSENT FORM
FOR
PARTICIPATIONIN HUMAN RESEARCH AT
MONTANA STATE UNIVERSITY

Project Title: The Effects of Using Guided Notes for At Risk High School Students

The purpose of this research project examines the use of guided notes in science class and its effect on content understanding, test scores, short and long term memory and science attitude. For this project, students will be asked to complete a Student Notebook Survey, Unit Test, On-Line Post Unit Quiz and a Student Interview as well as several Formative Classroom Assessments. All of these data collection instruments fall within the area of common classroom assessment practices.

Identification of all students involved will be kept strictly confidential. All of the students involved in the research will remain unidentified in any way, and their levels of environmental interaction will be assessed and noted. However, ten students will be randomly selected to participate in an interview concerning the guided note and science class. Students will be selected on availability for the interview during the school day. Nowhere in any report or listing will students' last name or any other identifying information be listed.

There are no foreseeable risks or ill effects from participating in this study. All treatment and data collection falls within what is considered normal classroom instructional practice. Furthermore, participation in the study can in no way affect grades for this or any course, nor can it affect academic or personal standing in any fashion whatsoever.

There are several benefits to be expected from participation in this study. Students currently in the science class may benefit from this note taking style. It could provide a better understanding of the content leading to a successful Regents Exam score. The study will also benefit the teaching staff of the Science Department as we seek ways to improve science instruction.

Participation in this study is voluntary, and students are free to withdraw consent and to discontinue participation in this study at any time without prejudice from the investigator.

Please feel free to ask any questions of Mrs. Climenhaga via e-mail, phone, or in person before signing the Informed Consent form and beginning the study, and at any time during the study.

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, _____ *(name of subject),* agree to participate in this research. I understand that I may later refuse to participate, and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: _____

Parent or Guardian Signature_____

Investigator: _____

Date: _____

APPENDIX B

PRE TREATMENT SURVEY

Appendix B
Pre Treatment Survey

Pre-Treatment Student Survey

As part of my Masters Program at Montana State University I will be conducting a research project. The focus of this project will be note taking in science class. It would be helpful to me if you would fill out the following questions honestly. I want to know your feelings on the subject of note taking in class. Your answers will be anonymous.

Thank you for your assistance, Mrs. Climenhaga

You will answer by circling your response

.

SA = strongly agree, A = agree, D = disagree, SD= strongly disagree

1. I take notes every time there is important information.	SA	A	D	SD
2. My notebook is very important to me.	SA	A	D	SD
3. I use my notebook to review the class material each day	SA	A	D	SD
4. I take good notes.	SA	A	D	SD
5. My notebook is readable and complete.	SA	A	D	SD
6. I use my notebook several times a week as a study tool.	SA	A	D	SD
7. I enjoy taking notes in class.	SA	A	D	SD
8. I have difficulty listening and taking notes	SA	A	D	SD
9. I think getting a notebook grade is fair.	SA	A	D	SD

10. Do you have any other thought on notebooks or note taking that you would like to add?

APPENDIX C

CONCEPT MAP RUBRIC

Appendix C
Concept Map Rubric

	1	3	5
Relationships between concepts	Unclear relationships between concepts. Components and sub components unorganized.	Relationship between concepts evident. Components and sub components present	Clear relationship between concepts. Hierarchical organization from components to sub components.
Cross Linkages	Linkages do not make sense and are not explained. Information is inaccurate.	Logical linkages. Explanation of links unclear. Information is accurate.	Logical linkages. Clear and thorough explanation of links. Information is clear, accurate and precise.
Presentation	Presentation is not orderly.	Presentation is orderly and effective.	Presentation is orderly and visually appealing. Demonstrates effective use of the note packet.

APPENDIX D

DNA VOCABULARY QUIZ

Appendix D
DNA Vocabulary Quiz

_____Histone

_____ Heredity

_____Double Helix

_____Nucleus

_____Base pairing

_____DNA

_____Chromatin

_____chromosomes

_____nucleotide

1. Protein around which DNA coils.
2. The building block (monomer) of DNA.
3. The Location of DNA in the cell.
4. The shape of DNA that resembles a twisted ladder
5. Threadlike structure in the nucleus that contains hereditary information.
6. When adenine matches with thymine and cytosine matches up with guanine.
7. Tightly packed nuclear material. (more tightly wrapped than naked DNA)
8. Passing on of characteristics from parent to offspring.
9. Deoxyribo nucleic acid.

APPENDIX E

STUDENT INTERVIEW

Appendix E
Student Interview

Student Interview Questions

1. At the beginning of the year you took notes in your notebook. Tell me about this method of note taking for you?

2. What were your problems with that method?

3. What are your feelings about using the guided notes?

4. Do you think you improved as a student using the guided notes?

5. Describe your thought patterns as you take notes.

6. Can you keep track of what the teacher is saying when you only have to put in a few words?

7. Did you use your guided notes for doing your other worksheets and vocabulary?

8. How does the guided note packet help you understand the material?

9. Would you change the packet at all?

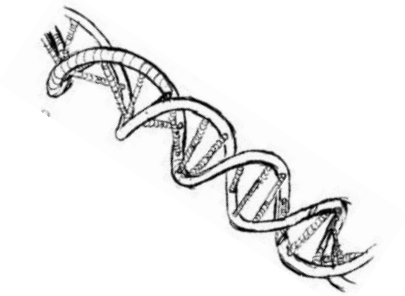
10. Would you like to add anything else?

APPENDIX F

GUIDED NOTE PACKET

Appendix F
Guided Note Packet

Name_____
Block_____
Living Environment



DNA, RNA, Protein Synthesis

Heredity = the passing on of characteristics from parents to offspring. **HOW?.....DNA!**

What do you know about DNA? Fill out the KWL

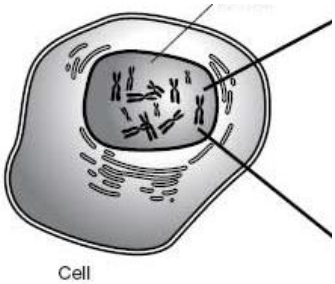
what I **k**now	what I **w**ant to know	what I learned

A. DNA

- DNA is _____ _____ _____.
- It is located in the _____ of almost all cells.
- The function of DNA is

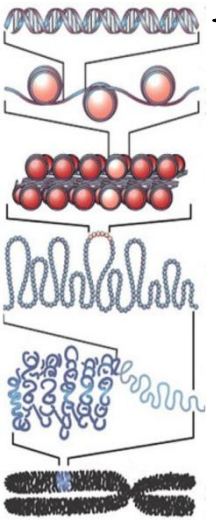
_____

- Label the diagram below: cell membrane, cytoplasm, nuclear membrane, nucleus, chromosomes



Cell

B. DNA in a cell - The DNA in each of your cells is _____ long.



⇐ Naked DNA

_____- The ball of protein that DNA wraps around.

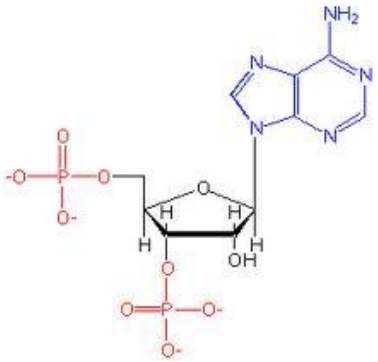
_____- The loosely coiled DNA.

_____- tightly packed DNA that looks like an X

C. DNA Structure:

- The discovery of the shape of DNA was made by _____ and _____ in 1953.
- DNA is a _____
- DNA is made of **_____

<u>DNA nucleotide components</u>:



5 carbon sugar**_____

Phosphate group

Nitrogen base:

A -**_____

T- **_____

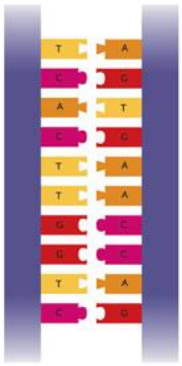
C-**_____

G- **_____

Draw and Label a basic nucleotide:

D. DNA Shape

- DNA is called a twisted _____.
- The _____ are phosphates and deoxyribose.
- The rungs are the _____
- The rungs are joined by _____bonds.



- **_____ _____ rule:

  Adenine bonds to _____

  Cytosine bonds to _____

  _____- _____

  _____- _____

STOP- Using the DNA worksheet, color the large double helix.

Deoxyribose- red
Phosphate- yellow
Adenine – orange
Thymine- blue
Guanine – green
Cytosine - pink

Summarize what you know about the structure of DNA so far.

_____

_____

_____

_____

_____