Rocking Academics with Altered Books: A Scientist and His or Her Scientific Impact on You/How You May Make a Scientific Impact

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Abstract

This action research project investigated instructional methods used to help students think critically and improve district assessment scores regarding themes and concepts across curriculum. The specific themes and concepts included language arts, art and science. A population of 67 students is the subject of the investigation. Also, 69 students were indirectly involved regarding some specific comparisons that were made between a group that did create an Altered Book and a grous that did not. Explicit instruction accompanied with student created techniques and strategies were used to help students extend on their thinking about and comprehension of language arts, art and science. Sixty-seven students including 7 ESL students were a crucial part of this instruction. Findings proved that students learned to make varied and in-depth connections across curriculum regarding language arts, art and science when they were given explicit instruction and created their own Altered Books based on their scientific subjects. Students' ability to think critically across curriculum and improve science scores was evident in post data and their completed Altered Book rubric scores.

Background/Context

In order to conduct a beneficial research project it is essential to pick a topic that is relevant to the life or interests of the researcher. A main focus in our school has always been improving the science scores of students and keeping students engaged with connected interests in more than one subject. Teaching with Altered Books is vital and effective in attaining this specific level of progress and interest in students. This project gives students the opportunity to incorporate what they want to do with what they must do. Students must be able to think critically in various academic areas. With the Altered Book project students are actively engaged in a hands-on project with a purpose that will help them gain academic progress. They are working collaboratively, independently and are able to articulate what they know or have discovered in many ways. Students are able to own every part of their lesson and to share it with others visually and verbally. Teaching with Altered Books, as a foundation for learning, is key to students' being able to know, comprehend, apply, analyze, synthesize and evaluate. The Altered Book project will also help improve their assessment scores regarding science.

The main research question in this study is designed to explore how Altered Books with science as the main focus will impact student thinking and achievement across curriculum, most importantly in science. Sixty-seven students are to be observed in this class. Seven students are classified ESL. Also, 69 additional students including 4 classified as ESL will be looked at for the specific purpose of making comparisons between a group creating Altered Books and a group that does not. The students will be observed during Writers Workshop, Art classes, and Science Journaling.

This topic is very meaningful to the researcher because of the lack of interest and ability to make connections across curriculum regarding language arts, art and most importantly science has been observed in the classrooms during some school years. The researcher is seeking to find solutions that will certainly enhance student learning and his or her affinity for participating at various levels in the classroom. Students need to have the opportunity to initiate and share in their own learning process from beginning to end with a great deal of enthusiasm. They need to be involved in hands-on student driven experiences. The Altered Book project offers all of the attributes mentioned above to students. Without this specific type of instruction in the classroom there will be fewer times to collaborate with peers. Students need a total learning experience involving authentic communication and a presentation of what has been gained in the learning process. The researcher wanted to study the impact on student achievement that can be made when teaching with Altered Books regarding the subject of language arts, art and most importantly science. Researcher's specific questions follow.

1) How will students' scores in group A (Altered Book Group) compare to students' scores in group B (Traditional Instruction) regarding specific areas? How will group A scores for the 1st 9 weeks compare to group A scores for the 4th 9 weeks? More specifically, will the students be able to incorporate and expand on the knowledge of language arts, art and science with the artistic technique of altering a book? Scores to be observed and compared include: Language Arts: Common Formative Assessments (CFA), Art: Construction and Theme, and Science: Texas Assessment of Knowledge and Skills (TAKS) Release and Final Tests.
2) Regarding Language Arts: Will the students demonstrate the ability to apply critical thinking skills regarding Nonfiction Text Features? Will their abilities be made evident in

their Common Formative Assessments and then finally in their completed Altered Books according to the AB rubric?

3) Regarding Art: Will the students' demonstrate a broad understanding of Construction and Theme taught in art class involving portraits, figurative drawing, Colonial portraits and the culminating project of altering a book?
4) Regarding Science: Will the science TAKS Release and Final Test scores improve in group A as a result of the rubric requirements for their Altered Book project?

Research on Project-Based Learning

As we approached our subject of Altering Books as a way to help students think critically regarding themes and concepts across curriculum and improve their science TAKS scores, we also discovered that our Altered Books do indeed already have a firm place in the educational process. They fall under the category of Project Based Learning (PBL). We set out to take a closer look at each component involved: PBL, language arts, art and most importantly science. Next, we delve deeper into what others have to say about Project Based Learning. Then, we looked at other places that the Project-Based Learning was taking place.

Project-Based Learning is a comprehensive instructional approach to engage students in sustained, cooperative investigation (Bransford & Stein, 1993). This is where students collaborate in an effort to discover what is going on. Project-Based Learning differs from inquiry based activity by its emphasis on cooperative learning. Inquiry is traditionally thought of as an individually done activity. Project-Based Learning differs from traditional inquiry by its emphasis on students' own artifact construction to represent what is being learned (Houghton Mifflin, 2009). Language Arts is language, communication, writing, research, logic, informational text, media and literature. Art includes the products of human creativity; the

creation of beautiful or significant things; a superior skill that you can learn by study and practice and observation and artwork such as, photographs or other visual representations. Science is a systematic enterprise of gathering knowledge about the world and organizing and condensing that knowledge into testable laws and theories.

These subjects are so imperative to our every day. All of these concepts require a student to produce, influence, derive and express meaning on various levels not only in school but in life. The Consortium of National Arts Education Associations (1994) expresses that people have an abiding need for meaning- to connect time and space, experience and event, body and spirit, intellect and emotion. They go on to state that people can create art to make these connections, to express the otherwise inexpressible. Students need to be able to express their ability to comprehend concepts relating to various subjects. Teachers need to ensure that integrated curriculum includes innovative lessons and activities that help students tap into their background knowledge and what they are presently learning in all subject areas. This research will help to enhance the curriculum being taught in the classroom by allowing educators to pull together necessary materials for students to use in the technique of altering books. The process of altering books will be used to encompass the elements of language arts, art and most importantly the core subject of science. Highlighting the subject of science with altered books will heighten student interest and participation in the classroom. Interested and participating students will earn higher academic scores.

In *Arts, Neuroscience, and Learning* an article by James Zull, Professor of Biology and Director of the University Center for Innovation in Teaching and Education at Case Western Reserve University (New Horizons for Learning, 2005), Zull states that the researcher understands that the learner feels rewarded when creating new objects or actions. It is further

discovered that due to creativity being based on the creator, the reward system kicks in when we are in control and making things that we have thought of ourselves. Freedom and ownership are part and parcel of the neurochemistry of the arts. James Zull goes on to share in his article that the importance of arts in school is strongly associated with motivation and interest. Students' progress observed by the researcher does align very closely with Zull's findings. Freedom, ownership and interest, was evident in the students' responses and their work on their Altered Books. This includes all students involved.

According to Joy Evans, publisher and co-founder of Evan-Moor Educational Publishers (T. Thomas News Release, 2008), "When children learn about art, they're not just learning about line and symmetry or color and form,…They're learning about creativity, exploration, and innovation. They're learning habits of mind that they'll put to use in all academic areas of life itself." Evans continues with, "…According to research, art instruction helps to develop a specialized group of thinking skills that aren't often addressed in other curriculum areas. These skills include visual-spatial abilities, reflection, self-evaluation, originality, and experimentation—skills that are becoming more important than ever in today's rapidly changing, technology-based environment." Additionally, Evans points out that "All students, even those who struggle in other areas, can do well and even excel in the arts. It gives them a sense of pride that carries over to other subject areas. That allows them to approach all learning situations with a little more enthusiasm and confidence because they know they have it within them to succeed."

Why is it important to use art instruction, such as Altered Books to enhance and improve the learning experience of students? Project-Based Learning offers a great deal of benefits to students and their instructors. Academic research does support the use of Project-Based Learning in school. Students are engaged, fewer absenteeism occurs, cooperative learning skills are

boosted, and academic performance is improved (George Lucas Educational Foundation, 2001). For the students, benefits of Project-Based Learning include: increased attendance, growth in self-reliance, and improved attitudes towards learning, (Thomas, J.W., 1998). Academic gains equal to or better than those created by other models are present during Project-Based Learning especially with students involved in projects taking greater responsibility for their own learning than during more traditional classroom activities (Boaler, 1997; SRI, 2000). Opportunities to develop complex skills, such as higher-order thinking, problem-solving, collaborating, and communicating will also benefit students, (SRI, 2000). Access to a broader range of learning opportunities in the classroom, and providing a strategy for engaging culturally diverse learners is beneficial, (Railsback, 2002).A great deal of students finds this type of learning style appealing because it offers authenticity in an experience, (Intel Corporation, 2007)

For teachers, Project-Based Learning includes the benefit of enhancing professionalism and collaboration among colleagues, and opportunities to build relationships with students (Thomas, J.W., 1998). In continuing, many educators are pleased to discover a model that accommodates diverse learners by giving a wider range of learning opportunities in the classroom. (SRI, 2000).

The previous research keys in on the importance of using art instruction, such as Altered Books, to enhance and improve the learning experience of students. Art instruction is a proven method that leads to student success across curriculum. This research study will use art instruction in the form of Project- Based Learning such as Altered Books, along with student presentation to ensure that students are given the tools they need to become better critical thinkers in many subject areas. The goal of this project is to use effective teaching strategies

while allowing students to become excellent at incorporating and expanding on the knowledge of language arts, art and most importantly science with the artistic technique of altering a book.

Methodology

Participants

All of the students participating directly and indirectly are in the 5th grade. Group A rotates between 3 separate teachers in one set of our 5th grade hall. Group B also rotates between 3 separate teachers in another class set of our 5th grade hall. Sixty-seven students participated in our action research directly. These particular students actually created Altered Books. Seven of these students were classified ESL. The group creating the Altered Books included 30 boys and 37 girls. Our Altered Book group is referred to as Group A. Sixty-nine students have been indirectly included in the action research. Four of those students were ESL classified. These students included 35 girls and 34 boys. This particular group did not make Altered Books. This group has been identified as, Group B. They did have access to the books via a hands-on display and interviews presented by Group A with Movie Maker.

Materials

Altering a book requires one blank art or discarded book; various art materials; found objects; basic tools that will help in manipulating and re-crafting the book; a variety of writing utensils; resource books; past student examples; rubrics/timeline, a camera and a creative mind. 1) The blank or discarded book acts as the canvas for the student to work on or in. The book is

taken apart, added to or reshaped to reflect the students theme or purpose. 2) Various art materials include: paint; colored paper and paint brushes. 3) Found objects are just that, items that help the creator and the reader to have a visual and something concrete to help them make a real connection with the subject of the Altered Book. 3) Basic tools are scissors, glue, tape, embossing tools, stamps, paper crimpers, and anything that will help the student re-shape their book for their purpose at hand. 4) A variety of writing utensils are needed to help the students add language arts to their Altered Books. These are some examples of what students need: pens, pencils, markers, and crayons. 5) Resource books help the teacher get a visual and artistic strategy across. They also allow the students to see that they can have a focus that is highlighted by creativity. These books include examples of Altered Book in progress along with completed books. 6) Past student examples are a collection of actual student books. The students get to see that students in their grade level can do this. 7) Rubric/Timeline: the rubric serves as an indicator of expectations. It very clearly states what an "F-A" project looks like grade wise. Use at least 2-3 rubrics. One scores the planning; another scores the construction of the book and one more to score the listening and speaking component. The timeline is a great tool that helps the teacher and the student stay on track with where they should be in the Altered Book Project. 8) Camera/Computer: these materials help to pull together the listening and speaking part of the project. These are also used to record student progress. 9) Creative minds are a must. The student and teacher must be able to think outside of the traditional application of research and results.

Procedure

At the onset of the Project-Based Learning of Altering a Book, the teacher works to plant seeds. Planting seeds is the process of subliminally introducing the idea of the project to the students. Past student Altered Books are displayed throughout the classroom. The Altered Book resources have been included in the class library selections and displayed as well. Naturally, student curiosity arises. The teacher is questioned by the students, "What are these books? How did they do this? Why did they do this? Did they do this in here? Will we do this?" The teacher takes her time to answer the questions. At the same time the subject for the students' class is slowly mentioned. The seeds are planted by the teacher, "These are Altered Books! Well, the whole thing is a part of a special project. The books have been altered! Yes, the students completed these in class. Oh yes! This class will make some Altered Books too soon enough. I think the subject this year will be science, poetry or social studies. We'll see!"
This seed planting takes place at least by the second week of school.

After a great deal of prepping by having students complete items that will eventually be used in their books from language arts, art, and most importantly science, the teacher will prepare the students by inviting them to the floor as a whole group for a special discussion. This big discussion takes place in the month of March. Students will participate in a daily discussion with the teacher regarding the purpose and subject of their timeline related to their AB. They will be made aware that their project will be based on a great deal of work they have and continue to complete for language arts, art and most importantly science class. When the teacher initially meets with her students they have already taken at least one science TAKS release test; attended more than five art classes; and have produced many pieces of writing during Writers Workshop and Science Journaling. For five days to start, the teacher will work closely with the students

explaining specific expectations and guiding them through the initial process. A gradual release model with resources will be used as students become more comfortable with their Altered Book project.

Table 1 Procedure

Altered Book Timeline

Day 1-Day 5	**Day 6-10**	**Day 11-15**
Mrs. Jones meets with the class to talk about Altered Book expectations. Create a plan on white paper including: student name, science, scientist's name, and area of science. **Check for progress and understanding each day.** **ESL students are pulled from class and must be considered. They will be allowed additional time on the timeline.**	**Choose a scientist and submit the name to your teacher.** **Check for progress and understanding each day.**	**Choose an area of science and submit the area to your teacher.**

Day 16- Day 20	Day 21-25
Students must write a short autobiography about themselves. Include: who you are, how you think you make an impact on science now and will in the future, tell us why you chose your scientist /area of science.	**Students are collecting: science vocabulary, articles about the scientist and his or her area of science, pictures about the scientist/area of science, science diagrams, graphs, and cycles (student made), work student has generated in science class, students' best graded science work, poetry/stories student have written about science in ELA and items that represent student color scheme** **Resources are given such as links to examples of Altered Books.** **Parental Signatures are requested on a hard copy of the timeline.**

Data Sources

Five specific assessment instruments were used to measure the results of this project. More specifically, common formative assessments in language arts (CFA); teacher created rubrics; construction and theme aligned art projects; student-created and recorded interviews of the completed Altered Books; and most importantly Science TAKS release and final tests will serve as assessment instruments both formal and informal. The researcher has evaluated quantitative and qualitative data to arrive at the following conclusions and remarks.

All of the data was collected to see if the Project-Based Learning, the Altered Book project along with student presentation will ensure that students are given the tools they need to become better and critical thinkers across curriculum regarding language arts, art and most importantly science.

Initially, a CFA will be designed and given regarding non-fiction text features for the 1st through the 4th 9 weeks. This assessment will measure student understanding and ability to identify and use non-fiction text features, such as graphic organizers, titles and captions.

Secondly, teacher created rubrics will be used to measure student progress with the Altered Book project from beginning to end. Each rubric serves the purpose of measuring different components of the project. Those components include: planning, construction, and presentation.

Thirdly, another data source includes comparing students' initial scores made in the first 9 weeks of art class to their scores made at the end of the fourth 9 weeks regarding artistic projects with a common theme, such as construction and theme. The final project for the fourth 9 weeks will be the Altered Book project. This source includes qualitative and quantitative points. The piece of art as the qualitative and the score each piece is assigned as the quantitative.

Most importantly, the TAKS release test for Science will be used for formal assessment purposes. This particular test seeks to demonstrate what students know on entering 5th grade science and what has been presently learned at the time of the test. The final science TAKS test serves to measure the culmination of the students' knowledge and ability regarding 5th grade science.

Finally, the students' completed Altered Book along with their peer interviews with all of its components will demonstrate the level of understanding students are able to walk away with at the end of the project. The researcher will know if the student is aware of their purpose for and the subject of their Altered Book.

Data Analysis

The researcher will mainly use the pre and post Science TAKS release test for formative data analysis. Additionally, other assessment indicators will be used in tandem for a complete analysis of this Project-Based Learning with the Altered Book project. That data will be derived from: teacher created rubrics; theme and construction aligned art projects; student-created and recorded interview; and the completed Altered Books. The Science TAKS release scores will be charted and analyzed to see if the Altered Book instruction helps students make connections across curriculum regarding science. The scores will be evaluated in a way that will help determine the effectiveness of the teaching strategies that have been implemented in the Altered Book project.

Parental Consent Procedure

All parents will be notified of the goal of this instruction so they can be aware of how the students use Project-Based Learning such as, the Altered Book project, to become sharper at thinking critically across curriculum regarding language arts, art, and most importantly science. All materials will be supplied and gathered by the administering teachers.

Analysis and Findings

Pre and Post Test Findings

This chart demonstrates where students' scores where regarding science TAKS release test at September and then April science TAKS release tests. The September science TAKS release test was given before students were introduced to and began work on their Altered Book

projects. The April science TAKS release test was given after the students started completing significant components of their AB projects. Class averages are presented in Figures 1-3.

Science TAKS Release Tests September and April

Averages for Each Class Actively Participating in the Altered Book Project: Group A

	September Average	April Average
Jones	49	77
Field	68	86
Williams	72	81

Figure 1.

Student scores did increase in Group A classes. Compared to student scores for Group A classes in September before starting the Altered Book project in April, overall the April scores were definitely more than 30% better. From informal observations made by the researcher and colleagues during Writers Workshop, Art and Science Journaling and the students were often seen as caught up in discussions about science and how the student does play a role in science. The students eagerly added to their entries and also sketched out diagrams and graphic organizers to better get their point across. Some discussed how they could copy their entries onto their Altered Book pages.

Science TAKS Release Test Averages For the Three Remaining 5th Grade Students **not** Participating in the Altered Book Project: Group B		
	September Average	April Average
Scott	83	75
Forsythe	65	67
Gilbert	67	78

Figure 2.

Students in Group B did not show any significant increases in their Science TAKS release scores in April. Scott's class scores actually showed a decrease. The researcher collaborated with the teachers in Group B to inquire about how they felt about their students' scores. Some responses included: "They are just not interested. They don't look at these tests as important. Some of the students know what to do they just don't want to follow through." The researcher inquired about some the activities taking place with the Group B classes and found that some of their activities included: creating brochures based on the food chain, building examples of the layers of the Earth, Science Journaling and giving partner presentations about what they know and want to know about science.

After the researcher's inquiry questions still remained: Why did the students lose interest? Did these students need something more stimulating like the Project-Based Learning with Altered Book project to move them from,(*I don't want to deal with this mode to I can't wait to participate.)*?

The researcher did conclude that more time would be needed to accurately make such a comparison between what the students were being exposed to in class presently to what they may

need in the future. Right now the researcher felt very strongly that the students definitely needed something more stimulating in Group B.

Science TAKS Release Tests for September-April Compared to Final Science TAKS Tests Results of All 6 Classes in April- Groups A/B Passing Averages

Classes: **Jones, Field, Williams**/Scott, Forsythe, Gilbert Results for September-April Release Science TAKS Passing Average	Classes: **Jones, Field, Williams**/Scott, Forsythe, Gilbert Results for April Final Science TAKS Passing Average
50%	95 %

Figure 3.

At this point, all students have had some exposure to the Project-Based Learning with the Altered Book project. Group A has participated directly, they created the books. Group B indirectly, they were able to handle the books on display and also view the interviews presented in Movie Maker by Group A.

The results for the Science TAKS release tests, Figure 3, given in September-April did give cause for some concern for all classes Groups A/B. The results for passing were only at 50%. The researcher and her colleagues met to discuss what could and needed to be done. We shared what was going on in our classes. We talked at length about what the students were doing and saying.

The researcher continued to feel comfortable about the progress of Group A and the activities they were participating in. The researcher stayed with the teaching strategies implemented through the Altered Book project. Although, students' scores were not off the charts they were showing steady project as they fulfilled obligations set forth by the rubrics and assessments given relating to the Altered Book project. The students' Altered Books became a constant reminder that they needed to focus most importantly on science.

As Figure 3 also shows the students in Groups A/B yielded Science TAKS test scores of 95% passing in April. The researcher and all parties involved were totally elated!

The researcher remained on focus with the questions at hand:

1) How will students' scores in group A (Altered Book Group) compare to students' scores in group B (Traditional Instruction) regarding specific areas? How will group A scores for the 1st 9 weeks compare to group A scores for the 4th 9 weeks? More specifically, will the students be able to incorporate and expand on the knowledge of language arts, art, and science with the artistic technique of altering a book? Scores to be observed and compared include: Language Arts: Common Formative Assessments (CFA), Art: Construction and Theme and Science: TAKS Release Tests
2) Regarding Language Arts: Will the students demonstrate the ability to apply critical thinking skills regarding Nonfiction Text? Will their abilities be made evident in their Common Formative Assessments and then finally in their completed Altered Books according to the AB rubric?
3) Regarding Art: Will the students' demonstrate a broad understanding of Theme and Construction taught in art class involving portraits, figurative drawing, Colonial portraits and the culminating project of altering a book?

4) Regarding Science: Will the science TAKS Release Test scores improve in group A as a result of the rubric requirements for their Altered Book project?

The remaining data was analyzed.

Student Artistic Components: Quality of Construction/Attention to Theme

All 6 Classes Comparing Averages Regarding the Artistic Components: Quality of Construction/Attention to Theme Boldface= Classes that Participated in the Altered Book Project- Group A				
Classes	1st 9wks Portraits/Figurative Drawing	2nd 9wks Colonial Portraits	3rd 9wks Tiles	4th 9wks Altered Books
Jones	70	78	70	85
Field	75	80	75	90
Williams	75	70	78	95
Scott	76	88	80	_
Forsythe	78	80	80	_
Gilbert	70	75	89	_

Figure 4.

Students remained consistently in the 70% score range during the 1st 9weeks, Groups A/B. During the 2nd nine weeks Group B showed a 5-10% increase in their overall scores regarding construction and theme in their art projects. In the 3rd 9 weeks Group A remained consistent with scores in the 70% range while Group B remained steady in the 80% scoring

bracket. The researcher has observed that between the 1st 9 weeks and the 2nd 9 weeks Group B did fair better regarding quality of construction and attention to theme. Group A did demonstrate a much better understanding of these key art points during their final project of altering their books. It looks like Group A needed an additional art project to help them become sharper at quality of construction and attention to theme in art.

Language Arts/Reading Component: Identifying and Composing Nonfiction Text Measurement Tool: Common Formative Assessments in Conjunction with Altered Book Project Comparing Averages of 3 Classes Participating in Altered Book Project						
Classes	1st 9wks Before Project Nonfiction Reading		2nd 9wks Introduction/During Project Why America is Free	3rd 9wks During Project Main Idea/Write a Summary	4th 9wks End of Project Elana's Recital	Overall Average at the End of Project
Jones	83		82	72	78	77
Field	85		90	82	78	83
Williams	87		87	82	76	81

Figure 5.

Initially, the Group A classes did great with a B average in the 1st 9 weeks regarding non-fiction text features. Field's class showed that they were able to identify, understand, and apply the concept of non-fiction text features on a higher level and on a consistent basis between the 2nd and 3rd 9 weeks with the common formative assessments that were given. Keep in mind also that the students have been actively working with their Altered Book projects as well. William's

class remained in a good place academically as well at 80% regarding non-fiction text identification, comprehension, and application. Jones' class showed some evidence of struggling with these non-fiction text features. Their scores remained closer to the 70% range regarding the non-fiction text features and the ability to make the identification, comprehension, and application connections. In the end, the CFA's in language arts demonstrates that although some growth was made in the Group A classes relating to non-fiction text features, most evident is that each class remained consistent with Field's class being on the high end of eighty percent, William's class falling in the middle; and Jones' class remaining in the seventy percent range. The researcher realizes after reviewing the data that additional time and practices is required to conclude that the Altered Book project did make a significant impact on the students' ability to identify, comprehend, and apply knowledge related to non-fiction text features.

Discussion

The researcher can certainly determine that this Project-Based Learning with the Altered Book had some impact on student scores in their post tests in the areas of language arts, art, and most importantly science. Regarding the depth of the impact, the researcher has discovered that more time with the students and the implementation of the Altered Book project is definitely needed. Informally the researcher has been able to observe the increase of students being able to fire off those connections regarding language arts, art and most importantly the interest in the subject of science. This has been made evident by the students finished Altered Books and their peer interviews presented in their Movie Maker production created by Group A. The researcher also recognizes the 95% passing score on the Science TAKS test for Groups A/B as an indicator that the Altered Book project did impact science scores. At this point, to what degree has not been definitely determined.

Research does continue to support making a transformation of the more traditional classroom (Intel Teach to the Future, 2003). Intel offers a presentation that describes a classroom where the teacher uses the Project-Based Learning model effectively:

There is a problem with no predetermined answer

There is an atmosphere that tolerates error and change

Students make decisions with a framework

Students design the process for reaching a solution

Students have a chance to reflect on the activities

Assessment takes place continuously

A final product results and is evaluated for quality

For students used to a more traditional classroom, this means a change from following orders to carrying out self-directed learning activities; from memorizing and repeating do discovering, integrating and presenting; from listening and reacting to communicating and taking responsibility; from knowledge of facts, terms and content to understanding processes; from theory to application of theory; from being teacher dependent to being empowered (Intel, 2003).

The researcher does believe that this action research has served to demonstrate that a change implemented in the form of Project-Based Learning with an Altered Book is an excellent and beneficial change. The benefits support both the teacher and student.

Reflection/Action Plan

In conclusion, this project demonstrated how crucial it is to provide a learning atmosphere that will allow students autonomy in the learning process. Some of the pretests in the action research showed how interest level does impact student scores. Additional assessments, formal and

informal showed how different groups of students fair at different times in the school year within the same themes and activities. The researcher will continue to implement the Project-Based Learning with Altered Books in the classroom. The students will be given a specific subject to work from as described in the methodology section. Students became extremely excited about being able to create their Altered Books. They were equally excited about being able to produce their own Movie Maker presentations with their peer interviews about their Altered Books. All students, Groups A/B including our ESL students, gained from the Altered Book project. These teaching strategies were successfully applied to the language arts, art and most importantly science instruction. The researcher is looking forward to the challenge of gaining more knowledge about how Project-Based Learning with Altered Books truly does impact student scores in subject areas across curriculum.

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If you were to choose 25 discoveries to document the progress of chemistry through millennia, what would you pick? In Chemistry for Kids, Liz Lee Heinecke takes us on such a journey, using familiar objects and simple scientific instruments to create straightforward chemistry experiments that chart the fieldâ€™s evolution over time. Each chapter is centered on a different experiment and begins with a vivid illustration that highlights a scientist and his or her work. A few paragraphs of engagingly written introduction are followed by colorful photographs of youngsters demonstrating the steps of t Reading a scientific paper is a completely different process from reading an article about science in a blog or newspaper. Not only do you read the sections in a different order than they're presented, but you also have to take notes, read it multiple times, and probably go look up other papers in order to understand some of the details. Reading a single paper may take you a very long time at first, but be patient with yourself. The process will go much faster as you gain experience.Â Before you begin reading a paper, take note of the authors and their institutional affiliations. Some institutions (e.g., University of Texas) are well-respected; others may appear to be legitimate research institutions but are actually agenda-driven. Also take note of the journal in which it's published. The Impact of Perceived Scientific and Social Consensus on Scientific Beliefs. Article. Full-text available.Â An increased focus on reporting effect sizes in addition of p-value based significance statements or Bayes Factors may improve scientific communication with the general public. Across three studies (N = 652), we compared subjective informativeness ratings for five effect sizes, Bayes Factor, and commonly used significance statements. Scientific writing is writing for science. Scientific writing in English started in the 14th century. The Royal Society established good practice for scientific writing. Founder member Thomas Sprat wrote on the importance of plain and accurate description rather than rhetorical flourishes in his History of the Royal Society of London. Robert Boyle emphasized the importance of not boring the reader with a dull, flat style.