

Research: A Product of the Curious Mind
How do we encourage students to breach the divide between nonfiction and fiction in order to pursue research into a topic of personal interest?

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Randolph Middle School, 8th Grade Language Arts

This curriculum unit is recommended for:
8-12th Grade Students

Keywords: thinking classroom, research paper, ethical dilemmas, scientific research, the Design Cycle, make, tinker

Teaching Standards: See [Appendix 1](#) for teaching standards addressed in this unit.

Synopsis: How often do we isolate subject areas thinking that science should stay in science class and English should stay in English class? In this unit, I plan to teach that science class and English class do not need to work independently, but rather can function in a beneficial way for both subjects.

This unit focuses on the concept of ethical dilemmas. Ethical dilemmas are explored through research into the scientific community and through the concepts of individualized creation and reflection. This unit encourages students to explore real scientific research that has been taken from a science fiction novel, *The Uglies*. In this novel, sixteen-year-olds undergo extensive plastic surgery in a futuristic world to achieve the ideal standard of beauty. We will hold discussions about if beauty is a scientific topic or personal preference. We will also discuss whether beauty or friendship is more important. These thought provoking questions will lead to discussions about current scientific research and the ethical dilemmas that scientists face every day. Students will end the unit by self-selecting a current ethical dilemma presented in today's research, and choosing a side to prove in a paper.

I plan to teach this unit during the coming year to 101 students in my MYPIB Eighth Grade Language Arts Class.

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**How do we encourage students to breach the divide between nonfiction and fiction
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Elizabeth Ashley Walker

Introduction:

As educators, one of the concepts we try to instill in our students is the idea of becoming a life-long learner. Whether you are four or forty, you should be challenging yourself to learn something new every day!

Yet, the question remains, how do we create this culture of curiosity in the classroom? When children are young, they appear to be natural inquirers, always asking the question why. But as they mature, curiosity starts to die right around the time of middle school. As a middle school teacher, I hope to inspire and not crush this curiosity. In this unit, I plan to discuss how elements of the scientific research process can be applied to other subjects like Language Arts.

Rationale

The reason that I decided to pursue this study of a thinking classroom arose from a donation that my middle school received two years ago from the NASCAR Foundation. This enabled us to create a “Maker Space” in the media center. This area provides students with a creative space to explore new ideas on white board tables, try designing projects using a 3-D printer, and construct projects using circuitry and coding. Cindy Urbanski, a member of the UNCC Writing Project, conducted a Professional Development course that trained some of the staff on the devices in the Maker Space. During one of the half-days last year, these staff volunteers presented lesson plans demonstrating how the “Maker Space” could be used in the classroom.

While I was not one of the presenters, I have taken several courses with the UNCC Writing Project on the topic of “Make.” After seeing all of the fantastic presentations with the equipment in our “Maker Space,” I felt inspired to teach my students to research, create, and write. Fortunately, I work in a magnet school that pushes its students to design.

As part of the International Baccalaureate Magnet Program, our curriculum requires us to teach the Design Cycle. The Design Cycle has four parts, which include inquiring, developing ideas, creating a solution, and evaluating the product. As part of my

unit, I would like to incorporate the “Maker Space” in a way that will challenge both my high and low level learners. I’ve noticed that students who don’t normally enjoy school love to build creative projects from hands-on materials. I also believe the higher levels of technology would allow my advanced learners to try to design something that they haven’t created before.

Specifically, in this unit I plan to combine the rigorous expectations of IB with the Common Core Standards to teach students how to research individual interests. In my seminar, I’ve learned that the way real scientists research and experiment allows for curiosity and creation of tools to help them conduct the experiment in a way that will allow data to be collected for analysis. I found this investigation process to be applicable no matter the discipline. In science, if you use the wrong tool or can’t understand the data, then your research may not be very relevant. In Language Arts or social studies, if you gather the wrong resources then your paper will be terrible and will fail to align with your thesis. I believe it’s important to teach students that the process of investigation is just as important as the final result.

Additionally, this concept of curiosity is hardly limited to one subject. I’ve noticed that many famous scientists actually were avid readers of science fiction and through this inspiration, they decided to change the how the world works. A prime example of science fiction made real is the current work of Elon Musk. Another example is the science fiction novel The Uglies. In this novel, the characters are physically transformed into the scientific definition of beauty based on the Golden Ratio and use technology that discusses magnetic levitation and nanotechnology. My hope is that through this unit, I can teach my students to dream big and believe that they really can make a difference in the world.

School Background

Randolph Middle School is zoned for the Central Learning Community, which means that many of our students travel from all over Charlotte to attend. Our student body community has this option due to the lottery system, which is in place for Magnet Schools. The lottery system allows any student in CMS who receives a level III or higher on the Language Arts EOG to apply. The only exception to the EOG rule would be a student who is already part of the Magnet Program that feeds into our middle school.

Our Magnet Program is classified as International Baccalaureate. The IB curriculum focuses on rigorous curriculum, global diversity, and community service. IB believes in teaching students how to be well-rounded through a variety of curriculum requirements such as the learner profile, the design cycle, community service hour requirements, an eighth grade community engagement project, and the requirement that students take a foreign language all three years in middle school.

As part of the diversity that makes up Randolph Middle School, we have students from all over the world. Since we have such an ethnically diverse community, it is important to teach students how to think critically and from a global perspective. We focus our curriculum around the IB Learner Profile Traits that encourage students to be inquirers, knowledgeable, thinkers, communicators, principled, open-minded, caring, risk-takers, balanced, and reflective.

This year, even more than before, I feel excited about the prospect of teaching my students how to be a universal researcher. My students are highly motivated to learn and are already asking tons of questions. They are dedicated to turning in strong work and make an effort to improve when given guidance. This means that as a teacher, it is my responsibility to take that current curiosity and challenge these gifted students with new rigorous curriculum.

As an eighth grade Language Arts teacher, I must balance both the Common Core and my students' interest simultaneously. I try to select topics that are relevant to the way our world is changing no matter the discipline. I prefer to allow students to have some input in the selection of class topics while also meeting the Common Core requirements. I believe that in order for my students to become engaged, they must be curious about the topic! I enjoy using project-based learning strategies, small group work, and close reading strategies to accomplish this engagement.

Unit Goals

The goals for this unit have been selected from the Common Core Standards (See Appendix 1). They are designed to teach students how to use the Design Cycle to inquire, develop ideas, create the solution, and evaluate through two separate assessments. The first assessment teaches students how to think critically and to communicate their design for a product. The second assessment teaches students how to research using MLA Citation.

Content Research

Scientific Research

Over the summer, I had the unique experience of interning in one of Susan Trammell's Research Labs. I was assigned to work with one of her graduate students, Joseph Peller, who is working towards his PH.D. During this process, I realized that scientific research is very different from what I had originally envisioned! I think I expected a large sterile white room with white lab coats and researchers recording data from the microscope.

However, what I experienced dealt more with building tools, using lasers, and recording data through multiple computer programs and spreadsheets. I realized that to

conduct a real experiment, you may not have the correct tools to collect the data you need to analyze. Instead, you may need to enlist the help of multiple people to create the proper tool before you even begin. For example, you may need to talk to a computer programmer to create the correct code for data collection and a machinist to create the metal structure for the tool. Depending on the experiment, you may need to speak with experts in multiple scientific fields to create the best set-up for your experiment. In other words, a good scientist needs to be friendly! Scientists do not work in isolation, and they need to learn the skills of teamwork and effective communication across content. This idea sounds very much like the life skills I need to teach my middle school students!

I also discovered that in real science you are truly investigating something that doesn't have a known answer. This is a particularly difficult concept to grasp because in earlier education, you may experience labs that have a predicted outcome. This also can be troublesome to discover when you have a hypothesis that may be proven incorrect. I was shocked to learn that even if your research does not go the direction you desire, it's still necessary to publish it. Apparently, other researchers can glean knowledge from your findings to help conduct new experiments that might produce a different result. Also, it is acceptable to change your original intent for the research if you discover something more promising.

I found that scientific research and research that you do for writing in Language Arts are not necessarily as isolated as many think. I have noticed in the past that my students have difficulty self-selecting a topic. They also do not like to change topics if they discover a lack of credible research on their initial topic. It's almost as though they believe that they have failed in the research process, which is far from the truth!

One final aspect that I participated in during the research experience was the creation of a scientific poster. These posters are used to present your findings from the research at conferences and universities. As teachers, we created a scientific poster to present to our fellow teachers! During the process, I discovered that precision of language and placement of headings and visuals are extremely important. If the poster is too wordy, then the reader is bogged down in terminology, but if there isn't enough detail then the poster leaves the reader with questions. I think by the time we finished we had revised the poster about four times.

The poster making experience reminded me of teaching my students how to write a research paper. I always teach the importance of formatting, citations, and revision. The particulars of formatting often frustrate students along with learning the correct method of citing sources. For many students, this is their first time writing formal research. This was definitely my first time creating a scientific poster. There was a learning curve! I felt like I was afraid the poster would be incorrect, and I think students also have that same fear. I also can relate to students on the topic of revision. Writing can be fun. Revision is painstaking but necessary. I believe students have the misconception that just because

something isn't easy or fun, then it isn't important. Yet, revision is at the heart of writing. Writing and research are a continuous process that evolves into something different from which you started. This helped me realize that when I am teaching research, I also should be teaching some life skills like perseverance and determination. This will help students to see the process to completion.

Ethical Research

Part of the inspiration for this unit comes from the old English adage that states "Just because we can, does it mean we should?" This is a time honored question that each generation seems to face in a new and innovative way. Currently, with the creation of new and improved technology we are able to explore exciting possibilities in the world of science, and even more specifically with the human body.

However, as technology evolves so does the definition for ethical research. What is the current definition and how do we know if we are in adherence to the standards? Many organizations worldwide have tried to create ethical standards to which the scientific community adheres. Many of these organizations felt compelled to issue regulations after tragic events occurred, most notably in the cases of human testing. One of the earliest and most tragic examples took place during World War II when German doctors were allowed to experiment on the prisoners in concentration camps without their consentⁱ. This resulted in the creation of the Nuremberg Code, which explicitly states the importance of "voluntary participation and informed consent"ⁱⁱ.

If we choose to narrow the focus to the United States, we notice multiple laws and organizations that regulate human testing so that mistreatment of subjects does not intentionally or unintentionally occur. Unfortunately, the United States is far from innocent when it comes to conducting unethical research. One of the most notable cases of misconduct is in the case of the Tuskegee Syphilis Study where men who had syphilis were allowed to be studied for over forty years, but never treatedⁱⁱⁱ. This resulted in the National Research Act being passed in 1974^{iv}. This act most notably created the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. This organization has since set the tone for ethics in the field of human research^v.

As a researcher, it is always your responsibility to investigate the legal regulations for your particular area of research. Ethical questions may arise no matter the field of research, which leads us to our next question. How do we know if we should ask permission or if something is considered to be acceptable practice? Well, the correct answer is when doubt, err on the side of caution.

Caution is exercised by both college campuses and commercial businesses when it comes to research. Tightly regulated safety protocols have been established to ensure

the ethical treatment of all animal and human participants in a study. On college campuses, research committees are required to approve requests for research. The committee reviews the request, and may make alterations to confirm that ethical research is being conducted, especially with cases that involve humans and animals. The researcher cannot gain approval to begin a study until all parts of the application have been reviewed and deemed within the safety protocols. Similar practices also exist in commercial research. The purpose of the protocols is to eliminate the possibility of accidental ethical dilemmas.

Yet, this still leaves open the answer to our original question about ethics that is truly at the heart of human nature. Just because we can, does it mean we should? We may be tempted by the possibility of discovering something new and sharing it with the scientific community, but at what cost? When new technology is created and possibilities flood the mind, it can be difficult to define what is ethical and what is not. Currently, the scientific community is hotly debating multitudes of topics that are not defined as ethical or unethical research. These are the topics that I would like for my students to research in the attempt to form their own opinion about what is ethical and what is not.

Creating a Thinking Classroom

As I mentioned in my findings during the research experience, “scientific inquiry is not a solitary activity” but rather a collaborative activity^{vi}. Therefore, if we intend to create a thinking classroom designed around the inquiry process, we must first teach our students to form questions rooted in their own curiosity. Currently, in CMS there is a push for more of a focus on the speaking and listening strands of Common Core. These goals are intended to provoke academic conversations.

I found it interesting that in the textbook Linking Science and Literacy, the authors made the argument that literacy in a science classroom is akin to holding a “conversation with a phenomenon.” I think this concept connects to that childlike curiosity that we all have but suppress as we grow older. We suppress it because it might be perceived as foolish or because we don’t have time to pursue all the questions that our mind can create. However, if we are going to teach students how to research, we need to teach them that it’s ok to ask a question to which you do not have the answer. In fact, we should be promoting more open-ended conversations in the classroom to help eliminate this fear of not knowing.

So how do we help students to become comfortable enough in the classroom to have conversations about open-ended topics? Well, the authors of The Thinking Classroom suggests that to promote these sorts of discussions requires more than a few simple lessons. They explain that a school is a sort of culture of its own. In order to promote discussion, you must create a “culture of thinking.”^{vii} This can be accomplished through creating a language of thinking, thinking dispositions, mental management, the

strategic spirit, higher order knowledge, and transfer. Out of all of the steps, I found the first and last to be most helpful. In order to promote these conversations in the classroom, students need the correct vocabulary to express their thoughts. All students are not born into a house where educated discussion occurs. This is a learned skill. Without a precision in language and practice, discussions cannot appropriately take place. I was also impressed with this idea of transfer. We actually use this term in IB quite a bit, but I've always felt at a loss of how to measure if a student is capable of transfer. The book defines the concept of transfer as "applying what they have learned to a context rather similar to the context of learning" ^{viii}. So if we start thinking conversations in the classroom in theory, students should be able to apply that sort of questioning to their own research.

Instructional Implementation

The Design Cycle

Part of the implementation of this unit will require students to make use of the IB Design Cycle. The IB Design Cycle supports the use of thinking language and even examples of real world applications. The examples are based on engineering principles, which clearly align with scientific research. Students first inquire, then develop the idea, create a solution, and evaluate the results. This process calls for reflection and encourages students to question where they could have improved. We teach students that improvement is just as valuable as the end result.

In this unit, students will use guided daily activities that build into a self-selected research topic for a paper. The topic must discuss a current ethical dilemma that is being debated in science. Students will reference the resources found later in the article for this research.

Unit Vocabulary

- 1) Ethics
- 2) Ethical Dilemma
- 3) Design Cycle
- 4) Make
- 5) Tinker
- 6) Engineer
- 7) Research
- 8) Source Evaluation
- 9) Citations

Teaching Strategies

SOAPStone Strategy-This strategy encourages students to evaluate visuals using the concepts of speaker, occasion, audience, purpose, subject, and tone.

Secret Envelope of Questions-Students will receive an envelope containing four questions. Each question will be thought-provoking. The student who pulls the question out of the envelope will read the question and answer first. Everyone else is quiet until it's their turn.

“Maker Space” Journal-As part of scientific research, scientists keep detailed journals of experiments in pen. In order to model this process, students will be asked to design a new product based on the technology found in the novel The Uglies. The design process will model the design cycle in IB, which asks students to inquire, develop ideas, create a solution, and evaluate. Students will be allowed to make a mock physical representation of this design using the materials in the maker space. These materials include physical options and programming options. Students will record this entire process in their own “Maker Space” Journal.

Seminar-Several controversial statements will be read to the class one at a time. Students will move to the left of the room if they disagree, the middle if they can't decide, and the right if they agree with the statement.

KWL Chart-This strategy is designed to help students determine what they know, what they want to know, and what they have learned about a topic. Students will use this guide to start research on a self-selected topic.

Thesis Creation-After determining a self-selected ethical dilemma, students will attempt to write a thesis on this topic. As a class, we will discuss the difference between strong thesis statements and weak thesis statements, which will allow students to modify the thesis as they research.

Source Cards-Students will be required to find a minimum of three sources on their self-selected topic. These sources should be either handwritten or typed in a Google Doc in MLA format.

Note Cards-After students have placed the MLA citations in ABC order, they may take notes from each source. These notes should be cited in the research paper.

Rubric Review-As a class, we will review the expectations for writing a strong research paper. Students will be graded based upon the attached rubric (see Appendix 5).

Day 1

Brainstorm on the board about the genre of science fiction. Ask students to define the term and to give relevant examples of current science fiction novels. After this brainstorming session, give students examples of how real life scientists read science fiction and decided to create things that only the imagination could imagine at the time. A prime example of a current scientist who read science fiction and allowed his imagination to turn into reality is Elon Musk. You could ask students to research Elon Musk and discuss his current and ongoing contributions to society.

Day 2

Introduce the science fiction novel, The Uglies to the class. A great way to introduce the novel is to show the front cover to the class. Allow students to use a strategy like SOAPSTone to analyze the visual. If possible, you may want to obtain a current and past picture of the novel cover. These visuals are drastically different and provide insight into the theme or the main character of the novel. You may want to divide the class and have one group analyze the current visual and the other group analyze the past visual. After students have completed SOAPSTone, hold a class discussion about the differences in the visual. Discuss why the publishing company would choose to change the cover of the novel and what insights each picture provides to the reader.

Now, read the summary on the back of the cover. Focus on the fact that at age sixteen, every child undergoes plastic surgery to give them the perfect ideal of beauty. Ask students why a society would want to institute something like this practice and question what this says about the government in this society. Assign students to read the first chapter for homework. You may want to assign a 4-6 week reading schedule for the novel. The reading level of your learners should determine the length of the reading schedule. I have found that struggling readers often have difficulty immersing themselves in a fictional world, therefore needing more support at the beginning of the novel.

Days 3-7

Check for understanding with students about the setting of the novel. Encourage students to make a list of all technology mentioned in the novel and a separate list of characters. Students often struggle with understanding how the society functions. Hold discussions about the setting including the separation between the Uglies and the Pretties. Explain this concept of dorm life and the minimal involvement of parents in the lives of their children. Explain the importance of technology in this society and its connection with the government.

Days 8-11

Compare this fictional society to our society. Evaluate family structure, the use of technology, character personalities, plastic surgery, and role of government. At this point, students should have read about the Rusties. The Rusties are a previous society that had

roller coasters and used metal for development in city buildings. In other words, this society is our current society.

For this activity, divide students into groups differentiating based on student interest or ability level. Some topics lend themselves more toward close reading of the text while others are more abstract and require research. (See Appendix 2). Students will need 2-3 days for finding the information and another day to present the information to the class.

Days 12-20

The group activity presentations should be available for student access. They outline major themes in the novel and introduce the concept of science and its impact on literature. Over the course of the novel, students will be introduced to a society that lives in the wilderness and objects to use of technology as way to control the human mind. This concept will provide the transition necessary to discuss the concept of ethical dilemmas. At this point in the unit, the included vocabulary should be introduced.

Novel discussions should focus on the idea of the impact of technology on society and the ethical dilemmas it presents for both the researcher and the government. This would be a good time to use the strategy of the secret envelope. Use the four questions provided (see Appendix 3) to hold a mini-discussion about ethical dilemmas. Each question presents an example of an ethical dilemma.

Days 20-25

At this point, students should be approaching the end of the novel. Many ethical dilemmas have presented themselves. For example, do you betray your friend to receive a surgery that will make you look perfect? Another example might be is the government using technology to control the minds of its citizens? These ethical dilemmas tie in with the major themes for the novel.

At this point, ask the class to generate a list of ethical dilemmas from the novel or from real life. Use the seminar strategy to determine student opinion on the various topics. Many students may find it difficult to move to a particular side because of the complexity of the decision.

After this seminar, start to make connections between science and ethical dilemmas. Encourage students to research new scientific discoveries using the student resources provided below. Promote discussions about ethical dilemmas that might arise as a result of these discoveries.

Days 25-30

In our media center, we have a “Maker Space” that encourages students to create from physical and technological materials. Even if your school doesn’t have a space like this, students can still design projects from recycled materials or unused craft materials.

At this point, a mini-lesson on the purpose of tinkering and make is important. If you are uncertain about this process please refer to Invent to Learn: Making, Tinkering, and Engineering in the Classroom. Emphasize how when you create something, you are essentially engineering something for your purposes. Discuss what an engineer is and what they actually do in the real world. It would probably be beneficial to list different types of engineers and explain a few problems that they might have to solve in a real world setting. You may even want to include a homework article explaining more about engineering or providing a biography of a real life engineer. I recommend using a biography article because it helps students to connect better to the topic if they believe a real life person actually has this job.

If you are unfamiliar with presenting information about scientists, you may want to review the article included in the Teacher Resources, “How Stories Told of Brilliant Scientists Affect Kids Interest in the Field.” Shankar Vedantam, the author and researcher in this article, suggests teaching students that scientists struggle to achieve their discoveries allows students to view science and mathematical fields as something achievable instead of something that only geniuses can achieve. This seems like a great way to make scientific discovery appear approachable to students. Additionally, the article on the “Five Most Famous Living Engineers” and the website called Educating Engineers provide detailed information on the contributions of engineers in current society and describes education and day-to-day activities for different types of engineers.

Continue the discussion by referring to the rubric for the product, which can be found in Appendix 4. Point out that they will use the Design Cycle to create a product.

Explain to students that making and tinkering with materials is an important process in the design of scientific experiments. Now it’s time for the class to become familiar with the materials to use in this product creation.

When students enter the media center, I plan to have the media center specialist give an introduction to the materials and technology available in this space. We have computers where they can learn the basics of programming, a 3D printer, and craft materials. Students will bring a composition journal to the media center. This notebook will be used as the “Maker Space” Journal. Students will be given the task to design a new piece of technology that could be used in the setting of The Uglies. The technology should be as functional as possible, but limitations clearly will exist. Students will be graded based upon the Design Cycle. Did they chart each of the steps? Did they create a product that

would fit in with the setting of the novel? Were they able to reflect on the process and share it with the class?

Days 30-45

Now would be a good time to review the concept of scientific research and the scientific method. Ask students to brainstorm the steps they use for an experiment in science class. Students should be able to list the following steps for the scientific process: ask a question, conduct background research, create a hypothesis, test the hypothesis through an experiment, analyze data to draw a conclusion, and report the results. In middle school classrooms, students often are given a set of procedures to follow to achieve a certain result in an experiment. If students do not prove the hypothesis correct, they may have to explain why or redo the experiment. While these predictable experiments are useful for teaching important scientific principles in a timely fashion, they leave little room for creativity and inquiry into how science works. Point out that when scientists are faced with a problem to solve, they often need to create a procedure and experiment. These same scientists might have an idea about the results, but ultimately need to conduct the experiment to see what will happen! That's the point of science. To learn new things!

Just like in science, the MYP Design Cycle teaches students to inquire, develop ideas, create a solution, and evaluate the outcome. In this task, students are questioning how they can create a new product to fit in with the setting of our novel. They have to explain the product's relevance to the novel, draw out and design specifications for the creation, actually make the product, and evaluate how well the product fit the requirements.

Would any ethical dilemmas arise if they tried to market their product? For a warm-up, have students write down different ways they could try to market their product. What strategies would work best? After five minutes of brainstorming, ask students to partner up. Tell them to try selling their product to their partner. The partner should pretend to be a government official from the setting of our novel. After one minute, the partners should swap roles. You may want to have students change partners a few times to gain experience explaining and marketing this product. Once students return to their seats, ask them to reflect on this process. How did the marketing go? Did any ethical dilemmas arise?

At this point some instruction on the protocols for research will be helpful. Point out that in the cases of animal research, human research, and patent research many protocols are in place at both universities and in commercial use. Researchers must comply with these protocols or experimentation will not be allowed.

To end the unit, students need to select a topic that discusses current scientific research. They should reference the websites provided below and receive approval for the topic by the teacher. Ideally, the topic should be controversial and present an ethical dilemma faced by researchers.

To introduce the concept of self-selecting a topic, ask students to reference any of the materials mentioned below in the student resources section. These resources are all great examples of current scientific research. Students should be given some time to explore these resources in order to determine what topics are of personal interest. Students should use a KWL Chart to evaluate a potential topic. This strategy will help students to determine if a topic is too broad or narrow for a research paper.

The research paper rubric (see Appendix 5) should be provided and reviewed. At this point, eighth grade students have had little to no experience citing sources for a research paper. The research paper process which includes source cards, note cards, thesis creation, and an MLA Works Cited Page should be taught. The North Carolina Standard Textbook has an entire chapter devoted to teaching this process or you can reference the MLA Handbook. I like to give students checkpoints for the process. For example, I review and approve a working thesis before I allow a student to write an entire paper. I also require sources to be in MLA format before the paper is written to ensure proper citation. Teaching this process usually takes about 3-4 weeks.

Appendix 1

Objectives:

The following standards will be addressed through specific tasks in this unit.

RL2: Determine a theme or central idea of a text and analyze its development over the course of the text, including its relationship to characters, setting, and plot; providing an objective summary of the text.

Students will utilize science fiction texts like The Uglies to trace major themes in a fictional setting to explain the impact of science and technology on government and human choice.

RI5: Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.

Students will analyze nonfiction passages, highlighting and reflecting on sentences that help to prove the main idea.

RI6: Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.

Students will practice identifying claims and evidence in research articles.
Students will analyze how the author defends his point of view through use of the claims and evidence.

RI7: Evaluate the advantages and disadvantages of using different mediums to present a particular topic or idea.

Students will review digital, auditory, and print media to determine the effectiveness of each format so that the correct medium can be selected for their project.

W7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

Students will self-select an ethical dilemma to research and present in an MLA cited paper.

Appendix 2 for Days 8-11

Student Roles

Speaker-Presents the information

Creative Designer-Determines the format for the presentation of information

Time Keeper-Keeps the group on task and makes sure the requirements for the project are met

Helper-The only student allowed to ask me questions from the group

Note-If you have five students in a group, you may want to add the extra student to the role of creative designer.

Note-All students should work on researching and answering the question simultaneously to prevent anyone from causing a classroom management issue.

Group 1: Family Structure

- 1) In your group, compare your families. Make a list of different family types. Do you live with only your parents? Just your mom? Just your dad? A grandparent? Are you adopted? Be sure to include details about who lives in your home and how you share household chores.
- 2) After you have made a list of your family types, compare this set-up to the family structure in The Uglies. Think about the different expectations for different stages of your life. Also, when do we see Tally's parents come for a visit? Does it appear to be something that was their idea or a suggestion made by the government? Keep these thoughts in mind to reference for the second half of the book. A different family structure will appear.
- 3) Decide how you want to present your findings to the class. You will be graded on answering the questions and your list of family types. Make sure to include direct references to the text. You might want to consider using a Venn Diagram or a PowerPoint.

Group 2: Role of Technology

- 1) You were asked to create a list of technology found in this society. Everyone must share their list with the group. Create a group list of technology found in the novel complete with page numbers.
- 2) Do any of these devices remind you of technology currently found in our society? Do you think that engineers are in the process of creating technology that might function in a similar manner to the technology in the novel?
- 3) Bogus to Bubbly: Use this book to analyze Scott Westerfeld's addition of technology to the society in the novel. What technology did he actually research for the novel?
- 4) Be prepared to present your findings. Think about what presentation style would work the best for presenting this research to the class.

Group 3: Character Personality

- 1) You were asked to create a list of characters and explain their personalities. Everyone must share their list with the group. Combine your ideas and form one group character list.
- 2) Research Character Traits on Google. Add adjectives from this list to your group's description of the characters.
- 3) Evaluate: Based on the decisions of the characters so far, what do you predict they will do later in the story? What sort of events could cause the character to become dynamic? Remember that a dynamic character changes over the course of the novel while a static character stays the same.
- 4) Be prepared to present your findings. Think about what presentation style would work the best for presenting this research to the class.

Group 4: Plastic Surgery

- 1) The entire plot of this novel hinges upon the choice of Tally undergoing plastic surgery to become a Pretty or choosing not to betray her friends. Even though we do not have to make this choice, our society does highlight this idea of perfect beauty.
- 2) In your group, research plastic surgery. Is it only used for cosmetic purposes? Do some birth defects or accidents require plastic surgery?
- 3) Discuss your findings. How do you feel about plastic surgery? Does everyone in your group agree?
- 4) Present your opinions and research to the class in a format of your choice.

Group 5: Role of Government

- 1) How much influence does the government have on the day-to-day lives of its citizens in our novel? Do you think the government has an interest in controlling its population? Why?
- 2) Discuss the questions with your group and write down the answers.
- 3) Research totalitarianism and dictatorships. Define these terms and give examples from history or current world politics. Do you think the government in our novel is representative of one of these types of governments?
- 4) Be prepared to present your findings. What presentation style would work best for your group?

Appendix 3 for Days 12-20

Ethical Dilemmas

- 1) In the hallway at school, you find a chocolate box. You know that this chocolate box is part of a fundraiser for a school field trip. If a student sells all of the chocolate bars in the box, then a portion of the money will help them fund their field trip. The box still has chocolate and has an envelope with money from the partial sell of chocolate. You cannot find a name on the box. What do you do?
- 2) In English class, you are assigned a research paper. The teacher explains that plagiarism will not be tolerated. However, your best friend is behind on his paper. You know that there is a place on the internet where he could copy a paper for free. What do you do?
- 3) You are walking home from school with a friend. All of a sudden, a man steps out the bushes holding a knife. He grabs your friend, and puts a knife to her throat. He is demanding that you give him your money. You know there is a police station right around the corner, and you might be able to get help. What do you do? Do you give up your money to save your friend? Do you run for help?
- 4) The United States is facing a war with Russia. Both countries possess nuclear weapons. The government has intel that suggests Russia is planning to launch a nuclear weapon at New York City in two days. How would you advise the government? Should we launch a pre-emptive nuclear strike on Russia or not? Would this actually protect New York City?

Appendix 4 for Days 25-30 Rubric for the “Maker Space” Product

Science fiction authors are presented with the unique challenge of taking the concepts from current scientific research and creating a believable setting for their novel. Oftentimes, these authors use their novel to comment on the potential ethical dilemmas that could arise from the implementation of this new research in our society.

Clearly, Scott Westerfeld chooses to point out dilemmas in both our current society and his fictional world. He introduces the reader to a variety of technology including world-specific terms like an interface ring, eyescreen, tracker locket, hoverboard, and position-finder. In his Insider’s Guide to the World of Uglies: Bogus to Bubbly, Westerfeld explains how many of the devices are based upon the evolution of the cell phone, LED technology, and GPS. He also includes additional information on magnetic levitation and nanotechnology to explain how these devices function in his fictional world.

Since the publication of The Uglies in 2005, cell phone and nanotechnology applications in the everyday world has increased tremendously. In this product, you will be asked to locate a research article, keep a “Maker Space” journal, and create a product that could hypothetically function in the world that Westerfeld created in The Uglies.

Step 1: Using your Chromebooks, research the topic of nanotechnology or the evolution of cell phones since 2005. You may want to check on Sciencenews.org or Science Daily for reliable research-based articles. Once you have located your article, print it out and annotate it using the close reading strategies that we have practiced all year. Answer the following question: How is the research applicable to our day-to-day life?

Step 2: Now that you have had the opportunity to read about the real life research inspirations for the novel, you need to brainstorm! What type of technology could you create to fit into the world of The Uglies? Use the process of the design cycle to create a product that would fit into this world. You have already completed the first step, which is inquiring! Now, you just need to develop your idea, create it, and evaluate the process. During this process, use your daybook as the official “Maker Space” Journal. Plan out your technology before you build it. Practice creating the technology by use physical or digital materials found in the “Maker Space.” After your creation, evaluate the process. What do you like about your creation? What would you change?

Rubric

	Points
Article (20 points) -printed copy (5 points) -annotated (10 points) -question answered (5 points)	
“Maker Space” Journal (40 points) -plan/develop ideas (20 points) -creation process notes (10 points) -evaluation (10 points)	
Product (20 points) -must fit into the setting of the novel	

_____/100

Appendix 5 for Days 30-45

Research Paper Rubric

In class we have explored how scientific research can create ethical dilemmas. We have discussed how science fiction authors often blend fact with fiction to emphasize ethical dilemmas presented to society through current research. Just because we can do something doesn't mean we should! How as a society do we know where to draw the line?

Your task is to select a real-life research topic that presents an unanswered ethical dilemma. What do scientists say about the topic? What does the government say? The general American population? You will present your findings in a research paper where you take a stance on this topic.

Step 1: KWL Chart- What do you know about this topic? What do you want to know? What did you learn through your research?

Step 2: Source Cards- Locate at least three sources on your topic. Each source must provide material that you would like to cite in your paper and be from a credible source. Each source should be documented in MLA format either on a Google Doc or on three separate index cards.

Step 3: Thesis Statement- Now that you have had the opportunity to research your topic, you need to take a stance. Write a thesis statement detailing your stance and the reasons why. This thesis must be approved by me before you continue on with the paper.

Step 4: Note Cards- Take notes from your three MLA sources. You must have at least five bullet points from each source on either an index card or a Google Doc. The notes should reference citations you would like to include in your paper to support your thesis statement.

Step 5: Works Cited- All of your sources for the paper should be included here. These sources must be cited in the paper. The works cited page should be on a separate page from the rest of the paper, double-spaced, in ABC order, and in 12pt Times New Roman Font.

Step 6: Research Paper- This is the completed version of your paper. It should be 5-6 pages long, include MLA Citations within the text of the paper, and be in 12pt Times New Roman Font.

Student Resources Background

Science Daily: Your Source for the Latest Research News. 2016. Accessed October 28, 2016. <https://www.sciencedaily.com/>.

This is a great resource for students to use for accessible scientific articles during research

Science News. "Science News." Society for Science and the Public. 2016. Accessed October 28, 2016. <https://www.sciencenews.org/>.

This website is also a great resource for students to use during researching their self-selected topic.

Odyssey: Adventures in Science. August-December, 2016.

Each month, this magazine focuses on scientific topics that are specifically targeted at middle school age students. Most of the articles involve building or becoming actively engaged in your community based on the scientific article.

Skloot, Rebecca. *The Immortal Life of Henrietta Lacks*. New York: Broadway Paperbacks, 2011.

This novel provides a real life example of an ethical dilemma that occurred to a woman in 1951 when her cells were taken by researchers without her permission. This novel would be an excellent suggestion for high fliers to read if they show interest on the topic.

Warlick, David. "Citation Machine™ Automatically Generates Citations in MLA, APA, Chicago, Turabian, and Thousands More!" Citation Machine: Format & Generate Citations – APA, MLA, & Chicago. 2016. Accessed October 28, 2016.

<http://www.citationmachine.net/>.

Students should use this resource to help create correct citations for the research paper.

Westerfeld, Scott. *Uglies*. New York: Scholastic, 2005.

This will be the class assigned novel during this unit of study.

Teacher Resources Background

Allen, Janet. *Holt McDougal Literature*. Evanston, IL: Holt McDougal, a Division of Houghton Mifflin Harcourt, 2012.

In this textbook, Unit 10: The Power of Research, provides examples for students and teachers on how to write a research paper using the MLA format. It also teaches students the research process including how to evaluate sources.

Delisle, James R., Judy Galbraith, and Pamela Espeland. *When Gifted Kids Don't Have All the Answers: How to Meet Their Social and Emotional Needs*. Minneapolis: Free Spirits Pub., 2002.

This textbook is one of the few resources that discusses the ever-evolving definitions of “gifted,” and how to teach gifted students. It was useful for creating lessons targeted at gifted students.

"Engineers Career List." Educating Engineers. 2013. Accessed November 16, 2016.
<http://educatingengineers.com/career-specialties>.

This website provides insight into the education, salary, and day-to-day tasks of certain types of engineers. It's a great resource if you don't know a lot about engineering.

Gibaldi, Joseph. *MLA Handbook for Writers of Research Papers*. NY:NY.

There are several print additions for this book. The most recent addition will include the most up-to-date information on citations and also details some of the hard to cite references.

Martinez, Sylvia Libow, and Gary Stager. *Invent to Learn: Making, Tinkering, and Engineering in the Classroom*.

This textbook provided an excellent history of make, defining both the historical differences and current differences in terms like make, tinker, and engineer. Additionally, the discussion about design cycles was especially applicable for the implementation of the IB Design Cycle in the classroom.

Stephens, Liz Campbell., and Kerry H. Ballast. *Using Technology to Improve Adolescent Writing: Digital Make-overs for Writing Lessons*. Boston: Pearson, 2011.

This textbook provided recent research on the writing trends in a digital world.

24h, Tech News. "Five Most Famous Living Engineers." November 27, 2012. Accessed November 16, 2016. <http://www.technews24h.com/2012/11/five-most-famous-living-engineers.html>.

This website provides an introduction to engineers that would interest middle school students.

Westerfeld, Scott. *Bogus to Bubbly An Insider's Guide to the World of Uglies*. Paw Prints, 2008.

This book provides additional information on the world that Scott Westerfeld created in our class novel. It is particularly useful when comparing real scientific research to research used in the creation of the novel.

"What Is Ethics in Research & Why Is It Important?" U.S National Library of Medicine. July 07, 2016. Accessed October 28, 2016.

<http://www.niehs.nih.gov/research/resources/bioethics/whatis/>.

This website is a great resource for exploring the concept of ethics and finding examples of ethical dilemmas.

Vedantam, Shankar. "How Stories Told Of Brilliant Scientists Affect Kids' Interest In The Field." NPR. June 7, 2016. Accessed November 16, 2016.
<http://www.npr.org/2016/06/07/481058613/how-the-stories-told-of-brilliant-scientists-affect-kids-interest-in-the-field>.

This study presents a way to engage students with stories of scientists in the classroom. The idea is to make scientists appear as ordinary people who discovered something through trial and error, and not set them up as a genius who just knew the answer.

Bibliography

Douglas, Rowena. *Linking Science & Literacy in the K-8 Classroom*. Arlington, VA: NSTA Press, 2006.

This textbook provided excellent insight into the instruction of the scientific method within the classroom. Its focus on literacy was especially useful for aligning the scientific teaching style with the Language Arts teaching style.

Online Research Ethics Course. 2003. Accessed November 16, 2016.

https://ori.hhs.gov/education/products/montana_round1/research_ethics.html.

This website is essential for understanding the ethical decisions that have been made regarding research. It gives multiple examples of past mistakes that led to the revision of ethical standards in research.

Tishman, Shari, David N. Perkins, and Eileen Jay. *The Thinking Classroom: Learning and Teaching in a Culture of Thinking*. Boston: Allyn and Bacon, 1995.

This textbook was the most helpful resource I found for designing a classroom that creates a "culture of thinking." The process was explained in detail complete with take-away classroom examples.

ⁱ (Online Research Course 2003)

ⁱⁱ (Online Research Course 2003)

ⁱⁱⁱ (Online Research Course 2003)

^{iv} (Online Research Course 2003)

^v (Online Research Course 2003)

^{vi} (Douglas, 2006) p.5

^{vii} (Shari, 1995)

^{viii} (Shari 1995) p.158