Anchor Papers for Spring 2013 Assessment

Assessment Score: 1 2
Assessment Score: 2 6
Assessment Score: 3 13
Assessment Score: 4 18
Assessment Score: 5 25

Assessment Score: 1

A current argument that has been debated for years is whether or not public water supplies should be fluoridated or not. One side of the argument states that water fluoridation, adding fluoride to public water sources, could be a beneficial preventative measure of poor dental health such as tooth decay. This argument was found to be effective after the dental health of people living in areas with high fluoride levels in their water had better dental health than those with lower levels of fluoride in their water source (Watson 26). Many people believe that water fluoridation can drastically increase the dental care of the people, but others argue that the benefits are not worth the negative effects of this idea. Although there are some benefits to the idea of water fluoridation, others argue that the side effects of this forceful measure are not worth the risks.

One of the reasons people oppose water fluoridation is the mass medication of people without their consent (Watson 26). Many people believe the decision should be up to the individual whether or not they ingest higher levels of fluoride or not (Watson 26). For example, some countries have chosen to supply its citizens with unfluoridated water, and the tooth decay rates compared to those of the United States are decreasing at the same rate ("10 Facts About Fluoride"). Therefore, these countries that have chosen not to add fluoride to their water have proven that the benefit of this practice can be found by the use of other sources of fluoride("10 Facts About Fluoride"). Now that the benefits of fluoride are known, fluoride can be found at higher levels in other sources such as toothpaste and mouth wash. With the higher overall levels of fluoride available, people are more likely to be over exposed to fluoride. One might argue that there is no reasonable way to correctly monitor the levels of fluoride consumed by the public (Watson 26). This also addresses the problem of over exposure to fluoride. If the levels of the natural amount of fluoride in publicly used water are increased, how can each person using the public water know if they are consuming too much fluoride? In the beginning of the findings of the benefits of water fluoridation, it was thought that fluoride had to be ingested in order to be affected ("10 Facts About Fluoride"). After recent extensive research, it was found that there is no benefit in the ingestion of fluoride ("10 Facts About Fluoride"). Instead, it is now known that the effects of fluoride on tooth decay only occur with the direct application to the teeth ("10 Facts About Fluoride"). Therefore, drinking fluoridated water is only effective when in direct contact with the outside of the teeth, but can be harmful when swallowed ("10 Facts About Fluoride").

Because most people do not have the option to choose whether or not they can drink fluoridated water, the effects of over exposure can be seen by fluorosis of the enamel and incurable diseases (Watson 26). Too much fluoride in water can increase the chances of tooth decay and erosion (Watson 26). Fluorosis can cause discoloring of teeth such as white blotches or a brown color along the edges of the white blotches (Watson 26). Other diseases such as bone cancer, hypothyroidism, and Down's Syndrome are also thought to be side effects of over exposure to fluoridation (Watson 26).

Thought by some to be one of the greatest public health achievements of the 20th century, fluoridated water is now available to over sixty percent of the United States population through public water systems ("Fluoridated Water"). By inhibiting bacteria that build up on the outside of teeth, fluoride has been found to reverse tooth decay and inhibit remineralization of the teeth ("Fluoridated Water"). By adding approximately 0.7 milligrams of fluoride per milliliter of water to public water sources, the overall health of the public population can be positively affected with higher fluoride levels to prevent tooth decay ("Fluoridated Water"). Studies completed in Australia are said to have proven the effectiveness of water fluoridation in fighting tooth decay (Armfield 26). By comparing the dental health of people living in areas affected by water fluoridation and those not affected by water fluoridation, studies found that adding fluoride to drinking water reduced dental decay specifically in children (Armfield 26). These studies took into account many different factors that could have affected the results such as other sources of fluoride like toothpaste and socio-economic status (Armfield 26). Children living in areas with water sources that contained 0.7 ppm fluoride or more showed consistently better oral health than children drinking water with a concentration fluoride of 0.3 ppm or less (Armfield 27). Higher levels of fluoride in drinking water showed fewer children suffering with filled, missing, or decayed teeth (Armfield 27). Overall, higher fluoride levels in drinking water showed better oral health in children between the ages of four and fifteen.

Although the cancer risk of water fluoridation has been debated for years, many studies have proven this theory wrong ("Fluoridated Water"). Studies have shown that there is no relation in risk of cancer of individuals who are exposed to fluoridated water and those that are not ("Fluoridated Water"). A number of studies on humans and animals over many years have taken a multitude of different approaches to the study of this theory, but recent studies have failed to find any credible evidence supporting water fluoridation as a cause of cancer ("Fluoridated Water"). Researchers have also studied the statistics of counties in the United States comparing those people living in counties affected by water fluoridation and those people not living in counties affected by water

fluoridation (“Fluoridated Water”). The results show no increase in individuals affected with cancer in counties that have implemented the use of water fluoridation compared to counties that have not (“Fluoridated Water”). Researchers have also gotten even more accurate data by studying the natural accumulation of fluoride in the bones of individuals that have bone cancer and those without (“Fluoridated Water”). Their tests showed that the total fluoride levels in the bones of the test subjects were the same (“Fluoridated Water”). This is another one of the many studies done in order to prove that water fluoridation is not a cause of cancer (“Fluoridated Water”).

In my opinion, while there are many negative effects of public water fluoridation, there are many people who argue that the overall health of the public population can benefit from this practice. Although the dental health of people can possibly be fixed simply by fluoridated water, I feel like the opposing argument presents other major challenges to completely solving the situation. Although tooth decay is a huge problem in today’s society and can be decreased by water fluoridation, there are many other aspects of the situation that must also be addressed. I do not believe that anyone has the right to determine how another person should live their life especially when it comes to the well-being of one’s own body. I feel that the decision to ingest fluoride, whether it is through fluoridated water or another source, should be up to the individual whose body will be affected in the end. While there is a problem with the dental health of the overall population in many places, I do not think those who do not suffer from poor oral health should be forced to ingest fluoride through their public water source. Although there are people who cannot afford great dental care products, those people who can afford them will be at risk of over exposure. I disagree with those who think that the strong should suffer for the weak. With the exception of those who did not have a hand in choosing their destiny, I do not agree with the idea of the hard working people having to pick up the slack of those who did not put out the same effort to succeed. Therefore, I would suggest a different approach to the situation of water fluoridation. Instead of affecting the entire population of people within the area that shares the same public water source, the money and time used for this project could go to a more personal approach. The people who do not want extra fluoride treatment would not be forced to, and those who would like extra fluoride treatment would be allowed that treatment. With the use of awareness information and proper dental upkeep, the problem can be prevented without the risk of other diseases and dental problems (“10 Facts About Fluoride”). For example, spending the money that would normally be spent on water fluoridation on dentists and dental hygienists, the problem would be attacked directly and no others would be at risk of fluorosis or any other risks of water fluoridation(“10 Facts About Fluoride”).

Another problem with both arguments against and for water fluoridation is the outcome of their research studies. Although both sides of the argument have an appealing conclusion to the effects of water fluoridation, one of them has to be wrong. If both studies are testing for the same treatment of fluoride then how do they both have consistently opposite conclusions to the use of fluoride? This brings me to the thought of skewed studies. Because both arguments are trying to prove their idea, I think there is a great chance of the researchers choosing certain situations in which it would be easier to prove their side of the argument. I agree that fluoride does have some benefits that fight tooth decay, but I also think that every situation should be treated differently because not every situation is the same. Although tooth decay is a big problem around the world, I do not think it is necessary to treat every situation involving areas with tooth decay with water fluoridation. In the end, I do believe that water fluoridation can benefit society in fighting tooth decay, but I believe that each situation does not require water fluoridation as its only source of fighting tooth decay.

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Assessment Score: 2

Is Animal Testing Ethical or Unethical?

In the course of a year, “Approximately 17-22 million animals” are used for testing and research experiments ("US Statistics"). The ongoing debate surrounding the idea whether animal testing is ethical or unethical is a very controversial topic. Animal testing has been around for centuries and it is dated back to the 1800’s. Originally, testing was for creating vaccines for young children, using an assortment of animals such as monkeys, mice, and guinea pigs. . I am going to tell you the truth about animal testing in this essay. The cruelty of animal testing is a serious issue and it should be banned because there are better testing alternatives out there in the world.

Today, animal testing has grown tremendously in society. Animal experimentation is a highly disagreeable practice that should not be allowed. The facts revolving animal experimentation and the painful processes many innocent research animals endure are horrifying.

There are nearly “50 different alternative testing methods” alternatives to animal that exist in society today (“Alternatives to Animal Tests”). Reducing the number of animals that are used in experimentation is a goal that many animal activists and some companies strive toward. The unnecessary discomfort, pain, and suffering that animals experience during animal testing must be stopped. I believe that using animals for experimentation and testing is immoral. I think society should become more involved and support to stop animal testing. Modern technology has aided in the creation of new alternative testing methods. New alternatives methods and testing strategies are being developed, validated and accepted by authorities daily. Although there are more than fifty different

alternatives to animal testing, the most recent and notable testing methods include: vitro, stem cell, computer models, computerized patient drug databases, virtual drug trials, MRI's, CT Scans, and micro dosing (Ferdowsian and Beck 4). I believe these alternatives have the capability to have a great impact on the animal testing industry, gearing towards non-animal forms of testing, instead of traditional animal testing methods.

There are many benefits that arise from the use of non-animal experimentation. It has been proven that using alternative testing methods are more reliable than the use of traditional animal testing. If the results of non-animal experimentation are more reliable, then why are companies still using animals as test subjects? This is an interesting question that has arisen. It is undeniable that in producing a 100% accurate result, the best test species for humans are simply using humans themselves. However, the option of testing on the human species is illegal and cannot be performed. The commonly used test on animals that test eye or skin irritancy is called the Draize test; it is tested solely on rabbits. The Draize test is argued that it is not 100% accurate and is widely considered crude and evil resulting in countless rabbits undergo unnecessary suffering. The Draize test data is useless mainly because there are major differences between a rabbit's eye and a human's eye. Many companies have sought out new alternative to this type testing. There are three different tests alternatives to the Draize test: EpiSkin, EpiDerm, and SkinEthic. These tests have the ability to save thousands of innocent rabbits each year. The alternative test that is most commonly used by companies is an in vitro test is called EpiDerm. The EpiDerm test has proved the belief that (non-animal) alternative testing methods are both reliable and reproducible. EpiDerm is a human 3-D skin like tissue structure that is used to test chemical skin irritants. According to authors, Ranganatha,

N., and I. J. Kuppast, "EpiDerm correctly detected all of the test chemicals that irritate human skin, while tests on rabbits misclassified 10 out of 25 test chemicals- a full 40% error rate" (Ranganatha and Kuppast 31).

Researchers have discovered that the use of human tissue in toxicity testing produces accurate testing results than the animal models. The commonly used toxicological testing on animals is known as the LD50 test and the results of these tests are identified as not being 100% accurate. That fact that researchers or scientists are aware that the LD5O test does not give concrete results from experiments. Personally, the continuing use of this particular practice is foreign to me. Any form of test that poisonously kills a creature, obviously inflicts considerable suffering. Most people have no clue what the LD50 test entails. The LD50 or Lethal Dose 50 test is a short-term toxicity test that last less than three months, and is administrated on rabbits, dogs, cats, mice and guinea pigs. Some examples of the types of products they test are lipsticks, skin-care, moisturizers, cleaners, and even nail polish. During the LD50 test, researches mix a chemical either into the animal's food or water, inject a chemical into an animal's mouth, or insert a chemical into the animal's stomach through a tube. Almost all of animals in the testing group end up dying, and the few that survive are killed soon after their results are evaluated. This type test sounds extremely painful and it astonishing that a person can do such cruel things like this to a cute, innocent animal. Not only is the test cruel, it is scientifically invalid. It does give an accurate test result and therefore should not be used. Many companies have introduced new alternatives instead of using the classic LD50 test. There are other means of testing toxicity levels for products, such as the use of human tissue in a test called cytotoxicity. The cytotoxicity test "measured toxicity at a precision rate of

77-84% accuracy compared to the LD50 rate of 52-60%" ("Alternative In Testing"). It is evident that this test is more accurate compared to the use of animal models. According to the credible Dr. Bjorn Ekwall, he states that "the test can target toxic effects on specific human organs, whether or not the toxic substance permeates the blood barrier, and other highly sophisticated and precise information that the agonizing death of an animal of a different species would not reveal" ("Alternative In Testing"). In addition, the test can be used to identify the toxic outcome on specific human organs.

Over the years, a few companies have switched to using alternative testing methods because they realized non-animal tests are more expedient. For example, an inVitro test called corrositex, which uses human synthetic skin to determine chemical corrosvity. The main reason why every company should convert and use this test instead of using animals for testing is because it will save lots of time. Unlike a normal animal testing experiment that lasts nearly a month, a corrositex test can offer a chemical corrosivity result in less than a few hours. In addition, if you use Corrositex you could save money because shipping costs are significantly lower. Companies should take a closer look at using the corrositex test mainly because of its benefits. Another example is an in vitro test on sunscreens called DakDak. This test allows data to be determined in a couple days, which is a great time saving opportunity as well. Time is a very crucial part of the experimentation process. The faster you can perform an experiment, the faster you received the results. The expression "faster is better" is instilled in our brains. Companies could benefit from using alternative testing methods and in doing so, could save enormous amounts of time.

alternative testing methods is that non-animal tests are more effective and practical.

Everyone is aware that in order to perform an experiment, it costs a large sum of money. Most companies are stingy and insist on producing animal experiments that are the easiest and cheapest to perform. These types of companies are the few of many that are negligent during these animal experiments as long as the job gets done, yet what most companies don't know is that using non-animal alternative testing methods are more time and cost efficient. The informative authors, Ferdowsian and Beck, state that a in vitro human immune system creates benefits as in " reductions in the time and costs bring drugs and vaccines to the market" (Ferdowsian and Beck 3). One example, in relation to traditional animal testing, the in vitro test called DakDak is seen to be way more inexpensive. It is suggested that to test "five or six products of DakDak cost less than half the amount of testing one single product on an animal" ("Alternative In Testing"). In my opinion, choosing non-animal alternative testing methods over traditional animal testing is a very plain and simple choice. There is solid evidence that non-animal alternative testing methods are much more beneficial and overall, the better choice.

The fifth benefit of using non-animal alternative testing methods is that cruelty-free products are more environmentally friendly. There are many companies that produce products that are cruelty-free. I feel that companies that practice this lifestyle approach are much more considerate of an animal's well being and acknowledge that animal experimentation is destructive. The option of being cruelty-free and not testing on animals is a major benefit to our society because it does not damage the environment or produce harmful waste.

There are many people that will argue that using animal experimentation is the most valid testing method in the world. Skeptics may argue that animal experimentation has

been around for hundreds of years and provides quality results. I believe that animal testing is rooted from natural curiosity. The closest thing to a human is an animal and that is the main reason they are test subjects. In the article, The Truth About Animal Testing, the author Michael Brooks states the reasons why he believes animal testing is ethical. Brooks states "The use of animals in medical research is inevitable. Every drug licensed for treatment has to be tested on animals. It's not just a legal issue. Many of the cures we celebrate – and let's remember that cancer is now more survivable than ever – were developed only because researchers were able to carry out experiments on animals ("The Truth About Animal Testing"). Brooks makes a great point. His main point is about human survival and finding cures for human diseases. His article is quite eye opening, and I think many people can relate to him. However, there are many people that do not have an opinion about animal testing and simply do not care. These people feel that the controversy over animal testing doesn't concern them. I will admit that I used to think the same way until a couple years ago. I read an article on the Internet that changed my life. I can still remember the photos that were presented in the article. The fact of the matter is that people in society that don't see animal testing first hand are likely to not care about it.

In conclusion, there more benefits from the use of non-animal testing methods compared to the traditional animal testing. The use of non-animal testing does not only benefit major companies but it benefits animals as well. Reducing the number of animals in experiments is what animal activists and numerous people strive for everyday. Animals are similar to humans; they eat, breathe, and live just like humans. Animals should not have to experience unnecessary pain and suffering. This is a major issue in

society, which needs to be resolved. Animals have no voice, and we must be there voice for them.

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Assessment Score: 3

The Future of The Grading Scale

On October 2nd, 2012, after almost a year of debating, LSU's Faculty Senate passed the bill in favor of the plus and minus grading scale (Bergeron). The plus and minus grading scale is a system in which grades will be broken down more thoroughly to better determine a student's real grade point average. For example, a student can receive an A or an A- on an assignment instead of just an A. The regular and familiar A will represent 4.0 points while the A- only represents 3.7 points (Addo). This system has been implemented in many varying universities across the United States such as Duke, Mississippi State, Cornell and even nearby Tulane (Chance 2). The plus and minus system was designed to deal with grade inflation, ability to differentiate between students and the ability to motivate students (Barnes and Burning). The implantation of the plus and minus grading scale at LSU will have no effect on future LSU student's grade point averages.

The plus and minus grading scale is widely supported for multiple reasons, but one of the most prevalent reasons is that this grading scale is supposed to help reduce grade inflation (Barnes and Burning). Grade inflation is when academic grades are awarded for assignments that would have received lower grades in the past (Millman et al.). Essentially, grade inflation is when students receive higher grades than they deserve. Proponents for the plus and minus grading scale argue that it is supposed to reduce grade inflation because the grading scale is much more narrow than the traditional grading scale (Barnes and Burning). With grade inflation lowered, students will receive more accurate grades and this will result in more reliable grade point averages. Many believe that grade inflation does not significantly affect students' grade point averages (Millman et al.).

Researchers Jason Millman, Simeon P. Slovacek, Edward Kulick and Karen J. Mitchell conducted two surveys to determine if grade inflation – and the results of grade inflation – were as prevalent as the proponents of the plus and minus grading system argued. These studies determined that grades are more bunched when in the traditional grading scale, which resulted in more grade inflation than the less bunched plus and minus grading scale (Millman et al.). However, while the surveys concluded that although more grade inflation is prevalent in the traditional grading scale, it had only slight, non-significant effects on grade point averages' reliability and accuracy (Millman et al.). Grade point average reliability began to suffer only when compared in the graduate programs because grades were subjected to two categories: A or B (Millman et al.). Therefore, it is safe to assume that outside of graduate programs, grade inflation does not affect students' grade point averages. So, whether grades are in the traditional grading scale or in the plus and minus system, their grade point averages will be reliable and accurate.

The plus and minus grading scale was also designed to help better differentiate between students. Proponents for the plus and minus grading system believe that this grading scale makes grades fairer and more precise (Barnes and Burning). The plus and minus grading scale is more narrow and this is supposed to produce a more reliable representation of students' performances. There was a study conducted by researchers Joseph L. Philbrick and Patrick I. O'Donnell to determine if a lack in grading precision due to using the traditional grading scale was related to the growing concern over college dropouts. Philbrick and O'Donnell randomly sampled students from each degree program that were in danger of academic disqualification. The students' grades were then

converted into the plus and minus grading scale and then compared with the original grades that were in the traditional scale (Philbrick and O'Donnell). The results showed that the students' grade point averages were not significantly different from their original grade point averages (Philbrick and O'Donnell). The results of this study helps to prove that the plus and minus grading scale does not affect the ability to differentiate students from one another based on performance and grade point average.

Student motivation is said to be much higher when the plus and minus grading scale is implemented because students are more driven to make higher grades throughout the semester. Another factor that is said motivates students is the higher risk of earning lower grades due to the more refined grading scale (McClure and Spector; Barnes and Burning). James E. McClure and Lee C. Spector wrote a paper on a study they conducted testing whether student motivation was impacted by the implantation of the plus and minus grading scale over the traditional grading scale. Their study included a group of undergraduate economics students at a mid-sized university. The survey took into account student characteristics and their academic performances (McClure and Spector). The students were asked to choose between the plus and minus grading system and the traditional grading system. Based on the results, students who opted for the plus and minus grading system were not proven to be more motivated than the students who chose the traditional grading system (McClure and Spector). This study gives the student perspective and helps to prove that motivation is not a factor that schools should be taking into account when choosing the plus and minus grading system over the traditional grading system because it is not a proven positive outcome.

All of the aspects that the plus and minus grading scale was said to have been designed to improve have been proven to not have any significant impacts on students' grade point averages. U.S. News & World Report has ranked LSU as one of the top schools in the United States for five years in a row (Ballard). LSU has achieved this ranking under the traditional grading system. However, according to the LSU Faculty Senate the plus and minus system is slowing going to be integrated "as a means to increase the accuracy of the evaluation of students" (Chance 1). This change will not occur for some time because of the university will have to purchase software and reprogram registration software (3). Students and faculty alike will have to be introduced and educated on all aspects of the plus and minus grading system as well (3). Another aspect of the legislation that is causing some controversy is that the plus and minus grading system will not be mandatory which could lead to inconsistency in grading (Chance 3; Addo). This will cause scheduling problems and crowding in classes that still continue to use the traditional grading scale. The professors that opt to use the plus and minus grading system in their class are also going to see an increase in appeals by borderline students about their grades (Chance 3; Addo). Although the plus and minus system does not significantly affect students' grade point averages, students are more likely to stick to the grading scale that is most familiar to them. As the plus and minus grading scale becomes more integrated into LSU and becomes more familiar, students will begin to take classes that use the grading system of their choice – whether it be the traditional grading system or the plus and minus grading system – because these grading scales will not determine students' grade point averages, the students themselves will.

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Assessment Score: 4

Hungry for Health

According to the United States Centers for Disease Control and Prevention, obesity now affects 17% of all children and adolescents in the United States - triple the rate from just one generation ago. In response to this drastic increase in childhood obesity, Congress passed the Healthy, Hunger-Free Kids Act in 2010 which contains new regulations which public school lunches must follow. After all, "more than 95 percent of American youth aged five to seventeen are enrolled in school, and no other institution has as much continuous and intensive contact with children during their first two decades of life" (Story 110). If there would be any place to help students learn about a healthy lifestyle, it would be a school. The Healthy, Hunger-Free Kids Act, more commonly referred to as the Child Nutrition Bill, would let the USDA, U.S. Department of Agriculture, update the guidelines of what food is contained in school lunches. A few of the guidelines provided by this act are : increasing amounts of whole grains, fruits, and vegetables contained in each school meal, offering only fat-free or low-fat milk varieties, and limiting calories based on the age of children. The price of a school lunch would also be increased an average of ten cents in order to make up for the extra money spent on the greater amount of fresh produce contained in the lunches. The regulations of the Child Nutrition Bill would be implemented over a three year period starting this past school year of 2012-2013.

However, even though most of the regulations contained in the Child Nutrition Bill seem as if they would be very beneficial to the overall health of students, they have yet to be accepted by the majority of students who have to eat school meals. Two of the largest oppositions students have towards these new regulations are the calorie limits

and the increase of vegetables. Most students believe as “the meals have gotten healthier, the taste has failed to keep up” (Doering). I do understand the government’s reasons for wanting to reduce portion size to potentially make students healthier, but because students have not yet accepted the new standards, most of them are bringing their own lunch from their home, not even eating the healthy school lunch provided. If students are not eating these healthy meals provided at their schools, how will these regulations have any impact on the decrease of childhood obesity? Unless certain changes are made to satisfy the students and improve their perceptions of health foods, I do not believe the current school lunch regulations will have any significant impact on childhood obesity. Even though I do support the change to healthier school lunches in order to decrease obesity, the regulations would become more effective if there were improvements with the system such as the increase of the current calorie limits and the implementation of school gardens in every school.

For the first time, the Child Nutrition Act has limited the amount of calories provided in a school lunch. These new calorie limits have been created according to three different age groups, providing “650 calories for a meal for kindergarten through fifth grade, 700 calories for seventh and eighth grade and 850 calories for high school grades” (Bottemiller). Even though the calorie limits are supposed to be a sufficient amount of calories for the children of each age group, school meals which abide by these limits are not satisfying every student and are being described as a one size fits all deal. However, it’s not that the school lunches contain unhealthy foods; the problem is school lunches, following the current regulations, do not contain enough calories to satisfy students. One study found school lunch participation, before the calorie limits were enforced, actually

leads to increased 24 hour intake of six vitamins and minerals as well as dietary fiber (Gleason 1047). In order to cut calorie amounts in school meals, schools are offering less meat, less meat alternatives, less grains, and have banned whole and two-percent milk from lunches which is decreasing vital nutrients.

Because of the decrease in the amount of food served, most "teens believe their lunch quality and quantity has decreased as prices for the meals have increased" (School). This has led students to bring their own lunch to school, avoiding eating a school meal altogether. In response to the decreased amount of food offered and the additional increase in price, students across the United States have created various protests in the form of boycotts, Facebook pages, Twitter pages, and also YouTube videos. If the students are this dissatisfied with the lunch they have to eat each day, there should be an increase in calories contained in each school meal in order to fulfill the students hunger throughout their school day. Students aren't the only people who think the new calorie amounts are insufficient. Principal Todd Quarnberg of Copper Hills High School also stated, "We are not getting enough food out of our school lunches right now to sustain kids through the end of the day. It is a big issue here" (Wood). Students and adults alike agree the decreased proportions are not sufficient.

There are many students who are left unsatisfied by the decrease of calories and portion size of school meals. Two groups which this regulation has impacted the most are student athletes and low income students. Because athletes tend to "burn upwards of 3,000 calories a day", their school lunches are leaving them unsatisfied (School). When they burn these additional calories, they are left feeling hungry for the rest of the day and throughout their sport's practice. Most athletes who still eat the meal provided by their

school now have to buy snacks from the school snack window or snack machine to replace the decreased amounts of food provided. Athletes aren't the only group of students who have been left hungry by the decrease in portion sizes. Lower income students are also left unsatisfied. For some of these students, this is the only meal they may receive in a day. No student should be left feeling hungry after eating a school lunch.

Along with the increase in calorie limits to satisfy students, I believe implementing school gardens and increasing health education would not only be beneficial to the students' health but also their knowledge about their health and healthy foods. All schools, especially elementary schools, should have a garden. Instead of only providing students with vegetables and fruits to eat, why not educate them on where they came from and why these particular foods are healthy? If children learn at a younger age where certain foods such as vegetables and fruits come from, I believe they will be more willing to taste the foods and eat them on a regular basis. Many students may live in apartments or not have enough land to grow a garden at their own homes; therefore, a school garden would be very beneficial to them. Judith Collier-Reid, national consultant for the Dallas-based American Heart Association's Teaching Gardens program, stated, "If the children are involved in growing the vegetables, then they are interested in eating them"(Stengle). Students will not only gain interest in vegetables and fruits but also be able to learn which foods are nutritious for them. There are also many other countless lessons children can gain from growing a school garden such as: "responsibility, lessons about the environment and science, teamwork, math skills, and leadership" (Stengle). Again, a school garden will not only improve the physical health of a student but also their mental and social health as well.

In addition to the many educational benefits which come from children growing a school garden, the food grown in the students' gardens can be used in school lunches. This could possibly decrease the amount of money spent to provide fresh fruits and vegetables for school meals. Not only will the produce be extremely fresh, students will also know where the food came from and not have to worry about any possible contamination of the produce. From personal experience, I can say growing a garden is extremely beneficial to broaden the minds and palates of children. As a child who grew up around a garden, I know how having the opportunity to be around food and eat food that you grow can potentially benefit young children in many ways. When children are exposed to vegetables and fruits, there is a greater chance they will grow to like them.

With the increase of calories contained in a lunch and the addition of gardens in schools, I believe there will be a significant increase of students who will eat their school lunches and potentially become healthier and more satisfied. Having increased calorie limits will help students stay fuller longer. This, in turn, will prevent them from buying unhealthy snacks from their cafeterias to curb their hunger. With the addition of school gardens, students will not only gain interest in vegetables and fruits but also be able to learn which foods are nutritious for them. However, there is a slight twist to the situation. Although the government seems to be genuinely interested in the health of America's school children by creating these healthy guidelines for school lunches, they are actually contradicting themselves by holding responsibility for the advertisements of junk food to children. So many children today are attracted to cold drinks, candy, and chips. Why might they be so attracted to these unhealthy foods? The reason children want these foods is because of the advertisements. "Marketing of food to children actually

contributes to the obesity epidemic…the government in the United States does not restrict food advertising aimed at juveniles and adolescents", therefore children are eating what they see advertised on television and in stores (Weiss 383). It isn't very often that you see advertisements containing healthy foods such as fruits and vegetables being aimed at children and adolescents. In conclusion, "while legislative action can be one of the many causes of a food environment that facilitates obesity, it can most surely be a solution" (Weiss 387). The government has made great efforts to decrease childhood obesity by implementing healthy lunch standards in schools. However, if the government wants to significantly decrease childhood obesity rates they will need to choose whether they want to sell junk food to make a profit or implement better improvements to school lunches such as increasing calories limits and providing gardens in schools to increase the likelihood that America's children will grow up healthy to provide a brighter future for our country and themselves.

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Assessment Score: 5

There will be a *Fungus amongus*

What if I told you that there was one thing we could use that could decrease the amount of hazardous waste added to landfills and water? Americans discard about 33.6 million tons of plastic each year and about 86 percent of it ends up in landfills where it may never decompose and could potentially leak pollutants into the soil and water (Themelis et al). In addition to that, about 100 million tons of plastic debris is polluting the Earth's oceans, where it negatively affects the health and safety of marine life (Cho). One thing that could replace a specific form of plastic called polystyrene foam is fungus. Growing fungus as a replacement of manufacturing polystyrene foams has the potential to use "less energy, produce less waste, and reduce environmental footprints" (Witkin). Fungus, or mycomaterials, should replace all polystyrene foams.

Polystyrene is one of the most widely used plastics in the world. In fact, several billion kilograms are produced each year (Maul et al). Polystyrene is a polymer of styrene, which is a liquid petrochemical (Withey 125; US Census Bureau). Petrochemicals are very important because they are the chemical products derived from petroleum, a flammable liquid made up of a mixture of hydrocarbons. It is also a fossil fuel, which means that it is a limited resource for us to use ("Petrochemical"). Polystyrene foams, more specifically, are 98 percent air, which makes them light weight and buoyant. They are used to make disposable trays, plates, bowls, insulation, and most popularly, packing "peanuts" (National Institute of Environmental Health Sciences).

The secret to using fungi as a replacement for polystyrene foams involves what people typically do not think of when you say, "mushroom." The mycelium, which grows beneath the ground, is a very powerful substance. It is a vegetative structure that gets

tangled up to create a web-like structure made up of root-like strands (US Environmental Protection Agency). It can be very strong because of the component called chitin in the cell walls, which is the same compound that makes lobster shells so sturdy (Zeller and Zocher 53). It is a living organism that requires a source of carbon and energy just like humans do. This source of carbon and energy can come from easily obtained things like agricultural waste (Shin). Cottonseed hulls, rice hulls, corn stover, or hemp hulls, are a few of the many types of agricultural waste that can be fed to the fungus. Once the agricultural waste, which consists of mostly plant materials, are pasteurized using steam to ensure their sterility, they are mixed with the fungus and placed into a mold of any shape (Zeller and Zocher 53). The mycelium of the fungus eats the plant materials for their carbon source and grows into the shape of the mold it was placed in ("Ecovative Design"). The final solid is a spongy-like material (Nearing) that is dehydrated and heat-treated. Finally, the product undergoes "rigorous biological quality control" to make sure the mycelium is completely dead (Zeller and Zocher 53).

Mycomaterials, materials grown from the mycelium of fungi, have a very high level of safety associated with them. When certain plant wastes, such as rice hulls, are used to feed the fungi and make it grow, it makes the fungi naturally fire retardant because silica is in rice hulls (Zeller and Zocher 53). Using the National Institute of Standard and Technology, "it performs as a Class 1 firewall due to the mineral content of the substrate" and qualifies for Leadership in Energy and Environmental Design (LEED) credits if used for insulation (Zeller and Zocher 52; US Environmental Protection Agency). This could be extremely beneficial for insulation of buildings. If a fire were to begin, the insulation would not amplify the size of the fire. Another element of safety in

the mycelium is that it does not contain any potential carcinogens. Styrene, the compound that makes up polystyrene foams, is labeled as a reasonably anticipated carcinogen (a cancer-causing agent). Those in the labor force that work with styrene to produce polystyrene foams are not the only ones exposed to it. It can get into the environment through landfills, or waste sites, and also seep out of polystyrene containers used for food products (National Institute of Environmental Health Sciences).

Not only is the mycelium of fungi safe, but it is a highly efficient alternative to polystyrene foams. The fungus grows at room temperature and pressure, in the dark, for five to seven days. Not only this, but it grows without watering and petrochemical inputs (Zeller and Zocher 53). This requires ten times less energy and emits five times less carbon dioxide than petroleum-derived equivalents, which include polystyrene foams (US Environmental Protection Agency). If fungi replaced polystyrene foam, it would decrease carbon dioxide emissions by twenty-five million kilograms in two years along with reducing energy consumption (Gonzalez). Polystyrene foams come from petroleum, which is a non-renewable fossil fuel, and it is used to manufacture disposable products used for a short time such as travel coffee mugs and packaging peanuts, whereas because the mycelium is a living organism that can be grown, we have an unlimited supply ("Petrochemical"). Another way it is efficient is because it is grown using agricultural waste as its energy source. It uses byproducts from agricultural production that are difficult to degrade and are removed from farms. The byproducts are things such as rice and cottonseed hulls. This offers an environmentally friendly use for previously unwanted agricultural waste (US Environmental Protection Agency). Lastly, traditional manufacturing processes convert raw materials to produce both a product stream and a

waste stream. Using the waste stream of agricultural processes as the food for the fungi, one hundred percent of that waste stream goes into growing the mycelium product. Even if a piece of the final mycelium product is not the desired size or shape, it can be broken down to use as food to grow more fungi or it can be biodegraded (Zeller and Zocher 53).

Because mycomaterials are biodegradable and recyclable, it increases their value when compared to polystyrene foams. The mycomaterials are primarily made up of vegetative mycelium (US Environmental Protection Agency). To prove the "organic-ness" of the mycomaterials, a sample of it was analyzed at the Researching Technology and Innovation Center of the University of Seville. Their analysis reported that it is ninety-five percent amorphous (or unstructured) organic matter, and a micro-textural analysis indicated that it is porous. These elements make the material biodegradable. It consists of zero harmful elements to people or the environment (Gonzalez). When the mycomaterial is no longer needed, it can be thrown in the yard to serve as fertilizer or simply thrown away where it will break down in a landfill (Zeller and Zocher 53). Polystyrenes are not degradable. For example, every packaging peanut that has ever been manufactured is still in existence somewhere on this Earth. That adds up to over three hundred million cubic feet of packaging peanuts (Sesno)!

Some people wonder if the mycomaterials can cause allergic reactions because fungi is involved. Because only the vegetative mycelium of the fungus is involved, and not the spores, it is not mold-like and cannot cause allergic reactions (Zeller and Zocher 53). To ensure that there are no spores, the last step after growing the fungus to a certain shape, and to obtain the final product using mycomaterials, is heating it to kill the fungus and any spores (US Environmental Protection Agency). The heating process also puts to

rest any worries about bugs being in the fungus (Zeller and Zocher 53). To keep with the theme of being environmentally conscious, the heat treatment uses green hydroelectric power from Green Island Power Authority (Nearing). Also, some question the reliability of growing a living organism and say that it cannot be relied on to have a consistent density with no air pockets (Alsever). The way mycelium grows, which is aseptically, is a cloning process where no spores are involved, which makes the mycomaterial have a uniform density ("Ecovative Design"). Lastly, "the patented pasteurization process Ecovative uses to sterilize the agricultural feedstocks ensures that the material meets International Safe Transit Association standards for shipping agricultural products out of the country" (Zeller and Zocher 56).

With what humans are doing in their everyday lives that are destroying the environment, we should participate in anything that can help the environment. Using fungi to replace polystyrene foams is a safe, efficient, and eco-friendly way to start tackling the problem plastic is causing to our landfills and oceans. Mycomaterials made from growing fungi is safe in that when it is fed a certain agricultural waste by-product, it is naturally fire retardant, which would be very beneficial in the world of construction (Zeller and Zocher 53). It also does not contain any toxic chemicals or potential carcinogens. This is unlike polystyrene foams, which are made up of styrene, a compound labeled as a reasonable anticipated cancer-causing agent by the National Institute of Environmental Health Sciences. The efficiency of mycomaterials starts with the fact that they grow at room temperature and pressure, in the dark, for five to seven days. The growth of fungi also does not involve watering or petrochemical inputs (Zeller and Zocher 53). Manufacturing petroleum-derived equivalents, including polystyrene

foams, requires ten times more energy and emits five times more carbon dioxide (Gonzalez). One hundred percent of the agricultural waste collected to feed the fungi is used up, and if the fungi turn out to be the incorrect size or shape, then they can be used as food for the next round of fungi growth (Zeller and Zocher 53). The growth of fungi is an unlimited supply whereas polystyrene is a petrochemical with a limited amount of resource. Lastly, mycomaterials are completely organic and biodegradable so they can be break down in soil when they are no longer needed, unlike polystyrene foams, which are non-biodegradable and non-recyclable (Zeller and Zocher 53). The future of fungi is very bright and has more uses than the ones discussed in this paper. We should explore the possibilities of using more natural materials and organisms—like fungi—already on Earth rather than manufacturing synthetics that can harm human and animal populations.

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