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DOES SOCIO/ECONOMIC STATUS AFFECT ENVIRONMENTAL
AWARENESS IN ELEMENTARY SCHOOL CHILDREN
INTERACTING WITH SCHOOL GARDENS?

By

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Abstract:

This is a case study involving three elementary schools in the greater Lincoln, Nebraska area. These schools were chosen to provide insight to three different economic backgrounds. Saratoga and Randolph from Lincoln Public Schools, and Norris Elementary part of Norris Public Schools 160 was the third school involved in the study. This case study focused on seeing whether socio/economic background had any effect on environmental awareness. To do so, surveys were handed out to each school to help measure environmental awareness. These surveys also helped determine where the environmental literacy standards were in the elementary schools of Lincoln, Nebraska. The hypothesis of this case study is lower socio/economic background will result in schools having lower environmental awareness.

At all three schools, there were no-till, raised bed gardens. No herbicide was used and all vegetables grown were 100% organic. Along with the garden preparation, college students also taught the elementary school children, important environmentally friendly practices.

The results of the overall surveys consisted of the following: the majority of the elementary children gained most of their environmental knowledge from school and teachers. Whose environmental vocabulary and jargon was unfamiliar to the students surveyed. There is a growing trend of children spending more time indoors than outdoors. The elementary children are most comfortable with the word, "Outdoors".

Individually, Saratoga saw the highest percentage of correct answers. Saratoga was also had the most impoverished socio/economic background. Randolph had the second most percentage of correct answers. Randolph also was the second tier up on this reports socio/economic scale. Norris had the lowest percentage of correct answers. Norris was the highest school on this reports socio/economic scale. These results were inversely related to the

hypothesis, which stated, if a school with a lower socio/economic scale would have lower environmental awareness.

Introduction:

For generations, humans have made making a living their number one priority. In doing so, humans have led the way to the highest rate of natural resource consumption in the history of our planet. Since the Industrial Revolution humanity has seen a paradigm shift from thinking humans are part of the Earth and its natural systems, to one that is willing to exploit every nook and cranny for the smallest amount of precious stones or fossil fuels. While this shift was occurring, some things seemed to be lost in translation. Somewhere along the way, humans stopped caring about their “environment” and started to invest all their time, money, and attention toward the social science called the economy.

Today, there are unquestionable amounts of scientific evidence that humans are the leading contributor to greenhouse gases or GHGs (Pearman, 1988.). In our quest to rule the financial world, humanity has plundered the natural world of almost all its natural resources. There is little, to no doubt in people’s minds that something has to change: either to remediate the effects of global climate change, or to find a sustainable way to exist. But where do we begin? For so long, people have lost sight of what is important, what really matters. In order to combat this current way of thinking it is necessary to educate the minds that really matter. Children are the future- always have been and always will be. Children are ignorant to the intricacies that go into the economy. Their willingness to learn and open minds, allow children to absorb much of what they see, feel, or hear - both the good and the bad.

Because children have such an open mind, it is imperative that they be educated on the importance of the environment. Only through education can apathy and ignorance

be overcome, and with any luck the children will see an increase in their environmental literacy standards. Environmental literacy is about the practices, activities, and most of all, a feeling or sense of familiarity with the environment, particularly environmental knowledge. With a higher environmental literacy, a person's actions are aimed to being more of a steward to the environment. Higher environmental literacy also becomes second nature to those who are most familiar its higher standards.

In addition to the environmental literacy standards, this case study also focused on a concept first described in Robert Louv's Last Child in the Woods, nature-deficit disorder. There is a growing trend for children, especially here in America, wanting to stay inside, rather than go and play outside. This deficit disorder has lead to the No Child Left Inside Act. While this is a play-on-words (from the No Child Left Behind Act), there's nothing satirical about what it stands for. The goal is to get children outside, away from their electronics and into nature. That is why school gardens were used, to help get children outside.

There are two, main focuses for this report. The first focus deals with measuring environmental awareness in elementary school children in the greater Lincoln, Nebraska area. In order to do this, a simple survey was distributed to three different elementary schools and then results were compared. Simultaneously, afterschool programs were set up with the focus of them being the school garden at each school. College students became the primary teachers at each site. Lesson plans focused on sound environmentally-friendly practices and other curriculum was also implemented. However specific curriculum was not a collaborative effort. Each Garden/Nature Club teacher

could teach individually separate lessons from each other, with a common goal of raising environmental awareness.

The second part of this report dealt exclusively with one school that participated in the original survey. This school was given a second survey at the end of the 10-week session, and was the only one to do so. While originally, the plan was for all schools to do a “before and after” survey, due to time constraints and complications with other student teachers, only one school was able to participate in part two of this report.

The time frame for this case study was a 10-week session during the 2010 fall academic school year. It started in the second week of September and ended mid-December. Pre-tests, (or surveys given before the 10-week session) were given to the children on the first week and a post test was given on the ninth week.

The purpose of this study is to investigate whether social status and/or economic background plays a role in a child’s environmental awareness of their surroundings. The goal is to educate children on the importance of being a steward to the environment, by placing them around school gardens. This case study combines Brynjegard, Simon, and Louv’s case studies on school gardens and nature-deficit disorder (respectfully), and the environmental literacy standards that go with this disorder. In order to combat this “disorder” a healthy vaccine of environmental education is needed, because with information comes personal responsibility, which inevitably leads to change.

Literature Review:

Richard Louv's Last Child in the Woods concepts on nature deficit-disorder were the reason to do this case study. However, his book lacked scientific data therefore information was hard to find, per se (the majority of his book was about everyday observations with very little scientific data). With that being said, Louv's book was still the inspiration behind this case study. The goal was to leave no child inside by placing them in school gardens.

Another study that helped influence this case study was on 316 eight and nine year old, urban children and their rating of black and white photographs (Simmons, 1994). The photographs were of urban, nature pictures (city parks, greenways, etc.), which were rated higher than deep wooded photographs (forests, woods, etc.). The nature scenes included potential natural hazards, people, and inconveniences. While the children recognized and appreciated the opportunities of interacting with a variety of natural settings, less than 10% mentioned the possibility of seeing these natural settings in person. This helps reinforce the ideal that the most interaction most of these children had with nature was through pictures, never physically being there.

Another source used for this bibliography was on school gardens and raising environmental awareness among students (Brynjegard, 2001). The focus of this case study was to expose these children to the natural world and see if there was any improvement on awareness. Brynjegard started with a rough landscape drawing and has evolved that patch of land to a fully functioning educational environment. This turning "nothing" into food shows the children many things such as: where food comes from, not

just from the marketplace. Other concepts include, what goes into a sustainable garden, the planning and execution of actually maintaining the garden.

Brynjegard's garden case study, along with Louv's nature-deficit disorder was the two biggest influences on this case study. The concepts used from the school garden (Brynjegard) were directly used in the three elementary schools of Lincoln, Nebraska who participated in this case study. The practices of getting children outside, and help educate them about the importance of being outside and protecting the environment were taken from Louv.

Methods:

For this case study, three elementary schools were selected from the greater Lincoln, Nebraska area. These three elementary schools are from three different and distinct economic backgrounds. Two of these schools fell under Lincoln Public Schools (LPS) system's jurisdiction. The other elementary school is part of the Norris Public Schools 160. The two elementary schools from LPS were Randolph and Saratoga. Norris Elementary was the school from the Norris Public Schools. The three schools were chosen because they represent three distinct economic backgrounds. All students participating in this case study were Kindergarten through 5th grade.

Saratoga Elementary Information:

Saratoga Elementary is a member of LPS. It is the oldest school on the list, coming in at just over 100 years old (it was built in 1892). Saratoga employs 29 full-time teachers and has a staff of 58 at full strength. It teaches 266 students, with an average class size of 17. Of the 266 students, 47% are minority students (any race other than White/Caucasian, non-Hispanic or Latino), less than 1% is considered to be gifted, and 28% qualify as special needs and require special education. Annually, Saratoga sees 21% of its students leave the school for one reason or another (www.lps.org).

Saratoga is on Nebraska's list of Distinguished Title I Schools, which consequently is part of the United States Title I Schools. Saratoga is the only schools used in this research to have Title I status. According to the United States Department of Education, the Elementary and Secondary Education Act determines which schools are Title I schools. Under section 1003 of the ESEA, school improvement grants are used to help improve student achievements and test scores from schools that are, or have been,

traditionally low-income (www.ed.gov). To qualify as a Title I school, the school's population must have approximately 40% of the students from low-income or impoverished families. Funding for Title I schools are regulated by federal legislation. The No Child Left Behind Act is the latest addition to the Title I distinction. It helps determine, regulate, and fund which schools are on the lower end of the economic scale. Each school placed on the Title I list must have two consecutive years of improvement to be removed from the list. To help distinguish economic background, this report will compare the percentage of students who are eligible for free and/or reduced meals. Saratoga has 80% of its students qualify for free and/or reduced meals.

Randolph Elementary Information:

The next school on the list is Randolph Elementary. Randolph did not qualify for Title I status and is considered to be a step up from Saratoga on the economic ladder. Randolph sees 42% of its students qualify for free and/or reduced meals. Randolph housed 472 students last academic school year (2009-2010), and had an average class size of twenty. 27% of Randolph's students are minority students (any race other than White/Caucasian, non-Hispanic or Latino), 4% were considered gifted, and 14% were determined to be special needs students who require special education. Randolph has a 12% mobility rate, so a significant sign of stability. Randolph employs 38 full time teachers, with an all staff total of 62.

Norris Elementary Information:

The last school that participated in this case study was Norris Elementary. Norris School District is composed of 230 square miles, with roughly 40 in Gage County, three miles² in Otoe County, and the rest in Lancaster County. The school district is made up of

nine small, rural communities. These include: Roca, Hickman, Cortland, Panama, Princeton, Holland, Cheney, Rokeby, and Firth. Last year (2009-2010 academic year), Norris Elementary taught 770 students. Of these 770 Norris students, 10.25% were Special Education students. Less than six percent of the students were minority students. As of 2008-2009, 15.5% of Norris' students are considered to be gifted. Norris also has the lowest mobility rate, at roughly four and a half percent. Norris is the most affluent of the schools, based on the percentage of students receiving free and/or reduced lunches. It came in at 8.66% (www.norris160.com).

The goal of this case study is to see whether a lower socioeconomic background means lower environmental literacy scores. Saratoga is the most impoverished school on this reports list. Saratoga comes in with 80% of the student population receiving this benefit. Combine that with 47% of its students being of minority status (White/Caucasian, non-Hispanic or Latino), and 21% of its students being removed from Saratoga annually, and ideally, Saratoga will have the lowest environmental awareness. Comparatively, Randolph Elementary has 42% of its students qualify for free and/or reduced meals. It has a 27% minority rate, and has a mobility rate of 12%. Norris Elementary has the lowest and best percentage for its mobility rate and children eligible for free/reduced meals. Those figures are 4.5% and 8.66%, respectfully. Randolph was second on this list (from most impoverished to most affluent) so it should be second in the scores. Norris is the most affluent of the schools, therefore, it should ideally, have the best environmental literacy scores.

Prior to the Garden Club's first session, college students went to each site and turned rough, barren land into no-till, raised bed gardens. No herbicides were added.

Everything grown in the gardens was 100% organic. In addition to the gardens at each school there were afterschool clubs known as Nature Club or Garden Club. After the completion of the gardens, the college students turned into voluntary teachers, teaching various environmental principles to the elementary children. At Saratoga and Randolph Garden/Nature Clubs was voluntary participation from the students, meaning if the children signed up for Garden/Nature Club, they were not required to attend every session and could drop out at anytime. They could also sign up and participate in other activities held at the school. This was not the case at Norris. If a child signed up for an after school program they were required to participate in Garden/Nature Club.

To measure environmental awareness of the children, an aforementioned survey was administered. This survey can be found in appendix a. With the help of other college student teachers, each child participated in a pre-survey during the first week of club. By having different students from different schools take the same survey (both before and after the case study), this report can directly compare student's results from schools that are traditionally poverty-stricken, to those of more affluent status. In addition to measuring environmental awareness/knowledge, the survey serves as an insight to where the children fall in the environmental literacy standards.

Saratoga:

At Saratoga, college students, built from scratch, a school garden that was approximately 17 feet by 98 feet. A variety of vegetables were grown including: snap peas, cucumbers, eggplant, potatoes, green onions, and peppers. For fruit, we only grew sweet tomatoes. Basil is a natural insecticide so we planted it in nearly every bed at Saratoga.

Saratoga's club was part of a community-learning center (CLC). According to Lincoln's CLC website, the CLC program is dedicated to "serving children, families, and neighborhoods through collaborative partnerships". These hubs provide a safe, supervised, before and after school program in the academic year as well as the summer. Their goals include: helping to improve students' learning and developmental skills, creating healthier neighborhoods by instilling a sense of pride in the neighborhood, and helping to bring families together, making them stronger. CLC is only applicable to Distinguished Title I Schools.

Saratoga had 38 students participate regularly at Garden Club, however only 21 and 27 children partook in the pre and post surveys, respectfully. The children who attended club were in grades kindergarten through fifth. There were more, younger children (K-2) than older children (3-5). Saratoga split their club into two days, Wednesdays and Thursdays. In an average session, the children would arrive and check in around 3:00 PM. They would then be given a snack. While some parents paid for this afterschool program, the majority of children who attended CLC and Garden Club were receiving this benefit from the government. The rest of the club time would be spent outside for "recess" and activities in the garden. Some of the activities used this session were: reading books about nature in the garden, looking for different types of animals/insects in the garden, and winterizing the garden. The winterizing process included pulling all the plants out, breaking up the hard soil, and adding mulch on top of the beds to help prevent erosion. With every activity was a lesson for the children, as well as a word of the day. This way, every student understood some of the jargon that goes with gardens and/or nature.

Randolph:

Randolph afterschool club was divided into two different days. On Mondays, the first group met. This group was comprised of third through fifth graders. They met from 3:30-4:30 PM. There were 25 students who participated in club, however only there were only nine responses to the pre-survey. The reasoning for this was the student teacher had them take the survey in pairs.

The student teacher that worked with the group experienced much success with the conceptual side of environmentalism, as well as vocabulary used. This might be directly attributed to these older children be exposed to such vocabulary in their schooling.

On Wednesdays, at 3:30- 4:30 PM, the younger group meets. There were 25 students participating in this case study. All took the survey. This younger group comprised of kindergarten through second grade. The student teacher did not find the same success as here Monday counterpart.

Norris:

Norris held their Nature Club on Fridays from 3:00-4:00 PM. As previously mentioned, all students who signed up for an after school program were required to participate in Norris' Nature Club. There were 33 students who participated in the survey from Norris. It was thought that the average attendance was somewhere around 40 children. Their grades consisted with the other schools in that all grades (K-5) were represented.

In the end, there were a total of 88 children who participated in the pre-survey from all three schools. There were 27 children who took the post test and all were from Saratoga. Some assumptions to the survey process include:

1. Saratoga and Randolph had two days of Garden/Nature Club; however, on the final spreadsheet they are combined for each school. For example, Saratoga had a Wednesday and Thursday club. But on the spreadsheet it will simply say Saratoga Pre-Test, Saratoga Post Test, with no distinction of which day is which. This also applied to Randolph.
2. The survey was formatted into two parts. The first, or top part, focused on the literature side of environmental awareness. This includes measuring where the kids were as far as their environmental literacy standards. The second, bottom part, focuses mainly on the environmental efficacy of the child taking the survey.
3. Each club had a fluctuating attendance. However, on average, Saratoga had approximately 38 students (for both days), Norris had approximately 40 students (just Fridays), and Randolph had the highest attendance with about 50 students (both Monday and Wednesdays). Each child who partook in the survey was given anonymity. Only students participating in Nature/Garden Club were eligible to take the survey. Also, only students present on the days the survey was given out could take the survey.
4. If a child answered a question with no answer selected, more than one answered selected, or had any answers as questionable (i.e. circling part of

two answers) that question was not recorded and was expunged from the final spreadsheet. There will be a blank spot where there should be an answer.

5. The survey was formatted with: a, b, c, and d answer sheets. Since this is not compatible with Microsoft Excel, each letter was given a numerical value. Therefore “a” now equals one (1), “b” equals two (2), etc.

Results & Discussion:

All Schools Involved

The results were broken into two parts: the first part is on general results of this survey. The second part will deal with each school individually.

In Part 1, 52% of the 88 children surveyed said they hear about nature and the environment the most from teachers and school. However, what's surprising is that TV came in second with 19% and their parents only came in at 5%. That is quite the discrepancy. 16% (Figure 1) of the children said they hear nature the most from newspapers, magazines, and books, which is still ahead of friends and parents.

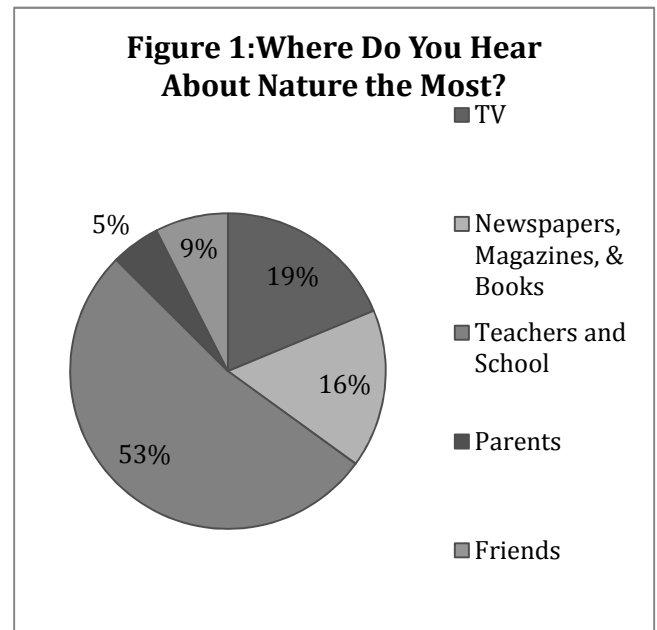
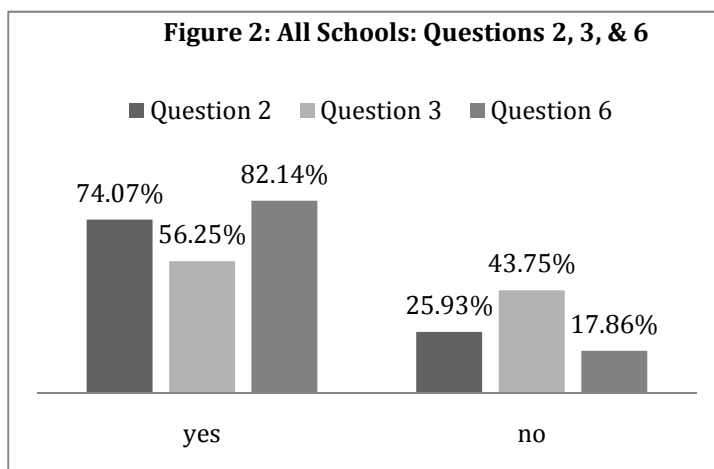


Figure 2 represents a direct relationship between questions 2, 3, and 6. Each question respectfully states the following:

2. Does your entire family ever spend time together outside?
3. Have you ever read a book with your family that has nature in it?
6. Have you ever been fishing, stargazing, hunting, camping, or hiking?

Each answer has a yes or no response. It was nice to see that the majority of all students

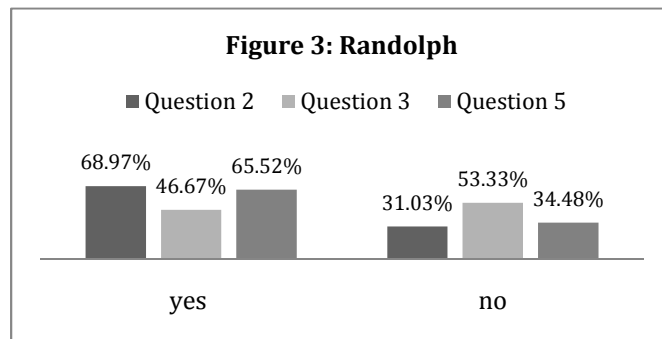


answered "yes" to each question. The lowest percentage of "yes" answers was question 3. This might seem a little

weird that Newspapers, Magazines, and Books came in a close third for most influential input, and only 56.25% of all children have read a book that contained nature in it with their families. This lack of environmental literature does not help with the environmental literacy standards.

To put these numbers in perspective towards the three schools involved in this report, Randolph has the lowest percentage of families read together (Figure 3). Norris,

Figure 4, has the highest percent of families who spend the most time together outside. This consequently leads to a higher percent of families spending time together reading



about nature. This high percentage of children being outside might be directly attributed to Norris being a rural community, compared to the urban and pseudo-urban backgrounds of Saratoga and Randolph.

Saratoga falls in between the two other schools. This was a bit surprising since traditionally, urban schools do not typically spend time reading books together as families.

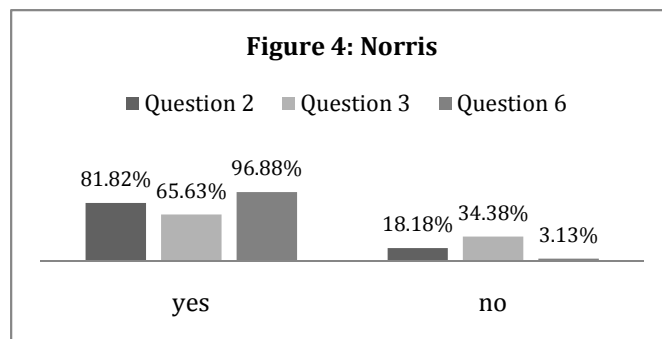
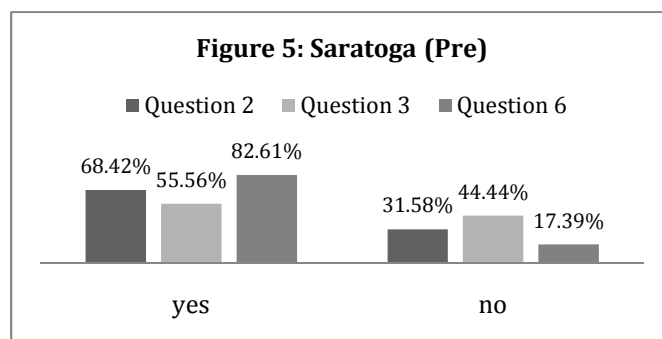
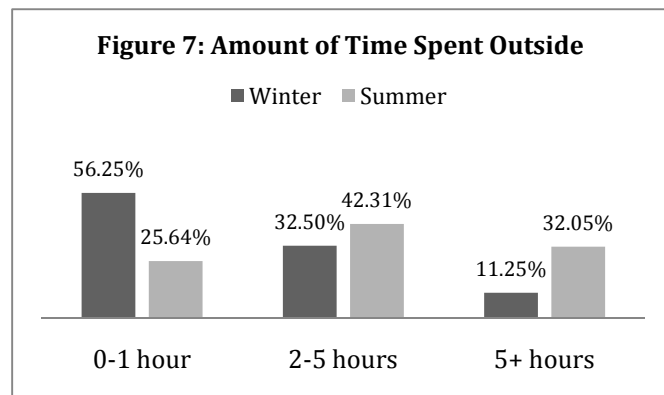


Figure 2 also points out that an overwhelming majority of children surveyed spend time outside together with their families

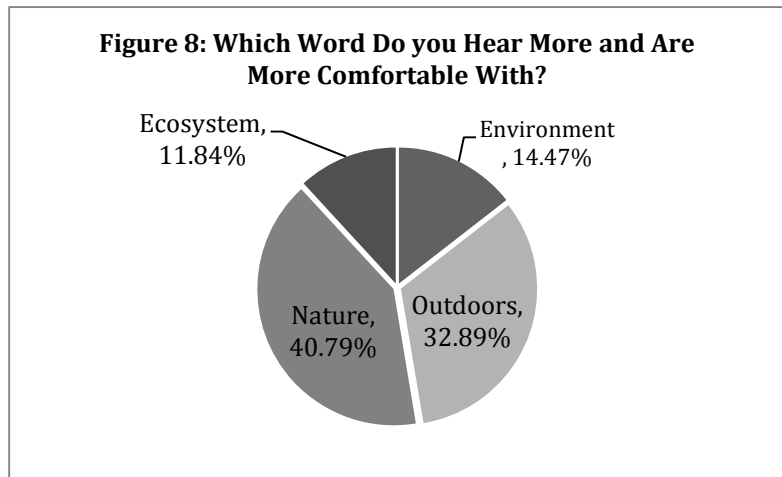


(74.07%) and over 80% of children answered yes to question six. Of the 82.14% that answered yes to question six, 80.77% enjoyed their outdoor activity to only 6.41% who did not enjoy it. (Figure 6, Appendix C). It looks like more children enjoy being outside doing some type of outdoor activity with their entire family then there are who don't. This is a very positive and encouraging sign for the youth in the greater Lincoln area.

As predicted, the majority of students stay indoors during the winter (Figure 7), with the general reasoning of parents don't want their children to get sick. There is a decending curve in the amount of children outside and the length of time. However, the same can not be true for the summer months. Common knowledge would predict the amount of time spent outside would be a direct inverse to the winter months. This is not true. Sure the majority of children spend at least two hours outside, (more than 74%), but there is a growing trend that children don't spend their entire days outside anymore. For whatever reason, children in this generation are spending less time outside, and more time inside with all their electronics.



There is also a direct correlation with the amount of time spent outside (both winter and summer months) and their vocabulary. According to Figure 8, the majority of children prefer the words

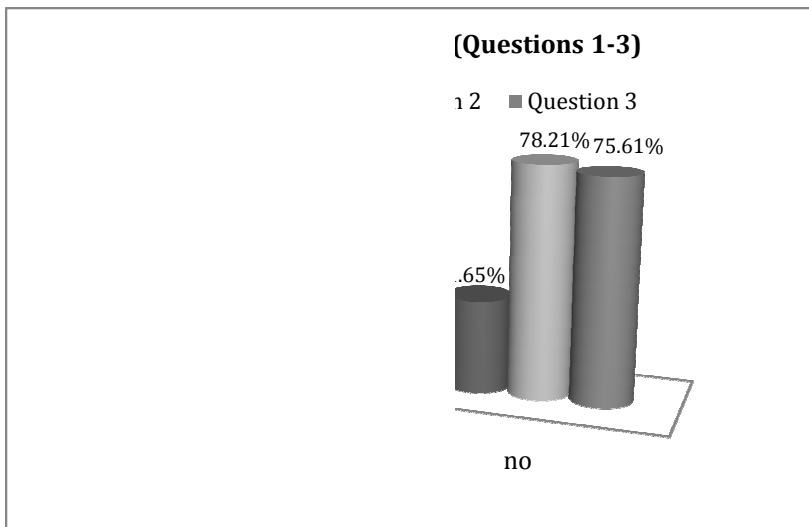


“Nature” and “Outdoors” to “environment” and “ecosystem”. This lack of scientific vocabulary could be attributed to: 1) There were early elementary (K-2) children in clubs who haven’t been exposed to these words yet. 2) There is a lack of attention towards natural sciences and more emphasis on math and reading comprehension scores than science and social studies. This could be directly related to new standardized testing methods, in which testing is now on a “state-wide” level, as opposed to the traditional “by-the-district” levels. This is also a prime example on why schools get low scores on the aforementioned environmental literacy standards. To go even further into the children’s lack of scientific terms, less than four percent of children knew what biodiversity was (Figure 9, Appendix C), 11.69% didn’t know what evolution was, and 10.39% didn’t know what multi-celled organisms were. While there is no studies that support this specific trend, one would think a lack of terms would result in a lack of knowledge.

The reason behind this report was to see if elementary-aged children know about the dangers of a declining environment and how to remediate these damages, and also see where their awareness of environmental literacy. While the literacy standards, initially,

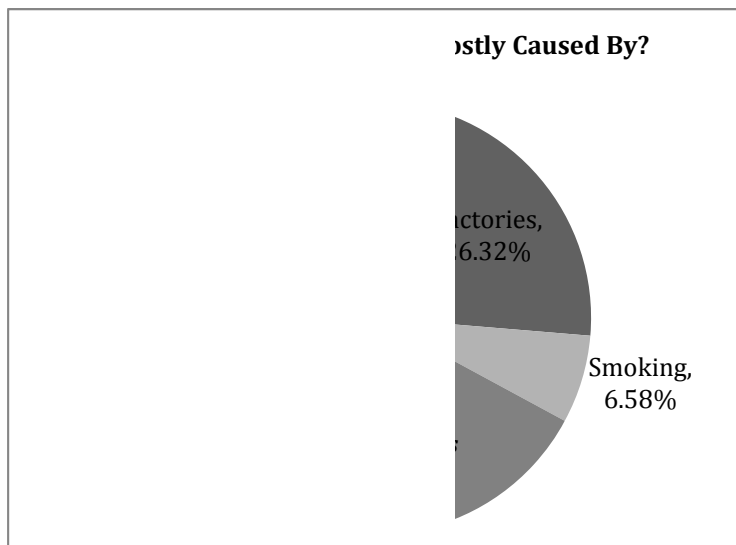
have been less than adequate, the children are starting to concicously make sound, environmental decisions. In Figure 10, this chart shows the following results:

1. Does your family recycle at home?
2. Do you leave lights on in rooms that no one is in?
3. Do you leave the faucet running when brushing your teeth?



While the answers vary in some degree, the gist of them can be quantified into either yes or no answers. In the first question, this report shows that a vast majority of children and their families recycle. While it may look

like a bad thing, it is actually a good thing that over 75% of children said “no” to questions two and three. This means that the bulk of all children surveyed turn off the



lights when no one is occupying the room, and turn off the faucet when they are brushing their teeth. While the reasoning for the recycling, turning off the lights, and turning off the faucet might be other than environmental, (most likely economic reasons) they are still,

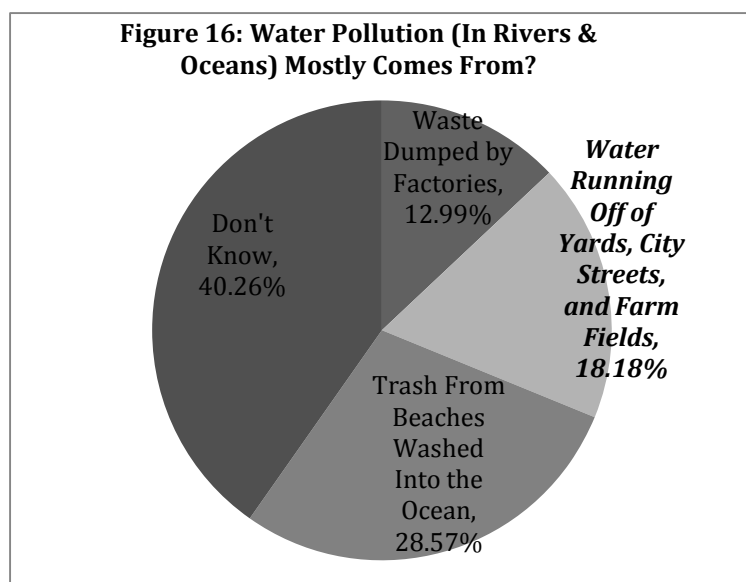
practicing good, environmental behavior. Even at this age, these children know the importance of recycling and conserving energy and water, even if it is for no other reason than “Mommy and Daddy told us to in order to save money.”

While the children know the action of recycling and conserving are important, their aptitude on why these things are important is severely low. While most kids know pollution is bad, the majority of them just don’t know where pollution comes from. In Figure 11 (previous page), 38.16% of all children surveyed do not know what causes air pollution. The correct answer, cars, trucks, and motorcycles, did come in second with 28.95%, but this number pales in comparison to those who do not know, and is too close to the third highest percentage (factories).

The same trend could be said for Water Pollution. The majority of children said they “Don’t Know”. Only 18.18% knew the answer. Aside from knowing that wasting water was a bad thing (Figure 10, Question 3) the students didn’t seem to know anything about water pollution; neither where it came from nor its effects on the environment (Figure 16).

The only question in which the children surveyed knew the answer more than any other choice was the last question of the survey. It states:

2. What is the biggest reason animal



species go extinct?

- a. Too Much Hunting
- b. Climate Change
- c. Humans Destroy Their Habitat
- d. Don't Know

The percentages consisted of the following with the bold answer being the correct one:

2. What is the biggest reason animal species go extinct?

- a. Too Much Hunting (17.11%)
- b. Climate Change (2.63%)
- c. Humans Destroy Their Habitat (**40.79%**)
- d. Don't Know (39.47%)

Both Saratoga and Norris saw “C” as their highest responses, with 36.36% and 53.13%, respectfully. It should be noted that Saratoga continued seeing the trend of having the same amount of correct answers as the “Don't Know” option. Randolph was the only school who didn't have “C” as their highest response, which was 27.27%. “Don't Know” was again the highest percentage with 45.45%.

From a big picture point of view, this survey showed where Lincoln and Norris elementary school children's environmental aptitude is at. While their practices are headed in the right direction, their environmental vocabulary is abysmal and needs teachers (of Garden/Nature Clubs mainly but other educators wouldn't hurt) to help bridge this gap from ignorance to enlightenment. For whatever reason(s), the majority of children spend the majority of their time indoors. This lack of being outdoors or nature-deficit disorder, is becoming an epidemic in this case study, let alone this country. On a

positive note, when families do decide to go outside, the children are enjoying it (Figure 6).

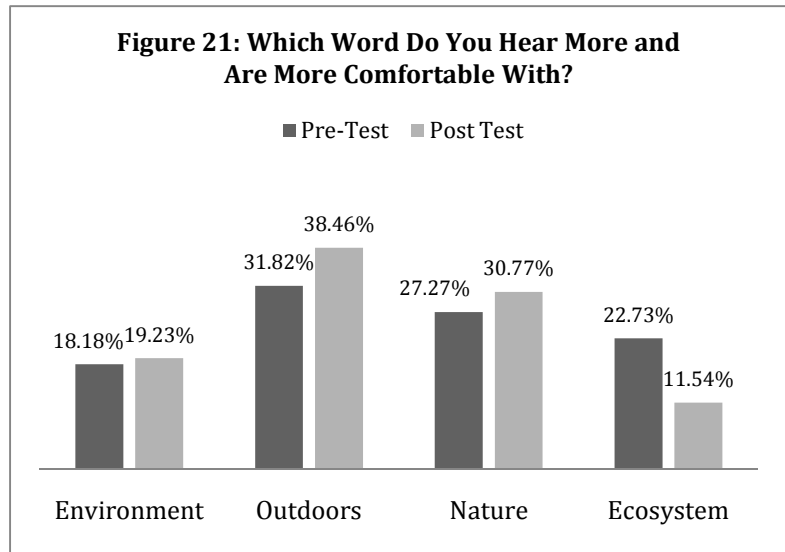
Finally, the only question with the bulk of children answering correctly was the last question of the survey. This author feels that the reason for this overwhelming correct response is due to the exposure of animal rights/activities in mainstream America. Save the Whales, Save the Rainforests, Save the Buffalo are just a few examples of animal related groups that these children might be exposed to on any given day. These children know, with very little conflicting opinions, that humans are destroying their homes and this survey shows that. The other questions on this survey don't get this kind of luxury. Most of these questions, according to public opinion, are quite subjectable. Water and Air Pollution could be attributed to many things (non-point pollution) therefore it's hard to quantify where exactly the "majority" or "mostly" comes from. Depending on who one gets your information from (either newspapers, magazines, tv, friends, family, etc.) one might feel and think differently on, say Global Warming, than one's neighbor.

The second part of this report focused on each school and their results from their surveys. If a school had multiple days of club, it was condensed into one data source.

Saratoga:

Saratoga was the most "urban" school on this list. It also had the lowest socio/economic score determined by this report.

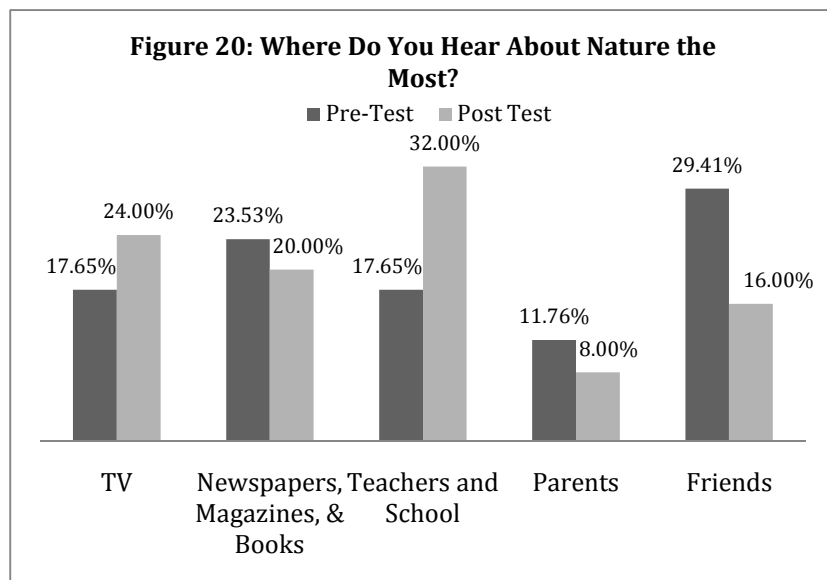
Initially, Saratoga saw the biggest influence from “Friends” with “Newspapers, Magazines, & Books” coming in second (Figure 20). However, after a 10-week session, there was a



dramatic shift in influence. There was a 14.35% increase in “Teachers and School”. On the flip-side, there was a dramatic decrease of influence from their peers and “Friends”; a 13.41% drop. Clearly the educators are the biggest influence on the children at Saratoga. The only question that remains is how much did they affect the appetite and awareness in these children.

Let’s start with the vocabulary that was used at Saratoga. Every day there was a word of the day. This

was to help the children understand some of the jargon that goes with the environment. In Figure 21, you can see that “outdoors” remains the most recognizable to the children of



Saratoga. It is funny to point out that the percentage of children who picked “Ecosystem”

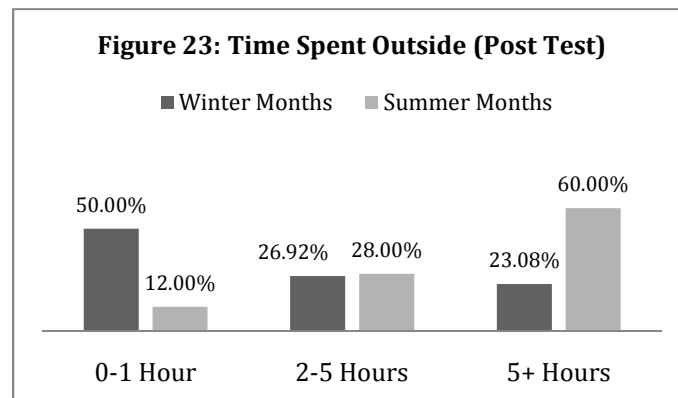
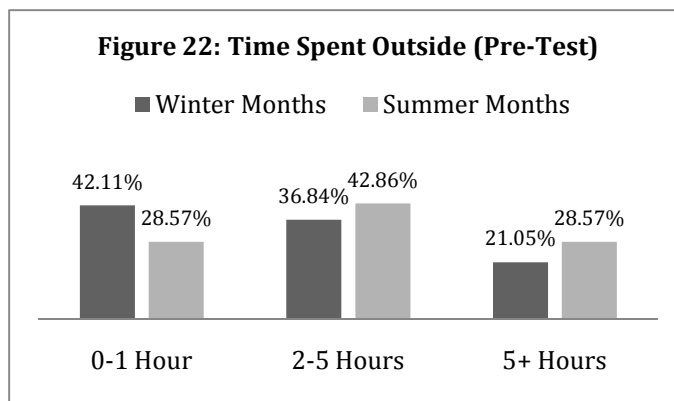
was virtually cut in half. Apparently, the children aren't very familiar with that word at all.

To continue with the vocabulary trend, the students were asked to pick the word that best defines the following sentence (the answers appear in bold):

3. There are many different types of animals and plants, and they live in many different kinds of environment.
 - a. Evolution
 - b. **Biodiversity**
 - c. Multi-Celled Organisms
 - d. Don't Know

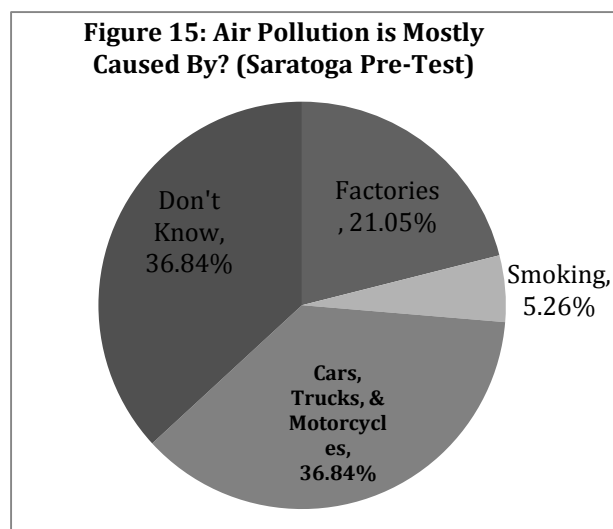
Before the 10-week session, the majority of children picked that they "Don't Know" the answer at a whopping 64.71%. Only 5.88% knew (or most likely guessed) "Biodiversity" was the correct answer. After the 10-week session of being outside and having each word, among many other, a word of the day, this report saw a dramatic increase from the 5.88% correct answer. The final percentage of right answers was 30.77%. Unfortunetly, 50% of the students still "Didn't Know" the answer.

The amount of time spent outside should have changed due to the fact that Garden Club spent every day outside, with the exception of the last session when the temperatures were too cold (Figure 22). There were no rain days. We see a significant climb in the summer months, which most likely, is from



children anticipating spending more time outside. This is speculation at this point since it's not summer, however this is a very promising statistic. On the other end of the spectrum, there was an increase in time spent indoors during winter month, but this may be skewed because of the colder winter setting in. Either way, the amount of time spent outside in winter months has decreased and the amount of time spent outside during summer months will go up.

When it came to pollution, both air and water, Saratoga's pre-test, had the highest number of correct answers from each school. Specifically in terms of air pollution, Saratoga had the



highest percentage of correct answers, at 36.84%. Which ironically, had the same percentage of children answer “Don’t Know” (Figure 15).

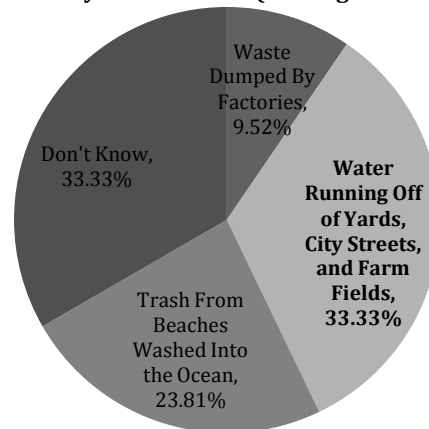
In terms of Water Pollution Saratoga, had the best percentage of correct answers (Figure 19) Saratoga also had the same amount of students answer “Don’t Know” as the correct answer, at 33.33%.

Oddly enough, Saratoga displayed the children regress in both air and water pollution. Air Pollution saw a decrease to 26.92% of correct answers, and Water Pollution also had a decrease in correct answers to 19.23%. Figures 24 and 25 show these results, respectfully.

There could be many reasons why there was a decrease, but at this point they are only speculation. This would be a good topic for future students/educators to look into, “Why there was a noticable drop in correct

answers at this urban elementary school?”

Figure 19: Water Pollution (In Rivers & Oceans) Mostly Comes From? (Saratoga Pre-Test)



The elementary children at Saratoga, were consistent to Figure 10’s chart on the practicing of recycling and conservation with their families. In fact, there was some small improvement on recycling and turning the lights off if no one is in the room (less than 5% growth). All in all, the practices saw slight improvement or hardly no change at all (change less than 1%).

In summation, Saratoga's students saw a drastic increase in planned time spent outside during the summer months. Saratoga saw an increase in vocabulary used correctly as well as a lower percentage of "Don't Know" answers. There was also an increase in knowledge of where electricity comes from and household hazard waste (Figures 26 and 27, Appendix C, respectfully). Unfortunately, there was a decrease in the awareness of pollution, for reasons unknown.

Randolph:

Seeing how Randolph is one school, its results from both days were combined and made into one data source. That being said, the biggest influence of nature for Randolph kids were "Teachers and School".

While this isn't a shocking statistic, the continual trend of parents and friends having little to no influence on these children is,

especially a lack of parental input. This lack of parental input for nature falls in line with Saratoga's 11.76% (Pre-Test) and 8.00% (Post Test).

From a vocabulary

point of view (Figure 29), the majority of children claimed they were most comfortable

Figure 29: Which Word Do You Hear More and Are More Comfortable With?

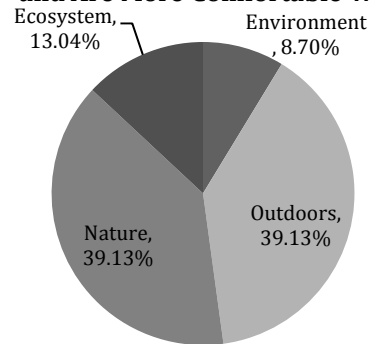
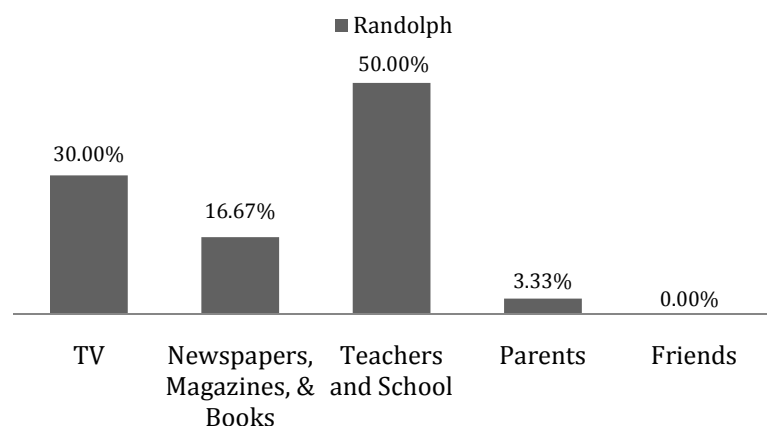
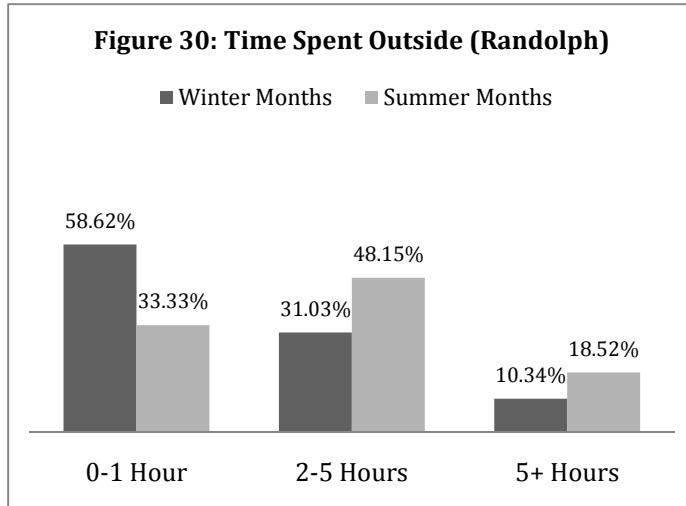


Figure 28: Where Do You Hear About Nature the Most?



with the words “Nature” (39.13%) and Outdoors (39.13%) making up 78.26%. Randolph recorded the lowest percentage of children who are most comfortable with the word



“Environment” than any other school. This also includes pre and post tests from Saratoga. However, this might be a little skewed due to the fact that the older children were paired up, and the younger children took this survey individually. This would be one recommendation that

this author would make for Randolph as a whole; give a survey to each individual child.

Lastly, Randolph only recorded a 6.67% of correct answers to “What is Biodiversity?”

While shocking in its own right, it wasn’t the lowest percentage recorded.

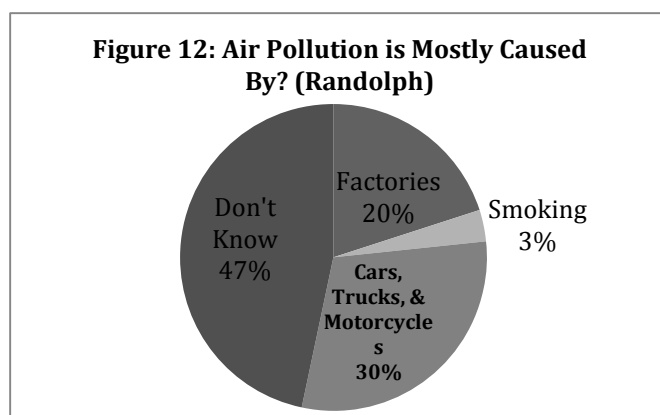
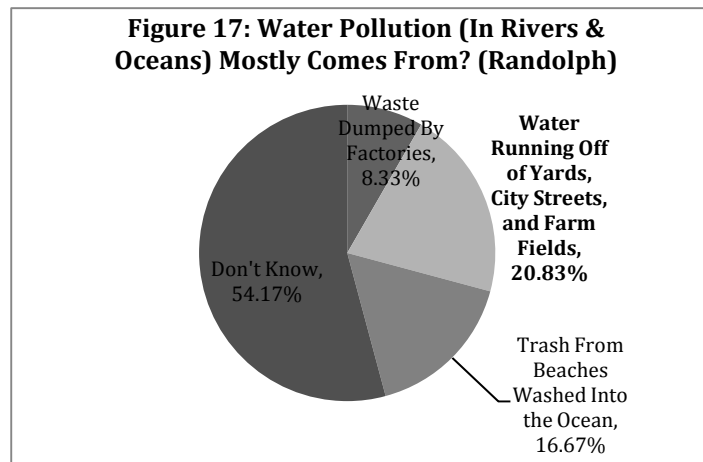
In addition to the vocabulary, the majority of Randolph’s children spend more time inside during the winter months than outside (Figure 30). This was expected due to weather patterns as well as fear of children catching a sickness due to the frigid temperatures. The summer months sees the majority of children planning to spend at least two to five hours outside. However, there still is an awful lot of children planning to spend the majority of their summertime indoors. This 33.33% of children spending time indoors during the summer is the highest percentage recorded for this report.

In terms of air pollution, Randolph's Pre-Test scores raised quite a few questions. While Randolph had the second highest percentage of children answer correctly (30.0%), it also had the highest percentage of children answer they "Don't Know" as well

(46.67%) (Figure 12). This was shocking that almost half of the children didn't know what caused air pollution. It was nice to see that smoking only generated 3%. This could be attributed to the stop

smoking adds that are continuously played on TV, as well as visual aids all over the city via billboards.

In terms of water pollution, over half the students (54.17%) didn't know what caused water pollution, (Figure 17). The correct answer, "Water Running Off of Yards, City Streets, and Farm Fields", barely came in second to "Trash From Beaches Washed in the Ocean". Considering how every living thing on Earth depends on water, this is a very important subject to teach to the future of this planet.

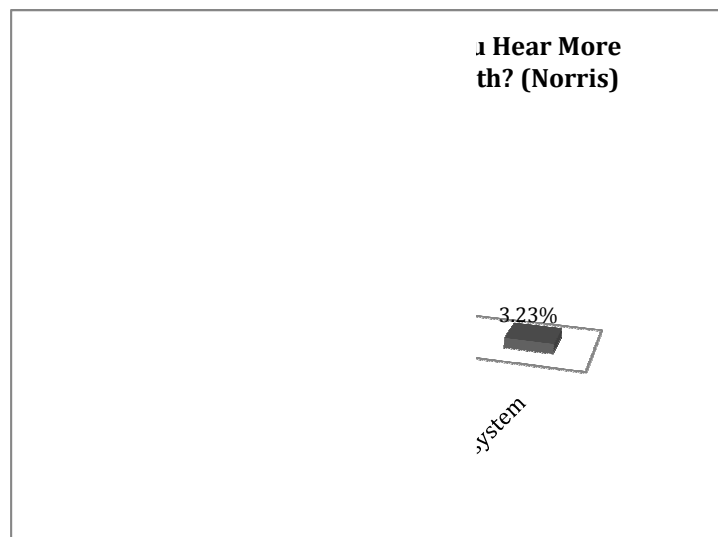
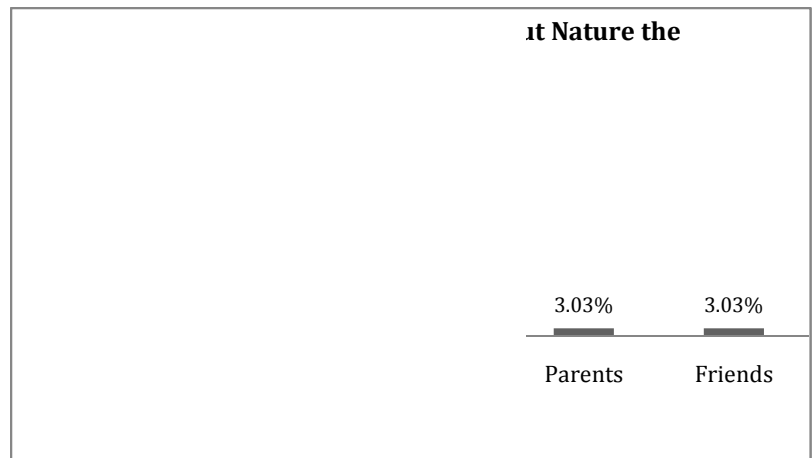


Norris:

The last school on this report is the most affluent, according to this report's standards. It is the most "rural" of the three schools. Norris children got the majority of their information from "Teachers and Schools", at an overwhelming

72.73% (Figure 31). Again, the growing trend of "Parents" having little to no influence was on full display. This author is hoping this lack of parental input isn't the truth and is hoping its skewed data due to the children taking this survey is at their school. The 72.73% is by far the single biggest influence recorded for this report.

From a vocabulary point of view, Norris saw the highest percentage of the word "Nature" (Figure 32). This was the highest concentrated answer, which in turn led to "Ecosystem" being this report's smallest percentage recorded for this question. Additionally, no (0%) Norris children understood that "Biodiversity" was "different types of animals and plants living in different environments".



In terms of pollution, Norris did not score very well. For air pollution (Figure 13), the majority of children selected the wrong answer. 29.63% of them just “Didn’t Know” the answer. The correct answer was their third option, “Cars, Trucks, & Motorcycles”. In terms of water pollution (Figure 18), Norris children scored the lowest of correct answers at 6.25%. Compared that to Saratoga’s Pre-Test (33.33% of correct answers), Saratoga’s Post Test (19.23%), and Randolph (20.83%), Norris scored the lowest of the three schools, in terms of water pollution.

In Figure 34, the majority of children plan on spending less than 1 hour outside during the winter (62.50%). This is the highest percentage recorded from any school. The 6.25% in the winter is the lowest recorded as well. On the other end of the spectrum, the ideal trend of spending more time outside during the summer came true with Norris children. 83.87% of Norris children plan on spending at least two hours outside during the summer!

Figure 13: Air Pollution is Mostly Caused By? (Norris)

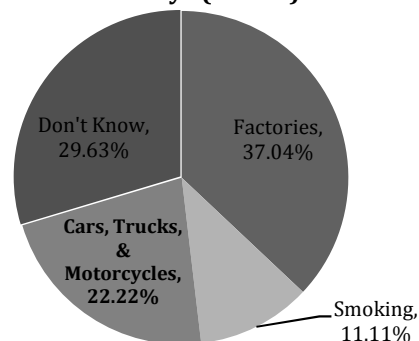
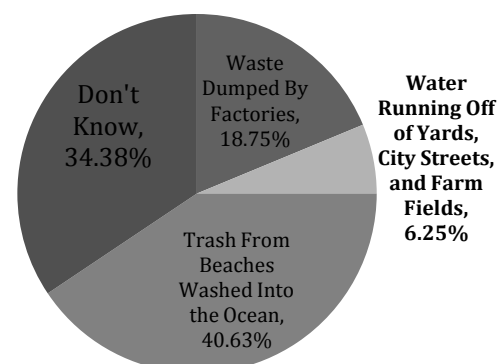
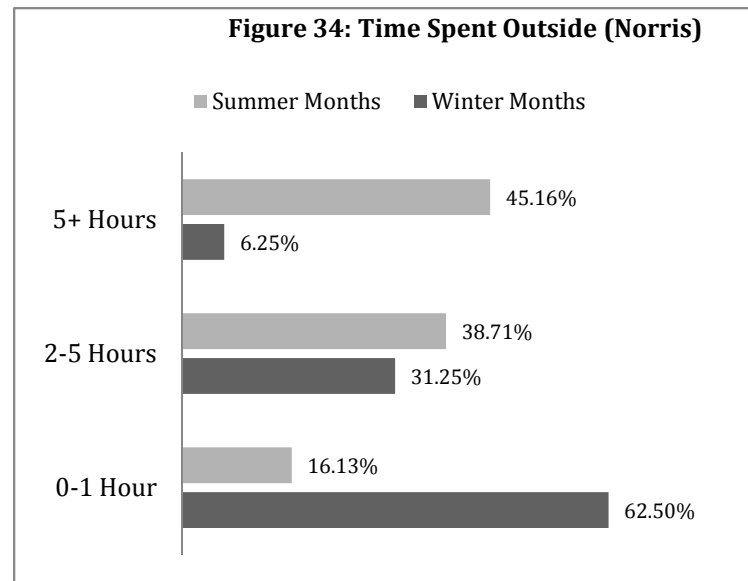


Figure 18: Water Pollution (In Rivers & Oceans) Mostly Comes From? (Norris)



While Norris children plan on spending the most time outside is a great first step, implementing the environmental literacy standards will be a difficult process at Norris. Their awareness is on the lower end, which went against this reports hypothesis



Conclusion:

There is a growing trend found in mainstream America that the environment will always be static and belongs to man. This could not be further from the truth. Humans should be stewards to the environment, not to try and take claim over it. Because the latter is the dominant paradigm, it has left the Earth with many problems, problems which have not been seen in millennia, maybe even eons. The salvation of Earth and all its inhabitants lay with the younger generations, for it is they who shall inherit the world and all its problems. That is why this report was done, to help educate those who have the most to lose. While the scale might be small (the greater Lincoln area as opposed to the state of Nebraska, the United States, and/or the world), its results were very significant.

The majority of all students get their information about the environment from their teachers, the littlest from their own parents. The vocabulary that goes with environmental learning is a tricky thing to understand. The majority of these students are still struggling with some of the terminology, but as we saw with Saratoga, there is hope for improvement.

Overall, the three schools did not fit the hypothesis, “a lower socio/economic background would most likely produce lower environmental awareness”. Saratoga finished with the highest percent of correct answers, which oddly enough was the same percent of “Don’t Know” answers as well. Norris needs the most help due to it having the lowest percentage of correct questions. Randolph was the only school who fit this hypothesis, but that was probably due to Norris’ low results.

As far as individual schools go, Saratoga saw steady improvement in all areas of the survey except the pollution questions. For some inexcusable reason, there was a

sudden and sharp decrease in correct percentages. That is what the kids may be used to thanks to standardized testing being the driving force, financially, behind education now.

With air pollution, Saratoga scored the highest with 36.84% of its children answering the correct answer. Oddly enough the percentage of correct answers was the exact same percent of children who answered “Don’t Know”. Randolph had the second highest percentage of correct answers at 30.00%. however, their “Don’t Know” was close to fifty percent (46.67%). Norris struggled the most with the concept of where air pollution is from. 22.0% of Norris children answered this question correctly, with 29.63% “Didn’t Know” the answer.

With regards to water pollution, Norris struggled the most, again with only 6.25% of its students knowing the answer. 34.38% of the children answered “Don’t Know” (Figure 18, Appendix C). Randolph had the highest percentage of children answer “Don’t Know”, which was over 50% . 20.83% of Randolph’s students answered correctly (Figure 17, Appendix C). Saratoga again had the same percentage of correct answers (33.33%) as “Don’t Knows”.

In terms of pollution in general, there is a trend of Norris having the worst percentage, Randolph having the highest “Don’t Know” percentage, and Saratoga having the same percent of “Don’t Know” answers and the correct ones. This seems to be leaving more questions than answers. For example, why is it the most affluent school (as far as the amount of free/reduced meals) has the lowest environmental knowledge and why does Saratoga’s top two answers are either the correct answer or they “Don’t Know”.

There were also many limitations that arose from this case study. One limitation was the length of the case study which was only 10 weeks. This was mainly due to the fact that the author only had one semester to do this. This was the biggest hindrance of this report, and will be recommended to increase the length of any potential case studies related to this report. Lack of collaboration between schools was another limitation. The original goal was to have all schools take a Post Test, however due to scheduling conflicts; other student teachers could not participate in giving Post Tests to their children. Another limiting factor was the weather. For the most part the days of club were beautiful, fall days. But towards the end, when winter set in, it became increasingly harder to have club outside for more than a few minutes. Because we had to move craft time inside during the later parts of club, Garden Club at Saratoga had to share the auditorium with the CLC kids. This “sharing of the room” cut down on space as well as increase noise. Another recommendation would be to get a separate room, if possible for Garden/Nature Club to work in.

Some recommendations for further studies could include the following:

- Increase the length of time for the case study. 10-week session is just a little too short.
- What are some of the reasons why there was such a dramatic and sharp decrease in correct answers at Saratoga?
- Is there a distinct difference between “urban” schools and “rural” schools?
- Have a pre and post tests at all sites, not just one site.

- We know which words children are most comfortable with; now find out why they are not familiar with the others and methods for enhancing their familiarity.
- Separate and distinguish how many children are from which grade bracket.
 - Kindergarten through 2nd Grade
 - 3rd Grade through 5th Grade
- Continue giving this survey and see if over time (maybe annually, or five or 10 years down the line) there are any improvements or shortcomings with any questions. Then see what the reason was (i.e. change in public perception, cultural changes, climate changes, etc.). This could focus on either the same children used in these case studies, or elementary school children. Both would be applicable to this recommendation.

APPENDIX A: Survey

1. **Where do you hear about nature the most?**
 - a. TV
 - b. Newspapers or Magazines or Books
 - c. Teachers and school
 - d. Parents
 - e. Friends
 2. **Does your entire family ever spend time together outside?**
 - a. Yes
 - b. No
 3. **Have you ever read a book with your family that has nature in it?**
 - a. Yes, I have read at least one book with my family about nature
 - b. No, I have never read a book with my family about nature
 4. **Pick the word that best defines this sentence "There are many different types of animals and plants, and they live in many different kinds of environment."**
 - a. Evolution
 - b. Biodiversity
 - c. Multi-celled organisms
 - d. Don't know
 5. **Air pollution is mostly caused by**
 - a. Factories
 - b. Smoking
 - c. Cars, Trucks, and motorcycles
 - d. Don't know
 6. **Have you ever been fishing, or stargazing, or hunting, or camping, or hiking?**
 - a. Yes, I have done one or more of these activities
 - b. No, I have done none of these activities
 7. **If you answered "Yes" to question #6, did you like your outdoor activity?**
 - a. Yes, I liked it
 - b. No, I did not like it
 - c. I answered "No" to question #6
 8. **How many hours do you spend outside during the winter on most days?**
 - a. 0-1 hour
 - b. 2-5 hours
 - c. More than 5 hours
- Last Question! You're doing**
9. **Electricity in the USA comes from**
 - a. Nuclear power
 - b. Solar power and Hydro-electric power plants
 - c. Burning oil, coal, and wood
 - d. Don't know

Thanks for
Helping!



-
1. **Does your family recycle at home?**
 - a. Yes, my family recycles some or almost always
 - b. No, my family does not recycle
 2. **Do you leave lights on in rooms that no one is in?**
 - a. Yes, the lights are on all the time
 - b. No, the lights are on only when someone is in the room
 3. **Do you leave the faucet running when brushing your teeth?**
 - a. Yes, the sink is running water when I am brushing my teeth
 - b. No, the sink only runs water when I rinse my toothbrush
 4. **How many hours do you spend outside during the summer on most days?**
 - a. 0-1 hour
 - b. 2-5 hours
 - c. More than 5 hours
 5. **Which word do you hear more and are more comfortable with?**
 - a. Environment
 - b. Outdoors
 - c. Nature
 - d. Ecosystem
 6. **How much do you like being outdoors or learning about the environment?**
 - a. I like it very much!
 - b. It's okay, not great.
 - c. I do not like it.
 7. **Water pollution (in rivers and oceans) mostly comes from**
 - a. Waste dumped by factories
 - b. Water running off of yards, city streets, and farm fields
 - c. Trash from beaches washed into the ocean
 - d. Don't know

8. These are things you find in your house, which one hurts the environment and humans if not thrown away correctly?

- a. Glass
- b. Plastic bubble wrap
- c. Batteries
- d. Don't know

Last Question! You're doing

9. What is the biggest reason animal species go extinct?

- a. Too much hunting
- b. Climate changes
- c. Humans destroy their habitat
- d. Don't Know

Appendix B: Results

Some basic assumptions for the survey:

- Survey answers are put into a number scale for the spreadsheet.
 - All “A’s”= 1
 - All “B’s”= 2
 - All “C’s”= 3
 - All “D’s”= 4
 - All “E’s”= 5
- Correct answers to certain questions are distinguished by being big, bold, italicized, and underlined.
- All blank, open spaces are a question in which there is no number value represented is a survey where the student either didn’t submit an answer, or answered more than one choice. Either way the answer was discarded.

All Schools Involved

Column 1	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q72	Q9
	3	2	2	4	4	1	1	1	4
	3	2	2			1	1	1	
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3	1	2	3	3	1	1	3	2

All Schools Involved (Cont.)

Part 2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
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2	2	1	2		2			
	1	2	1					
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1	2	2	2	3	1	4		
1	1	2			2	2		
2		1	2	1	1	2	1	1
1	2	2	2	1	1	4	3	3
2	2	2	2	2	1	3	1	3
1	2	2	2	2	1	3	1	3
1	1	2	1	4	1	2	3	4
1	1	2	2	3	1	3	2	1
1	2	2	1	1	2	2	1	1
				2				
1	2	1		2	1	1	1	3
2		2	3				4	1
1	2	2	3	4	3	2	1	3
1	2	2	3	4	3	2	1	3
	1	1	3	4	1	3	3	4
2	2	2	2		1	4	2	4
		2	1	2	1	2	1	3
2	2	2	1	2	1	2	1	3
1	2	2	2	1	2	2	1	2
1	2	2	2	3	1	2	3	3

Saratoga (Pre-Test)

Part 1	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	3	2	1	4	4	1	1	3	4
	4	1	1	4	1	1	1		2
		1	2	4	3	1	1	1	4
	1	1	1	4	4	1	1	1	1
		2				1		2	4
	5	1		4	4	1	1	2	4
	2	1	2	4	1	1	1	1	4
	5		1		3	1	1	2	1
			2	3	3	1	1	2	1
	3	1	1	3	1	1	1	1	2
	5	1	2	1	1	1	1	3	2
	1	1	1	4	2	1	1	3	2
	2	2	1	2	3	1	1	3	2
	2	1	1	1	3	1	1	2	4
	4	1	2	4	4	1	1	1	4
		2				2	1	2	4
	1	1	2	4	4	1	1	2	4
						2			
	5	1	1	4	3	1	2	1	4
	3	2	1	4	4	2	1	1	4
	5		2		4	1			4
	2	1	2	1	3	1			
		2				2	1	1	2
Total	17	19	18	17	19	23	19	19	21
# of 1s	3	13	10	3	4	19	18	8	3
# of 2s	4	6	8	1	1	4	1	7	6
# of 3s	3	0	0	2	7	0	0	4	0
# of 4s	2	0	0	11	7	0	0	0	12
#of 5s	5	0	0	0	0	0	0	0	0
% of	17.65%	68.42%	55.56%	17.65%	21.05%	82.61%	94.74%	42.11%	14.29%

#1									
% of #2	23.53%	31.58%	44.44%	<u>5.88%</u>	5.26%	17.39%	5.26%	36.84%	28.57%
% of #3	17.65%			11.76%	<u>36.84%</u>			21.05%	<u>0.00%</u>
% of #4	11.76%			64.71%	36.84%				57.14%
% of #5	29.41%								
Total %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Part 2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	1	1	2	2	3	1	3	2	1
	1	2	2	1	1	2	2	1	1
					2				
	1	2	1		2	1	1	1	3
	2		2	3				4	1
	1	2	2	3	4	3	2	1	3
	1	2	2	3	4	3	2	1	3
		1	1	3	4	1	3	3	4
	2	2	2	2		1	4	2	4
			2	1	2	1	2	1	3
	2	2	2	1	2	1	2	1	3
	1	2	2	2	1	2	2	1	2
	1	2	2	2	3	1	2	3	3
	1	2	2	3	3	1	3	1	3
	2	2	2	2	3	1	3	1	3
	1	2	2	2	4	1	1	1	4
	1	1	1	1	1	3	4	4	1
	2	2	2	2	4	1	4	3	4
	1	2	2	2	2	1	4	4	4
					3				
	1	2	2	1	2	1	4	4	4
	1		1		2	1	4	4	4
	2	1	2	3	1	2	4	4	4
	1	2	2	1	3	3	3	3	1
	2			2					
Total	21	19	22	21	22	21	21	22	22
# of 1s	14	4	4	6	4	14	2	10	5

# of 2s	7	15	18	9	7	3	7	2	1
# of 3s	0	0	0	6	6	4	5	4	8
# of 4s	0	0	0	0	5	0	7	6	8
#of 5s	0	0	0	0	0	0	0	0	0
% of #1	66.67%	21.05%	18.18%	28.57%	18.18%	66.67%	9.52%	45.45%	22.73%
% of #2	33.33%	78.95%	81.82%	42.86%	31.82%	14.29%	<u>33.33%</u>	9.09%	4.55%
% of #3				28.57%	27.27%	19.05%	23.81%	<u>18.18%</u>	<u>36.36%</u>
% of #4					22.73%		33.33%	27.27%	36.36%
% of #5									
Total %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Saratoga (Post-Test)

Part 1	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q72	Q9
	1	1	1	1	1	1	1	1	1
	1	2	1	2	1	1	1	1	1
	3	2	1	2	1	1	1	1	4
	3	2	2	2	4	1	1	3	2
	2	2	1	1	4	1	1	1	2
	4	1	1	2	3	1	1	1	2
	2	1	1	4	2	1	1	2	3

	5	1	2	4	4	1	1	1	4
	3	2	1	4	3	2	3	1	2
	3	2	1	4	3	1	1	2	2
	3	2	2	4	4	2	3	3	4
	3	2	2	4	3	1	1	1	2
	3	1	1	2	1	1	1	2	1
	5	1	1	1	1	1	1	1	1
	1	2	2	4	4	1	1	1	4
	1	2	1	4	4	1	1	1	3
	3	2	1	2	2	1	1	3	2
	5	1	1	4	1	1	1	3	3
				4	4	1	1	1	
	1		1	4	4	1	1	2	1
	5	1	1	2	3	1	1	3	3
	4	1	2	4	3	1	1	2	1
	1	1	1	1	1	1		1	1
	2	1	1	1	1	1	1	2	2
	2	2	2	2	2	1	1	2	1
	2	1	2	4	3	2	3	3	4
Total	25	24	25	26	26	26	25	26	25
# of 1s	6	12	17	5	8	23	22	13	8
# of 2s	5	12	8	8	3	3	0	7	8
# of 3s	8			0	7	0	3	6	4
# of 4s	2			13	8				5
#of 5s	4								
% of #1	24.00%	50.00%	68.00%	19.23%	30.77%	88.46%	88.00%	50.00%	32.00%
% of #2	20.00%	50.00%	32.00%	<u>30.77%</u>	11.54%	11.54%	0.00%	26.92%	32.00%
% of #3	32.00%			0.00%	<u>26.92%</u>		12.00%	23.08%	<u>16.00%</u>
% of #4	8.00%			50.00%	30.77%				20.00%
% of #5	16.00%								
Total %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Part 2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	1	2	1	1	1	1	1	1	1

#5									
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
%	%	%	%	%	%	%	%	%	%

Norris

Part 1	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q72	Q9
	3	2	2	4	4	1	1	1	4
	3	2	2			1	1	1	
	3	1	1	1		1	1	1	1
	3	1	1	4	4	1	2	1	3
	3	1	1	4	1	1	1	2	3
	3	1	1	4	2	1		1	3
	3	1	1	4	1	1	1	1	3
	3	1	1	4	1	1	1	2	3
	3	1	1	4	1	1	1	1	3
	3	1	1	4	1	1	1	1	3
	3	2	2	4	4	1	1	1	3
	1	1		4	4	1	1	2	3
	3	1	1			1	1	3	4
	3	1	1	4	2	1	2	1	4
	3	1	1	4	4	1	2	1	4
	5	1	1	4	4	1		2	2
	3	1	1	4	4	1	1	2	4

	3	1	1	4	1	1	1	1	4
	3	1	1	4	1	1	1	1	4
	2	2	2	1	1	1	1	1	2
	3	1	1	4	1	1	1	1	3
	2	1	2	4	3	1	1	3	2
	2	1	1	3	2	1	1	1	4
	3	1	2	4	3	1	1	2	4
	2	1	2	4	3	1	1	1	4
	3	1	1	4		1	1	2	4
	3	1	1	4		1	1	2	4
	1	1	1						
	1	2	2	3	4	1	1	2	2
	3	1	2	4	3	1	1	1	2
	3	2	2	4	3	1	1	1	2
	3	1	2	1	3	1	1	1	2
	4	1	1	3	1	2	3	2	2
Total	33	33	32	30	27	32	30	32	31
# of 1s	3	27	21	3	10	31	26	20	1
# of 2s	4	6	11	0	3	1	3	10	8
# of 3s	24	0	0	3	6	0	1	2	10
# of 4s	1	0	0	24	8	0	0	0	12
#of 5s	1	0	0	0	0	0	0	0	0
% of #1	9.09%	81.82%	65.63%	10.00%	37.04%	96.88%	86.67%	62.50%	3.23%
% of #2	12.12%	18.18%	34.38%	<u>0.00%</u>	11.11%	3.13%	10.00%	31.25%	25.81%
% of #3	72.73%			10.00%	<u>22.22%</u>		3.33%	6.25%	<u>32.26%</u>
% of #4	3.03%			80.00%	29.63%				38.71%
% of #5	3.03%								
Total %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Part 2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	2	2	2	2	2	3	4	3	4
	1	2	2		2	1	4	4	3
	1	1		1	1	1	1	2	4
	2	2	2	3	3	1	4	1	4

	2	2	2	3	3	1	2	1	1
	1	2	2	3	1	1	3	3	1
	1	2	2	3	1	1	3	1	3
	1	2	2	3	3	1	3	2	3
	1	1	2	3	3	1	3	1	3
	1	2	2	3	3	1	3	1	3
	1	2	2	1	3	1	4	3	4
	1	2	2	2	4	1	1	1	4
	2		1	3	3	1	4	3	4
	1	2	2	2	3	1	4	1	4
	1	2	1	2	3	1	4	1	4
	1	2	2	3	1	2	4	3	4
	1	1	1	2	3	1	4	3	4
	1	2	1	2	3	2	1	4	3
	1	2	1	2	2	2	1	4	3
	2	2	2	1	3	1	3	1	3
	1	2	2	1	1	1	3	3	3
	2	2	2	2	3	1	3	3	3
	1	2	1	2	2	1	4	4	3
	1	2	2	3	2	1	4	3	3
	1	1	2	2	2	2	3	4	4
	1	2	2	3	3	1	3	2	3
	1	2	2	3	2	1	3	2	3
	1	2	2	3		2	3	3	3
	1	1	2	1	3	3	1	3	4
	2	2	2	2	3	2	2	4	1
	1	2	1	2	2	2	3	4	3
	1	2	2	3	2	1	1	4	3
Total	32	31	31	31	31	32	32	32	32
# of 1s	25	5	7	5	5	23	6	9	3
# of 2s	7	26	24	12	9	7	2	4	0
# of 3s	0	0	0	14	16	2	13	11	17
# of 4s	0	0	0	0	1	0	11	8	12
#of 5s	0	0	0	0	0	0	0	0	0
% Of #1	78.13%	16.13%	22.58%	16.13%	16.13%	71.88%	18.75%	28.13%	9.38%
% of #2	21.88%	83.87%	77.42%	38.71%	29.03%	21.88%	<u>6.25%</u>	12.50%	0.00%
% of #3				45.16%	51.61%	6.25%	40.63%	<u>34.38%</u>	<u>53.13%</u>
% of #4					3.23%		34.38%	25.00%	37.50%

% of #5									
Total %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Randolph

Part 1	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q72	Q9
	3	1	1	1	1	1	1	1	4
	3	1	1	4	3	1	1	1	2
	1	1	2	1	3	1	1	1	3
	1	2	2	4	3	1	1	1	4
	2	2	2	4	3	1	3	1	3
	1	1	1	3	1	1	1	2	2
	1	2	1	4	4	2	3	1	4
	1	1	1	4	3	1	1	2	1
	1	1	1	2	3	1	1	1	1
	3	2	2	4	4	2	3	2	4
	1	1	1	4	3	2	3	1	2
	1	1	1	4	4			2	1
	3	1	1	4	4	1	1	2	4
	2		2	4	4	1	1	1	4
	3	1	1	1	3	2	3	1	2
	3	1	1	4	4	1	1	1	4
	3	2	2	4	4	2	3	1	2
	3	1	2	4	4	2	2	1	2
	3	1	2	4	4	2	3	2	4
	2	2	2	4	4	1	1	1	4
	3	1	2	4	4	2	3	2	2
	4	1	1	3	4	1	1		
	2	2	2	4	1	2	1	1	4
	3	1	2	4	4	1	1	2	
	3	1	2	4	1	1	1	3	2
	3	2	1	4	4	1	1	1	1
	2	1	2	4	1	1	1	3	1
	1	2	1	2	1	1	1	1	1
	3	1	2	4	2	2	3	2	2
	3	1	2	3	3	1	1	3	2
Total	30	29	30	30	30	29	29	29	28

# of 1s	9	20	14	3	6	19	19	17	6
# of 2s	5	9	16	2	1	10	1	9	10
# of 3s	15	0	0	3	9	0	9	3	2
# of 4s	1	0	0	22	14	0	0	0	10
# of 5s	0	0	0	0	0	0	0	0	0
% of #1	30.00%	68.97%	46.67%	10.00%	20.00%	65.52%	65.52%	58.62%	21.43%
% of #2	16.67%	31.03%	53.33%	<u>6.67%</u>	3.33%	34.48%	3.45%	31.03%	35.71%
% of #3	50.00%			10.00%	<u>30.00%</u>		31.03%	10.34%	<u>7.14%</u>
% of #4	3.33%			73.33%	46.67%				35.71%
% of #5	0.00%								
Total %	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Part 2	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
	1	2	2	2	2	1	1	2	4
	2	2	1	3	2	1	3	2	3
	2	2	2	2		1	4	4	1
	1	1	2	1	4	1	3	4	4
	2	2	2	2	2	1	2	3	1
	1	1	1	1	2	1	4	4	4
	2	2	2			1	4	3	4
		2	1	1	4	1	4	4	4
	1	2	2	3	3	1	2	2	1
	1	2	2	1	3	3	1	4	1
	2	1	2	3	2	1	4	4	2
	1	1	1	1	3	1	4	4	4
	2	1	1	1		1	4	4	4
	1	2	2	2	3	1			
	2	2	2	2	3	1			
	1	2	1	2	3	1	4	1	3
	1	2	1	1	3	1	4	4	4
	2	2	2	3	3	3			
	2	2	2	3	2	1	4	3	3
	2	2	1	2		2			
		1	2	1					
	1	2	2	2	2	1	4	1	4
	1	2	2	2	3	1	4		
	1	1	2			2	2		

2	1	2	1	1	2	1	1
---	---	---	---	---	---	---	---

Figure 1:Where Do You Hear About Nature the Most?

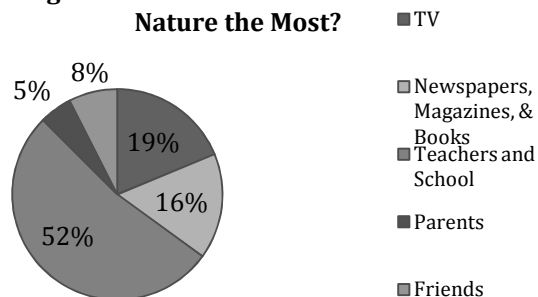
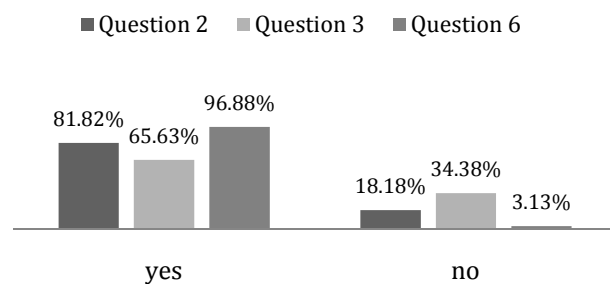


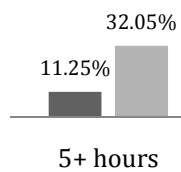
Figure 4: Norris



	1	2	2	2	1	1	4	3	3
	2	2	2	2	2	1	3	1	3
	1	2	2	2	2	1	3	1	3
	1	1	2	1	4	1	2	3	4
Total	27	28	29	27	23	28	24	22	22
	0								
# of 1s	15	8	9	9	2	24	2	5	5
# of 2s	12	20	20	13	9	2	5	3	1
# of 3s	0	0	0	5	9	2	4	5	6
# of 4s	0	0	0	0	3	0	13	9	10
#of 5s	0	0	0	0	0	0	0	0	0
% of #1	55.56%	28.57%	31.03%	33.33%	8.70%	85.71%	8.33%	22.73%	22.73%
% of #2	44.44%	71.43%	68.97%	48.15%	39.13%	7.14%	20.83%	13.64%	4.55%
% of #3				18.52%	39.13%	7.14%	16.67%	22.73%	27.27%
% of #4					13.04%		54.17%	40.91%	45.45%
% of #5									
Total %	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

APPENDIX C: Charts & Graphs

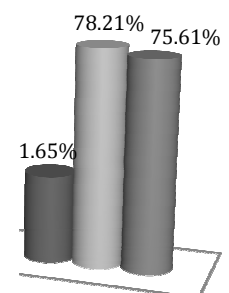
ent Outside



10

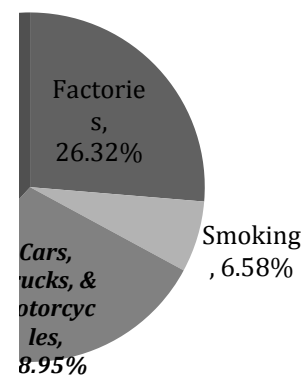
s (Questions 1-3)

ion 2 ■ Question 3

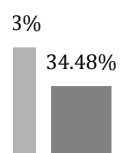


no

ollution is Mostly ed By?



stion 5



)

answered "Yes" to Like Your Outdoor ty?

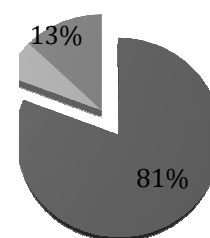


Figure 13: Air Pollution is Mostly Caused By? (Norris)

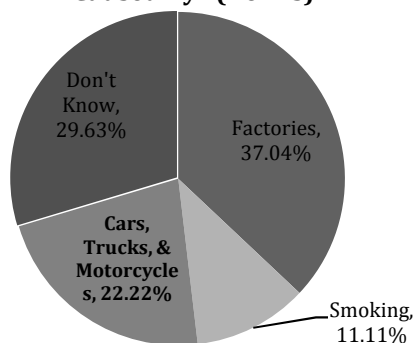


Figure 17: Water Pollution (In Rivers & Oceans) Mostly Comes From? (Randolph)

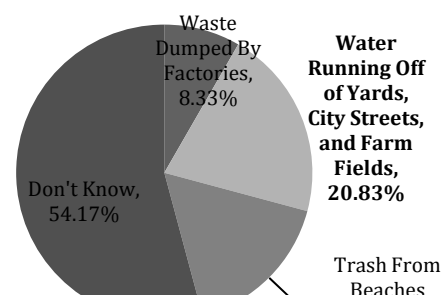


Figure 15: Air Pollution is Mostly Caused By? (Saratoga Pre-Test)

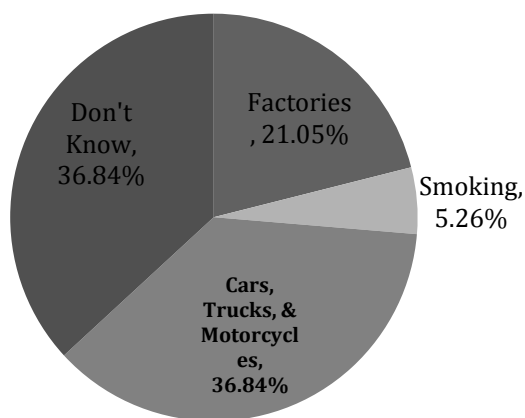


Figure 18: Water Pollution (In Rivers & Oceans) Mostly Comes From? (Norris)

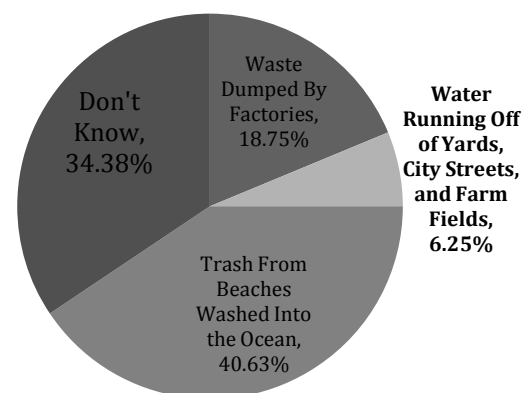


Figure 9: Pick the Word That Best Defines This Sentence: " There are Many Different Types of

Figure 16: Water Pollution (In Rivers & Oceans) Mostly Comes From?

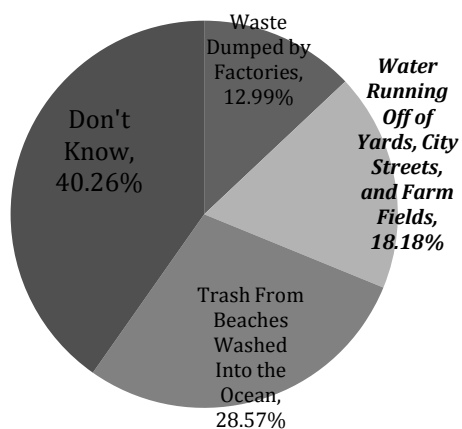


Figure 12: Air Pollution is Mostly Caused By? (Randolph)

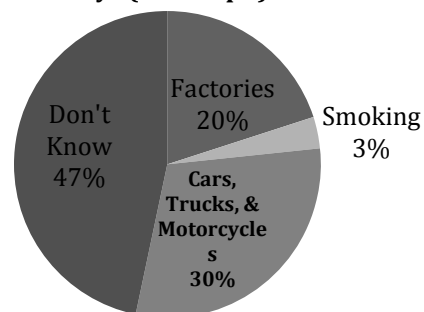


Figure 20: Where Do You Hear About Nature the Most?

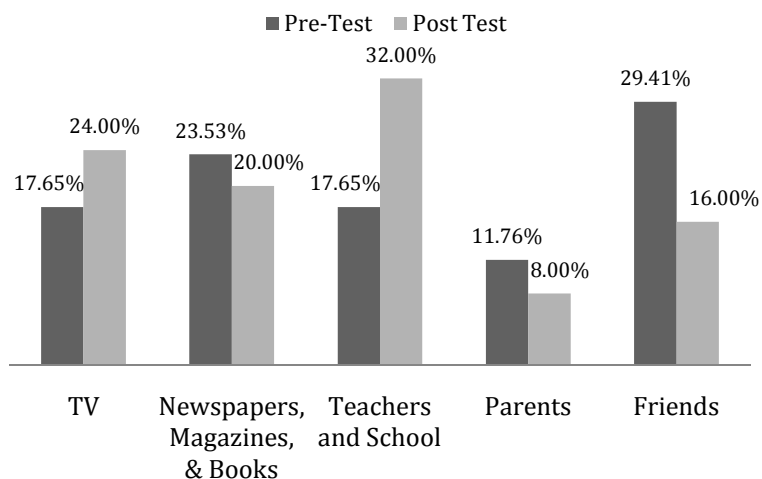


Figure 23: Time Spent Outside (Post Test)

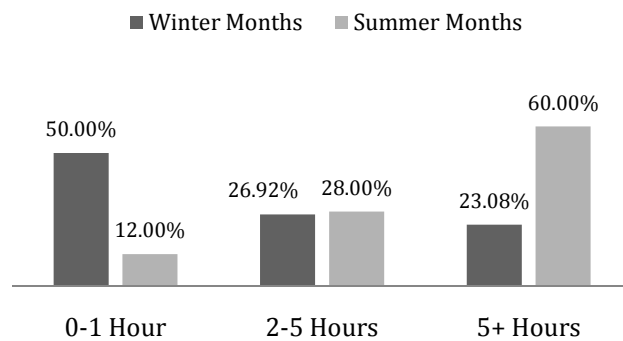


Figure 21: Which Word Do You Hear More and Are More Comfortable With? (Saratoga Pre)

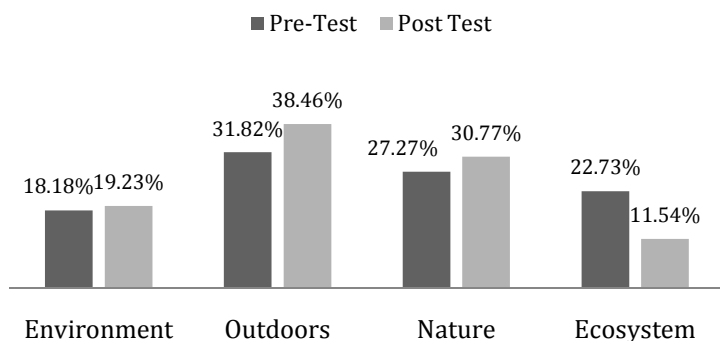


Figure 19: Water Pollution (In Rivers & Oceans) Mostly Comes From? (Saratoga Pre-Test)



Figure 24: Air Pollution is Mostly Caused By? (Saratoga Post)

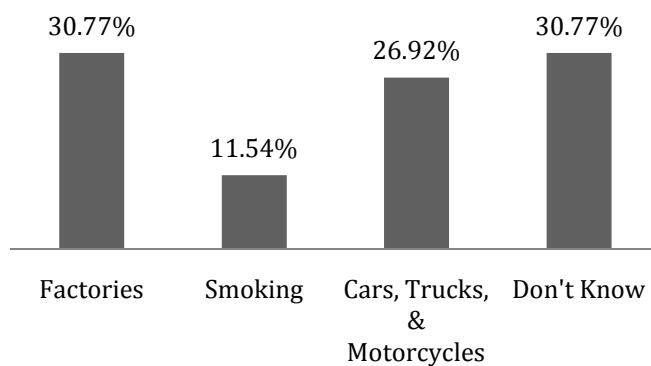
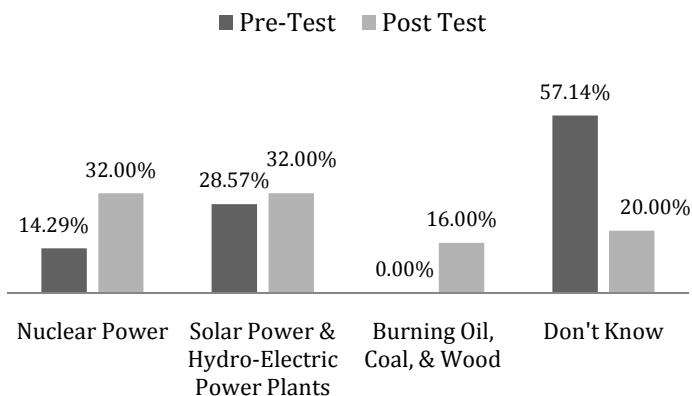
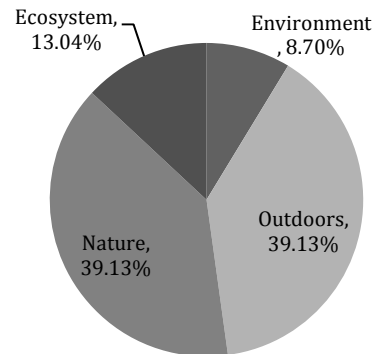
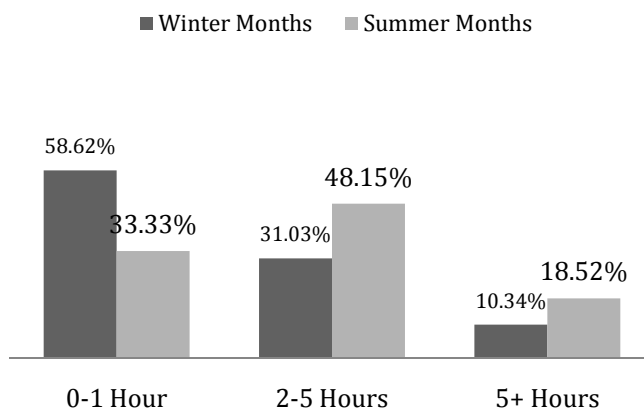
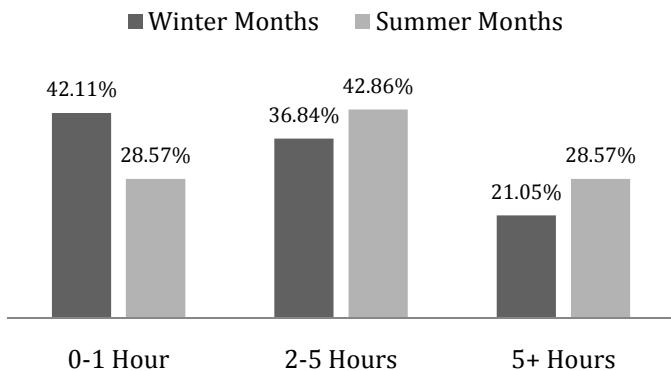
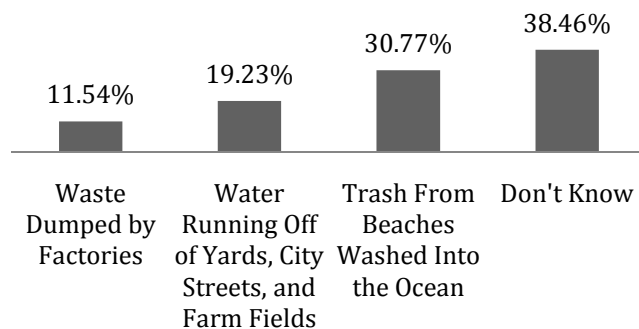
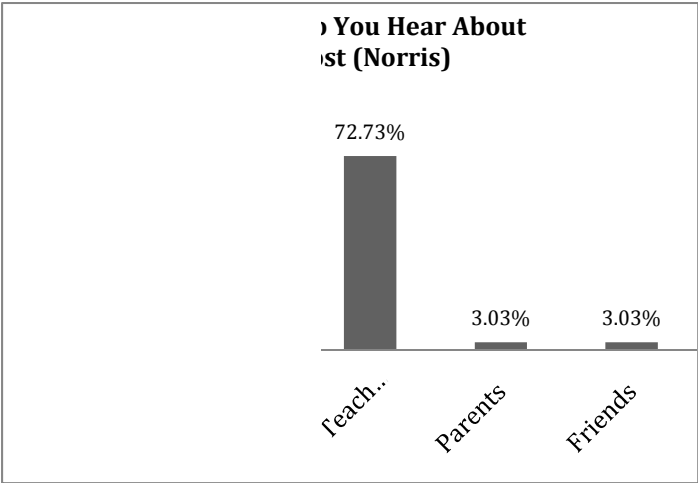
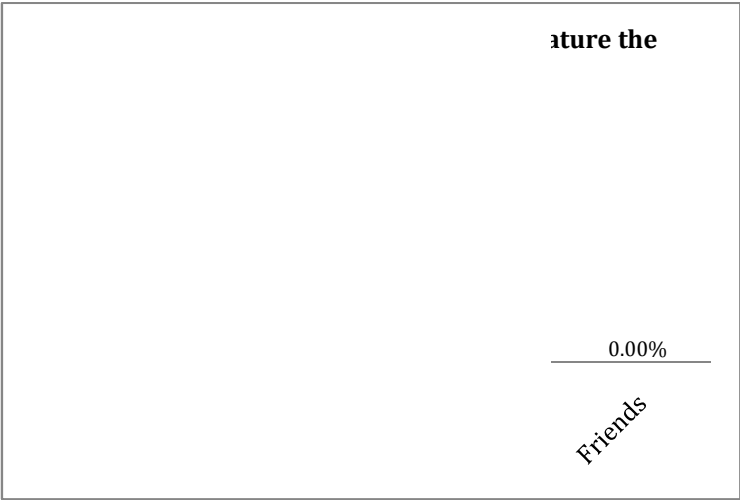
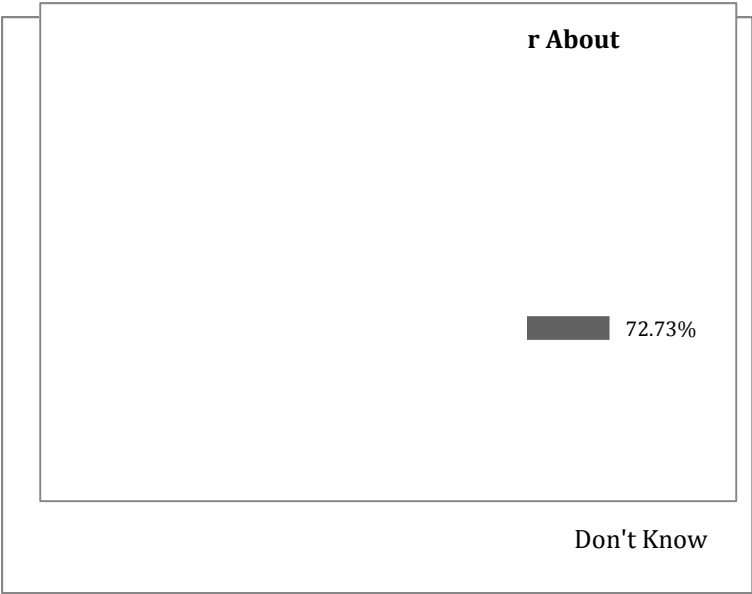
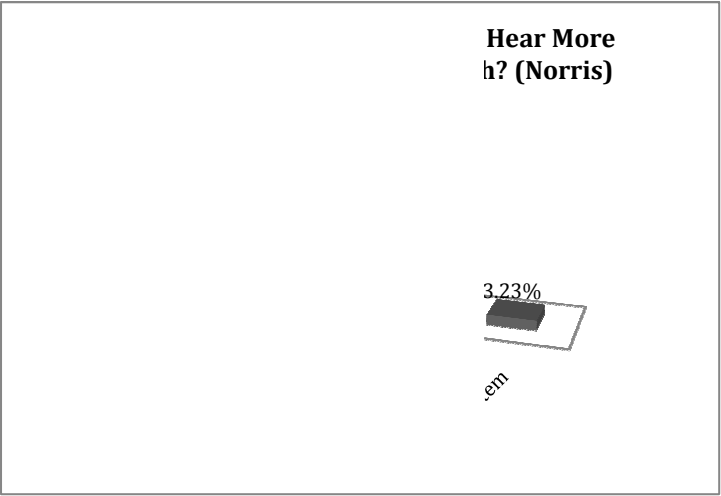


Figure 26: Electricity in the USA Comes From?**Figure 29: Which Word Do You Hear More and Are More Comfortable With?****Figure 30: Time Spent Outside (Randolph)****Figure 22: Time Spent Outside (Saratoga Pre)****Figure 25: Water Pollution (In Rivers & Oceans) Mostly Comes From? (Saratoga Post)**

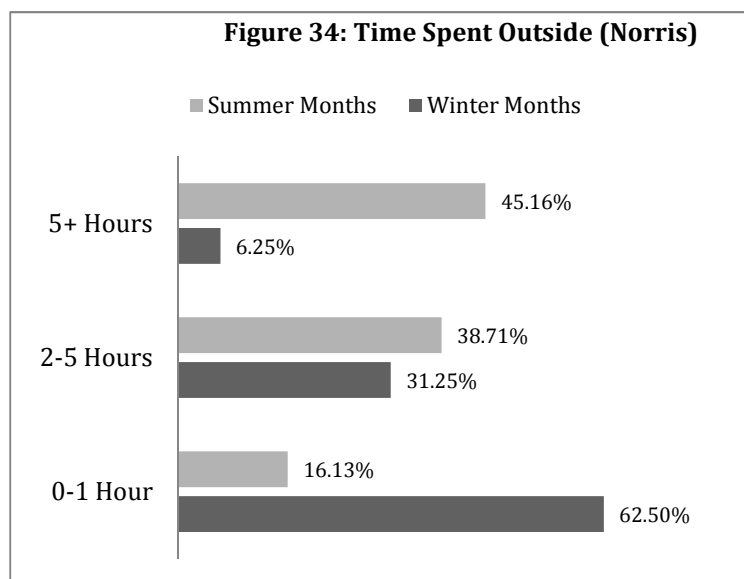


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