Measuring how age affects recycling tendencies

Research Question

How does a student's grade level affect his/her decision to recycle in school and at home?

> CXT: The research question is not focused enough. "Recycle" is a broad term, and so the question should say if they mean glass, aluminum, paper, plastic, batteries, or all of these.

Hypothesis

I believe that the students from a higher grade level will be the ones that recycle the most, both at school and in their households because they are the ones who are supposed to be more informed about global warming. Therefore, this should make them feel the need to protect the environment.

Background Information

For this lab, I will be gathering my data through an anonymous online survey that I will be distributing to students in my school. I am going to compare the results obtained from 10th and 11th grade students. I have hypothesized that the older students will be the ones who recycle the most because supposedly they should be more knowledgeable about climate change than the younger kids. And, if they know more about the problem, they probably have a stronger urge to solve this issue.

> CXT: No context is provided. There is a very tenuous link between the issue of recycling and the question.

Variables	Named Variables	Units (if applicable)	Equipment or Procedure for Measurement/Control
Independent	Student's grade level	-	I surveyed students from two different grade levels: 10th grade and 11th grade. I sent an email to all of the students in these two grade levels and later analysed how the student's grade level affects how much they recycle.
Dependent	How much the students recycle	-	In the survey, I asked the students if they brought their own water bottle to school, if they recycled at home and at school and, if they didn't recycle at home, why not? After the survey was completed, I analysed how the student's grade level affected their answers to the survey.
Controlled	The same survey was used for all students	-	All of the students who answered my survey completed the same survey, regardless of their age.
	All students were contacted in the same way	-	I sent the same email to all of the high school students in my school.
	Time period	-	The survey was sent on the same day to all of the students and remained available for exactly two days.
	Similar cultural background		All of the students that filled in the survey attend my school, so they receive the same quality of education and have similar cultural backgrounds.

Procedure

1. Created a short five-question survey in SurveyMonkey.com. The questions were:

   - What grade level are you in?

   - Do you bring your own water bottle to school?

   - Do you recycle at school?

   - Do you recycle at home?

   - If you don't recycle at home, why not?

2. . Distributed the survey to all students from grades 10 and 11 in my school. The survey was sent to 216 people of which 104 are from 10th grade, and 112 are from 11th grade. I sent the survey to a large amount of people so that a representative portion of each year group would answer the survey.

3. Distributed the survey through school email.

4. Left the survey open for two full days.

5. Closed the survey after two days.

6. Recorded each survey response.

7. The responses for each question were evaluated separately.

8. The data was represented in graphs showing how students from each grade level answered each individual question.

9. Analysed if the data backed up my hypothesis or not.

PLA: The grade levels are so close together that many of the students may actually be the same age. A wider spread of ages should have been selected.

PLA: Risk assessment and ethical considerations are not really applicable in this practical. Privacy of information could have been mentioned, but this is not sensitive information and the non-inclusion of this aspect would not be penalized in this case.

PLA: The sampling strategy is described but it is confused. As the question seeks to establish differences between grade levels, it either needs to be a census or a random sample. This is neither.

Data Collection

Data table 1: Student's response to question 1

Question 1: What grade level are you in?	
Grade level	Number of students
10	32
11	20

As you can see from this data table, a total of 64 students answered my survey.

RAC: The table suggests 52 students.

Data table 2: Student's response to question 2

Question 2: Do you bring your own water bottle to school?		
Grade level	Response	Number of students
10	Yes	19
	No	13
11	Yes	13
	No	7

PLA: In general the survey is a bit simple for this level. The problem with binary (yes/no) surveys is that there is a limit to how deeply the information can be analysed. One can do some probability work, but more in-depth analysis requires questions with graduated responses.

Data table 3: Student's response to question 3

Question 3: Do you recycle at school?		
Grade level	Response	Number of students
10	Yes	22
	No	10
11	Yes	16
	No	4

Data table 4: Student's response to question 4

Question 4: Do you recycle at home?		
Grade level	**Response**	**Number of students**
10	Yes	19
	No	13
11	Yes	11
	No	9

Data table 5

Question 5: If you don't recycle at home, why not?		
Grade level	**Response**	**Number of students**
10	Blank response	2
	Doesn't have access to a recycling company	6
	Inconvenient	4
	Does not consume many recyclable things	1
11	Blank response	1
	Doesn't have access to a recycling company	4
	Inconvenient	3
	No space	1

Graph 1

Percentage of students surveyed per grade level

11th graders 38%
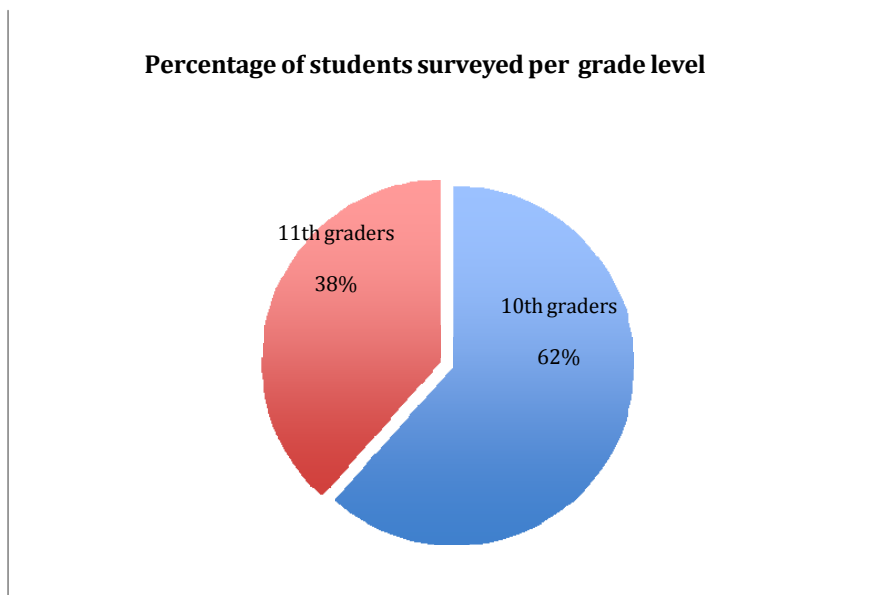
10th graders 62%

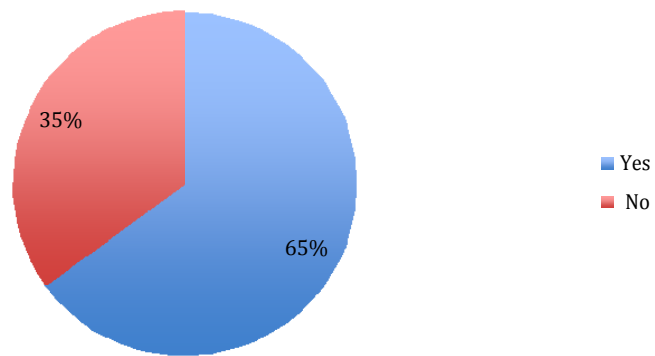RAC: The title is unclear.

Question 2

Graph 2

Do you bring your own water bottle to school? (Only 10th graders)

Yes
No

59%
41%
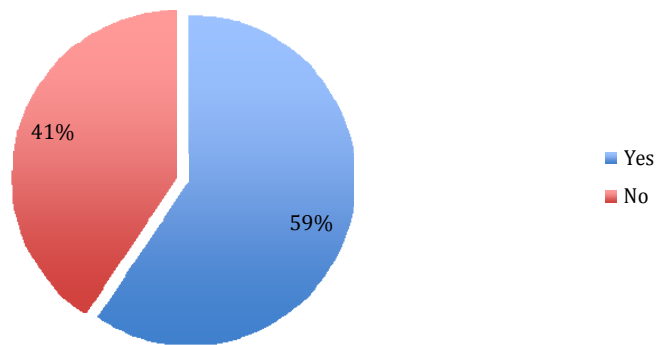
Graph 3

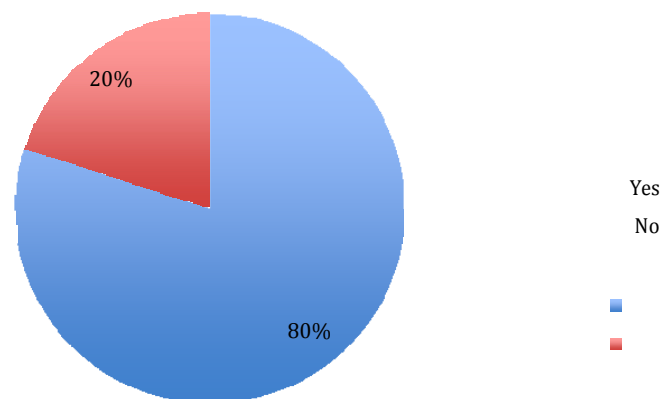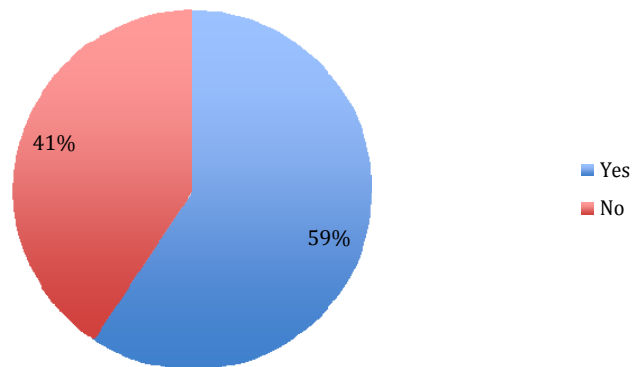**Do you bring your own water bottle to school? (Only 11th graders)**

Yes
No

65%
35%

Question 3

Graph 4

Do you recycle at school? (Only 10th graders)

Legend: Yes, No
31%
69%
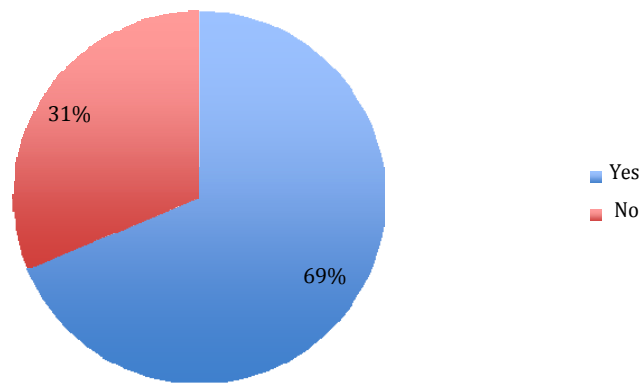
Graph 5

Do you recycle at school? (Only 11th graders)

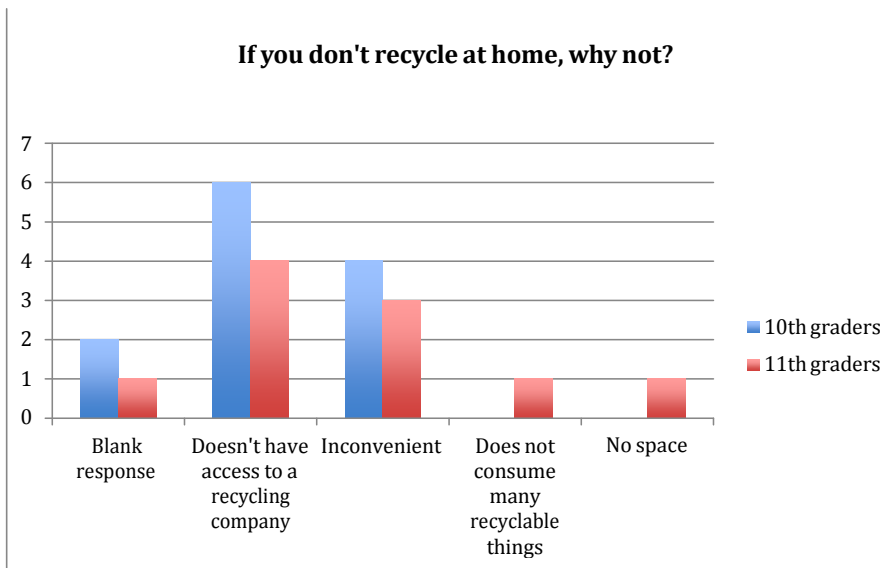Legend: Yes, No
20%
80%

Question 4

Graph 6

Do you recycle at home? (Only 10th graders)

Graph 7

Do you recycle at home? (Only 11th graders)
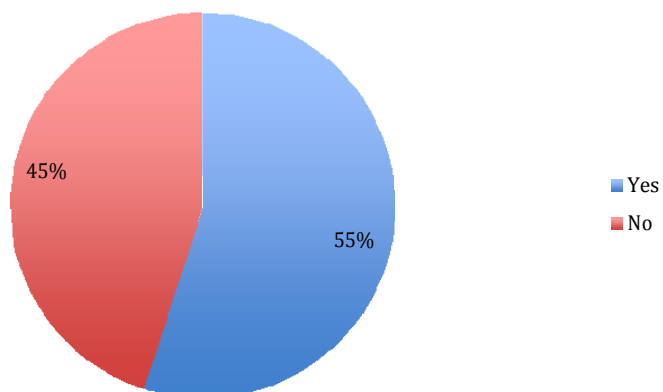
Question 5

RAC: The chart includes no label on the vertical axis—these could be absolute numbers or percentages.

If you don't recycle at home, why not?

Legend: 10th graders, 11th graders

Conclusion

RAC: There are no bar charts comparing the responses to different questions. Without these it is hard to get an idea of patterns across the different questions.

In general, my data proved my hypothesis because in most of the questions in my survey, a greater percentage of the 11th graders surveyed answered that they recycled than the 10th graders. As shown by graph 1, 62% of the students surveyed were 10th graders and only 38% were 11th graders. But, I still consider that my results were relatively constant throughout the survey, so I do think that I surveyed a significant portion of each year group.

RAC: The student should have calculated the percentage of the population that was surveyed.

The second question I asked in the survey was, "Do you bring your own water bottle to school?" I asked this question because the school administration has recently decided that no more plastic bottles will be sold in school and students have to bring their own bottles from home. The school's administration has imposed this measure in order to reduce pollution. So, I wanted to measure if this new regulation was actually working because the only way for it to work is if people bring their own water bottles from home. If they don't, they will still buy drinks in school. In school now they only sell drinks in Tetra pak or paper/cardboard cups, which contaminate less than plastic bottles, but it is still not the ideal scenario if people are still buying these. My results show that most of the students surveyed from both grade levels bring their own water bottle to school. 59% of the 10th graders surveyed bring their own water bottles to school and 65% of the 11th graders surveyed bring their own water bottles to school. This question supports my hypothesis because a greater percentage of 11th graders bring water bottles to school than 10th graders.

My third question asks if the students recycle at school. My results show that most of the students in these two grade levels recycle. 69% of the 10th graders answered that they do recycle at school and 80% of the 11th graders surveyed answered that they do recycle in school. Therefore, this question also supports my hypothesis because the older students recycle more in school than the younger students.

> RAC: Although the analysis is essentially correct, the problems with the survey design limit the validity of the conclusion. If a student recycles paper but nothing else, they will answer yes to the question "Do you recycle at home" but that is obviously different to a student who recycles plastic, paper, aluminium and glass.

The fourth question asks if students recycle at home. I included this question in the survey to measure how willing the students are to recycle. It is very easy to recycle at school because the students have all of the separated bins to recycle each thing, but in order to recycle at home students have to show real initiative. In this question I got different results than in the previous ones due to the fact that 59% of the 10th graders surveyed recycle at home and only 55% of the 11th graders surveyed recycle at home. Even though a greater portion of the students in both grade levels recycle at home, more students from 10th grade recycle at home.

> RAC: The conclusion could be improved if data had been gathered and analysed to clearly show how one behaviour affected another.

The fifth question was an open-ended question that examined the reasons why some students did not recycle at home. The most popular response, both for 10th and 11th graders, was because they don't have access to a recycling company at home. Some other appropriate answers were because they don't have any space at home, they don't consume many recyclable things and another very popular response was because it is inconvenient. As you can see, this shows that in most cases people don't recycle at home because it is hard and some students find it inconvenient.

Overall, my data shows that, in my school, students care about the environment since in all of the questions more than 50% of the students ,regardless of grade level, answered that they recycled one way or another. Since in two out of the three questions that measured if students recycled or not, 11th graders recycled more than 10th graders, I dare to say that this survey proved my original hypothesis.

> RAC: The data is incorrectly analysed. It actually shows that 50% of the students who chose to answer the survey feel this way. Students need to be aware of this distinction for internet-based responses.

> RAC: Apart from taking into account the issue of sample strategy, the conclusion interprets the relevant trends.

Evaluation

Even though I consider that my lab was well conducted and I got reasonable results, there are still several aspects that I could have improved in order to obtain better results.

Firstly, I chose to distribute the survey through the school email because I considered that more people would take the survey seriously if I distributed this way. But the truth is that there are many students who don't check their school email that often. Therefore, if I had distributed the survey some other way, such as

through Facebook or personally, maybe I would have collected more data.

DEV: Good point. To ensure a representative sample either the entire class should have been selected or a random sample. This sample is only of those students who check their email and chose to answer.

I only left the survey open for two complete days. If I had started my lab with more anticipation I would have been able to leave it open for a longer period of time and I think I would have been able to collect more data. But I still think that I collected an adequate amount of information in order to draw conclusions.

Another aspect of my lab that could have been improved for a better result is the grade levels I collected data from. I was trying to measure how age affects a student's capacity to recycle and I surveyed students from the 10th and 11th grades. So, if I had collected data from two grade levels that were more separate from each other, maybe my results would have been more conclusive. Even

DEV: Good point. This is perhaps one of the weakest points of the investigation.

though these are some factors that I could have improved to make my lab better, I still believe that my lab showed a clear pattern of how willing and able to recycle students from my school are

Discussion

The pattern shown in the data collected suggests that the older students are more aware of climate change because a greater percentage of them recycle more at home and at school. But, more importantly, it shows that most of the students surveyed from grades 10 and 11 recycle both at home and in school. I believe that my data can be useful to the school's administration because they have been emphasizing global warming and recycling a lot lately and this proves that their effort is actually working.

DEV: There is no way to support this statement based on this data. A baseline study would have had to be carried out prior to introducing the policy.

The school's decision to stop selling plastic bottles in school was criticized by both students and faculty. However, my survey shows that most of the student population surveyed brings their own water bottle to school, proving that the school's decision was effective after all because students have access to clean water in school and they don't create that much plastic waste.

Since the school has been trying a lot to incentivize recycling, this data can also help them see that many people are not recycling at home because they don't have access to a recycling company, not because they don't want to. Therefore, the school could maybe try to implement some sort of solution for this. Maybe the school can create a simple way to make the connection between the student's families and the recycling companies in Lima.

APP: This is the only reference to a solution to a "problem", namely how many people currently recycle. However, this is not the precise purpose of the study.

Bibliography

"Recycling." SurveyMonkey. N.p. 18 Mar. 2013. Web. 22 Mar. 2013.
<http://www.surveymonkey.com/s/5XXGZSX>.