Recycling Patterns on Edgewood Campus

Improvement in Recycling Habits and Waste Disposal through Increased Awareness and Education

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Abstract

For both environmental and economical reasons, recycling and proper waste disposal should be important to all members of a community. Data collected from random classrooms on the Edgewood campus indicated that members of the campus community were not properly using the recycling and waste bins. Based on this information, we designed an experiment which would test the effectiveness of an education campaign in increasing the amount of correct recycling and waste disposal habits on campus. We hypothesized that the poor use of the bins was caused by a lack of awareness and education on the part of the individuals on Edgewood campus. Through the use of proper labeling, informative signs, and a list of recyclable and non-recyclable items in each classroom, we attempted to "educate" the individuals who used the sampled classrooms. Once this new system had been in place for a week, another set of data was collected. After comparing the average percentage of items in the correct bins before the experiment, to the average percentage in the correct bins after the experiment, we were able to conclude that proper labeling and access to more information did make a difference in the recycling and waste disposal habits of those who used the sampled classrooms. This means that it is possible that this type of system might also be able to make difference on a larger scale on the Edgewood campus.

Introduction

Throughout the United States waste disposal is an issue facing many communities. The most widely used system for waste disposal is the sanitary landfill. The problem with most landfills is that the garbage they contain barely decomposes or decomposes slowly. This leads to fuller landfills and as a result new landfills must be built to compensate for all of the waste. In the 1970's and 1980's there was interest in waste to energy incinerators, in which burning garbage was intended to produce electricity. However, this system also faced obstacles as it was found that in order for the incinerators to burn cleanly "they would have to run continuously" (Gonick and Outwater, 181). While neither of these systems are very effective, environmentalists suggest that if the amount of waste was reduced through recycling, landfills and waste to energy incinerators would not be needed as greatly (Gonick and Outwater, 182).

While it seems as though people who have difficulty recycling are simply uneducated about the subject, *The Capital Times* explains that even one of the "Green Leaders" of the country had problems recycling. Between 2001 and 2002 the amount of per capita recycling in Madison sharply decreased, from 145.43 to 141.57. This decrease continued through 2003. The president of RecycleWorlds, Pete Anderson, believes that this problem occurred as a result of a lack of "education on how, why, and where to recycle" (*Capital Times*, November 21, 2005). This has proven to be true, as recycling is already up forty-percent since the initiation of the new recycling program on September 12, 2005 (*Capital Times*, November 27, 2005). The new program raised awareness about recycling, as well as simplified current procedures in order to make recycling easier. By following a similar model we believe that we can create awareness and simplify the process of recycling on the Edgewood campus.

Recycling should be important to everyone at Edgewood, as there are both economic and environmental benefits to recycling. Edgewood currently pays for the recycling and waste produced on campus to be removed. This costs a great deal of money, money which could easily be saved if the campus had a more effective disposal system. If Edgewood were to sort and dispose of its own recycling and waste it would greatly reduce the cost of recycling (Lorman). The National Recycling Coalition echoes this idea, explaining that well developed recycling programs actually save money (NRC, 2005).

In addition to economic benefits, an increase in proper recycling and waste disposal would be of great benefit to the environment. While it might not seem as though an increase in recycling on campus would make a dramatic difference, the NRC argues that any amount of recycling makes a difference and that "one year of recycling on just one college campus, Stanford University, save the equivalent of 33,913 trees and the need for 636 tons of iron, ore, coal, and limestone" (NRC, 2005). While the Edgewood Campus is not as large as that of Stanford University, it is obvious that a change in recycling habits on campus would still benefit the environment greatly.

We have noticed that the current recycling system in Edgewood classrooms is not very effective. There is often a great deal of waste in the recycling bins and recyclable items in the waste bins. For this reason, we chose to study recycling patterns on the Edgewood campus for our Watershed Research Project. We believe that the mistakes made in disposing of recyclable items and waste are a result of ignorance. We have observed that the bins in the Edgewood classrooms are not labeled properly or are not labeled. Another issue is that some classrooms at Edgewood do not have a recycling and

waste container and simply have one unlabeled container. In addition, through informal surveys of teachers and fellow students, we have discovered that there are few people on campus who are aware of what is and is not recyclable. We believe that by including informative facts, a list of recyclable and non-recyclable items, along with proper bins for disposal, we can increase the amount of recycling which occurs on the Edgewood campus.

If our hypothesis that an increase in knowledge about recycling and waste correlates with an increase in recycling is proven correct, it could mean a chance for a complete change in the amount of waste disposal on the Edgewood campus. If members of the Edgewood community were to exercise proper recycling and waste disposal habits, it would mean economic and environmental benefits for everyone involved. For this reason, it is important to explore a different type of recycling and waste disposal system.

Methods

We collected the items in both the waste and recycling bins, from our sample classrooms (Appendix 1). Sampled classrooms were randomly selected, two classrooms from each of the four buildings. The items in each room and each bin were kept separate with the use of clearly labeled bags. Using a list of recyclable and non-recyclable items, we sorted through the items in each bag. We placed all the items in a bin and measured the total mass, including liquids. Next we removed all items which did not belong in the particular bin (i.e. if items were from a waste container, we removed all recyclable items). If the classroom did not have both a waste and a recycling bin, we used the label on the bin as guidance (i.e. if the bin was labeled waste and there were recyclable items in it, we considered them to be not properly disposed of). We weighed what was left in the bin, recorded it and subtracted it from the original mass, giving us the mass of the items that were removed from the bin. Afterwards, we counted the number of recyclable and non-recyclable items (Appendix 5).

After base data was collected we placed six informative signs in the sampled classrooms, five featured "fun facts" (Appendix 4) and the other contained a list of what was and was not recyclable (Appendix 3) on Edgewood campus. Each sign was approximately five by two inches and was backed with a brightly colored piece of construction paper. In addition, signs which were approximately eight by eleven inches and said "Recyclable Items" and "Waste" were placed above the proper bins. If a room did not have at least one recyclable bin and one waste bin, we placed one in the classroom. Once this information had been posted for a week, another sample was collected. The same procedure which was used to sort the base data was used for sorting these samples. In order to determine the amount of change in recycling and waste

disposal habits, we compared the average percentage of correct items in the recycling and waste bins before we began our experiment, to the average percentage of correct items in each bin afterwards.

Results

Our experiment supported our hypothesis. As portrayed in our following data charts, as well as in our bar graphs, there was an overall increase of the amount of materials in the correct containers from 66% to 86%, an increase of 20%. The increase in the amount of waste items in their correct containers was from 47% to 82%, an increase of 35%. The increase in the amount of recyclable materials in their correct containers was from 85% to 94%, an increase of 9%. These percentages are determined from the actual number of items collected. We also collected data on the weight of the items (Tables) but did not put it in our graphs because the number of items provides more accurate results. The weight of liquid in some of the recyclable items might throw off the data. The overall increase of items in their correct containers, according to weight, was from 63% to 85%, an increase of 22%. The increase of recyclable items based on weight, was 88% to 94%, an increase of 6%. The increase of waste items based on weight was 47% to 75%, an increase of 28%.

Watershed Research Project Recycling/Waste Data (before)

Table 1

Room	Total Weight (kg)	Weight of Recyclable Items (kg)	Weight of Waste (kg)	Correct Container
Sondregger 219	0.97	0.84	0.13	13.40%
Sondregger 317 Recycling	0.54	0.54	0	100%
Sondregger 317 Waste	0.19	0.07	0.12	63.20%
Regina 1	0.49	0.21	0.28	57.10%
Regina 2	1.39	0.85	0.54	38.80%
Predolin 122 Recycling	0.14	0.09	0.05	64.30%
Predolin 122 Waste	2.18	0.87	1.31	60.10%
Predolin 116 Recycling	0.18	0.18	0	100%
Predolin 116 Waste	0.87	0.12	0.75	86.20%
Mazzechelli 103 Recycling	0.08	0.08	0	100%
Mazzechelli 103 Waste	1.97	1.26	0.71	36%
Mazzechelli G-14 Recycling	0.49	0.36	0.13	73.40%
Mazzechelli G14 Waste	0.17	0.13	0.04	23.50%
Total	9.66	5.78	3.88	62.77% Avg

Watershed Research Project Recycling/Waste Data (before) cont.

	Total # of Items	# Of Recyclable Items	# Of Waste Items	Correct Container
Sonderegger 219	15	6	9	60%
Sonderegger 317 Rec.	8	8	0	100%
Sonderegger 317 Waste	24	5	19	79.20%
Regina 1	41	10	31	75.60%
Regina 2	30	20	10	33.30%
Predolin 122 Rec.	8	5	3	62.50%
Predolin 122 Waste	18	8	10	55.60%
Predolin 116 Rec.	3	3	0	100%
Predolin 116 Waste	9	5	4	44.40%
Mazzechelli 103 Rec.	3	3	0	100%
Mazzechelli 103 Waste	11	6	5	45.50%
Mazzechelli G-14 Rec.	5	3	2	60%
Mazzechelli G-14 Waste	21	11	10	47.65
Total	196	93	103	66.44% Avg Waste: 48% Avg Recycling: 84.5% Avg

Table 1 (cont.)

Watershed Research Project Recycling/Waste Data (after)

Rom	Total Weight (kg)	Weight of Recyclable Items (kg)	Weight of Waste Items (kg)	Correct Container (weight)
Sondregger 219 Waste	0.195	0.025	0.17	87.18%
Sondregger 219 Recycling	0.015	0.01	0.005	66.67%
Sondregger 317 Waste	0.03	0.015	0.015	50.00%
Sondregger 317 Recycling	0.05	0.05	0	100.00%
Regina 1 Waste	0.54	0.05	0.49	90.74%
Regina 1 Recycling	0.02	0.02	0	100.00%
Regina 2 Waste	0.68	0.03	0.65	95.59%
Regina 2 Recycling	0.01	0.01	0	100.00%
Predolin 116 Waste	0.365	0.105	0.26	71.23%
Predolin 116 Recycling	0.1	0.1	0	100.00%
Predolin 122 Waste	0.475	0.13	0.345	72.63%
Predolin 122 Recycling	1.25	1.2	0.05	96.00%
Mazzuchelli 103 Waste	0.845	0.36	0.485	57.40%
Mazzuchelli 103 Recycling	0.17	0.17	0	100.00%
Mazzuchelli G14 Waste	0.525	0.12	0.405	77.14%
Mazzuchelli G14 Recycling	0.09	0.08	0.01	88.89%
Total	5.36	2.475	2.71	84.59%(average)

Table 2

Watershed Research Project Recycling/Waste Data (after) cont.

Room	Total Number of Items	Number of Recyclable Items	Number of Waste Items	Correct Container (Number)
Sonderegger 219 Waste	34	5	29	85%
Sonderegger 219 Rec.	9	5	4	56%
Sonderegger 317 Waste	10	3	7	70%
Sonderegger 317 Rec.	16	16	0	100%
Regina 1 Waste	23	3	20	87%
Regina 1 Rec.	2	2	0	100%
Regina 2 Waste	22	1	21	95%
Regina 2 Rec.	2	2	0	100%
Predolin 116 Waste	10	2	8	80%
Predolin 116 Rec.	3	3	0	100%
Predolin 122 Waste	25	9	16	64%
Predolin 122 Rec.	9	8	1	89%
Mazzechelli 103 Waste	45	9	36	80%
Mazzechelli 103 Rec.	7	7	0	100%
Mazzechelli G14 Waste	32	2	30	94%
Mazzechelli G14 Rec.	16	12	4	75%
Total	265	89	176	86% (average)

Table 2 (cont.)


Waste Items Disposed of Correctly
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Before
After
Incorrect Items
Correct Items

Table 3

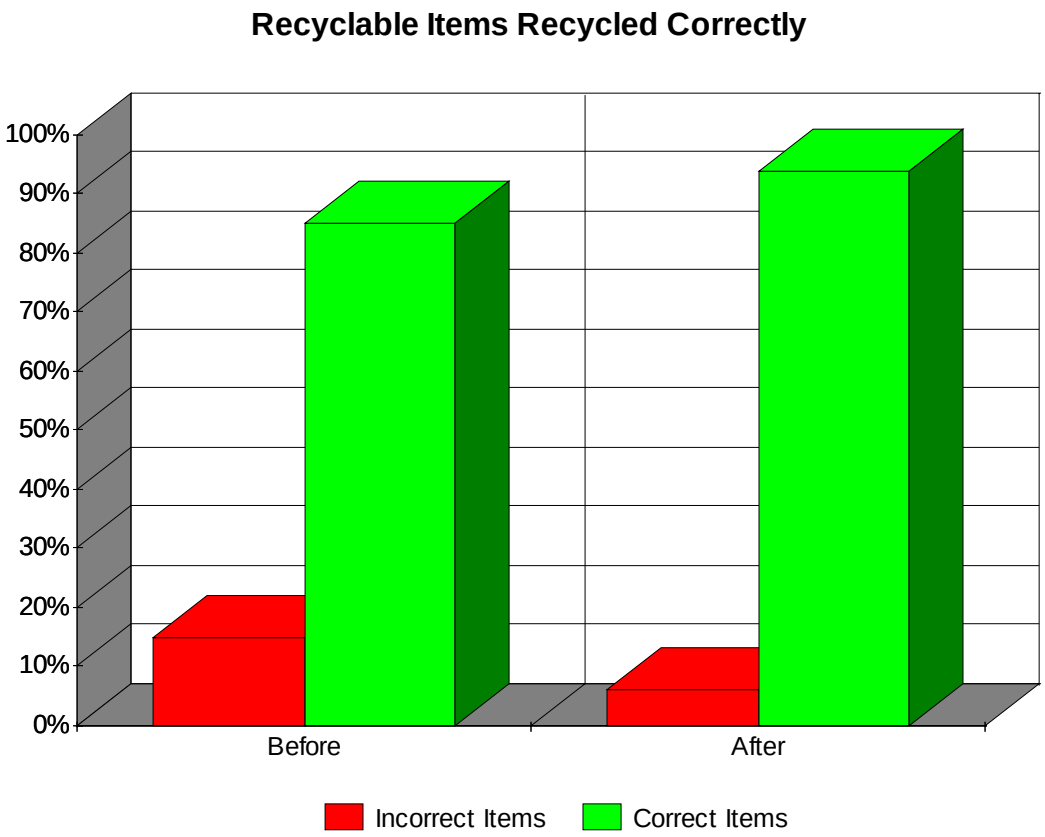
Recyclable Items Recycled Correctly
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Before
After
Incorrect Items
Correct Items

Table 4

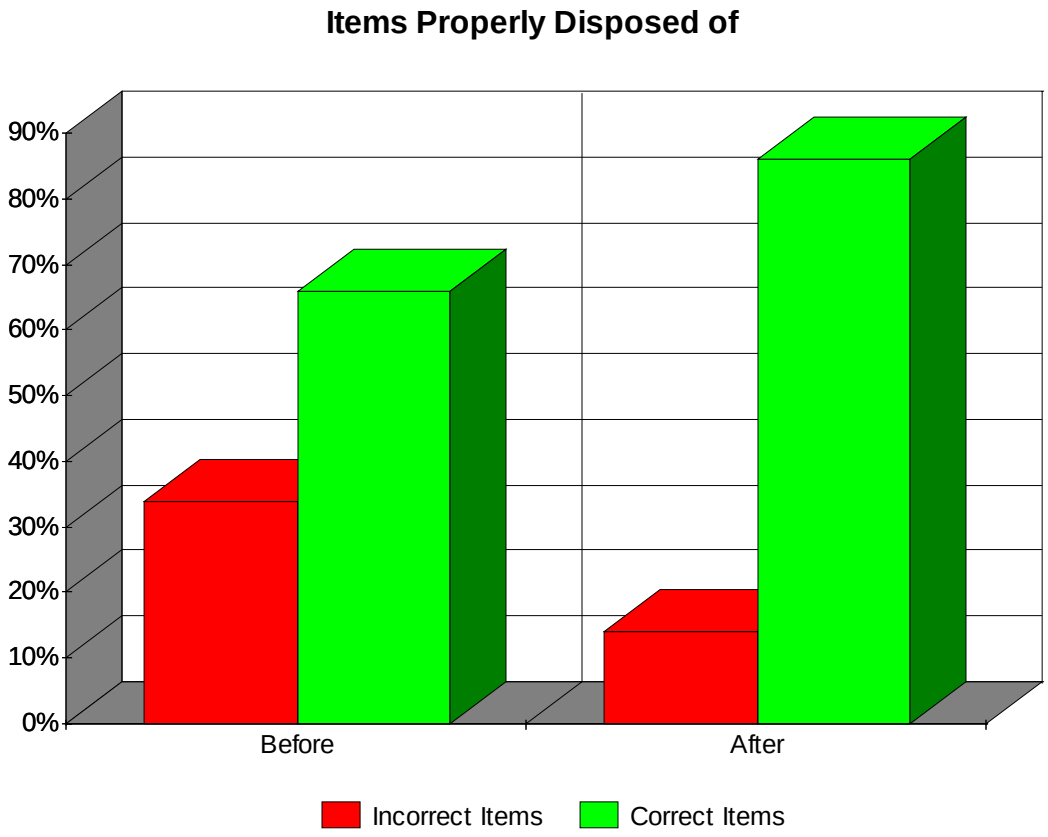

Table 5

Discussion

We believe that the observed increases in items placed in correct containers are a direct result of our experiment in which we supplied enough recycling and waste containers, properly labeled the containers, and posted facts about what is and is not

recyclable. In Sondregger 219, Regina 1, and Regina 2, there was only one unlabeled container, which we assumed would be considered waste to the custodial staff. This situation only gave students and teachers the option to throw their materials in the waste. We remedied this by placing additional bins in those rooms, as well as properly labeling all bins. This obviously made a dramatic increase in the amount of recyclable materials in the correct containers for these rooms.

We also observed that there was a greater increase in the amount of correctly placed waste materials than in the amount of properly placed recyclable materials. The difference was approximately twenty-five percent. We unsure of why this occurred, we believe it is because in general people waste more, so there were more items to be thrown into the waste.

There were a few things we could have done to produce more accurate results. After we collected the trash from all of the rooms and sorted the first time, we realized that the liquid weight from some of the bottles would possibly have an effect on our data. This had not been taken into consideration the first time we sorted, so we did not calculate it in our second sorting. In future studies it would probably be a good idea to dump alls liquids out before weighing containers. This makes a difference in the overall weight results because it would suggest that there is possibly more correct or incorrect items in a given bin, when a piece of paper counts as the same amount as a bottle of water, yet weighs a lot less.

When we had the middle students come to help us sort through our first collection, we felt somewhat unprepared. While it was nice to have the students sort through the trash, it was hard to keep track of what all of the students were doing

independently. It is possible that they did not sort everything correctly because there only reference was what we told them to consider as recycling or waste. This also leads into another issue which needs to be taken into consideration of our possible mistakes. The first sort was based on the Madison recycling chart, while the second was based off of Edgewood's recycling policy. The two lists are very similar; however a few of the items on the lists are different and may have been counted incorrectly during the first sort.

Another factor that may have influenced the results of our study was the day and time of each collection. Our first collection was done in one evening during the first semester. The second collection was done second semester over the course of two different days and times. While it should not have a large effect, as the samples are intended to be random representations, it is possible that on one of the days more students had been in and out of the classroom. We attempted to minimize this margin of error by averaging totals, rather than relying on individual classroom or bin results.

When compared to other Watershed Projects which examined recycling habits on the Edgewood campus, it seems as though many of our results are quite similar. For example, the group that conducted the research project titled "Is Recycling Working at Edgewood?" discovered that the recycling and waste bins in the hallways were more effective than those in the classroom. The group wondered if this difference was due to the fact that the hallway containers were more clearly labeled. Our results appear to support this idea. Once the bins in our sample classrooms were properly labeled, the average percentage of correct recycling and waste disposal increased. While this change could also be attributed to the increased knowledge of members of the Edgewood

community regarding recycling, when one examines the fact that in both studies better labeling meant improved recycling and waste disposal, it seems as though correct labeling is an important part in the improvement of a recycling and waste disposal system.

If our project, or one similar to it, were implemented throughout the Wingra Watershed Community based on our results one could hypothesize that there would be an increase in knowledge about recycling and an increase in the rate of proper disposal of recyclable and waste items. According to our research, this increase in recycling would improve the surrounding environment significantly. There would be less litter in the community and the process of sorting recyclable items would greatly increase in speed. As previously discussed in our Introduction section, this increase in speed would be to the economic benefit of members of the community.

When we began our project we hypothesized that through an increase in proper labeling and available educational materials, we could make recycling easier for members of the Edgewood campus community and increase the amount of recycling on campus. Based on data which showed an increase in properly placed recyclable and waste materials, we believe that our hypothesis has been proven to be true.

Works Cited

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"State's Recycling Levels Fall". *Capitol Times*. 21 Nov. 2005. 2005. <www.madison.com>.

Appendix 1 (Classroom List)

Mazzuchelli

G-14
103

Predolin

116
122

Regina

R1
R2

Sonderegger

219
317

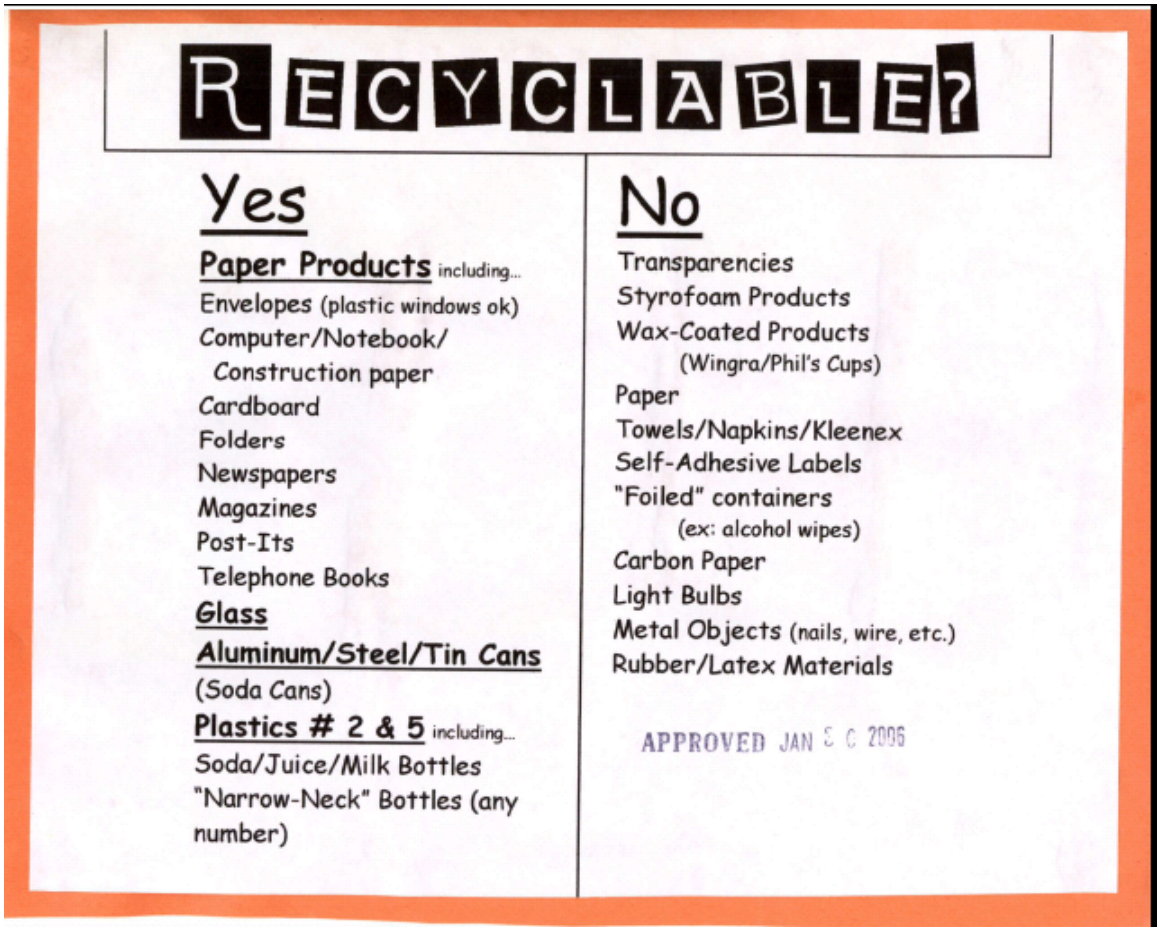
Appendix 2 (Labels)

Recyclable Items

Appendix 2 (Labels)

Waste

Appendix 3 (List of Recyclable and Non-Recyclable Items)



RECYCLABLE?

Yes

Paper Products including...
Envelopes (plastic windows ok)
Computer/Notebook/
Construction paper
Cardboard
Folders
Newspapers
Magazines
Post-Its
Telephone Books

Glass

Aluminum/Steel/Tin Cans
(Soda Cans)

Plastics # 2 & 5 including...
Soda/Juice/Milk Bottles
"Narrow-Neck" Bottles (any number)

No

Transparencies
Styrofoam Products
Wax-Coated Products
(Wingra/Phil's Cups)
Paper
Towels/Napkins/Kleenex
Self-Adhesive Labels
"Foiled" containers
(ex: alcohol wipes)
Carbon Paper
Light Bulbs
Metal Objects (nails, wire, etc.)
Rubber/Latex Materials

APPROVED JAN [illegible] 2006

Appendix 4 (Fun Facts)

Five Good Reasons to Recycle:

1. **Recycling conserves our valuable *natural resources*.**
2. **Recycling saves *energy*.**
3. **Recycling saves *clean air* and *clean water*.**
4. **Recycling saves *landfill space*.**
5. **Recycling can save *money* and create *jobs*.**

DID YOU KNOW…

Each *ton* of recycled paper can *Save* 17 trees, 380 gallons of oil, 3 cubic yards of landfill space, 4,000 Kilowatts of energy and 7,000 gallons of water?!

DID YOU KNOW…

Americans use *more than* 67 Million tons of paper per year, or about 580 pounds *per person*?!

DID YOU KNOW…

Every Sunday, Americans *waste* 90 percent of *recyclable* newspapers? This *wastes* 500,000 trees!

DID YOU KNOW…

Making recycled paper *instead* of new paper uses 64 percent *less* energy and uses 58 percent *less* water?!

DID YOU KNOW…

Paper products make up the *Largest* part (approximately 40 percent) of our trash?!

Appendix 5 (Procedure)

1. Select buildings on Edgewood campus to be sampled.

2. Select two classrooms at random from the chosen buildings on campus.

3. In each classroom collect items from the recycling and waste bins, making sure to keep each bin and each classroom in separate bags.

4. Sort items in each individual bag.

    A. Place tub on scale, zero out.
    B. Place all items from bag in the tub.
    C. Weigh items and record the weight in kg.
    D. Count the total number of items in the bin and record the number.
    E. Separate recyclable items from waste items.
    F. Count the number of items in each category and record number of items.
    G. Weigh the recyclable items and record the weight.
    H. Subtract the mass of the recyclable items from the total weight. The resulting number is the weight of the waste items. Record this number.