Section III: Results

Gamification Strategy Survey

98 participants, ages 13+, responded to the Gamification Strategy survey. The respondents' preferences for gamification strategies are outlined in Figure 1. The scores were calculated by assigning a numerical value to each of the possible survey responses.
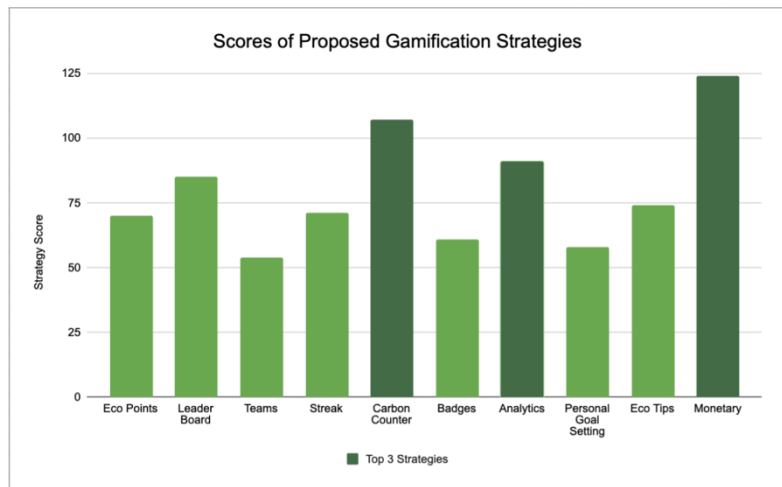

Figure 1: Bar graph depicting the strategy score for each gamification strategy included in the survey. The three highest scoring strategies are marked in dark green.

The response options and their corresponding values are as follows: Strongly Disagree (-2), Disagree (-1). No Impact (0), Agree (1), Agree Strongly (2). The scores were summed for all gamification strategies. No significance tests were performed on the survey data.

Inhouse Testing

Local Participants

For each week, participants were given a quantity score. This score was the total number of items that they recycled in the week. Additionally, they received a quality score. The quality score was the percent of the recyclables that were clean, correctly separated, and recyclable.

Figure 2: Bar graph depicting the quality scores of Local participants. The week 1 quality scores are shown in light green, and the week 2 scores are shown in dark green. On average Local participants scored 16.4% higher while using Carbon Crush.

Figure 2 shows the Local participants' quality scores before and after the introduction on the app.

On average, participants' quality score for week 2 was 16.4% higher than their quality score for week 1. This increase in quality is significant at the ***p<0.005 level.

Local participants were given a quantity score which represented the total number of products they recycled during the week. Figure 3 shows the Local Participants quantity scores before and after the introduction of the app. One average, the participants' quantity score was 19.8 points higher in the second week than the first.

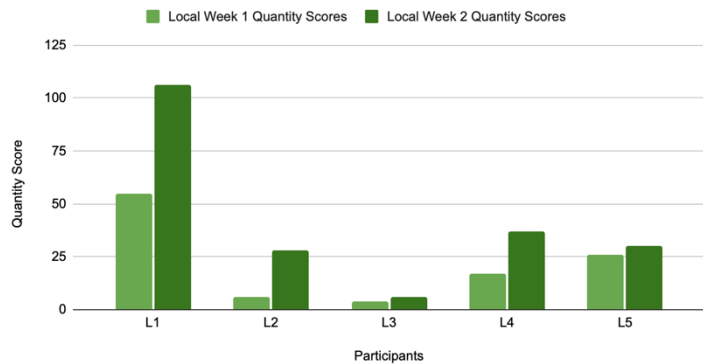Figure 3: Comparison of Local Quantity Scores Before and After the Use of Carbon Crush

Figure 3: Bar graph depicting the quantity scores of Local participants. The week 1 quantity scores are shown in light green, and the week 2 scores are shown in dark green. On average, Local participants produced 19.8 more recyclables in a week while using Carbon Crush.

Remote Participants.

Remote Participants were given quality and quantity scores in the same fashion. Figures 4 and 5 show the remote participants' quality and quantity scores for the two testing weeks. On average, the Remote participants quality score increased by 6.17% and their quantity score decreased by 3 points between the two weeks of testing.

Figure 4: Comparison of Remote Quality Scores before and After the Use of Carbon Crush
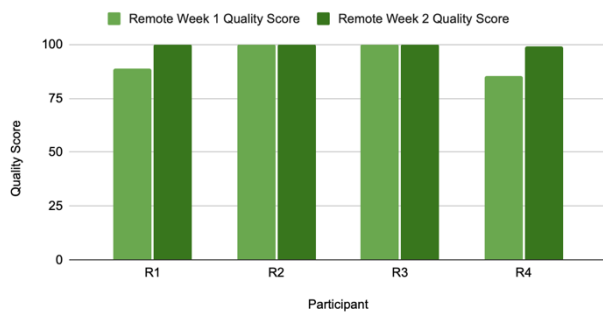
Figure 4: Bar graph depicting the quality scores of Remote participants. The week 1 quality scores are shown in light green, and the week 2 scores are shown in dark green. . On average Remote participants scored 6.2% higher while using Carbon Crush.

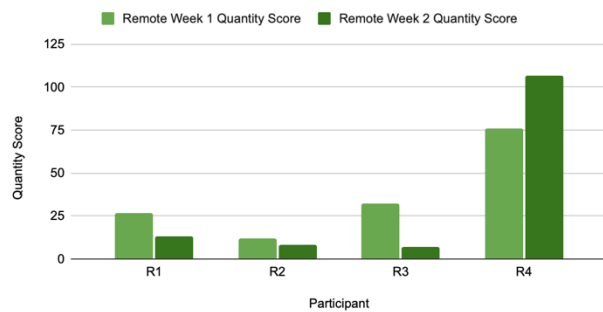Figure 5: Comparison of Remote Quantity Scores before and After the Use of Carbon Crush

Figure 5: Bar graph depicting the quantity scores of Remote participants. The week 1 quantity scores are shown in light green, and the week 2 scores are shown in dark green. On average, Remote participants produced 3 fewer recyclables in a week while using Carbon Crush.

Non-Recycling Senior Citizen Participants

Senior Citizen Participants were given quality and quantity scores in the same fashion. Table 1 shows the senior citizen participants' quality and quantity scores for the two testing weeks. On average, the Senior Citizens' quality score increased by 91 points.

Table 1: Comparison of Non-Recycling Senior Citizen Quantity and Quality Scores Before and After the Use of Carbon Crush

This Table 1 depicts the Non-Recycling Senior Citizens' quantity and quality scores before the use of Carbon Crush. The quality scores are marked as NA for week 1 because the participants did not produce any recycling to be analyzed. The Non-Recycling Senior Citizen's average quality score for week 2 was 96.8%.

Participant	Quantity Score	Quality Score
S1: Week 1	0	NA
S1: Week 2	77	97.40
S2: Week 1	0	NA
S2: Week 2	105	96.19

Recycling Knowledge, Motivation, and Belief in Impact of Recycling

By comparing the reported recycling knowledge, motivation to recycle, and belief in the impact of recycling before and after the implementation of Carbon Crush an increase of at least 20% can be observed in all target areas (Figure 6). Additionally, 90.9% of all participants reported some

Figure 6: Average Change in Participants' Recycling Knowledge, Motivation, and Impact Belief

■ Pre-Survey ■ Post-Survey

Knowledge +25%	Motivation +21%	Impact Belief +20%
3.64 → 4.55	4.27 → 5.18	4.18 → 5.00

Figure 6: Bar graph depicting the increase in each of the user's target areas (Obj 1c). Participants ranked themselves in each area on a scale of 1-6. The results in this figure represent individuals in all testing groups.

increase in motivation and 100% of participants reported some increase in knowledge of the impact of recycling.

Preferred Gamification Strategy

In the post-survey, participants were asked to rank how strongly they agreed that

gamification strategies (Quests, Carbon Counter, and Stats) increased their motivation to recycle and overcome barriers to recycling. The scores for these strategies were calculated in the same fashion as it was for Figure 1,

Figure 7: Participant Reported Most Impactful Gamification Feature

Monetary Incentive
9.1%
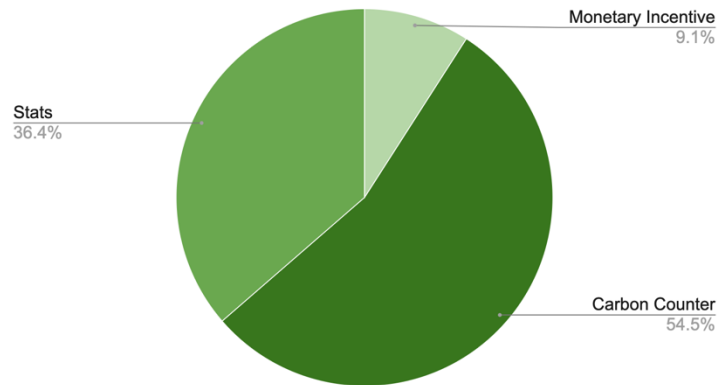
Stats
36.4%

Carbon Counter
54.5%

Figure 7: Pie chart depicting the breakup of preferred gamification strategies of all participants as reported in the post-survey.

where each survey response was assigned a numerical value ranging from -2 to 2, and the scores

for each strategy were summed. Figure 7 shows the total score for each gamification strategy

calculated from the responses of all participants.