

TEACHING BRIEFS... Goodwill Tours

by Chuck Biehl

A radio commercial advertised that Goodwill Industries of Delaware had just opened a new collection center in the Wilmington area. The people in the commercial were trying to figure out how the new center would affect where they could drop off their goods for donation. Although the "mathematics" used in the commercial consisted of meaningless jargon and formulas typical of the media's portrayal of mathematics, the situation did lead to a Traveling Salesperson Problem (TSP) that evolved into a project for my consumer math class -- find the shortest circuit of the collection centers, beginning and ending at the downtown office.

The project was to take a map of the metropolitan area [see map below] and locate the total of eight Goodwill collection centers, including the central collection office downtown. (The director of Goodwill Industries provided the class with brochures listing all the locations and a tape of the radio commercial.) Using the map's scale, the students generated mileage charts showing the actual driving distance (not straight line distance) from any one center to all others. Using calculators and algorithms discussed prior to the project (nearest neighbor and cheapest link) the groups competed to find the shortest circuit. The final step was to take the results and use them to write directions for the driver, which turned

out to be the hardest part!

In completing this project, the students used a wide variety of concepts and skills, including: measuring, map-reading, modeling (a graph was used based on the street map), estimation, rounding (distances were to be to the nearest tenth of a mile), making and reading tables, TSP algorithms, and writing. The cooperative learning environment was very effective in the sharing of the large tasks like generating the distance charts and directions from place to place, and the competitive nature of the final product kept class members actively engaged.

The most interesting aspect of the project was the follow-up discussion, in which the strengths and weaknesses of each model were examined. Although the ultimate solution could be useful to Goodwill Industries of Delaware, the students observed that it was impossible to account for factors such as time of day for collections, traffic patterns, construction along the route, and imbalance in the quantities of goods collected at each center. Generally speaking, however, the project was a great success, especially because the students felt that they had been able to use mathematics in a real situation that could have a positive impact on an organization which was helping the community.

