Assignment 1: Mini Case for Inquiry Based Teaching

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Narrative

When people consider buying a car to save money, many factors are often overlooked. Often, they assume that the only factor to consider is fuel economy. That is, the number of miles a car can travel per gallon of gasoline. Perhaps this faulty assumption is driven by an overwhelming inundation of automotive advertisements claiming cost savings by better mileage. To experienced consumers the impact of these claims is minimal. To a less experienced consumer of cars, these claims are quite appealing. In order to ensure a more informed auto purchase we have designed instruction to correct the commonly held faulty assumption that cars that achieve a great fuel economy save money. Instead we propose that as a learning goal the following rule is taught.

Rule: Better gas mileage does not necessarily save money. A newer car costs more than an older car.

Mental Model: If my vehicle got better gas mileage I would save money. This faulty perception is reinforced every time the vehicle is filled up with gas. A new car gets better gas mileage so it costs less. An assumption is made that a person can save money by buying a newer vehicle.

Unidentified Factors: Many other factors must be accounted for beyond cost of fuel when determining the Total Cost of Ownership (TCO) among which are the cost of maintenance, insurance, and vehicle cost. Unlike filling up with gas, expenses for purchasing a vehicle, maintenance and insurance occur less frequently and may be overlooked when considering TCO.

Mini-case: Parents handed down the family car to their 16 year old daughter. The eleven year old vehicle is reliable, in good condition, but gets terrible case mileage; about 13 MPG. They told her she can have the car but she is responsible for ongoing expenses. These expenses include gas, maintenance, and insurance.

She believes she can save money by buying a newer vehicle that gets better gas mileage. In addition, newer cars typically require less maintenance than older cars.

> **Daughter:** It cost over $100 to fill up my car.
> **Parents:** Your car has a big tank so you can drive a long time between filling it up.
> **Daughter:** I would save money if I traded in my car for a car with better gas mileage.
> **Parents:** How much would you save?
> **Daughter:** I drive 500 miles a month. I spend $135/mo on gas for my car. If my car got 50 MPG, I would only spend $35/mo. I would save $100/mo!
> **Parents:** Could you buy a new car for $100/mo?
> **Daughter:** Probably not. But I would save money on oil changes and maintenance.
> **Parents:** This is true, but at 500 miles per month, you only need to change the oil every 10 months. We don't know of any repairs the car needs at this time.

The dialogue could continue to indicate that auto insurance for a newer car is more expensive than an older car.

Instructional Strategies

1. Tracing Consequences to a Contradiction

a. This strategy will teach the learner to correct misconceptions by tracing the consequences of certain decisions. In this mini case, for example, she needs to compare all the costs of driving the newer vehicle and the older vehicle which includes insurance costs, gas costs, and gas mileage and determine the effect of the two choices. By allowing the learner to follow the faulty rules to their logical conclusion, she should realize the flaw and recognize that driving the older vehicle really does cost less than the new vehicle, even though the newer vehicle gets better gas mileage.

2. Varying Cases Systematically

   a. This will help the learner analyze the costs of driving a newer vehicle compared to an older vehicle using varying cases. Specifically, how much does gas cost to drive a newer vehicle compared to an older vehicle? What is the difference in the cost the gas mileage? The student will be exposed to scenarios where they need to calculate the costs for a new vehicle versus an older one to compare the cost. The cases presented will vary by only one variable other than gas mileage (purchase price, maintenance cost etc.). By varying the cases by only one variable, learner will have a clear representation of the impact of that variable towards TCO.

3. Evaluating Hypotheses

   a. This will test their questions. Based on the previous strategies and cases, the learner determines answers to the question about whether or not it costs more to drive a new vehicle compared to an older vehicle. If they start with a hypothesis that cars which achieve greater miles per gallon save money, they can attempt to disprove this by finding exceptions. If they are able to find cases where their hypothesis is disproved, they can weigh the merit of their hypotheses compared to others.

Since there are a number of incorrect mental models in this case, we will use dialogue control structure to determine an agenda for which errors or omissions to correct first, second, and so on. For example, if the student does not identify all the dependent variables (error), her evaluation will be incomplete. Our instructional strategy includes questioning the student about costs to determine the level of understanding. The instruction could be expanded to include subgoals to correct the error, for example, that the student did not think about insurance costs.