Classroom

EXPERNOMICS

Using Student Data to Teach Utility Maximizing Behavior

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Introduction

The vast majority of the students enrolled in principles of microeconomics are not economics majors, and therefore generally have limited concern with, and/or aptitude for, microeconomic analysis. It is a monumental challenge to stimulate interest amongst these students. Utilizing classroom experiments that provide hands-on exposure to economic principles can do just that. These experimental techniques can improve both attention and performance in principles classes. In addition, such innovative, interesting techniques can enhance the recruitment of economics majors both to sustain our discipline, and to increase the analytical skills of college students. Bergstrom and Miller (2000) recently published an entire book of experiments related to most other topics from micro-economics.[1] However, we are not aware of any utility maximization experiments currently in the literature. Consequently, we outline one here that has proven extremely successful in our classes over the last few semesters.

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[1] The use of classroom experiments in economics actually dates back to Chamberlin (1948), with additional early examples in the literature by Smith (1962) and Joseph (1965).

The Monetary Value of Time

The primary goal of this experiment is to introduce students to the utility maximizing rule and to convince them that whether individuals know anything about economic principles or not they will act to maximize their utility subject to constraints in each of their purchases or activities. As all authors dating back to Chamberlin (1948) imply, the lecture material regarding any topic should follow an experiment so that the students see that the expected outcomes occur even without any prior knowledge of what theory implies. As an outgrowth of the results of the experiment, the theory flows more effectively both by interrelating cardinal and ordinal utility concepts and by defining those terms.

The Theory

The theory associated with maximizing utility subject to budget constraints is fundamental in microeconomic theory. Whether your students are advanced enough in principles or intermediate microeconomics to show them the calculus involved in the derivation of the utility maximizing rule, or you simply state it without mathematical development, the ratio of the marginal utilities per dollar of the last units of all goods purchased are implied to be equal at the point that the budget is exhausted ($MU_a/P_a = MU_b/P_b = \ldots = MU_n/P_n$). The customary treatment in principles texts seeks to verify this rule by providing cardinal marginal utilities for anywhere from two to five goods, constant prices for those goods, and a budget constraint. The students note at the end of the process that the marginal utilities per dollar are equal for each of the goods purchased, presumably confirming that utility is maximized at this level. However, in the forty-five years that we have been teaching microeconomics, we agree that students routinely infer that the problem is rigged, and they do not believe that the outcome verifies anything useful. Informal queries of students in the last few years have confirmed this perspective.

Although we continue to suggest that students work problems like this in preparation for an exam on this material, we no longer introduce cardinal utility maximization using this type of problem. Rather, we allow the students to interject their own data to confirm the reasonableness of the utility maximizing rule using cardinal measures of the value of time.

The Methodology

After completing the course material concerning elasticity, and a very brief introduction to what utility is and that it can be evaluated using both cardinal and ordinal analysis, we distribute the attached two page document (Table 1 and the Time Usage List). It is best if a brief explanation of the document occurs at the completion of a class period, and then the students leave to embark on their task. You should instruct the students that they need to keep track of the activities they engage in for a specific time period. We have found for classroom purposes that you can achieve pretty accurate record keeping for up to about ten activities, and that this is an effective number of endeavors for which to have them calculate their monetary values of time in class. In addition to determining their time used, they also need to record the value they derive from that time. Liberally following van Praag (1991), we tell them to use a scale of –100 to +100 to identify the value they derive from *the average minute* of each activity.[2] They are instructed that –100 should represent the absolute worst moment of their life to this point and +100 the absolute best moment of their life.[3] These numbers are

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[2] We have also employed ranges from 0 to 40 and 0 to 100 to determine whether any alteration in the results occurs. None arise, and we prefer the –100 to +100 because it gives students practice at working with negative numbers.

[3] We have found that it helps for the instructor to think of these end points in his/her own life and tell the students so that they have some frame of reference. We each use the death of our fathers for the worst moment, for example.

designed to be representative of the marginal utilities of the activities.[4]

The last two columns of the handout are designed to make the students think about the activities in which they engage and to focus their thought processes on alternatives. Any time use category that is followed by an asterisk on the Time Usage Topics List is an activity that likely includes a direct expense. You should instruct the students that before they record their marginal utilities for that activity, they should think about what the activity costs. For example, if the activity is category 46, Active Sports, the students should consider what they might pay to engage in that activity prior to determining how much value they derive *from just the time involved*. Similarly, categories followed by a double asterisk are activities they could avoid by paying others to do them. If students consider their maximum willingness to pay to avoid these activities they can focus their assessment of the marginal utilities derived from the time involved or saved more effectively. Understand that these numbers are not directly employed by you or them; but they help the students separate the value of the activity from the value of the time inherent in that event.

More specifically, during your introduction at the end of a class period, instruct the students

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[4] Some may object to this structure arguing that it should be the last minute of an activity instead of the average that the students appraise. However, if one considers the standard textbook example of cardinal utility maximization when the ratios of the marginal utilities per dollar are equal for the *last unit purchased,* which marginal utility do you employ for that last unit? In-other-words, if you get 12 utils per dollar of utility from the fourth and last ice cream cone that you buy (the one at the margin), the 12 utils is the change in total utility derived from the ice cream, not the value from the last lick. If you interject time into the consumption of a good or activity, the change in the total utility from that total activity (any goods or services in the Becker "full" sense) is best reflected in the change in total utility from the average minute.

to as accurately as they can, keep track of what they do, and for how long they do it beginning at 5:00 a.m. of the morning they are to come to class next. When they get to the tenth activity they can stop recording. Any time allocation that involves more than one activity (e.g., watching TV while eating breakfast) should be recorded using a format such as 55,23 in the activity category. First, they should record the activity number(s), then the starting and ending time of the activity. From the latter they should record the number of minutes spent in each task. Then they should record the marginal utilities (although you have not yet referred to them using this terminology) using the –100 to +100 scale after considering, when appropriate, their maximum willingness to pay to avoid the activity or the monetary cost of the activity. Instruct the students that you will help them determine their monetary value of time based on these numbers during the subsequent class period.

At the beginning of the next class, introduce the utility maximizing rule. Impress upon your students that if they know the marginal utilities of two activities and the monetary value or price of one of the two, then they can derive the price or monetary value of the other one (i.e., $P_A = MU_A \times P_B/MU_B$). Therefore, if you can develop a baseline ratio of marginal utility to price for some activity that they engage in, then you can use their estimates of the marginal utility of that activity to determine the monetary value of all of their activities.

To determine the baseline activity, you need to determine an activity that they all engage in regularly. Ideally, this activity should be one that can be effectively reduced to simply time usage, i.e., where no good or service is involved. We have used watching TV (non-network, non-paid to avoid the interference from commercials and the costs of paid programming) and also reading a book they have owned for a while. We have also used the marginal utility derived from the average minute of *their entire work experience*, which is the best measure—but not all students work. Whichever they choose to employ, they need to record either their pay per minute if it is

for work, or their maximum willingness to pay in order to engage in the average minute of reading or watching TV.

Understand that the calculation of these comparables is being completed after they have just estimated marginal utilities for ten or more activities earlier that day. They should have no difficulty identifying the marginal utilities relative to the scale they employed for their actual morning. Likewise, because of the last two columns on the handout, they have likely thought about what activities cost and their maximum willingness to pay.

Once the students have developed these comparables, it becomes elementary to show that the reciprocals of these ratios multiplied by their estimates on the –100 to +100 scale for each specific activity identifies their monetary values per minute for each of their ten activities. Simply multiplying by 60 gives the monetary value per hour, and multiplying by the number of minutes that they actually spent and recorded determines the total monetary value of that activity that morning.

Allocating only about ten minutes for calculations, you can then review the findings for reasonableness. We prefer to ask for ranges on common tasks. For example, since you had them begin at 5 a.m., they probably all started their activity list with night sleep (#25). Ask individual students to reveal their monetary value per hour for sleep, and create a range. Then go on to other likely common activities like meals at home, personal care, commuting to and from education, etc. You will likely be amazed at how consistent the estimates are, and how well they fit common expectations regarding relative values of things like commuting, education, eating, sleeping, etc. Table 2 presents one student's responses using the value of reading or watching TV (r) to calculate the monetary values of time, but also reporting the value of time at work (w). Since the students were instructed to use the value r or w that they thought was most representative, this student believed that the value

derived from watching TV reflected her preferences better.

A couple of cautionary notes, however. Although not one hundred percent consistent, those who use the maximum willingness to pay for TV or reading will likely exhibit lower monetary values of time than those who work. However, this is not without justification. College students generally work at jobs that are beneath their lifetime expected income levels. Thus, they derive estimates that show that their rate of pay is less than their general value of time. We submit that although they are less concrete, the estimates based on reading or TV are better ones for students.

Second, the discussion may extend into areas that may be touchy. Particularly if one or more of the students begin their day with #28 or are still ending their previous day with #42 at 5:00 a.m., the discussion could become somewhat offensive to some. However, in our experience it adds some levity.

The conclusion of this experiment should involve commentary about the utility maximizing rule. Even though the students did not know anything about the rule when they recorded their time uses and values, and very little before they determined their ten monetary values of time, the consistent and realistic results support its validity. All of us, as consumers of goods, services and time, make constrained utility maximization decisions virtually instantaneously multiple times every day. The utility maximizing rule guides this process whether we are aware of it or not, without any knowledge of the economic theory involved.

Conclusions

The goal of any experimental classroom technique in economics should be to involve the students directly in deriving postulated relationships. Preferably, this task should be completed before the students have been introduced to the theory so that it is clear that the results were not biased by *a priori* expectations or knowledge of the process. In addition, the

students are more interested in the outcomes and the interrelationships of the concepts since they are introduced to them through a process that they have participated in directly.

We can almost hear your concern that this takes more time than a traditional lecture on utility theory. However, the experiment took only part of one 50 minute class period to complete, including the post-experiment discussion. We fervently believe that because the students were personally involved in developing the relationships, they more quickly assimilated the implications of the utility concepts, requiring less reinforcement than historically has been necessary. They are also more likely to believe that the utility maximizing rule is valid because it worked for them personally.

Ultimately, because the students were given the opportunity to engage in interactive learning, they became more involved, and were more impressed by the applicability of these basic microeconomic concepts. We recommend that professors try this experiment, as well as Holt's classic supply and demand experiment and several others that have been outlined elsewhere (e.g., Wells (1991), Holt and Davis (1993), and Williams and Walker (1993)), and many others available at this site.

Economists face a daunting task. The students in college classes are increasingly less analytical. Further, students are more accustomed to interactive activities as the result of video games, interactive television, and computer software. Classroom presentations need to correct the former, and adapt to the latter. This experiment, and classroom experiments in general, can be effective tools for preparing students to be more productive workers. Such techniques may even motivate more students to recognize the extensive benefits to economics education. Experimental techniques require extra planning, and may limit the coverage of certain material. However, the rewards of having more motivated students, and more analytical ones, should encourage any instructor.

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Table 1: Template for The Experiment

Start time	End time	Activity Number	Minutes Spent	Utility per avg min #(–100—+100)	Pay Others	Direct Expense
5:00 am						

Table 2: Monetary Value of Time Example

Start time	End time	Activity Number	Minutes Spent	Utility per avg min #(–100—+100)	Pay Other	Direct Expense	Monetary Value (r)
5:00 am	11:30 am	25	390	25			$6.32
11:30 am	12:30 pm	30	60	15			$3.79
12:45 pm	1:15 pm	23	30	20			$5.05
1:15 pm	2:00 pm	21	45	30			$7.57
2:00 pm	2:45 pm	30	45	25			$6.32
2:45 pm	5:00 pm	20	135	35		$45.00	$8.84
5:00 pm	5:45 pm	21	45	30			$7.57
5:45 pm	6:00 pm	17	45	30			$7.57
6:00 pm	6:30 pm	23	30	27			$6.82
6:30 pm	11:30 pm	41	300	32			$8.08

$r = 38/.16 = 237.5$ $w = 21/.12 = 175$

TIME USAGE TOPICS LIST

Work
1. Spent actually working
2. Meals at work*
3. Employer granted breaks
4. Leisure at work (time on the job conducting personal business or otherwise not working)
5. Smoozing

Travel for work
6. Travel to work*
7. Travel from work*

Household Work
8. Food preparation**
9. Meal cleanup**
10. Cleaning house**
11. Outdoor cleaning**
12. Clothes care**
13. Repairs**
14. Plant/animal care**
15. Child care**
16. Other household work**

Shopping and Services
17. Obtaining Goods*
18. Obtaining Services (banking, insurance, cleaners, legal services, etc.)*
19. Medical appointments*
20. Errands*
21. Travel to and from shopping and services*

Personal and Family Needs
22. Personal Needs and Care
23. Meals at home*
24. Meals out*
25. Night sleep
26. Time awake, trying to go to sleep
27. Naps/day sleep
28. Sex

Education
29. Education and Training*
30. Homework
31. Travel to and from education*

Organizational Activities
32. Professional/union*
33. Political/civic*
34. Volunteer/helping*
35. Religious groups*
36. Religious practice*
37. Other organizations*
38. Travel to and from organizational activities*

Entertainment/Social Activities
39. Sports events*
40. Entertainment events (movies, theater, museums)*
41. Visiting*
42. Parties*
43. Bars, lounges*
44. Other social*
45. Travel to and from entertainment activities*

Recreation
46. Active sports*
47. Hobbies*
48. Domestic crafts*
49. Art*
50. Music/drama/dance*
51. Games*
52. Computer use/other*
53. Travel to and from recreational activities*

Communication
54. Listening to the Radio*
55. Watching TV*
56. Listening to CDs/Records/tapes*
57. Reading books, magazines, or newspapers*
58. Conversations
59. Writing*
60. Thinking and relaxing
61. Keeping track of your time

*   -   may require direct expenses
** -   may be possible to pay another to do

SOURCE: Americans' Use of Time Project

'Low Cost' vs. 'Best Value': Sealed-Bid, First-Price Auction Experiments with Department of Defense Contract Specialists

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Many of the articles in *Classroom Expernomics* report the results of experiments in classroom settings. In most cases, typical participants are traditional undergraduate students where the purpose of the experiment is to enhance their understanding of an economic idea. While they may be motivated in the experiment by a prize offered by the instructor or because they value winning, we hope they are also motivated by the desire to learn. This latter objective may be enhanced if students have a direct attachment to the context of the experiment other than simply being registered for the class.

Our experiment was part of a repeated business seminar series offered by the Stetson School of Business and Economics of Mercer University to contract specialists of the Department of Defense working at a large local military base. The overall program is comprised of ten modules designed to provide general knowledge of the accounting, economics, finance, marketing and management aspects of business. Each module is taught by a Ph.D. qualified instructor in the relevant field. One module of the series is a four hour section of economics.

The primary function of a contract specialist is to provide procurement services for weapon systems, communication networks, and related equipment. The position requires a comprehensive knowledge of business practices and market conditions so contractor performance can be evaluated. It also requires the ability to negotiate prices and other terms of contracts. Contract specialists have a minimum of a bachelor degree and were in the top ten percent of their academic class. Degree fields vary widely and include liberal arts, education, engineering, and to a rather limited extent, business. In recent years, the role of the contract specialist has been changing. Contract specialists now provide advice on what and how to purchase equipment. In general, the position has expanded to assume the role of a business advisor. Thus, an enhanced understanding of internal business functions and the general business operating environment has become critical for job success.

In addition to the changing role of contract specialist, the awarding of contracts has also changed. Traditionally, contracts have been awarded by 'low bid'. Now, contracts are awarded by 'best value'. However, the meaning of the latter concept is not really defined or clearly understood by contract specialists. The contract specialists wanted the economics module to help them understand the differences between the two approaches of awarding contracts while acknowledging monopsony power on the part of the government and a limited number of bidders on most contracts.

To begin the economics section, the nature of the competitive market was presented. It was stressed that, in this setting, there should be no difference between 'low bid' and 'best value' as seen in the long run equality between price, marginal revenue, marginal costs, and minimum average total costs. Next, deviations from the competitive market were presented in discussions of monopoly, oligopoly, monopsony, and, finally, bilateral monopoly. Here, the forces separating price from marginal revenue, marginal cost, and average total costs were shown as possibly leading to differences between 'low bid' and 'best value'. Thus, given the general lack of understanding of the meaning of 'best value', the instructor suggested that competition should be promoted in bidding so that a 'low bid' procedure would result in a 'best value' outcome.

At this time, a sealed-bid, first-price auction was introduced. Seminar participants were put into two-person firms (teams). The goal was to sell the instructor one 'inspection flashlight' (represented by a pocket flashlight used by fly fishermen) that will be used to inspect the rivets on the inner cowlings of jet engine intakes. The instructor assumed the role of the monopsony buyer (Department of Defense) who will buy (award the contract) the 'inspection flashlight' from the 'low bid'. To begin, the teams were asked to make a blind selection from a set of

'cost cards' that had been randomly scattered on a table in the front of the room. Each card listed the firm's cost of production of producing one flashlight. Costs ranged from a low of $25 to a high of $37. In addition, two other items on the cards told how these costs change as the result of a coin toss *after* bids had been submitted. Each cost card had positive or negative changes associated with either a head or a tail from the coin toss. The purpose of this item was to introduce uncertainty into the calculation of bids. Each team was told to try to be the low bidder and to make a profit. As motivation, the instructor gave a dollar to each member of the winning team. Ties were broken with rock, paper, scissors.

Several forms of the auction were used. First, a single sealed-bid, first-price auction was used. As expected, the low bid was not necessarily the team with the lowest cost card. Next, the cost cards were redistributed and another sealed-bid, first-price auction was conducted. However, in this instance, the contract was not awarded but the winning bid was announced with neither the winning firm nor their costs identified. Firms were then asked to resubmit their bids if they wished. After about four rounds, the low bid was consistent with the lowest cost firm willing to accept the lowest profit. Finally, the cost cards were redistributed again and another sealed-bid, first-price auction was conducted. In this auction, the firms were told that a positive or negative change associated with a coin toss would occur *after* their bids had been submitted. The low bid would be determined by the actual bid plus or minus the effect of the coin toss. In general, the bids prior to the toss under this format where higher, expected profits were higher, and the lowest cost team was not the low bid team.

Class discussion revealed that participants recognized that repeat auctions tended to move the ultimate outcome toward the competitive solution. This is to say, they saw that repeat auctions could equate the 'low bid' regime with the 'best value' regime. Several class participants indicated repeat bidding might be possible under existing contracting procedures and that they would pursue the matter. Participants also recognized that uncertainty moved the outcome away from competition in that the low bidder was not necessarily awarded the contract. The discussion evolved toward the sources of uncertainty in the bidding process. Participants realized that, while some uncertainty is exogenous to the bidding process, some uncertainty in bidding is endogenous coming from the Department of Defense and, as such, is controllable. If endogenous uncertainty can be limited, then the impact of overall uncertainty would be reduced and the differences between the two bidding procedures would be minimized.

In the end, active involvement in the auction experiment allowed seminar participants to recognize the value of promoting competition. Also, they were able to identify ways competition could be promoted internally. This is to say, they extended the point of the experiment out of the classroom and into the work environment. The participants, through post-auction evaluations, indicated that this simple experiment closely duplicated the work environment and that their role as bidders, rather than as the monopsonist, altered their perspective of some bidding issues. This auction experience with this unique constituency reveals that experiments alter perspectives and may initiate change in actual procurement practices. It is clear that a connection to the context of the experiment by participants enhances learning outcomes from the experiment.

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The Distributive Justice Game

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Before discussing income distribution policies, I have my students play a game based on a thought experiment suggested by philosopher John Rawls. Rawls asks us to imagine that members of a society are completely unaware of their endowments and place in society, a state he calls the "original position." While in such a state, people do not know if they will gain or lose from policies that promote equality. According to Rawls, the social contract that would emerge from this process would be impartial and fair, and therefore ethical.

The Distributive Justice Game asks students to draft a social contract while in a state that roughly mimics Rawls' original position. I begin by limiting the amount of chairs, time, pencils, and textbooks that the class will be able to use during an upcoming extra credit quiz. I announce that I intend to allocate these resources among the students according to such attributes as sex, race, and wealth. I then divide the students into groups and invite them, if they wish, to redistribute these resources among themselves.

There's a catch, though. To give the game a Rawlsian twist, I announce that I will not allocate the quiz-taking resources according to the students' existing attributes; instead, all students will be "reborn" just before the quiz and given new identities. Unsure of whether their new attributes will entitle them to a fair share of the quiz-taking resources, students often strive to redistribute them as equally as possible, even at the expense of efficiency.

Time required

About 45 minutes, not counting the follow-up discussion. The game can be played over two class periods.

How the game is played

Step 1 (five minutes): Distribute the handout *Allocating Resources for the Quiz* (see Appendix A) to each student. Begin the game by announcing that students can earn extra credit by getting correct answers on a twenty-question multiple-choice quiz. Explain that you will give the class a limited amount of time, textbooks, chairs, and pencils to use during the quiz. Since not enough of these resources will be available for everyone to take the quiz comfortably, say that you will allocate them as follows: Males will get to sit in chairs, females will have to sit on the floor. Anglo students will get fifteen minutes each to take the quiz, Hispanic students will get ten, and African-American students will get five. The wealthiest students will be able to consult their textbooks; the poorest students will need to "buy" pencils from you for twenty quiz-taking minutes each.

Explain that this allocation can be changed—students will have an opportunity to redistribute the time, chairs, and textbooks among themselves. However, warn that all students will be "reborn" just prior to the quiz, and that you will randomly assign them new identities.

Step 2 (twenty minutes): Divide the students as evenly as possible into groups of about ten. Have each group select a group name and elect a chair. Give the groups about twenty minutes to redistribute (if they wish) the quiz-taking resources. Have each group draft a "social contract" describing any redistribution of resources from the proposed allocation.

Step 3 (ten minutes): Have students in each group draw slips of paper which give them new identities (see Appendix B). Have them note on their handout how they will take the quiz given their new attributes and their group's social contract. Collect the handouts and write on the board the different amounts of time that students have to take the quiz (e.g., 8 minutes, 9.5 minutes).

Step 4 (ten minutes): Distribute the quizzes face down. Instruct students to stop work and turn in their quizzes when their allotted times have expired. When everyone is ready, allow them to begin. To help students know when to stop work, make an announcement whenever one of allotted times marked on the board has been depleted.

Typical Results

Ignorant of what their new endowments will be, students often choose to redistribute the resources as equally as possible. They usually end up sharing the textbooks. They often tax time away from the "Anglo" students and give it to "African-American," "Hispanic," and "poor" students. They sometimes opt to have "males" and "females" switch positions halfway through the quiz so as to give everyone an equal shot at the chairs.

Many of their decisions involve some sacrifice of efficiency for equality. Switching chairs, for example, uses up several seconds of precious time. Some groups choose not to allow anyone to use a textbook during the quiz because they cannot find a way to share it equitably. Most notably, groups often sacrifice twenty minutes of time in order to buy a pencil for the "poorest" student, even though each group would probably score more points if that student did not take the quiz at all and gave his or her resources to other members of the group.

Recommended Discussion Topics

The game can be used to launch several interesting class discussions. Suggested topics include the following:

- In what ways does our government promote equality?
- Do you think that our government should work harder or less hard to promote equality? What trade-offs are involved?
- Which do you think is more important—equality of opportunity or equality of income?
- Do you think that knowledge of your endowments and place in society has affected your views about equality?

Conclusion

I have used variations of the Distributive Justice Game in my classes for several years, and it has helped me launch many interesting class discussions about equality and justice, and about how values may be shaped by one's lot in life. My impression is that the game makes students more inclined to accept equality as a legitimate social goal, and leads to richer class discussions about public policies that pit equality against efficiency. Many students have remarked to me that the game has given them valuable insights about their values.

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Appendix A
Handout: Allocating Resources for the Quiz

Name _____

Group Name _____

Resources

Depending on its size, each group will have access to the following resources during the upcoming quiz:

Group Size	Texts	Time (minutes)	Chairs	Pencils
7	1	70	4	6
8	1	80	4	7
9	1	90	5	8
10	1	100	5	9
11	1	110	6	10
12	1	120	6	11
13	1	130	7	12

Rules

The following rules must be followed while taking the quiz:
- Students may not share answers.
- All quizzes must begin at the same time.
- Pencils may not be broken in half, nor may students share pencils.
- Students who finish the quiz before their time is used up may not give their extra time to another student.
- Students may purchase the right to use an additional pencil for 20 quiz-taking minutes.

New Identities

Just before the quiz is passed out, the teacher will *randomly* assign a new identity to each student.   After receiving new identities, each group will be composed as follows, according to its size:

Group Size	Race			Gender		Wealth	
	Anglos	Hispanics	African-Americans	Males	Females	Wealthy	Poor
7	3	1	3	4	3	1	1
8	3	2	3	4	4	1	1
9	4	1	4	5	4	1	1
10	4	2	4	5	5	1	1
11	4	3	4	6	5	1	1
12	5	2	5	6	6	1	1
13	5	3	5	6	7	1	1

Proposed allocation

Unless the students in a group decide otherwise, the resources will be allocated as follows:

- Each "Anglo" student will have 15 minutes to take the quiz; each "Hispanic" student will have 10 minutes, and each "African-American" student will have 5 minutes.
- The chairs will be assigned to the "males"; "females" must sit on the floor.
- The "wealthy" student will get to use his or her text during the quiz.
- In order to take the quiz, the "poor" student will need to buy a pencil from the teacher for 20 quiz-taking minutes.

Each group can change any part of this proposed allocation if a majority votes in favor of an alternative allocation. *Only the proposed allocation can be changed. The resources and rules may not be changed.*

Social Contract

Our group hereby agrees to redistribute resources as follows:

_____ minutes of time:

_____ chairs:

One textbook:

What is your group doing about the "poor" student who must buy a pencil?

Your new identity (circle the characteristics of your new identity)

   Wealthy/Poor/Neither   African-American/Anglo/Hispanic   Male/Female

How will you take the quiz?

   Are you allowed to use your own pencil? Yes/No (If you answered no, are you able to buy a pencil? Yes/No)
   How many minutes will you have to take the quiz? _____
   Can you use a chair? Yes/no/sometimes
   Can you use the text? Yes/no/sometimes

Appendix B
Suggested New Identities

Identities for a group with seven members:
You are an Anglo male.
You are a Hispanic male.
You are a wealthy African-American male.
You are a poor Anglo male.
You are an African-American female.
You are an African-American female.
You are an Anglo female.

For a group of eight, add this:
You are a hispanic female.

For a group of nine, subtract the Hispanic female and add these:
You are an African-American female.
You are an Anglo male.

For a group of ten, add this:
You are a Hispanic female.

For a group of eleven, add this:
You are a Hispanic male.

For a group of twelve, subtract the Hispanic female and add these:
You are an Anglo female.
You are an African-American female.

For a group of thirteen, add this:
You are a Hispanic female.