Student Loans

SUBMITTED BY: Nina Hoe, University of Pennsylvania

SUBJECT(S): Computation

GRADE LEVEL(S): 9, 10, 11, 12

OVERVIEW:

This is a two-part/two-day lesson. Each lesson should take approximately 40-45 minutes. The first lesson begins with students discussing the concept of loans, and then specifically of student loans. Students compute different loan scenarios. Finally, students discuss and reflect on student loans in general.

NBEA STANDARD(S):

- Computation, I. Mathematical Foundations
- Computation, II. Number Relationships and Operations
- Computation, III. Patterns, Functions, and Algebra
- Computation, VI. Problem-Solving Applications

RELATED ARTICLES:

- “Zina Kumok’s Guide to Smart Student-loan Liftoff”
- “When It Comes to Student Loans, It Pays to Finish Your Degree”
- “Two Young Women Share their Struggles and Successes with Student Loan Debt”
- “The Rising Costs of a U.S. College Education”
- “The Ins and Outs of Interest — from a Student Loan Survivor”
- “The College Investment: Will It Pay Off?”
- “Paying for College: Why the Money Issue Is a ‘Big, Big Deal’”
- “10 Truths about Student Loan Debt”

Common Core Standard(s):

- A-SSE.1. Interpret expressions that represent a quantity in terms of its context
- A-CED.1. Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*

Objectives/Purposes: Students will understand the complexity of student loans, how to compute payments with different combinations of loan packages.

Knowledge@Wharton Article: "More Savings, Less Plastic: Consumer Credit after the Crisis"

Other Resources/Materials:

- Calculators
- Computer with Internet to access the US News and World Report website to determine college costs – http://colleges.usnews.rankingsandreviews.com/best-colleges

Activity:

Day 1

1. Whole Class Discussion: (*10 mins*)

Orient students to the idea of borrowing money, loans, and why people do these things.

1. Do you always have enough money to buy what you want to buy?
2. What do you do if want to make a purchase for something you do not have enough money for?
3. What are some examples of things that you, or any consumer, might want to buy and might not have enough money to buy outright?
4. How do people get access to money?
5. What is a loan?
6. What does it mean to loan someone money or to be a lender?
7. What does it mean to receive money from a lender or to be a borrower?
8. What are the incentives for banks or other entities to lend money to borrowers? (i.e. is this ever done for free?)

Use student definitions of a loan to articulate a succinct definition from which students can work.

Example: A **loan** is a type of debt, typically a sum of money that is borrowed and is expected to be paid back (in most cases) with **interest.** A loan involves a lender, who provides the money, and the borrower, who uses the money and then pays it back to the lender over a specified **term** or period of time. The initial amount of loaned from the lender to the borrower is the **principal**.

Banks or other entities DO NOT usually lend money for free. They charge **interest** on **loans**, which is how they generate **revenue**, or income.However, different types of loans are structured in different ways with different interest rates and payment plans. Generally, there are two types of loans – **secured** and **unsecured**. **Secured loans** mean that there is some sort of security for the lender, or collateral, in case the borrower does not pay the loan back. Examples of this are home loans or car loans, whereby if the borrower **defaults**, or fails to make appropriate payments, the lender could take the home or car and resell it to recover the money lent. There are also **unsecured loans**, where there is no collateral for the lender, so if the borrower fails to pay the loan or declares bankruptcy, then the lender may loose the money all together. Examples of this are credit card loans or personal loans. Generally, interest rates are *higher* for *unsecured loans* and *lower* for *secured loans*. Additionally, the **term**, or amount of time, the borrower will take to pay back the loan has an effect on the interest rate. Generally, *shorter term* loans will have *lower interest rates* than loans with *longer terms*. Also, a persons **credit rating**, may determine the interest rate s/he gets. A **credit rating** is an estimate of the ability of a person or organization to fulfill their financial commitments, based on previous dealings (i.e. do you have a history of not paying back loans?).

2. Student Loans (20 mins)

1. How much does going to college cost?
   (Obviously, depends on where you go)
2. What factors affect how much you will pay for a college education?
   (What type of college – community, public, private; location of college and cost of living there; whether you live at home, in dorms or in an apartment)
3. How do people pay for college? What are some of the options of ways to finance this?
   (Help from parents, scholarships, grants, loans, work study)

Student Worksheet

If help from parents, scholarships, grants and work study do not cover the full cost of a student's education, many students take out loans to pay for school.

All information about federal student loans can be found on the Federal Student Aid website.

The *New York Times* Guide to Student Loans is a great resource for understanding loans.

Generally, there are three types of student loans:

- Federal loans made by the government directly
- Federal loans made by banks or other lenders and guaranteed by the government
- Private or alternative loans from banks or other private lenders (these carry no government guarantee)

Federal government loans are the best option but are only available to students attending colleges that participate in these direct loan programs. This is simpler than going through a bank, but all federal loans are a much safer and better option than private loans, as the interest are rates guaranteed and capped by congress.

There are several types of federal loans, which all require at least half-time enrollment:

Loan	Eligibility	Interest Rate	Subsidization	Maximum Amount
Perkins Loans	Students with financial need	5%	subsidized	$20,000
Stafford Loans Dependent Students Independent Students (and dependents whose parents cannot obtain a PLUS loan)	Students with financial need Students ———–	4.5% 6.8% ———– 4.5% 6.8%	subsidized and unsubsidized ———– subsidized and unsubsidized	$31,000 – up to $23,000 subsidized ———– $57,500 – up to $23,000 subsidized
Direct PLUS Loans	Parents of undergraduate	7.9%	unsubsidized	Student's cost of attendance – other

	students			aid received

Beyond federal loans, students can get private loans, and interest rates vary dramatically. Students begin payment on loans up to 12 months after completing a degree, dropping below half-time status, or withdrawing from a degree program and have 10 years to pay them back. For **unsubsidized loans**, interest accrues throughout the student's time in college. Students can choose to pay the interest each month as it accrues, or it can be added to their principal balance at the time of graduation. For **subsidized loans**, the government pays (or **subsidizes**) the interest while the student is in college. Most students end up with a combination of two or more different loans.

3. Small Group/Pair Activity: (20 mins Day 1: problems 1 – 3. Day 2: 43 – 40 mins, problems 4, 5, 8, 9)

Although students should work in small groups or pairs, it may be helpful to start this exercise with students so that get comfortable with the calculations first.

Recall the formula for **simple interest**

$$I = P * r * t$$

where,

- I is the interest owed
- P is the principal amount outstanding
- r is the interest rate
- t is the time in years

Note: to express 1 month in terms of years, divide by 12, so that to calculate the interest over a period of 1 month, t = 1/12

$$A = P(1+\frac{r}{n})^{12t}$$

Recall the general form for **compound interest** (an **exponential growth model**)is the equation: where,

- P is the principal amount, or the original amount of money before any growth occurs
- r is the annual nominal interest rate or the **growth rate** in decimal form

- n is the number of times the interest is compounded per year
- t is the number of years, and A is the new amount

Formula for Interest Compounded Monthly:

$$A = P(1+\frac{r}{n})^{nt}$$

Formula for calculating monthly payments on loans while paying off the loan (similar to mortgage payments):

$$MP = P * \frac{\frac{r}{n}(1+\frac{r}{n})^{nt}}{(1+\frac{r}{n})^{nt}-1}$$

where,

- MP is the monthly payment
- P is the principal amount, or the loan amount
- r is the annual nominal interest rate or the **growth rate** in decimal form
- n is the number of times the interest is compounded per year
- t is the number of years

This is a very complicated formula, but has a lot of similar components to the compound interest formula. It is more complicated because each month, as you make payments, the proportion of the monthly payment that goes towards interest vs. principal changes.

(10 – 15 mins)

Complete the following problems. All problems assume a single dispersement at the beginning of each academic year.

1. For unsubsidized loans that accrue interest while you are attending college, is it better to pay the interest each month or wait until the end of college? Why?
   (Maybe depends – Pay as you go because the unpaid interest starts to accrue interest. But maybe wait until after – you will be able to make more money after you graduate. Might be a better use of resources.)
2. What is the most money you could borrow subsidized by the government?
   ($43,000 – $20,000 Perkins + $23,000 Stafford)

3. A student took out an unsubsidized Stafford loan of $4,000 for each year of college. Each year, the loan accrues interest monthly. This student chose not to pay interest along the way, and so when she graduated, she owed more than the original amount borrowed.
    - How much money does this student borrow in total? ***($16,000)***
    - How much interest will accrue on the first year loan throughout college? ***($5246.32)***
    - How much interest will accrue on the second year loan throughout college? ***($4902.37)***
    - How much interest will accrue on the third year loan throughout college? ***($4580.97)***
    - How much interest will accrue on the fourth year loan throughout college? ***($4280.64)***
    - How much interest will accrue in total while the student is in college? How much will she end up needing to pay the bank back? ***(Pay back $19,010.30. Since only $16,000 was borrowed, this is a total of $3,010.30 in interest, which comes to about 19% the total amount borrowed.)***
    - If this student wanted to make monthly interest payments along the way, how much would he/she need to pay each month? This interest payment will be different for each year (as it is dependent on how much has been borrowed.) ***(Year 1 – $4000 x (.068/12) = $22.67 per month; Year 2 = $45.33 per month; Year 3 = $68 per month; Year 4 = $90.67 per month)***

Day 2

(30 mins)

Where do you want to go to college? Use the US News and World Report website to find out the annual cost for attending this college. Remember this is just the Tuition and Fees and does not include Room and Board.

1. What is the cost of “Tuition and Fees” at this college? (Use the USNAWR website or estimate.)
2. How much do you estimate needing per year for room and board? (For private colleges, it’s approximately $10,000 per year; for public, it’s approximately $7,000; and if you live at home, you may not have to pay anything.)
3. Based on your parents’ contribution and scholarships or grants that might help you pay the cost of your tuition, estimate how much money you may need to borrow per year.

4. How much money will you borrow in total?
5. Which types of loans do you plan to get? Justify your answer.
6. Calculate the amount of money you will owe at graduation if you DO NOT pay interest while in college (that is the total amount you borrowed + the interest that accrued each year). This will require separate calculations (1 for each year of your loan) and some addition, to figure out how you will owe total. See #3 for an example.
7. Do you think you will pay your interest while in college? Why or why not?
8. Most repayment plans allow you 10 years to pay your loan back. Calculate your monthly payments based on your principal owed after graduating. Use your answer to either (d) or (f), depending on if you plan to pay your interest along the way or not.
9. How much will you end up paying for your loan total? (What is the difference between the amount you borrow (d) and the amount you actually have to play back including interest?)
10. Does this seem like a reasonable amount to pay each month? Why or why not?
11. Do these calculations change your thoughts about borrowing more college? Why or why not?

Tying It All Together:

Whole Class Discussion (*15 mins*)

1. Call on a few students to share their calculations. Have them explain:
    - Where they plan to go to college
    - How they arrived at their estimate of how much they will need to borrow
    - Whether they think they will pay interest along the way
    - What their monthly payments will be
    - If the monthly payments seem reasonable/feasible
    - If their ideas about borrowing have changed at all
2. How do you know how much is reasonable to take out in loans?
3. How can you best organize your debt to minimize the amount you pay in interest?
4. Why are there different loan types?
5. What are ways to decrease the amount of interest you pay and thus the time that you are paying the loan?
6. What are other alternatives to taking out student loans?

Practice Outside of the Classroom:

Talk to friends or family members to see how they financed higher education. Did they take out loans? If so, which kinds?