Ways to Be Financial Sufficient Retirement

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Abstract

- Dr. Wang and I joined the "A Course-Based Undergraduate Education Research (CURE)" workshop at Morehouse University that were held from June 11 to June 13, 2022. During the workshop we developed a student research project for our student who learn Mathematics Finance.
- My students are freshman who took course Math 1001 Quantitative Skills. We only have two chapters of saving and Loans. I modified the project so that fits in my student's level. Our textbook only covers three formula: Compounding, Annuity, and payout annuity.

  Compounding Interest: $A = P_0(1 + \frac{r}{n})^{nt}$

  Annuity: $A = \frac{PMT((1+\frac{r}{n})^{nt}-1)}{r/n}$

  Payout Annuity: $P_0 = \frac{PMT(1-(1+\frac{r}{n})^{-nt})}{r/n}$
- Through small group discussion, students have more interaction with classmates and instructor.

Learning Objectives

- This is not working on financial planning as other financial companies that design retirement plan for individual client.
- Students are able to calculate the future values given initial deposit and time of maturity using compounding interest formula.
- Students are able to calculate future values given regular payment.
- Students are able to calculate regular payment given expected future values.
- Students are able to calculate regular payment given loan amount.
- Students are able to calculate expected loan amount if they know the payment they can afford.

Student Activities

1. Small Group discussion about when and how to use formulas that students learned in the classes and how to develop a retirement plan.
2. List all formula from Chapter 6. Explain the purposes of each formula.
3. Find examples that you can use formula from (1) to get solutions
4. Develop your retirement plan that include:
    a. When do you expect to get retired?
    b. How many more years you expect to enjoy your life after retirement?
    c. How much income do you expect to have each month after retirement?
    d. In order to achieve your goal, what amount of funds in your retirement account before your retirement?
    e. What is your investment plan to achieve the financial goal of item (d)?
5. Mathematical calculations are required to support your claims.

Format of your paper

1. Title page: Title, author name; author affiliation.

2. Abstract

3. Introduction: apply item 1, and 2 above to this part in narrative way.

4. Body of your research: Detail research about item 3 and 4

5. Conclusion: Is your plan executable?

6. References

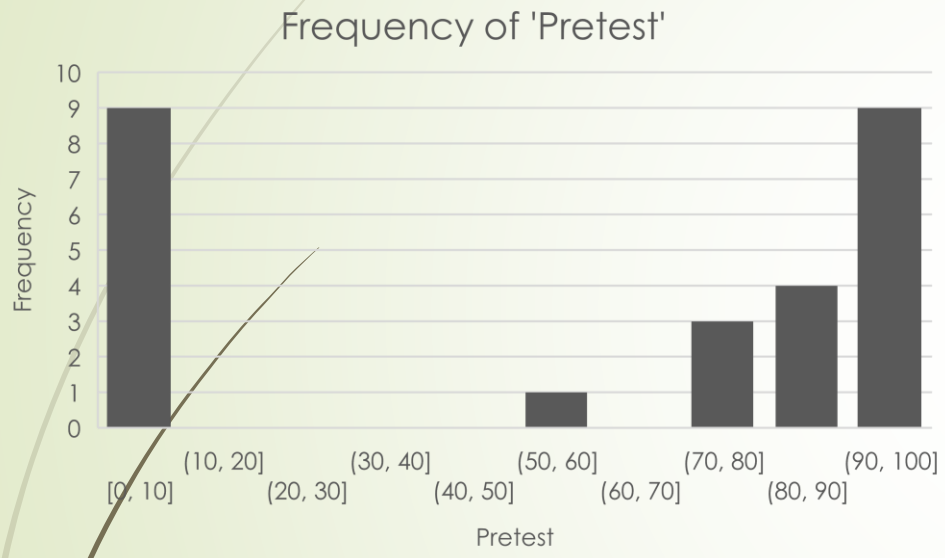
Student's Talk During the discussion Session

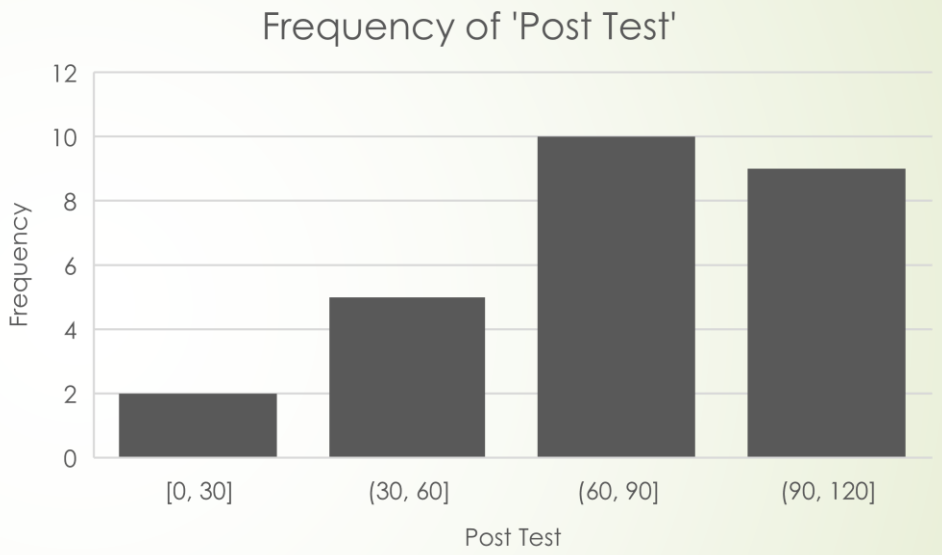
- I over heard some student's talk during the discussion:
  - I will deposit 90% of my income when I have professional job. In such a way I will have enough retirement fund.
  - I like to be a cyber security specialist, so I can make a good income.
  - I expect to have 100 thousands monthly after retirement to enjoy retirement life.
  - I will change my major to computer science and specify in cyber security. I will have better chance to have a high income job to support my retirement plan.
  - My parents will set up trust fund for my retirement. I don't worry about it.
  - ……

Assessment Approach

- I did regular instruction on Chapter 5 and Chapter 6. After they complete assignments, I gave them a test on these two chapters.
- After the test, students work on retirement project.
- I gave them a similar test after student submitted their research project
- Make a comparison between these two tests using paired T-test.

Test Results 1





Comparison Results 2

Pretest	Post Test	Project
0	35.3	0
100	100	92
100	54	95
100	100	0
80	82	0
82	87	90
0	0	75
100	80	85
82	80	0
0	0	0
100	97	80
4	71	80
82	97	95
0	55	0
100	100	95
0	80	95
0	100	85
0	45	0
95	85	80
100	72	85
53	93	0
0	53.3	0
78	100	95
82	73	0
78	90	75
100	100	85
58.30769	74.21538	53.34615
44.23552	28.76524	43.38105

Statistical Results:

Paired T-test: T = 0.013067

Correlation Coefficient between Pretest and posttest = 0.631586

Correlation Coefficient between Pretest and project = 0.358049

Correlation Coefficient between Posttest and project= 0.382998

Conclusion:

- From histogram and Paired T-test p-value, we can conclude that posttest in average is better than pretest.
- However, research project seems has very small relationship with pretest and posttest. This is probably many students did not submit research paper.
- Because the sample is only one class, I am not sure the higher score of posttest is because of students who completed the research project. It is possible because of students study more on the topics. If students can study rigorously in the beginning, they can learn better even without the research project. Research project is to tell students that what they learned in class can be applied to real-world.