Lesson Research Proposal for 3rd Year Foundation Level

Date of lesson: 25/2/19
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Teacher giving lesson: Eoghan Healy
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Lesson plan developed by: Eoghan Healy, Eimear Coholan, Eileen Barrett, Katie O'Donovan

1. **Title of the Lesson: Car savings conundrum**

2. **Brief description of the lesson**
Students act as a financial advisor and must investigate a number of saving plans to advise their client how long it will take to save a car, given a monthly wage.

3. **Research Theme**
As part of our SSE priorities we are focused on assessment and feedback. This includes verbal, non-verbal, AfL, self and peer assessment, with feedback to guide future learning provided in each case. As Math teachers we are interested in providing consistent reassuring feedback to encourage our students.

We are interested in our students developing their communication of mathematical thinking. We want students to realise that number pattern problems can be solved using tables and graphs along with describing the pattern in words. We are also interested in showing our students where math can be useful in their lives.

4. **Background & Rationale**

3rd Year
Ordinary/Foundation

Students regularly struggle with the practicalities of saving, and experience difficulties when translating written word into mathematics. We want students to be able to find a pattern using either a table or graph in order to be able to predict future values of the pattern because this appears throughout the course and relates mathematics to everyday life.

We also acknowledge the often negative attitude of ordinary/foundation level students. By emphasizing frequent in class assessment and encouraging feedback, we aim to build our students' confidence in their own ability.

We have used our individual reflections on our teaching as the main method of research when choosing this topic.

5. **Relationship of the Unit to the Syllabus**

Related prior learning outcomes	Learning outcomes for this unit	Related later learning outcomes

Students will have a basis in:	Students should be able to:	Students should use this knowledge to build to:
1. Working with different types of data (1.4 OL) 2. Select appropriate methods to represent and describe the data (1.6 OL) 3. Formulate questions (1.5 OL) 4. Clarify the problem at hand (1.5 OL) 5. Interpreting and drawing graphs (5.2 OL)	1. Use tables, diagrams and graphs to represent a repeating pattern (4.1 OL) 2. Analyze linear patterns (4.2 OL) 3. Formulate data (4.3 OL) 4. Interpreting (5.2 OL) **Statements of Learning:** 14: Student makes informed financial decisions and develops good consumer skills 16: Students describes illustrates, interprets, predicts and explains patterns and relationships 17: Student devises and evaluates strategies for investigating and solving problems using mathematical knowledge, reasoning and skills **Key Skills:** Managing information and thinking; thinking creatively and critically Communicating; using numbers Managing myself; being able to reflect on my own learning Being literate; Expressing	1. Check a results by considering whether or not it is the correct order of magnitude (3.1 FL) 2. Generate patterns based on sequences of numbers (3.1 OL) 3. Generate arithmetic expressions from repeating patterns (4.1a FL) 4. Examine proportional algebraic relationships (4.1d FL) 5. Solve linear equations in context (4.2 FL) 6. Use graphical methods to find approximate solutions to f(x) = k (5.1 OL)

	ideas clearly and accurately	
	Being Creative; Exploring options and alternatives	
	Working with others; Learning with others	
	Being Numerate; Expressing ideas mathematically, estimating, predicting and calculating. Developing a positive disposition towards investigating reasoning and problem solving. Seeing patterns trends and relationships.	

6. Goals of the Unit

Describe the cognitive or emotional changes within the student. What students need to know or understand in order to…

- Through our non-verbal assessment and encouragement students develop resilience
- After discussion and reflection students will respect different points of view
- Make informed decisions on managing their finances
- Students communicate effectively and confidently
- Through active listening (peer assessment and self assessment) students will learn from each other

7. Unit Plan

Lesson	Brief overview of lessons in unit
1	Research Lesson
2	Saving different portions of wages – Percentages
3	Saving with an initial starting amount
4	Finding the required common difference when given a common difference 2018 Paper 1 Question 1
5	Brief overview of other lesson in unit

8. Goals of the Research Lesson:

Looking at the goals of the research lesson itself from two perspectives:

a. Mathematical goals
   i. Use tables, diagrams and graphs to represent a repeating pattern (4.1 OL)
   ii. Analyze linear patterns (4.2 OL)
   iii. Formulate data (4.3 OL)
   iv. Interpreting functions to represent as graphs (5.2 OL)

b. Key Skills
   i. Managing information and thinking; thinking creatively and critically
   ii. Communicating; using numbers
   iii. Managing myself; being able to reflect on my own learning
   iv. Being literate; Expressing ideas clearly and accurately
   v. Being Creative; Exploring options and alternatives
   vi. Working with others; Learning with others
   vii. Being Numerate; expressing ideas mathematically, estimating, predicting and calculating. Developing a positive disposition towards investigating reasoning and problem solving. Seeing patterns, trends and relationships.
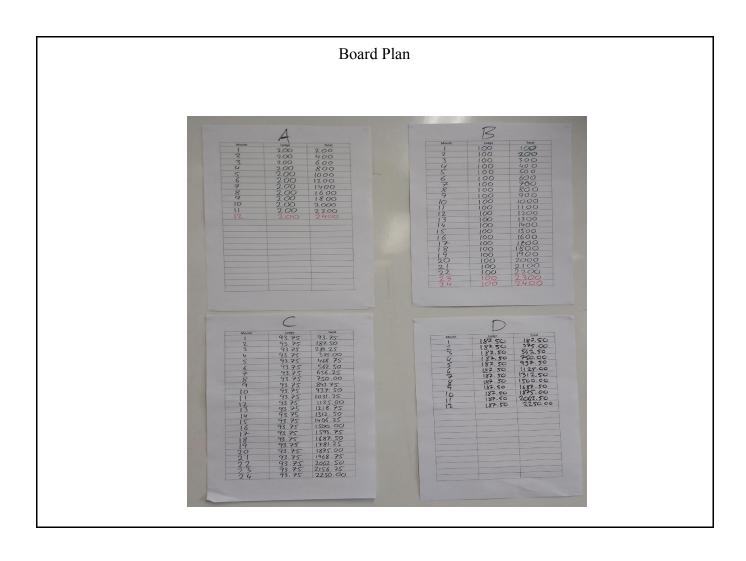
c. Statements of Learning
   i. 14: Student makes informed financial decisions and develops good consumer skills
   ii. 16: Students describes illustrates, interprets, predicts and explains patterns and relationships
   iii. 17: Student devises and evaluates strategies for investigating and solving problems using mathematical knowledge, reasoning and skills
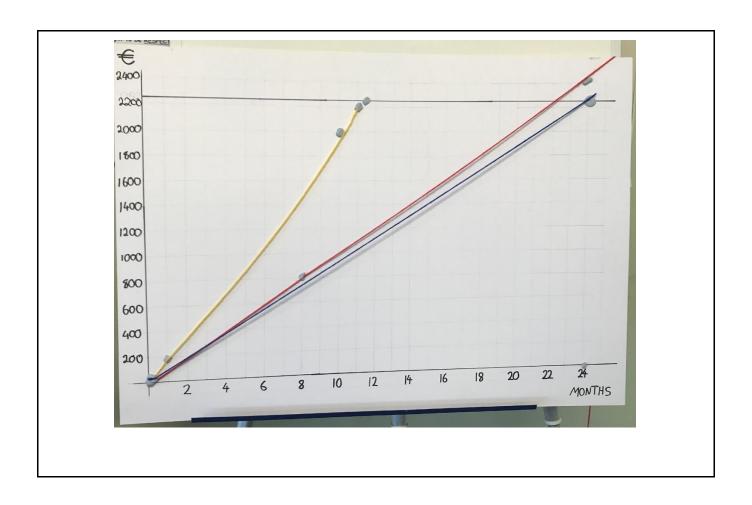
9. Flow of the Research Lesson:

Steps, Learning Activities Teacher's Questions and Expected Student Reactions	Teacher Support	Assessment
Introduction	Teacher hands out the worksheets and reads the problem	Verbal checking for understanding.
Posing the Task	You are a financial advisor. Your client, William, earns €200 every month. William has just turned 16 and would like to buy a car on or before his 18th Birthday. How much should William save each month if the car will cost €2250? Present William with a number of	Do the students understand the task?

	different savings plans that show monthly savings options.	
Student Individual Work	Walking the classroom checking for progress with the two suggested methods. 1. 12*200 = more than enough in 1 year 2. 100*24 = Slightly more than enough 3. 2250/24 = 93.75 = exact in one year 4. 2250/24 = = exact in two years.	Visual assessment with encouragement. Prompt questions: to try an alternative saving amount. Re-read the question Would the client be happy with the solution? If 24*200 occurs, ask them "how much money is actually needed?" "Where in your table does hat occur?"
Ceardaíocht /Comparing and Discussing	For each of the solutions we have one student to explain the method using the table and another student to blue tack the string onto the graph to represent that solution. We will put up our readymade A3 solution at the same time as the student's work is displayed on the projector. *Solution 1: if you kept saving this much, where would you be at 24 months. *Solution 2: do you need to go to 24 months exactly? *Solution 3: How much spending money does that give you? Do you need that much spending money? *Solution 4: Is that enough spending money? Saving for tax/insurance? Repeat with other three solutions.	Peer assessment: Do you agree with the work the student at the board did. Self-assessment: comparing their work to what was explained at the board
Summing up & Reflection	For homework write down how much money you would like to have in pocket money each month, find out how long you need to save to get the car now.	

10. Board Plan

11. Evaluation

Did the consistent assessment and feedback encourage the students to keep working?

We felt that the constant assessment and feedback/encouragement did lead to more work being put in by the students.

Did the lesson help build student confidence?
We are happy that the lesson did meet the goal of engaging the students and appeared to give them confidence in their ability to explain their work, in this class at a minimum.

Did the lesson build students awareness of savings and application to the real world?
The discussion around what would be an appropriate amount to save for a 16 year old wasn't as fruitful as we had hoped. The students didn't seem to agree or know how much money they would need for their own spending per month. More time given to this topic in the next class should help develop this further.

12. Reflection

We noticed that the students appeared to send a lot of the time reading through the task. They may have been nervous to ask questions when the teacher posed the question, due to the large number of extra teachers in the room.

We feel that they seemed quite engaged by trying out different savings plans, some students required more encouragement than others, but that was part of the plan as well. They really got into a good discussion about the different plans during the board work part of the class.

As is always the case we felt that we could have done with more time. Our planned fourth saving option wasn't discussed at all.

As mentioned in the evaluation, the discussion around responsible saving wasn't very deep, with the teacher doing most of the talking before leaving the topic.

The original plan for the string graphs was to only have a start and end point, showing how only two points are needed for a linear function. However, after one of the students made a curve (by not pulling the string tight) the teacher adapted this during the class, to the benefit of the students, and got them to plot a number of points with blu-tack first before attaching the string to each point. This also allowed a great teachable moment where the teacher questioned the student about how much the savings went up by each month and comparing their answer to what the string was telling us.

A fantastic moment occurred when we were discussing alternative savings plans not presented. One student quickly pointed out (unprompted) that €150 a month would give a string in between the €100 and €200 lines.

The micro assessments and feedback given by the teacher during the student work section did seem to really help the students and he commented that they seemed much happier than normal when leaving the class after the lesson.