

Unit Design, Before and After

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Topic and Objectives:

Students will develop and apply a formula for determining the: perimeter of polygons, area of rectangles and the volume of right rectangular prisms (from the grade 6 math curriculum)

Lessons and Activities:

Class discussion on formulas and identification of where and when you would use each one. Model, practice and apply to work:

Math Makes Sense (grade 6) page associated with measuring for perimeter, area and volume paired with Jump math worksheets relating to the same topic (attached – though these are just copies from textbooks/resources....blah!))

Hands on activity – measure and calculate the perimeter and area of our classroom, gym and field. Measure and calculate the volume of our classroom, your desk and the classroom library.

This lesson would probably take place over two days – one to introduce the formulas and model their use. Students would work on the worksheets, completing them for homework if they didn't get them done in class, then the next day we would do some hands on work (or vice versa – hands on work first then worksheets the second day to cement the idea).

Assessments:

Would come in the form of specific questions on a quiz or test to check for understanding and check student ability to apply the formulas provided. Students would be marked right or wrong on each question and be given a mark in the form of a percentage right on the test with a corresponding letter grade.

Critique:

Traditionally in my classroom as part of our measurement unit I would have students spend time working through assigned questions in the textbook, work through questions on the board with them and do some hands on activities with them measuring the perimeter, area and volume of things as outlined above. In this way students would be learning by doing, constructing their own understandings of the subject matter. Most students would be eager to complete the hands on activities and could understand and be able to use the formulas provided, further applying their knowledge when it came to the test. However there are always students who are not engaged when it comes to another worksheet or not interesting in this sort of classroom learning. There are others who are struggling to understand how a formula works and how to accurately put in numbers to determine the area or perimeter of a figure. Still others are just bored in the classroom and want a hands on activity in which they get to share their knowledge. Either way I am not reaching all of my students with this listen to me, apply rote information, prove your learning style of lesson. You know the old adage of how much you learn of something depending on if you see, hear, experience or teach it. Well, I need to change the way I think about this lesson.

This is the part where I admit I've done this before.....not to the detailed extent of what follows, but I first had this 'epiphany' last year when I got an iPod kit to use in my classroom. I challenged myself to try one new thing at a time, changing the activity I would typically do to incorporate technology. This project was one of the first ones that I 'critiqued' and adapted to a new way of doing things. I found great success and had a deeper understanding of my student's knowledge and understandings than I ever had in years past, just by having them present their work to me in this way. However, I have already made improvements to the lesson for this year. For instance: instead of just having students work from the worksheet (provided) to assess their learning, I am excited about the potential of having students measure the area of the gym floor or the field or the volume of the classroom and present their findings in the form of a video journal – explaining the process they went through to measure 'side lengths', choose a formula, calculate and check their work and then explaining when and where they would use this skill in the real world.....an improvement already! So on top of the existing model, I've expanded the project to engage and provide more relevance to this year's class when we complete this activity.

So here it is in a nutshell:

In order to engage all students in relevant, meaningful learning I will bring technology into the classroom in the form of iPods loaded with the SonicPics app. Using this app will allow students to present their learning to me in the form of a presentation instead of a test. By having them create a SonicPics presentation, I can listen to their explanation and reasoning and assess them based on outlined criteria to gain a deeper understanding of where they are at in learning the concept. Presenting it in this way allows me to listen to and understand their thought

processes because they are teaching me how to find the area, perimeter or volume – it's not just me marking a test wondering where they went wrong or what part they didn't understand.

In this respect, I guess the end result – or the assessment of knowledge – would be the factor I have changed. I will still introduce the concept, model how to use the formulas and give opportunities for hands on practice, but instead of a test to check learning at the end of the unit, I will provide a real world example which students can use to explain their method of solving to find the area, perimeter or volume of an object or space. By watching their presentations I will be able to see gaps in their understandings, minor mistakes they made in computation or in the application of a formula and redirect them in order to improve their understandings of the key concepts.

I guess this could be somewhat of an experiment in connectivist type learning as students could also network with each other on our virtual classroom dashboard to help find missing measurements, suggest which formula to use or share their presentations for peer review. More likely it would fall under the realm of constructivist learning, where students build their understandings of a concept through guided, hands on, relevant practice.

For your reference I have attached a few items: 1) the pages out of the textbook and workbook we typically complete; and 2) the worksheet that I created for students to work from when completing their videos for assessment last year (I may still use this as a step in the process towards reaching our end goal).

Stage 1 Desired Results

<p>ESTABLISHED GOALS</p> <p>Develop and apply a formula for determining the:</p> <ul style="list-style-type: none"> -perimeter of polygons -area of rectangles -volume of right rectangular prisms (from the grade 6 math curriculum) <p>Showcase learning through a presentation using technology</p>	Transfer	
	<p><i>Students will be able to independently use their learning to...</i></p> <p>Apply formulas for finding area, perimeter and volume in order to solve real problems in their lives, i.e. how much fencing they will need to enclose a garden, how much carpet they will need to cover a floor or how many of one object will fit inside of another object.</p>	
	Meaning	
	<p>UNDERSTANDINGS</p> <p><i>Students will understand that...</i></p> <ul style="list-style-type: none"> - There are a variety of shapes and objects in our world - These shapes can and often have to be measured in some form or another - There are formulas to find perimeter ($(l \times w) \times 2$), area ($l \times w$) and volume ($l \times w \times h$) and that these formulas can be applied to any measurable object or place - There are real world applications of finding perimeter, area and volume <p><i>Students will also have a workable knowledge of how to operate an iPod, specifically the SonicPics App.</i></p>	<p>ESSENTIAL QUESTIONS</p> <ul style="list-style-type: none"> - In what situations at home or at school would you need to find the area of a shape or space, the perimeter of an object or space or the volume of an object or space? - Is the practice we do in school realistic or relevant to your life? - In what ways can technology help you to find perimeter, area or volume? (is there an app for that??)
	Acquisition	
<p><i>Students will know...</i></p> <p>$p = (l \times w) \times 2$ How to input measurements $a^2 = l \times w$ into formulas to solve for $v^3 = l \times w \times h$ understanding</p>	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> -determining when they need to use each formula -applying a formula to find the perimeter, area or volume of a variety of shapes or objects 	

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
<p>Students will have to measure and compute the area of the gym floor without the one meter perimeter and divide that by the area of a mat to determine how many mats are needed. Student work would be evaluated based on their success in finding how many mats we needed to put out.</p>	<p>PERFORMANCE TASK(S):</p> <p>What if I promised you a movie in the gym, but to earn it you needed to tell me how many mats would be needed to cover the entire area of the floor except for a 1 meter wide walking area around the perimeter of the gym? Could you also figure out the volume of the foam in the mats?? (maybe that would equal some popcorn to go with your movie)</p>
<p>Worksheets will be marked according to a master sheet.</p> <p>Each video will be marked on a scale of 4 using the following criteria:</p> <p>1 – for creating a video in which they work through the question to reach an answer 2- for creating a video in which they identify the measurements and formula being used to find either perimeter, area or volume 3 – for creating a video that specifies what they will be doing (finding perimeter, area or volume), what measurements and which formula they will be using and showing step by step their process of solving the formula. Students must remember to include the units they are using to measure and remember that area is squared and volume is cubed. 4 – for creating a video as outlined in 3 but work is neat, thorough and goes above and beyond normal expectations to explain their process OR student completes a bonus question and successfully applies a new formula in order to find the area of a triangle</p>	<p>OTHER EVIDENCE:</p> <p>Answer a variety of questions (attached worksheet) to evidence understanding and proper application of the noted formulas</p> <p>Using a whiteboard, erasable pens and an iPod (SonicPics app with a minimum of 4 slides each), create a video for each of the following tasks:</p> <ol style="list-style-type: none"> 1) Teach me how you would find the perimeter of an object; 2) Teach me how you would find the area of an object; and 3) Teach me how you would find the volume of an object. <p>In addition students would explain, in a final video, overall learning that they experienced through this project, detailing what worked for them and what they struggled with, how they would change the activity to improve it and where they think this knowledge will be useful to them in their own lives.</p> <p>Students would be able to pre-assess their own videos using the rubric provided and work to improve their videos if they felt they needed to. These video presentations would then be marked by the teacher in place of a typical test on the same topic.</p> <p>Have students (for those finished early or for an extra challenge) find the perimeter of the field or the area of the gym floor or the volume of our classroom and create an additional video on their experiences. (see example learning activity above)</p>

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Learning Activities:

W=prior to completing activities there would be a class discussion on why and where these concepts would be applied and asking questions like: Have you ever (with your parents) painted a room? Built a fence? Put in carpeting? How did you know how much material you needed? I would also spend time discussing the formulas and measurement units to ensure my class understood the how and why of what we were doing.

H =using technology would help to hook these students, as well as saying that this activity was taking the place of a test (perhaps I could give them the option of writing a test, though, if they felt they might do better on one)

E =students would have to have access to an iPod and have prior knowledge of working with SonicPics (or confidence in order to figure out how to use it). They would also need to have the formulas and have had time to practice and work with the formulas in order to gain proficiency

R =rethinking and revising comes into play in the form of student self-assessment prior to handing in their videos

E =I would do a student share so that they could look at examples of student work and judge for themselves what they deemed to be a 1,2,3 or 4

T =for struggling students they might be able to pick one of the three options instead of doing all three, they could be paired with a strong student to work with, they could be allowed to write a test instead or they could explain a concept one on one to the teacher

O =this activity would be done in parts:

- 1) Complete lessons and classwork introducing and working through the concepts of finding perimeter, area and volume for given objects
- 2) Complete the attached assessment worksheet (marked by teacher prior to proceeding)
- 3) Work with a white board and iPod to create and capture slides, record narrative and pull together an instructional video
- 4) Self and peer assess each others work
- 5) Hand in (email or dropbox) for marks
- 6) Go measure in the gym.....transfer and apply! Make a video journal documenting the process for assessment by the teacher.

In order to complete these objectives the following learning activities could also be used to help to cement understandings and transfer knowledge:

- A) Play a role in measuring supplies for holiday gift (shoe) boxes to understand how many items can fit inside each gift box (volume)
- B) Measure the perimeter of our school field and plan for a fitness run of a certain distance based on laps of the field (perimeter)
- C) The gym activity outlined above (perimeter and area)
- D) Find the area of a bulletin board and determine how many posters or pages of a certain size will be able to be displayed there (area)
- E) Students could measure the perimeter and area of their desks and put forth an argument as to whether they needed bigger or smaller workspaces based on the size of their desks as related to the size of their binders and textbooks (area and perimeter)
- F) Students could determine the volume of the inside of their desk to determine how many of another object they could fit inside of their desk (volume).

