

Lesson Plan Session 2

Using technology to present a problem solving activity - practical session

General Aspects:

1. Learning Goals:

To develop an understanding of the opportunities that technology can afford teachers in presenting problem solving activities

To reflect on the appropriate use of technology when teaching and learning problem solving skills

To develop problem solving skills

2. General Strategy:

Working on 4 key problems, alongside discussion of appropriate teaching and learning strategies

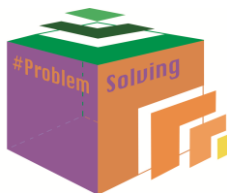
3. Structure:

Lesson segments include: an introduction, 4 key problem solving activities (including, reflection time, individual work, small group work and whole group discussion of strategies), demonstration and discussion segments (including exposition and discussion of key ideas) and a conclusion.

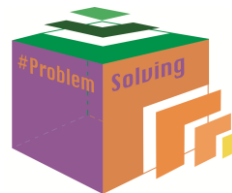
4. Resources:


PowerPoint presentation, sets of black, red, orange, green, blue and yellow cubes, squared paper, scissors, rulers, sticky tape.

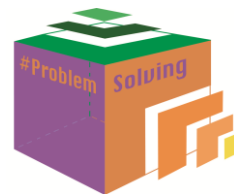
Development of the Lesson:



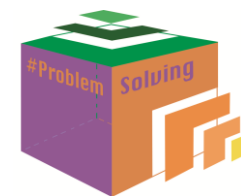
Task and Learning Activities	Expected Duration	Class Activity (potential difficulties)	Instructor Support	Goal and Assessment
<p><i>Introduction</i> Can you solve the bridge riddle? Video: https://www.youtube.com/watch?v=XoXJ4eIP7hk&feature=youtu.be</p>	10 mins	<p>Small groups work to solve the problem.</p> <p>Whole group discussion on using videos to engage students in problem solving</p>	<p>Allow sufficient time for problem to be solved</p> <p>reflection time before discussion of solution</p>	<p><i>Goal</i> To develop an understanding of the opportunities that technology can afford teachers in presenting problem solving activities</p> <p><i>Assessment</i> Peer assessment, group discussion</p>
<p><i>Problem 1 - Nana's Chocolate Milk</i></p> <p>Video: https://vimeo.com/37527166</p>	15 mins	<p>Individuals consider the problem for short time.</p> <p>Small groups work on solving problem</p> <p>Groups to reflect on what steps they have considered and the strategies they have used to solve the problem.</p> <p>Are there alternative approaches that are effective?</p>	<p>Allow for individual reflection</p> <p>Allow for group interactions</p> <p>Facilitate whole group discussion</p>	<p><i>Goal</i> To develop an understanding of the opportunities that technology can afford teachers in presenting problem solving activities</p> <p>To improve problem solving skills</p> <p><i>Assessment</i></p>



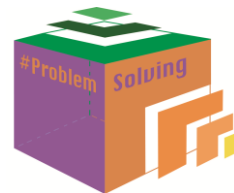
				Peer assessment, group discussion
<p><i>Discussion and activity to demonstrate research into collaboration</i> To collaborate or not...</p> <p>Brainteaser and collaborative activity using cubes</p> <p>Ground rules for students and research into conversations that promote learning</p>	10 mins	Reflect on working individually or as part of a small group	<p>Explanation of research regarding benefits of working in groups to solve problems, conversations that promote learning and how to manage group work effectively</p> <p>Facilitate discussion</p>	<p><i>Goal</i> To reflect on teaching strategies for effective problem solving sessions.</p> <p><i>Assessment</i> Group discussion</p>
<p><i>Problem 2 - Building towers</i></p>  <p>Tracey is building towers of plastic cups.</p> <p>How many cups has she used to build this tower? How did you find out?</p> <p>If Tracey wants to build a tower twice the height, how many cups will she need?</p> <p>If Tracey has 250 cups how tall can she make the tower?</p> <p>Explore how Tracey could build a higher tower with 250 cups.</p>	15 mins	<p>Individuals consider the problem for short time.</p> <p>Small groups work on solving problem</p> <p>Groups to reflect on what steps they have considered and the strategies they have used to solve the problem.</p> <p>Are there alternative approaches that are effective?</p>	<p>Allow for individual reflection</p> <p>Allow for group interactions</p> <p>Facilitate whole group discussion</p>	<p><i>Goal</i> To develop an understanding of the opportunities that technology can afford teachers in presenting problem solving activities</p> <p>To improve problem solving skills</p> <p><i>Assessment</i> Peer assessment, group discussion</p>



<p><i>Problem 3 - Why do penguins huddle?</i> Video: https://www.youtube.com/watch?v=OL7O5O7U4Gs</p> <p>Emperor penguins huddle together to escape wind and conserve warmth. Why is this effective? Use an approximation for height and body diameter (100cm x 50cm) Start by constructing models Use appropriate mathematical methods and present your findings</p>	<p>30 mins</p>	<p>Individuals consider the problem for short time.</p> <p>Small groups work on solving problem</p> <p>Groups to demonstrate using models why penguins huddle.</p> <p>Groups to reflect on what steps they have considered, the maths required and the strategies they have used to solve the problem.</p> <p>Groups to consider alternative student solutions. Are there alternative approaches that are effective?</p> <p>Would GeoGebra help model the situation?</p>	<p>Allow for individual reflection</p> <p>Allow for group interactions</p> <p>Facilitate groups demonstrating why penguins huddle.</p> <p>Facilitate whole group discussion</p>	<p><i>Goal</i> To develop an understanding of the opportunities that technology can afford teachers in presenting problem solving activities</p> <p>To reflect on the appropriate use of technology when teaching and learning problem solving skills</p> <p><i>Assessment</i> Peer assessment, group discussion</p>
<p><i>Discussion - Implications for the classroom</i> The clever crow https://www.youtube.com/watch?v=EZSk7oCNaHg</p> <p>Think of some words or phrases to describe the characteristics of the crow's behaviour as he tries to solve the problems in the video.</p>	<p>10 mins</p>	<p>Whole group discussion on implications of teaching problem solving in technology rich environments</p>	<p>Facilitate discussion on characteristics we want to develop in students</p>	<p><i>Goal</i> To reflect on the implications for teaching and learning problem solving in</p>



Suggestions – confident, systematic, resilient, persevering, checks progress, reviews problem, has a go, considers alternatives, analyses progress, wrestles with the problem, guesses, conjectures.				technology rich environments <i>Assessment</i> group discussion
<p><i>Problem 4 - Old fashioned weighing scales</i></p> <p>Craig is helping his mother in the farm shop to weigh potatoes. He is using scales similar to the picture below. Craig has lost some of the weights. He can only find 3 weights. Craig says this is not a problem. He can still weigh any whole number of kilograms between 1kg and 13kg. What weights does he have? How can he weigh 1kg to 13kg?</p>	20 mins	<p>Individuals consider the problem for short time.</p> <p>Small groups work on solving problem</p> <p>Groups to reflect on what steps they have considered and the strategies they have used to solve the problem.</p> <p>Are there alternative approaches that are effective?</p> <p>Explore sample student responses. Do these demonstrate errors or misconceptions?</p> <p>How might teachers support perseverance with the problem?</p>	<p>Allow for individual reflection</p> <p>Allow for group interactions</p> <p>After 15 minutes, show sample responses from students – facilitate whole group discussion</p>	<p><i>Goal</i></p> <p>To reflect on the appropriate use of technology when teaching and learning problem solving skills</p> <p><i>Assessment</i></p> <p>Peer assessment, group discussion</p>
<p><i>Conclusion</i></p> <p>Final points and allow for questions</p>	5 mins	Group discussion/questions on problems and strategies	Facilitate discussion	<p><i>Goal</i></p> <p>To recap ideas of the day</p>



				<i>Assessment</i> Group discussion
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