

Solutions to Climate Change-Integrative Thinking Activity

Developed by
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Lesson Plan Day 1

<i>Time</i>	<i>Task</i>	<i>Materials</i>
10 min	Set Up and Introduction	
10 min	<p>Define the Models:</p> <p>Students have been given the competing models, but it is important they make explicit, and agree upon, what each actually means:</p> <p>On the top of each sheet of chart paper, write the name of the model i.e. <i>Business as Usual</i> or <i>Everyone on the Bus</i> (it helps to express it as a catchy slogan);</p> <p>Immediately below, the groups are to describe exactly what each model involves. There are no value judgements made at this point; it's simply so that everyone understands what the two models actually involve, so that <i>Business as Usual</i> means: no limit on number of private vehicles on the street; individuals buy, lease or rent their own private automobiles; people pay to license, insure, and maintain their own cars; gas is purchased from privately run gas stations; a certain amount of space is allocated to accommodate parking of cars (in private driveways and garages, parking lots, on streets, &c.). Students do the same thing for model B.</p>	<ul style="list-style-type: none"> • Chart paper - 2 sheets/group • Markers
10 min	<p>Identify the Stakeholders:</p> <p>Students identify 2 or 3 groups of the most important groups common to both models who “matter” in coming up with a new solution. They list them across the chart paper immediately below the definition of the model.</p> <p>It is possible that in real life an individual might fall into multiple groups, but the important thing here is to identify multiple and potentially competing perspectives on the problem. For example: commuters, retail business owners, city government.</p>	
25 min	<p>Specify the Benefits (Pro-Pro Chart):</p> <p>For each group of stakeholders, students identify the benefits and the mechanism by which it is obtained.</p> <p>For example, a <u>Benefit</u> to commuters in <i>Business as Usual</i> might be “freedom of movement” and the <u>How it Works</u> is “individuals have 24-hour on-demand access to their own vehicles: they are not limited by public transit routes and timetables and can go where they want when they want.” If students identify a drawback of one model, they should endeavour to express it as a benefit of the other. For example, one disadvantage of private ownership is the high costs associated with purchasing, licensing, insuring, maintaining, fuelling, parking, &c. “Low Cost to Individual” is then a <u>Benefit</u> of public transit and <u>How it Works</u> is by government</p>	<ul style="list-style-type: none"> • Benefit slips • Masking Tape

	<p>owning everything, purchasing vehicles and services in bulk and spreading costs across all the taxpayers and users.</p> <p>Note that multiple benefits might accrue to different stakeholders from the same mechanism: both “faster commuting times” and “lower road maintenance costs” might be results of having fewer vehicles on the roads, for instance.</p> <p>At a minimum, students should try to come up with three solid benefits and mechanisms per stakeholder per model.</p>	
10 min	<p>Select the Benefits:</p> <p>Looking at the 18 or so benefits they have identified, the students select those they feel must be included in a new solution. That’s not to say that others might not be possible, but the goal here is to settle on the critical needs that must be met by the new model and that could not be met by simply choosing one over the other. There is no magic number here, but obviously the fewer there are, the easier the task of integrating them. Students take the benefit slips of the benefits they’ve selected and place them on a clean sheet of chart paper.</p>	<ul style="list-style-type: none"> • Chart paper
5 min	<p>Reframe the Question:</p> <p>Considering the benefits they’ve selected, students ask “How might we...?” in the context of their challenge. It’s possible to ask “How might we develop a transit plan that includes both freedom and low cost?” but a more interesting framing of the question looks at the mechanisms as well: “How might we develop a transit plan where freedom is obtained through common ownership?”</p> <p>This question will form the basis of the brainstorming in the next class. It’s also possible that students may not settle on a question right at this point and will want to think about it, discuss it, and revise it before day 2.</p>	<ul style="list-style-type: none"> • Chart paper • Markers
5 min	Wrap Up and Clean Up	

Lesson Plan Day 2

<i>Time</i>	<i>Task</i>	<i>Materials</i>
5 min	Set Up and Introduction	
5 min	<p>Regroup on the Reframe:</p> <p>Based on their discussions from day 1 and whatever conversations they may have had in the intervening period, students settle on their reframed question. It may change as they begin developing solutions, but it is important to have a guiding question to brainstorm around.</p>	<ul style="list-style-type: none"> • Chart paper from day 1
10 min	<p>Brainstorm Solutions:</p> <p>Groups begin by writing the question in the centre of a new sheet of chart paper. Then, for a timed 10-minute stretch, each student in the group concentrates on producing as many ideas as possible for possible solutions. They write their solutions on the Post-It Note, read it aloud so the entire group can hear, and slap it somewhere on the paper. The goal here is quantity of raw ideas—they will be selected and refined in later stages. In generating the ideas, students should</p>	<ul style="list-style-type: none"> • Chart paper • Markers • Post-It Notes

	<p>consider whether there is a way to break down the problem into different components so as to eliminate the apparent contradictions (flip-the-switch), or use the mechanism that already produces one benefit to generate another (double-down).</p> <p><i>Be prepared for this part especially to be noisy!</i></p>	
5 min	<p>Cluster Ideas:</p> <p>Looking at the ideas they have generated, students group them thematically on the chart paper. There are no predetermined categories: what is important is a grouping that makes sense to the students and will be helpful in expanding on the solution. Again, there is no magic number of clusters, but four or five is probably reasonable.</p>	<ul style="list-style-type: none"> • Chart paper • Post-It Notes • Markers
5 min	<p>Select a Cluster:</p> <p>Looking at each cluster and the ideas it contains, students select one (or possibly two that might complement one another) to develop into a prototype solution.</p>	
25 min	<p>Prototype a Solution:</p> <p>Having selected their route to a solution, groups now elaborate on the details of their concept. The more visual they can get at this stage, the better, so mind maps, diagrams, even 3-D models are a good way to turn their idea into a more concrete plan. The goal for this stage is to produce a clear summary of the plan that can be presented in a few sentences. In developing their plan, students need to keep in mind the benefits they decided they needed to produce, and the stakeholders for whom they are being produced.</p>	<ul style="list-style-type: none"> • Chart paper • Markers • Paper • ‘Arts and Crafts’ supplies (if desired)
15 min	<p>Share the Prototype:</p> <p>Each group has <u>two</u> minutes to deliver an “elevator pitch” to the class on the essence of their prototype solution. The pitch should include:</p> <ul style="list-style-type: none"> • A brief summary of the two opposing models they started with; • A statement of the benefits they decided their new plan must produce; • An outline of the plan itself including an explanation of how it produces the benefits they identified as being essential. <p><i>If prototyping is running overtime, and it seems that more time would be helpful, then this stage might be postponed to the start of Day 3 or skipped altogether, with the students instead sharing their solutions individually in their written submissions.</i></p>	
5 min	Wrap Up and Clean Up	

Lesson Plan Day 3

<i>Time</i>	<i>Task</i>	<i>Materials</i>
5 min	Set Up and Introduction	
5 min	Review Work from Previous Class: The students have access to their group work from the previous class.	<ul style="list-style-type: none">• Chart paper from day 1
40 min	Write up Reflection: Individually, students write up their reflection on the activity and how they learned to integrate models and come up with a prototype solution that is better than what they could have come up with in the individual model. The goal here is to summarize and make note of the changes in their ways of thinking that allowed them to come up with the solution. The solution should also be critiqued. This is a personal reflection and can be different within groups	<ul style="list-style-type: none">• Computers with MS Word
10 min	Peer Feedback: Each student receives feedback on their reflection from a peer who uses the comment feature of word to suggest changes, pares repetitions, posts questions when logic is unclear etc. The goal here is that the critique should improve the quality of the draft submission.	
10 min	Revise and Edit: Based on the input, students revise and edit their reflection and try to improve their submission to the teacher. At the end, students email the teacher their reflection.	Email
5 min	Wrap Up and Clean Up	

The Seven Models:

1. Mandatory education for all about the science of climate change
2. Mandatory use of public transportation
3. Ban on importation of food grown or farmed more than 200 km away.
4. Maximum weekly electrical consumption limit imposed on households
5. Ban on all disposable plastic products or other disposable products made with fossil fuels
6. Mandatory plumbing refurbishment directing waste sink and shower water to toilets. Maximum water consumption per household also enforced
7. Ban on all meat products and farm animals to lower methane release into atmosphere.

M3 Unit Summative: Integrating Models of Climate Change and Proposing Solutions

INTRODUCTION: During this climate change unit, you have learned about the earth's weather and climate. You have encountered theories that attempt to explain phenomena and evaluated evidence to determine the validity of such theories. In this summative, you will be using a model of multiple hypotheses developed at the Rotman School of Management, University of Toronto to understand the problems faced when humans try to respond to climate change in a meaningful and implementable way.

LEARNING GOALS: To understand conflicting viewpoints on proposed solutions to problems originating in climate change and rather than picking one over the other, learning to use the tension in that conflict to integrate and arrive at a new model of thinking that is better than either pre-existing model. Once you have successfully developed an integrated model, you will reflect on how the new model will affect you personally.

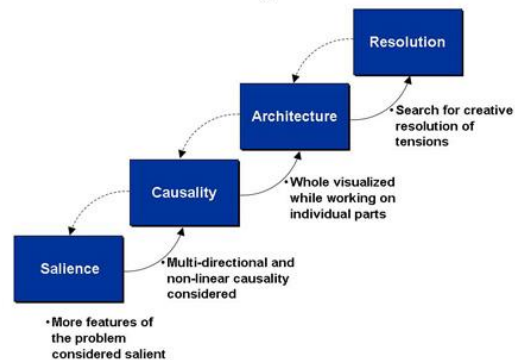
SUCCESS CRITERIA:

- (A) Ability to explore two models of climate change responses in detail and provide support for each model;
- (B) Ability to integrate the models to create a new understanding of climate change; and
- (C) to identify pros and cons and affect of integrated model on personal life and society.

TIMELINE FOR THE SUMMATIVE:

Day	A – Date	B – Date	What are you doing?	Product:
1	Mar 25	Mar 26	Learning about Integrative Thinking. Select your model, identify key stakeholders for each model, identify benefits of model for stakeholders and select those benefits that are found in both models.	Submit your group sheet to the teacher for use on day two.
2	Mar 28	Mar 27	Creating an integrated model. Brainstorm and record ideas that will allow you to take the best of the two opposing models. Cluster ideas and decide on priorities for your model. Organize your new model and synthesize implications for stakeholders.	Complete your group's ideas sheet and new model sheet and hand into teacher.
3	April 03	April 02	Implication Reflection: Individually, you will now consider the effects of your new model on you as an individual and on society as a whole and write a reflection on what changes if any the new model provides in our thinking about responses to climate change.	Submit your reflection at the end of the period for grading (AoL)

The Practices of Integrative Thinkers



Reflection Rubric

Assessment Strand	Level 4	Level 3	Level 2	Level 1
4 KU	Student uses terms and facts related to climate change accurately and appropriately in reflection. Concepts and understanding of the nature of climate change is integrated into the reflection.	Student uses terms and facts related to climate change in reflection. Concepts and understanding of the nature of climate change are referred to correctly in the reflection.	Student uses some terms and facts related to climate change in reflection. Concepts and understanding of the nature of climate change are referred to in the reflection.	Student uses few or no terms and facts related to climate change in reflection. Concepts and understanding of the nature of climate change are rarely referred to in the reflection.
8 TI	Student displays strong critical thinking skills in integrating the two models and analyzing the consequences of the integrated model. The responses proposed are logically linked to the specific problem models given to the student.	Student displays critical thinking skills in integrating the two models and analyzing the consequences of the integrated model. The responses proposed are linked to the specific problem models given to the student.	Student displays some critical thinking skills in integrating the two models and analyzing the consequences of the integrated model. The responses proposed are linked to the problem models given to the student.	Student displays few or no critical thinking skills in integrating the two models and analyzing the consequences of the integrated model. The responses proposed are not clearly linked to the problem models given to the student.
4 C	The reflection is well written, communicates ideas clearly and succinctly. There are no spelling mistakes or grammar errors.	The reflection is well written, communicates ideas succinctly. There are a few spelling mistakes and/or grammar errors.	The reflection is written and communicates ideas succinctly. There are some spelling mistakes and/or grammar errors.	The reflection is poorly written and ideas are not communicated to the audience. There are many spelling mistakes and/or grammar errors.
8 A	The reflection applies ideas learned in class to real world situations and proposes meaningful solutions to problems facing society. Stakeholders are correctly identified and the resolutions are effective, appropriate and critically thought out.	The reflection applies many ideas learned in class to real world situations and proposes solutions to problems facing society. Stakeholders are identified and the resolutions are effective and appropriate.	The reflection applies some of the ideas learned in class to real world situations and proposes a few solutions to problems facing society. Some stakeholders are identified and the resolutions are appropriate.	The reflection applies few of the ideas learned in class to real world situations and proposes few or no solutions to problems facing society. Stakeholders are mis/ not identified and the resolutions are inappropriate or ineffective.