

Critical Challenges

ACROSS THE CURRICULUM

Sample Critical Challenge

Our most valuable resources

Taken from
Managing Our Natural Wealth

Authors

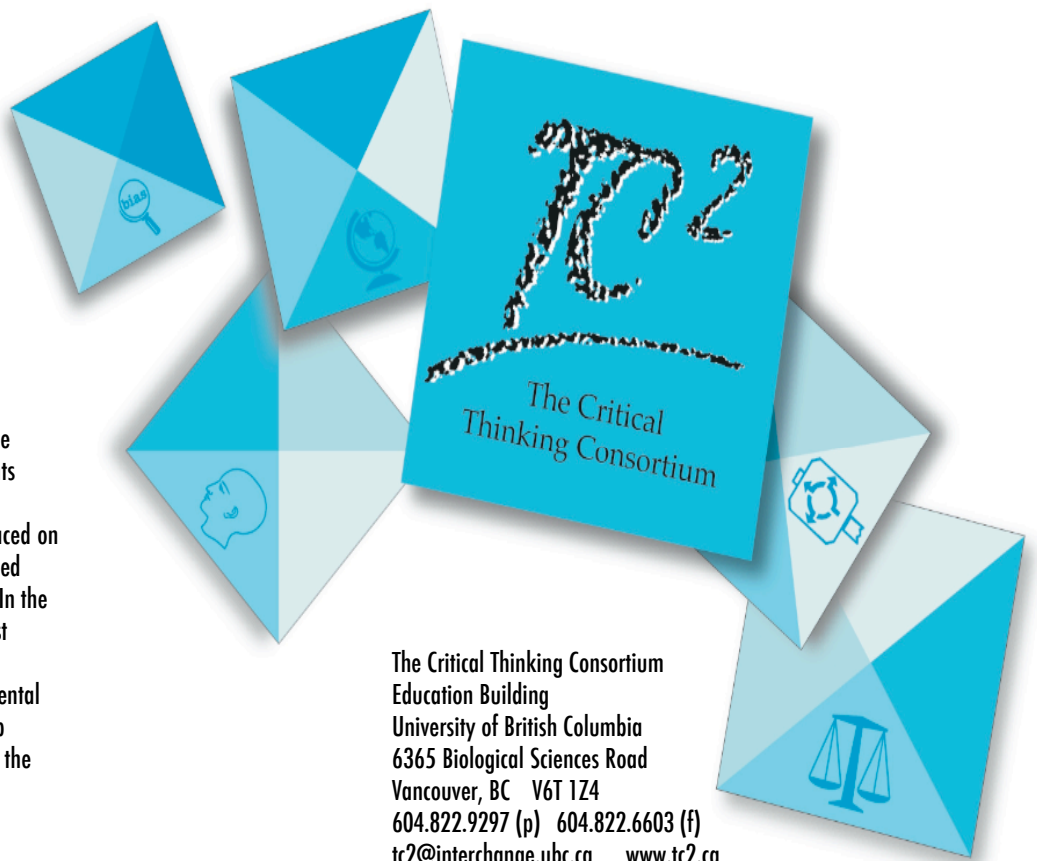
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Synopsis

In this two-part critical challenge, students study the wealth of natural resources across Canada. Students research the resources of an assigned province/territory. Results of this research are placed on drawn maps of the various regions, which are pieced together and posted as one large map of Canada. In the first critical challenge, students rank the three most valuable resources in their province/territory, considering the personal, economic and environmental effects. In the second critical challenge, each group prepares an outline and delivers a presentation to the class justifying its ranking.



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Our most valuable resources

Critical Challenge

- Critical question / task**
- (A) What are the first, second and third most valuable natural resources in your province/territory?
- (B) Explain your group's conclusions in a presentation to the class.

Overview

In this two-part critical challenge, students study the wealth of natural resources across Canada. Students research the resources of an assigned province/territory. Results of this research are placed on drawn maps of the various regions, which are pieced together and posted as one large map of Canada. In the first critical challenge, students rank the three most valuable resources in their province/territory, considering the personal, economic and environmental effects. In the second critical challenge, each group prepares an outline and delivers a presentation to the class justifying its ranking.

Objectives

Broad understanding

Canada has a rich and diverse supply of natural resources that add greatly to our national wealth.

Requisite tools

Background knowledge

- knowledge of personal, economic and environmental effects
- information about natural resources in regions of Canada



Criteria for judgment

- criteria for most valuable resources (e.g., greatest social, economic and environmental benefits)
- criteria for an effective presentation (e.g., face audience, strong voice)



Critical thinking vocabulary

- positive and negative effects



Thinking strategies

- data chart
- using speaking notes



Habits of mind



Suggested Activities

Plan for
giant map

Pre-planning

- In Session Two, each group of students will be asked to trace an enlarged outline of an assigned province/territory on poster paper using an overhead transparency made from Blackline Master #6. To ensure that the individual parts of the map fit together, designate a place in the classroom (indicated by a mark on the floor) where each group will position the overhead to trace its map. (If additional overheads can be borrowed, designate different spots that are equidistant from the wall, and create additional transparencies of the map.) Use Quebec as the trial province—its outline should fit on a single sheet of poster paper. (Two pieces can be pasted together for Nunavut.) Check the availability of sufficient wall space to accommodate the entire country—approximately four times the width of Quebec and twice its height. If need be, reduce the scale of the enlargement. Thirteen sheets of poster paper will be needed (Nunavut requires two sheets and PEI can be traced on an unused section of another province). Vary the colours so that the different provinces/territories will stand out.

Session One

Blackline Masters #12–13

Introduce the
research project

- Explain to the class that Canada is known all over the world for its natural resources—it is a very rich natural resource country. The class will be asked to take stock of our *national* resources. This will involve:
 - finding out what natural resources we have in Canada,
 - locating where in Canada (province/territory) they are found,
 - deciding which of these resources are the most “valuable”.

In order to answer these questions, the class will need to carry out research in the library and, possibly, on the Internet. But before actually conducting the research, students need to learn more about the ways in which resources have value in our lives.

- Remind students that in an earlier class they assessed the importance of various resources by looking at the usefulness of the products developed from each resource. Explain that the class will refer to these uses as the effects a natural resource has on us personally—the ways that a resource’s products are used in people’s lives. As illustrated below, write the following headings on the board and ask students to recall examples of products that were derived from trees and list how these products help us personally.

Discuss
personal effects

The effects of natural resources

personal

Examples

- desks to write on
- chairs to sit on
- firewood to keep warm
- houses to live in



knowledge of
personal effects

**Introduce
economic effects**

- Explain that natural resources have two other types of effects. Beneath “personal” write “economic” on the board and ask students if they can guess what this term means. Explain that economics deals with “money”—the way individuals and countries make money to pay their bills and to become wealthy. The economic effects of resources are largely in terms of the money and the jobs created by obtaining the resources and by making and selling the products. Ask students to think of jobs that might be created from the forest industry and how we might make money from tree-related products. List their suggestions and offer your own.

- economic
- *jobs to cut down trees*
 - *jobs to plant new trees*
 - *jobs to make furniture*
 - *money from selling logs to other countries*



*knowledge of
economic effects*

**Introduce
environmental effects**

- Beneath “economic” write “environmental” on the board and ask students if they can guess what this term means. Explain that the environment deals with “nature”—with the plants, animals, the ground and the air. The environmental effects of resources are the way nature is affected by how we gather the resources and use the products made from them. Ask students to think of how cutting down and using trees might affect nature. List their suggestions and offer your own.

- environmental
- *cutting down trees may destroy animal homes*
 - *cutting trees reduces forest fires*
 - *cutting down trees makes room for new healthy trees*
 - *burning trees creates smoke which pollutes the air*



*knowledge of
environmental
effects*

**Introduce
positive and negative
effects**

- If students have not already noticed that some of the effects are positive and others negative, draw this to their attention. Suggest that a “positive effect” is a good thing to happen and a “negative effect” is something that is undesirable. Invite students to think about these concepts in any of the following ways:

- Present an effect and ask students to indicate whether it is positive or negative.
- Ask students if one type of effect (i.e., personal, economic or environmental) listed on the board has more negative effects than the other two.
- Discuss why the major positive effects are largely personal and economic and the major negative effects are often environmental.
- Ask students if they can think of negative personal and economic effects (e.g., the injuries to loggers while felling trees are negative personal effects; the money required to build factories is a negative economic effect).
- Suggest that the various effects influence each other. For



*positive and
negative*

example, air pollution caused by burning trees is an environmental effect; yet pollution can cause people to get sick which would be a negative personal effect. This, in turn, might have negative economic effects (e.g., if people are sick they cannot work and more money may be required to pay for doctors).

Confirm understanding of concepts

- Confirm that students grasp the concepts of positive and negative effects by inviting them to classify six different effects of oil described on *Understanding effects* (Blackline Master #12). You may do this collectively by creating an overhead transparency or individually by duplicating copies for each student or each pair of students. Review student answers afterwards.

Understanding effects Blackline Master #12

Name: _____

The following are six effects of the use of oil:

1. taxes from oil sales provide money for the government to use,
2. oil is used to keep our homes warm in winter,
3. oil spills pollute the water,
4. some people get sick from products made from oil,
5. finding new supplies of oil costs a lot of money,
6. using oil is better for the air (less pollution) than using coal.

Decide if these effects are positive or negative and then if they are personal, economic or environmental. Write the number of each effect in the box that best describes the type and nature of the effect.

Type of effect	Positive	Negative
personal		
economic		
environmental		

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Assign regions of the country

- Explain to the class, because Canada is such a large country, students will be divided into groups of approximately three students to research a different part of Canada. (Depending on the precise size of the class, more students could be assigned to the larger provinces.) Because of the lack of information on the three territories and the small size of Prince Edward Island, it may be best to create ten groups focussed on the following regions:

- Newfoundland;
- Prince Edward Island and Nova Scotia;
- New Brunswick;
- Quebec;
- Ontario;
- Manitoba;
- Saskatchewan;
- Alberta;
- British Columbia;
- Nunavut, Northwest Territories and Yukon.

Begin the research

- Enlarge both sheets of the chart, *Effects of natural resources* (Blackline Masters #13A–B) to legal (8½ x 14) or ledger (11 x 17) size and distribute a copy to each group. Explain that students are to research all the types of natural resources (i.e., water, trees, minerals/fossil fuels, soil, fish, fur and other) and list specific examples of each (e.g., under minerals, students might list gold, zinc and coal) found in their assigned province/territory. Their main task is to look for information about the personal, economic and environmental effects, both



information about resources in Canada



data chart

positive and negative, arising from development and use of these natural resources. The following sources (full references are at the end of this challenge) may be useful to students in gathering the needed information:

- *The Canadian Encyclopedia* (on-line). Go to the subject index, click on “Provinces & Territories” and then access a specific province or territory. Within each jurisdiction most of the relevant information is to be found under “Economy,” but also under “Land and Resources” or “Natural Resources”;
- *Statistics Canada* (on-line). Although students may need help finding and interpreting relevant data, two links on this site are especially helpful:
 - ~ *Census* link: click on “1996 Census” and then “Nation series” and select “Occupation, Industry and Class of Workers” for employment figures by industry for each province;
 - ~ *Canadian Statistics* link: explore “The Economy” (Primary Industries), “The Land” (Geography and Environment) and “The People” (Labour, employment and unemployment);
- *Encarta Encyclopedia*;
- *Hello Canada* series;
- *Journey Across Canada* series;
- any grade-level textbook (e.g., *Exploring Canada*);
- *World Book Encyclopedia*

Effects of natural resources

Province / Territory of _____

Specific products from your area

	Personal effects (effects on people)	Economic effects (effects on money and jobs)	Environmental effects (effects on nature)
Trees			
Plants			
Minerals			
Oil			

Blackline Master # 11A

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Teach information locating strategies

- If students have been introduced to the use of the table of contents, index, key words and skimming strategies, remind them to use these in locating relevant information. If students are unfamiliar with these strategies, work with the teacher librarian or use a standard resource book on library research to introduce them. This introduction may be as simple as selecting one or two sources recommended for this assignment that all students might have at their disposal and asking students how they might look for information about natural resources in their assigned region.

Continue
the research

Introduce giant
map project

Session Two

- Allow students time in class and in the library to conduct their research. Remind each group to record its information on one set of Blackline Masters #13A–B.
- At some point, while students are gathering information, explain that the class will be creating a large map showing Canada's most valuable natural resources. Each group will prepare the map for their assigned province/territory. Indicate that during the research gathering session, each group will trace an enlarged outline of its region according to the following procedure:
 - position the overhead on the designated spot on the floor;
 - project the transparency on the wall;
 - align the poster paper and the image so the outline of the province/territory fits within the poster paper and then attach the paper to the wall with masking tape (the three territories should be done separately);
 - using a pencil, trace the outline of the boundary for the assigned province/territory and any interior lakes; also place a dot on the location of the capital city (do not trace any of the words or the circles);
 - OPTIONAL: If further work with latitude and longitude is desired place a mark at the boundary line where each line of latitude and longitude enters or leaves the province (the full lines will be drawn afterwards using a meter stick);
 - after the outline is traced in pencil, remove the paper from the wall and carefully go over the outline of the boundary with a thick/dark felt pen. If latitude and longitude were marked, using a thinner/lighter felt pen and a straight-edge ruler, join the marks to create a grid across the province/territory. Print, in large letters, the province/territory name and, in smaller letters, the capital city.

Session Three

Blackline Master #14

- Explain that each group is expected to indicate on its map the main types of natural resources found in its region. Provide or invite students to suggest symbols representing each resource (e.g., computer-generated icons or miniature 3-D representations—crumpled aluminum foil to represent mining, twig for trees). Because the individual maps will be placed together, a common set of symbols must be used to represent each resource. Referring to the list of eight (or more) types of natural resources on Blackline Masters #13A–B, assign each group to bring to class 11 copies (one for each of the 10 regions and one for the legend) of one of the agreed-upon symbols. (If some groups are without an assigned symbol, ask them to prepare 14 copies of a symbol for the provincial/territorial capitals and 2 copies of a symbol for the national capital.)

Develop
symbols for a legend

Add cities to the map

Present the first critical challenge

- OPTIONAL: If desired, invite students to add five other cities/towns to their map. (The symbol for these can be a “smartie” or a simple dot.) If lines of latitude and longitude were drawn on the maps, encourage groups to use an atlas to locate the communities and to position them using the latitude and longitude on their own maps.
- After students have collected information about their region, present the following question to each group:

What are the first, second and third most valuable natural resources in your province/territory?

Distribute a copy of both sheets of *Our top resources* (Blackline Masters #14A–B) to each group. Explain that there are three parts to this task:

- list four or five valuable types of natural resources found in the region;
- choose the first, second and third most valuable resources and list their positive effects and any negative effects;
- explain why the most valuable resource is more valuable than the second and third choices.

Students should begin to address the critical challenge by reviewing the results of their research and selecting the four or five natural resources that seem to be the most valuable.

In deciding on the most valuable, students should look to see which resource has the most positive effects and the least negative effects. Groups must then decide upon and rank order the three most valuable resources in their region. Suggest that each group provide five positive effects for their top three choices and be sure to mention two negative effects of each resource. Finally, each group should give two reasons why it ranked its first choice higher than each of the other two top resources.



criteria for valuable resource

Session Four

Assemble the giant map

- When every group has decided on its four or five valuable resources, it should select the appropriate symbols from the collection that each group has supplied and paste the relevant symbols on its map. Each group should cut out its map. Regions with offshore islands should leave a “bridge” between the mainland and the island(s) so that all parts of the region remain connected on poster paper. Arrange for some students to assemble the legend identifying every symbol on the map; others can attach the individual maps to the wall/board or create

Present the first critical challenge

a title for the map (Natural Resources of Canada) and, if need be, cards to label the lines of latitude and longitude.

- When each group has completed Blackline Masters #14A–B, announce the follow-up critical task:

Explain your group's conclusions in a presentation to the class.

Discuss the following aspects of this task:

- *Use of an outline.* Each group is to use Blackline Masters #14A–B as the outline for its presentation—using an outline means that students can refer to it as notes when making their presentation but they cannot simply read the sheet.
- *Shared participation.* Every member of the group is expected to contribute to the presentation, which suggests that the outline be divided into parts with each member getting his/her own section.
- *Refer to the map.* Students should refer to the giant map during their presentation to help the rest of the class understand where and what is being discussed.



speaking from notes

Present to the audience

- Students should speak to the audience which means *facing the audience* (not the map), *looking at the class* (which is the reason for not reading a speech) and *speaking in a strong voice*.



criteria for effective presentation

Plan for the presentation

- Direct each group to decide who in their group will be responsible for presenting which parts of Blackline Masters #14A–B. Group members may want to rewrite their sections in their own words using note form. Suggest that as homework, members of each group listen to each other present their part and watch for the following:

- not reading, but using sheet as notes;
- referring to map when appropriate;
- facing the audience;
- looking at people;
- speaking in a strong voice.

Session Five

Blackline Master #15

Deliver presentations to the class

- On the day (or days) set aside for the presentations, remind students of the expectations for the presenters and explain the listeners' responsibilities. The latter includes respectful listening, but also recording the top three resources for each region. To assist in this task, distribute to each student copies of *Canada's natural resources* (Blackline Master #15).



information about resources in Canada

Debrief the presentations

- After all the presentations, briefly discuss any observations about resources in Canada:
 - What did students learn about Canada's natural resources that they did not previously know?
 - Are the top resources the same in all parts of the country? What factors might explain why or why not?
 - Are any resources common across the country?
 - What seem to be the most common (worst) negative effects?

Name: _____

Blackline Master #15

Canada's natural resources

Region	Most valuable resource	Second most valuable	Third most valuable
Newfoundland			
Prince Edward Island			
Nova Scotia			
New Brunswick			
Quebec			
Ontario			
Manitoba			
Saskatchewan			
Alberta			
British Columbia			
Yukon			
Northwest Territories			
Nunavut			

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Evaluation

Blackline Masters #16-18

Assess the research

- Assess each group's research as recorded on *Effects of natural resources* (Blackline Masters #13A-B) using the rubric found in *Comparing resources* (Blackline Master #16). According to this rubric the assignment is worth 15 marks and is assessed on three criteria:
 - amount of information;
 - correct classification of type of effect;
 - accuracy of information.

Names: _____

Use this rubric to assess each group's research on the resources in its assigned region. Award intermediate marks for answers falling between the descriptors.

Comparing resources

Blackline Master #16

	Underdeveloped	Competent	Well developed
Amount of information	1 Almost no products or effects are listed for any resources.	3 Approximately two products and two effects are listed for each of the resources in the region.	5 All least four products and four effects are listed for each of the resources in the region.
Correct type of effect	1 Virtually none of the effects are correctly classified as personal, economic or environmental.	3 Half of the effects are correctly classified as personal, economic or environmental.	5 Every effect is correctly classified as personal, economic or environmental.
Accurate information	1 Much of the information is incorrect.	3 Several pieces of information are incorrect.	5 All of the information is correct.
Comments:	1	3	5
Total	/15		

Names: _____

Use this rubric to assess each group's ranking of its most valuable natural resources. Award intermediate marks for answers falling between the descriptors.

Justifying the ranking

Blackline Master #17

	Underdeveloped	Competent	Well developed
Relevant positive effects	1 Offers no relevant positive effects for any of the three choices.	3 Offers two or three relevant positive effects for each choice.	5 Offers five or more relevant positive effects for each choice.
Relevant negative effects	1 Offers no relevant negative effects for any of the three choices.	3 Offers only one relevant negative effect for each choice.	5 Offers two or more relevant negative effects for each choice.
Plausible reasons for ranking	1 Offers no plausible reasons for ranking the top resource over each of the other two choices.	3 Offers one plausible reason for ranking the top resource over each of the other two choices.	5 Offers two or more plausible reasons for ranking the top resource over each of the other two choices.
Comments:	1	3	5
Total	/15		

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Assess the rankings

- Assess each group's rankings of its top three resources as recorded on *Our top resources* (Blackline Masters #14A–B) using the rubric found in *Justifying the ranking* (Blackline Master #17). According to this rubric the assignment is worth 15 marks and is assessed on three criteria:
 - number of relevant positive effects;
 - number of relevant negative effects;
 - plausible reasons for ranking.

Assess the presentation

- Assess each group's presentation on its region's most important resources using the rubric found in *Assessing the presentation* (Blackline Master #18). According to this rubric the assignment is worth 15 marks and is assessed on three criteria:
 - effective use of notes;
 - speaking to the audience;
 - use of strong voice.

Assess audience notes


- After the groups have made their presentations, assess the listeners' notes recorded on the data chart *Canada's natural resources* (Blackline Master #15). This assignment may be awarded up to 10 marks; deduct one mark for each incorrectly recorded resource.

Name: _____

Use this rubric to assess each student's part in the presentation to the class. Award intermediate marks for answers falling between the descriptors.

Assessing the presentation Blackline Master #18

	Underdeveloped	Competent	Well developed
Use of notes	Notes were a problem throughout the talk, or were relied upon all the time.	The student was partly distracted by the notes or read too much from them.	The student effectively used the notes while speaking.
Speaking to the audience	The student was completely directed away from the class audience.	During half of the presentation the student faced the class and looked at the audience.	Throughout, the student faced the class and looked directly at the audience.
Strong voice	Almost nothing the student said could be heard by the audience.	Much of what the student said could be heard by most people in the audience.	The student's every word could be heard by the entire audience.
Comments:	1	3	5
Total			15

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References

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- World Book Millennium 2000 Edition*. (2000). Chicago: World Book.

Understanding effects

The following are six effects of the use of oil:

1. taxes from oil sales provide money for the government to use,
2. oil is used to keep our homes warm in winter,
3. oil spills pollute the water,
4. some people get sick from products made from oil,
5. finding new supplies of oil costs a lot of money,
6. using oil is better for the air (less pollution) than using coal.

Decide if these effects are positive or negative and then if they are personal, economic or environmental. Write the number of each effect in the box that best describes the type and nature of the effect.

Type of effect	Positive	Negative
personal		
economic		
environmental		

Effects of natural resources

Province / Territory of _____

Oil	Minerals	Plants	Trees	Specific products from your area	Personal effects (effects on people)	Economic effects (effects on money and jobs)	Environmental effects (effects on nature)

	Fish	Animals	Water	
				Specific products from your area
				Personal effects (effects on people)
				Economic effects (effects on money and jobs)
				Environmental effects (effects on nature)

Our top resources

Based on our research of _____ the valuable resources are

_____	_____
_____	_____
_____	_____

Our most valuable resource is _____

	Positive effects	Negative effects
personal		
economic		
environmental		

Our most valuable resource is _____

	Positive effects	Negative effects
personal		
economic		
environmental		

Our most valuable resource is _____

	Positive effects	Negative effects
personal		
economic		
environmental		

We rate _____ as our most valuable resource. It is more valuable than our SECOND choice because _____

Our most valuable resource is more valuable than our THIRD choice because _____

Canada's natural resources

	Most valuable resource	Second most valuable	Third most valuable
Newfoundland			
Prince Edward Island Nova Scotia			
New Brunswick			
Quebec			
Ontario			
Manitoba			
Saskatchewan			
Alberta			
British Columbia			
Nunavut Northwest Territories Yukon			

Comparing resources

Use this rubric to assess each group's research on the resources in its assigned region. Award intermediate marks for answers falling between the descriptors.

	Underdeveloped	Competent	Well developed
Amount of information	Almost no products or effects are listed for any resources. 1	Approximately two products and two effects are listed for each of the resources in the region. 3	At least four products and four effects are listed for each of the resources in the region. 5
Correct type of effect	Virtually none of the effects are correctly classified as personal, economic or environmental. 1	Half of the effects are correctly classified as personal, economic or environmental. 3	Every effect is correctly classified as personal, economic or environmental. 5
Accurate information	Much of the information is incorrect. 1	Several pieces of information are incorrect. 3	All of the information is correct. 5

Total /15

Comments:

Justifying the ranking

Use this rubric to assess each group's ranking of its most valuable natural resources. Award intermediate marks for answers falling between the descriptors.

	Underdeveloped	Competent	Well developed
Relevant positive effects	Offers no relevant positive effects for any of the three choices. 1	Offers two or three relevant positive effects for each choice. 3	Offers five or more relevant positive effects for each choice. 5
Relevant negative effects	Offers no relevant negative effects for any of the three choices 1	Offers only one relevant negative effect for each choice. 3	Offers two or more relevant negative effects for each choice. 5
Plausible reasons for ranking	Offers no plausible reasons for ranking the top resource over each of the other two choices. 1	Offers one plausible reason for ranking the top resource over each of the other two choices. 3	Offers two or more plausible reasons for ranking the top resource over each of the other two choices. 5

Total /15

Comments:

Assessing the presentation

Use this rubric to assess each student's part in the presentation to the class. Award intermediate marks for answers falling between the descriptors.

	Underdeveloped	Competent	Well developed
Use of notes	Notes were a problem throughout the talk or were relied upon all the time. 1	The student was partly distracted by the notes or read too much from them. 3	The student effectively used the notes while speaking. 5
Speaking to the audience	The student was completely directed away from the class and hardly looked at the audience. 1	During half of the presentation the student faced the class and looked at the audience. 3	Throughout, the student faced the class and looked directly at the audience. 5
Strong voice	Almost nothing the student said could be heard by the audience. 1	Much of what the student said could be heard by most people in the audience. 3	The student's every word could be heard by the entire audience. 5

Total /15

Comments: