LES 1

O B S E R V A T O R Y
ENVIRONMENTAL SCIENCE AND TECHNOLOGY (EST)
Teacher's Guide A
Second Year of Secondary Cycle Two

ATOMIX

STUDENT LOG

WORKING DOCUMENTS

EVALUATION DOCUMENTS

PROCEDURE AND EVALUATION : SSC2 – SCIENCE

Observatory / Guide
11129-A

Name: _____ Group: _____ EST

The project

COLLECTIBLE CARDS: A BOOMING BUSINESS!

Laval – Playing cards featuring characters with supernatural powers are a big hit with young people. In fact, these cards are so popular that the educational toy manufacturer Scientifix has decided to launch its own series of cards. The company's goal is to make science fun!

Laval, September 13, 2008

Educational toy manufacturer seeks creative designers

JOB REQUIREMENTS: Excellent knowledge of science. Discipline and imagination are also required.

RESPONSIBILITIES: Design and produce playing cards featuring superheroes with characteristics inspired by elements of the periodic table. Card design will meet the following requirements:

- **On the front of the card:**
  - **identification of the element** using Lewis notation. The Lewis structure must appear in the top right-hand corner of the card.
  - **the character's name,** based on the etymology of the name of the element
  - **an illustration of the character,** inspired by the physical description of the element. The illustration can be a drawing, a collage, a photomontage, etc.
  - **a short description of the character's personality,** based on the physical or chemical characteristics of the element. It should be an imaginative and colourful description of the character's main personality traits.
  - **a list of the character's powers (at least two),** based on uses or applications of the element
  - **a description of the character's weapons,** based on the toxicity of the element
  - EST **the strength of the character's defences,** based on the the sum of the numbers of neutrons in each of the natural isotopes of the element
  - **a list of the character's allies,** namely, other elements with similar chemical properties. The allies must be among the first 20 elements in the periodic table and must be identified using Lewis notation.
- **On the back of the card:**
  - EST **a chart for marking points,** with the number of game levels the character must reach and the number of points to win at each level. The chart takes the form of the simplified atomic model of the most common isotope of the element.
  - **the character's life points,** namely, the first ionization energy of the element, rounded to the nearest whole number

In this context, you must design and make a playing card.

Name: _____ Group: _____ EST

Creating the context

Selected element: _____

I ask myself questions

1. What is an element?

_____

_____

_____

2. What is the periodic table of the elements?

_____

_____

_____

3. What is an atom?

_____

_____

_____

EST **4.** What is first ionization energy?

_____

_____

_____

5. What is the etymology of a word?

_____

_____

6. Who are you designing and making a playing card for?

_____

_____

7. What questions should guide you in your information gathering?

_____

_____

_____

_____

Name: _____ Group: _____ EST

Creating the context (*continued*)

Selected element: _____

I must

8. Reformulate the goal of the project.

_____

_____

_____

I think

9. What kind of character do you think could represent your element? Explain your answer.

_____

_____

_____

What I know and what I must find out

10. Write the information you already know and the information you need to find out.

What I know	What I must find out

Name: _____ Group: _____ EST

Creating the context (*continued*)

Selected element: _____

I prepare my work

11. Where will you find the information you need to do your work?

12. Define the main steps of your project in chronological order.

Reflection

	Yes	No
Do I fully understand what I have to do?	☐	☐

Name: _____ Group: _____ EST

Gathering information

Selected element: _____

I do research

1. a) (EST) What is the simplified atomic model?

b) What is the atomic number?

c) What is a group?

d) What is a valence electron?

e) How can you determine the number of valence electrons in an atom?

Gathering information (*continued*)

Selected element: _____

f) What is a period?

g) How can you determine the number of electron shells in an atom?

h) What is Lewis notation?

i) How will you choose your character's allies?

EST **j)** What is an isotope?

Name: _____ Group: _____ EST

Gathering information (*continued*)

Selected element: _____

EST **k)** What is the difference between relative atomic mass and the mass number?

EST **l)** How will you determine the number of neutrons in each of the isotopes?

EST **m)** Describe the steps you will follow to draw an atom of your element according to the simplified atomic model.

EST **n)** Where will you find the first ionization energy of your element?

o) Do your research. Make sure you record the sources of all the information you consider relevant. Write the relevant information on the following page.

Gathering information (*continued*)

Selected element: _____

I apply my research results

2. Apply what you have learned from your research by answering the following questions. Make sure that you cite your sources.

a) Identify the information you will use to draw the simplified model of the atom.

b) Identify the information you will use to represent an atom of your element with a Lewis structure.

c) Identify the information you will use as inspiration for your character's name.

d) What information will inspire your character's physical appearance?

Name: _____ Group: _____ EST

Gathering information (*continued*)

Selected element: _____

e) Identify the information you will use to define your character's personality.

f) Identify the information you will use to determine your character's powers.

g) Who will your character's allies be? How will you describe them?

Gathering information (*continued*)

Selected element: _____

h) What information will you use to determine your character's weapons?

EST **i)** What calculation will you do to determine the strength of your character's defences?

EST **j)** What information will you use to attribute life points to your character?

Reflection

	Yes	No
Do I fully understand the concepts covered in this situation?	☐	☐

Name: _____ Group: _____ EST

Completing the project

Selected element: _____

1. Prepare the plan for your playing card.

2. What will you put on the back of your card?

_____

_____

_____

3. Make your playing card.

Reflection

	Yes	No
Have I considered other approaches?	☐	☐

Name: _____ Group: _____ EST

Validating the project

Selected element: _____

I justify my approach

1. Justify the following content on your playing card:

a) the physical description of your character

_____

_____

_____

_____

b) the character's personality

_____

_____

_____

_____

c) the character's powers

_____

_____

_____

_____

d) the character's weapons

_____

_____

_____

e) the character's allies

_____

_____

_____

2. Suggest improvements to your work. What could have made the design process easier?

_____

_____

_____

Name: _____ Group: _____ EST

My evaluation

Use the evaluation grid on the following page to evaluate yourself. Write A, B, C, D or E in the "Me" column of the chart below.

SSC2— Makes the most of his/her knowledge of science and technology				
Criteria*	Observable indicators	Me	Teacher	Comments
1	**Creating the context** Definition of the goal and formulation of the questions for gathering information		☐ With help	
2	**Gathering information** Selection of relevant information that meets the requirements for the card design		☐ With help	
3	**Completing the project** Production of the playing card		☐ With help	
4	**Validating the project** Justification of various content on the playing card		☐ With help	

*** Evaluation criteria**

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations or solutions
4 Suitable justification of explanations, solutions, decisions or opinions

Evaluation grid

Name: _____ Group: _____

LES1

EST

SSC2 Makes the most of his/her knowledge of science and technology

Criteria*	Observable Indicators	A	B	C	D	E
1	**Creating the context** Definition of the goal and formulation of the questions for gathering information	The goal of the project is very clearly defined, and all the questions for gathering information are relevant to the project.	The goal of the project is clearly defined, and most of the questions for gathering information are relevant to the project.	The goal of the project is not very clearly defined, OR only some of the questions for gathering information are relevant to the project.	The goal of the project is not very clearly defined, AND only some of the questions for gathering information are relevant to the project.	The work must be done again.
2	**Gathering information** Selection of relevant information that meets the requirements for the card design	All of the information is relevant and meets the requirements for the card design.	Most of the information is relevant and meets the requirements for the card design.	Some of the information is relevant and meets the requirements for the card design.	The information is not very relevant.	The work must be done again.
3	**Completing the project** Production of the playing card	All of the elements of the playing card respect the design requirements and the scientific concepts.	Most of the elements of the playing card respect the design requirements and the scientific concepts.	Some of the elements of the playing card respect the design requirements, OR the card contains some scientific errors.	The playing card does not respect the design requirements, OR it contains many scientific errors.	The work must be done again.
4	**Validating the project** Justification of various content on the playing card	All of the justifications are relevant and based on the scientific information gathered.	The justifications are relevant, and most are based on the scientific information gathered.	The justifications are partially relevant, OR only some are based on the scientific information gathered.	The justifications are partially relevant, AND only some are based on the scientific information gathered.	The work must be done again.

* Evaluation criteria

1 Formulation of appropriate questions
2 Appropriate use of scientific and technological concepts, laws, models and theories
3 Relevant explanations or solutions
4 Suitable justification of explanations, solutions, decisions or opinions