Annual Project

Science & Health
1st Course A/B
Year: 2015
Where are they when they are not around?  
A frog’s tale.

The effect of garbage pollutants on the richness of species of amphibians in local creeks of Asunción, Paraguay.

1ST Course A & B

The toad’s lullaby note comes from the far margin, sweeter than all others. . . . This song has been compared to the slow opening Movement of Beethoven’s “Moonlight Sonata.”
—Mary C. Dickerson, The Frog Book (1906)

BACKGROUND

Amphibians live in most habitats of the world except Polar Regions, salt water ecosystems and extremely dry deserts (Green et al., 2009). These animals were the first to have a true voice, using their calling especially during the breeding season and for marking territory (Green et al., 2009). Interactions between organisms are common and include predation, feeding and physiological responses to several factors. Frogs and Toads have developed an acoustic reception system and that allows them to recognize whether the sound is coming from the same species or a different one, all of this is possible because of the callings being species-specific allowing maintaining the species identities (Duellman & Trueb, 1994; Vitt & Caldwell, 2009).

Frogs and Toads are good indicators of an environment’s health because they are ectotherms, this means that they do not regulate their body heat, and have permeable body covering; these conditions make them especially susceptible to the vicissitudes of the environment (Vitt & Caldwell, 2009). According to the definition of keystone species, a species that have a disproportional impact on the environment or community in relation to its abundance, we can determine amphibians as keystone species as well, regarding their feeding habits (Vitt & Caldwell, 2009, Power et. al, 1996).

Comparisons of species richness provide geographic comparisons of community structure and with this we can infer habitat alteration and loss by human mediated environmental change (Vitt & Caldwell, 2009).
COMPETENCIES

- Ethical and scientific use of research methodologies and the scientific method in the application of problem solving and scientific research
- Apply scientific theories, laws and principles to understand and explain events that occur in the surrounding environment.

CAPACITIES

- Assists to the study area and records the audio and takes pictures.
- Analyzes the relationship between solid garbage and species of amphibians present in their study area.
- Cooperates with the different tasks the group has to fulfill.
- Acknowledges the importance of water for living organisms and the need to preserve it.
- Understands the importance of sustainable development for both social and personal welfare.
- Develops a critical and engaging attitude.

ACHIEVEMENT EXPECTATIONS

That the student should:
- Investigate, explore, observe and make judgments. That they should identify problems and seek answers.
- Become interested in the world that surrounds us.
- Discover things by himself/herself.
- Be curious and independent.
- Develop interesting and competitive projects.

Theme: The effect of garbage pollutants on the richness of species of amphibians in local creeks of Asunción, Paraguay.

THEMES

- How the pollution of a creek affects the species of amphibians in Asunción, Paraguay?
- In which hours are the amphibians more active?
PROCEDURE

1. Investigate about amphibians:
   - Species in Paraguay  - Ecology  - Feeding habits  - Calling  - Their role in the environment
2. Investigate about the creek you are going to work in:
   - Where is it?  - Which are its greatest/potential contaminants?
3. Investigate about solid garbage:
   - Types of solid garbage  - Consequences of the presence of solid waste in creeks
   - The potential relation between solid waste and toxic water contaminants
4. Mark the creek spot with the GPS in your cellphone.
5. Take observations every Saturday and Sunday at a stipulated time given by the teacher.
6. Take notes of all the solid garbage you can identify and take pictures.
7. During the whole hour record the sounds of the creek. Trying to identify toads and frogs singing. Do not forget to name the file with the date and the hour of the record.
8. Take notes of the temperature, climate, and any kind of variable you might think can have an effect. Do not forget to put the date. All the notes must be written in the registry notebook.
9. Analyze and compare results.

METHODOLOGY

The realization of this project is based on the methodology of scientific research, being this:

Exploratory: it helps to investigate and at the same time find and browse through materials: writing, images, videos, documentaries, interviews, surveys etc. the subject studied.

Descriptive: because through various means it will describe the steps of the scientific method by which students can understand the topics or events they are studying.

Critical: it is constantly judged objectively, the fact to be studied and experienced, eliminating personal preferences, and showing the development of communication skills to interpret, argue and propose ideas or concepts.

Reflexive: it helps to refine the concepts, the sensitivity of the researcher, noting the areas of application, because through scientific research, the students can develop independence in their work and study habits to overcome difficulties in theoretical and practical activities, leading to the stimulation of communication competence.

Evaluative: for interpreting facts, events, feelings, ideas or situations to determine the degree of importance and validity with both the personal and group, the topics proposed, as a capacity to be developed in students. The purpose of this project is to develop a reflective critical and participatory spirit, to obtain meaningful learning inputs and to achieve a scientific education.

Practical: for the application of appropriate techniques and enhancing creativity. Students will conduct scientific and technological work with original contributions, providing ade-
quate space to development, depth and condition as a social construction of knowledge, promoting intellectual and intense awakening and deep motivation for the study of different topics or events.

PURPOSE OF THE RESEARCH

a- Promote the strengthening of scientific thought, and the usage of the scientific method and technology.

b- Develop research skills and to live his education as a series of engaging and rewarding activities that strengthen and further personal improvement.

c- Encourage creativity in each of the members of the various working groups.

RESOURCES

• Human: Students, Teachers, Tutors, Parents.

• Materials: building infrastructure, laboratory, laboratory materials, etc..

• Library: magazines, brochures, texts several, journals, Internet, computers.

EVALUATION

Each phase or goal of evaluation will consist of blocks of the investigation. The score is assigned independently and by two periods during the school year.

Total points of the project: 50, distributed as follows:

FIRST PERIOD. STAGE 1: 20 P.

1st FORMATIVE TUTORIAL: GATHERING INFORMATION

EVALUATION GROUP

• Selects the most relevant, current and local on the assigned topic and presented in the folder field (min. 4 resources).

• Presents clear and Personal: introduction, rationale, objectives: general and specific problematization and problem definition, hypotheses and variables.

• Presents the Evidence Folder as required.

REMEMBER TO QUOTE THE AUTHORS.

INDIVIDUAL ASSESSMENT

• Presents on time the Evidence Folder with the structure assigned by the teacher
• Points to: sources, a bibliography and identification of / the topic researched / the group work and meetings/ name of the group/ leader of the group, member of the group

1st. SUMMATIVE TUTORIAL: (10 p) - EXECUTING

Communicates in writing the bibliographic information obtained. Presents the field notes per student.

GROUP EVALUATION (5p)

• Presents the report taking into account the structure of the established background (introduction, objectives: general and specific, problem definition, hypotheses and variables. (2p)

• The literature and other sources used (minimum 5 articles and 4 Web sites) are cited in the report. (1p )

• Presents the report on time and activities scheduled in the timeline (1p )

• The Evidence Folder contains the structure requested by the teacher (cover pages, dividers, annex) (1p)

INDIVIDUAL EVALUATION (5P)

• Answers the teacher’s questions about main concepts and group work.
• Participates and gets involved in the process (group work, group meetings, assigned role, etc.)

Presents the field notes per student.

2nd. SUMMATIVE TUTORIAL: (10 p) - EXECUTING

GROUP EVALUATION (5p)

• Presents the report taking into account the structure of the established background (introduction, objectives: general and specific, problem definition, hypotheses and variables. (2p)

• The literature and other sources used (minimum 10 articles and 4 Web sites) are cited in the report. (1p )

• Presents the report on time and activities scheduled in the timeline (1p )

• The Evidence Folder contains the structure requested by the teacher (cover pages, dividers, annex) (1p)

INDIVIDUAL EVALUATION (5P)

• Answers the teacher’s questions about main concepts and group work.
• Participates and gets involved in the process (group work, group meetings, assigned role, etc.)
Presents the field notes per student.

**SECOND PERIOD. STAGE 2: 30 P. PERFORMANCE (Experimental), DRAWING CONCLUSIONS & COMMUNICATING RESULTS**

**FORMATIVE TUTORIAL**

**GROUP EVALUATION**

- Filing Requirements
- Cover, title page, acknowledgments, index
- Body of work (order or sequence)
- Results: a) Surveys b) Cost Study, graphics and other c) Methodology
- Conclusion
- Annexes
- Bibliography & References

**INDIVIDUAL EVALUATION**

- Apply the rules of respect, tolerance and timeliness as the results of a critical and participatory attitude.
- Cooperates actively in the implementation of the work
- Answers the questions formulated by the teacher about any part of the work or research or experiments performed

**SUMMATIVE TUTORIAL (10p)**

**GROUP EVALUATION (6p)**

- Presents the written report in a ringed booklet. (1p)
- Presents a Powerpoint in a pen-drive or CD as a complement for the oral presentation of the project (2p)
- Presents the Evidence Folder with the work developed during the two periods with the teacher’s corrections (1p)
- Hands in the identification cards following the standard format and clips on the back (1p)
- Hands in the final flyers or brochures (3 or 5) (1p)

**INDIVIDUAL EVALUATION: (4p)**

- Writes his personal conclusions (1p)
- Apply the rules of respect, tolerance and timeliness as the results of a critical and participatory attitude. (2p)
- Cooperates actively in the implementation of the work (1p)
SUMMATIVE TUTORIAL (5 p)

GROUP EVALUATION

• Follows the correct structure of the experimental work guided by the teacher
• Develops a study design (model, questionnaire, sample)
• The results are expressed clearly using graphs, charts, tables, photos, and statistics
• The conclusions of the experimental work are expressed clearly and in accordance with the objectives of the research
• Has the flyers or brochures (Diptych or Triptych) draft.
• Uses the standard lab format to present the lab written report

INDIVIDUAL ASSESSMENT

• Apply the rules of respect, tolerance and timeliness as the results of a critical and participatory attitude.
• Cooperates actively in the implementation of the work
• Attends provided with all materials needed to perform the field work and / or experimental work.

ORAL DEFENSE (15p)

GROUP EVALUATION (5p)

• Presents the written report in a ringed booklet. (1p)
• Uses the Powerpoint as a visual support or complement to express the main ideas (1p)
• Presents the Evidence Folder with the work developed during the three periods (1p)
• Hands in the identification cards following the standard format and clips on the back (1p)
• Hands in the final flyers or brochures (1p)

INDIVIDUAL EVALUATION: (10p)

• Does not read from the powerpoint or papers in his hands (1p)
• Uses technical vocabulary appropriately (1p)
• Demonstrates ability to interpret the theme (1p)
• Explains clearly and with good diction the ideas, graphs, tables and diagrams (1p)
• Expresses conclusions consistent with the proposed objectives (1p)
• Takes and appropriate posture & behavior as well a positive attitude to express proper conduct and formality during the oral defense (2p)
• Comes with the correct uniform and name tags. (2p)
• Uses appropriate and effective visual support materials. (1p)

IMPORTANT OBSERVATIONS:

Procedural assessments are made through the tutorial system according to schedule established by the institution. Each period is accumulative and affects the next stage up to the final oral defense.

The evaluation of the product is verified by:

a) Guided tours of field trip or experimental work with written reports.
b) A written presentation of the work done by the group using the standard formats in the Evidence Folder and a Final Ringed Booklet.
c) Presentation of the best science fair projects nationally and internationally if the institution proposes to do so.
d) A Final Oral Defense will take place through an examination table, conformed for the purpose, with internal and external professionals that will listen and evaluate each group.

**Activity Schedule - Annual Project 2013**

<table>
<thead>
<tr>
<th>Directives</th>
<th>Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand in of project topics to the groups with guidelines for implementation (Manual of the Project)</td>
<td>Week 16-20 March</td>
</tr>
<tr>
<td>First hand over of raw data-evidence folder structure &amp; organization</td>
<td>Week 13 – 17 April</td>
</tr>
<tr>
<td>1st tutorial. Return Folder with first correction and guidelines for the first tutorial summative</td>
<td>Week 20 April - 24 April</td>
</tr>
<tr>
<td>2nd Tutorial: Return Folder field with second adjustment with the emphasis &amp; subtopics per group</td>
<td>Week 18 - 22 May Return: Week 1- 5 June</td>
</tr>
<tr>
<td>Implementation (product development, experimentation)</td>
<td>April – June Deliver product: Week 1- 3 July</td>
</tr>
<tr>
<td>3rd. Tutorial –Lab Reports, Methodology, type of investigation.</td>
<td>Week 10 - 13 August</td>
</tr>
<tr>
<td>Return Evidence Folder with corrections</td>
<td>Week 24 - 28 August</td>
</tr>
<tr>
<td>Powerpoints, ID cards, flyers and brochures (ringed booklet, and evidence folder)</td>
<td>Week 7 – 11 September</td>
</tr>
<tr>
<td>Final Oral Defense</td>
<td>Week 14 - 18 September</td>
</tr>
</tbody>
</table>

**Remarks:**

**SCHEDULING**

The dates above will be governed by the schedule of activities submitted by the Evaluation Department and might suffer changes that will be announced with anticipation.

**STEPS FOR DEVELOPING A SCIENTIFIC PROJECT.**

- **DESIGNING A RESEARCH IDEA:** The ideas are the first approach to the reality that
will be investigated, sources may be: individual experiences, written materials, discoveries, personal conversations, observations of facts, beliefs, newspapers, etc.

- **SUMMARY**: It has to be written at the end of the research and after drawing conclusions. It is a synthesis of the project in no more than 150 words including key words and results, with the following requirements: Log of the institution (upper left), name of the Institution Area, Course, Project Name, Tutor, Project Summary (as title), authors (such as footer).

- **INTRODUCTION**: This explains what is going to be research, the background of problem, which is the subject of the project and what is the element of reality of the phenomenon to study, establishing chapters to be developed in the investigation.

- **OUTLINE OF THE PROBLEM OF RESEARCH**: It is a formal explanation of the idea and structure of the research and the justification of the topic. Including the following steps

  a) **THE DEFINITION OF THE PROBLEM**: Set by a question that covers briefly and concisely the problem of research.

  b) **OBJECTIVES**: Establish a general idea of the intended research.

- **GENERAL**: Expresses the intent of the investigation or search. The what and to where you want to go.

- **SPECIFIC** expresses the intermediate steps to reach the expected results:

  c) **BACKGROUND OR JUSTIFICATION**: Indicates the reason for the investigation. It must describe the objective of the project following these steps: Relevance of the topic to research, feasibility & analysis of available resources.

- **MAKING ASSUMPTIONS**: A tentative explanation of a particular event or phenomenon. It is stated in a true propositional form and tries to explain the actual relationships between variables.

- **VARIABLE**: An entity or attribute that can vary and whose variation is likely to be measured.

  a. **DEPENDENT VARIABLE**: Is that part of the hypothesis clearly known, and which are unknown elements that produce, modify and influence it. It is what you measure in the experiment and what is affected during the experiment. It responds to the independent variable. It is called dependent because it "depends" on the independent variable. In a scientific experiment, you cannot have a dependent variable without an independent variable.

  b. The intervening variable: facilitates a better understanding of the relationship between the independent and dependent variables when the variables appear to not have a definite connection.

  c. **INDEPENDENT VARIABLE**: An independent variable is the variable you have control over, what you can choose and manipulate. It is usually what you think will affect the dependent variable. In some cases, you may not be able to manipulate the independent variable. It may be something that is already there and is fixed, something you would like to
evaluate with respect to how it affects something else, the dependent variable like color, kind, time.

d. CONTROL VARIABLE: is something that is constant and unchanged in an experiment. A control variable is any factor that remains unchanged and strongly influences values; it is held constant to test the relative impact of an independent variable. In scientific experimentation, a control variable is the one that must not be changed throughout an experiment because it affects the independent variables and thus affects the outcome of the experiment.

• THEORETICAL FRAMEWORK: Consists of the literature review, identification, collection, query, retrieval, collection and processing of relevant information, so as to give theoretical support to scientific research.

• METHODOLOGICAL DESIGN: is a clear and concise statement of each of the stages of the investigation. The description of how the investigation will be conducted.

• ANALYSIS OF RESULTS: The process by which the student prepares and presents the research report, with charts, diagrams and others on the study results: Survey and Study of costs.

• Conclusion: The conclusion is a final comment or idea that summarizes the most important aspects of the topic as well as the results of the experiments or activities that took place during the course of the investigation. The conclusion should be expressed in a paragraph of small size and is designed to meet the following objectives:

• Identify and summarize aspects of the subject that the student was expected to discover through the development of the task.

• Encourage student reflection on the importance of the issue to their daily lives or the environment in which they live.

• Provide a final comment on the results of the activity being performed, in order to provide feedback to the student or to invite you to make suggestions to improve the process that involves a scientific research.

• Annexes: in this section Additional information is attached ( photos, clippings, diagrams, schedules, tables, etc.) and other materials to enrich the research.

• Bibliography & References: On the basis of each book: the name or names of the author - year of publishing - editorial - page views. Internet pages, the page address.

**REQUIREMENT FOR A SCIENTIFIC REPORT.**

Written reports for each tutorial, will be monitored and evaluated by the teacher, according to the criteria presented in the corresponding item. The final written report must be drawn to computer, using the following guidelines:

• Font size 12.
In your Evidence Folder you must also have:

**Cover Page 1.**

- Name of the Institution.
- School Logo
- Project Title
- Project Topic
- A graph related to the subject
- Asuncion, Paraguay - Year.

**Cover Page 2**

- Project Topic
- Area: Basic Sciences and Technologies.
- School: St. Ignacio of Loyola.
- Tutor of the Project
- Project Period: March to October

- 3rd. Acknowledgments
- 4th. One or more index pages.
- 5th. Sheet I - Introduction
- 6th. Sheet II – Background (Justification)
- 7th. Sheet III - General and Specific Objectives
- 8th. Sheet IV - Brief description of the problem, a question
- 9th. Sheet V - Hypothesis:
- 10th. sheet - Variables:
- 11th. sheet - Development or Chapter I Theoretical Framework
- 12th. sheet - Chapter II Methodology.
- 13th. sheet - Chapter III Analysis of the results.
- 14th. sheet - Conclusion.
- 15th. sheet - Annexes.
- 16th. sheet - Bibliography.

*Silvia De Oliveira Lagôa Sforza*