

Animals, water and sound

Teacher's guide

Escola: Virolai

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Curs: 2016-2017

IBS&E

Aquesta seqüència d'ensenyament i aprenentatge a l'educació primària s'ha realitzat en el si del grup de treball *IBS&E: Inquiry Based Science in English*. Es el resultat d'una col·laboració establerta entre el Centre de Recursos Pedagògics Específics de Suport a la Innovació i la Recerca Educativa (CESIRE) de la Generalitat de Catalunya i el Departament de Didàctica de la Matemàtica i de les Ciències Experimentals de la Universitat Autònoma de Barcelona (UAB) durant els cursos 2014-2015, 2015-2016 i 2016-2017. El grup de treball ha estat format per mestres d'educació primària involucrats en projectes AICLE en ciències i formadors provinents del CESIRE i de la UAB dels àmbits de la didàctica de les ciències experimentals i de la didàctica de la llengua, en un model de formació i col·laboració *triàdic* que s'ha difós mitjançant la publicació:

Espinet, M., Valdés-Sánchez, L., Carrillo, N., Farró, L., Martínez, R., López, N., i Castellón, A. (2017). Promoting the Integration of Inquiry based Science and English learning in primary education through triàdic partnerships. A A. W. Oliveira i M. H. Weinburgh (Eds.), *Science Teacher Preparation in Content-Based Second Language Acquisition*. Dordrecht: Springer. pp287-303 (Disponible a <http://www.springer.com/us/book/9783319435145>)

El grup ha treballat durant 3 anys reflexionant sobre la integració de les pràctiques científiques i les pràctiques discursives i portant a la pràctica a les escoles intervencions didàctiques d'AICLE que treballen la ciència des d'un enfocament d'indagació científica i la llengua des d'un enfocament comunicatiu. La seqüència didàctica que aquí es presenta s'ha dut a terme a l'escola Virolai durant el curs 2016-2017 i ha estat dissenyada i experimentada a l'aula de 6è A i 6è B per les mestres Carol de Britos i Zoe Araus i les estudiants del Grau d'Educació Primària en anglès de la UAB Mireia Brunet i Laura Hernández, que hi han participat en qualitat de *Teacher Assistants*.

INTRODUCTION:

The aim of this tables is to collect accurate information of both linguistic and scientific practices during the development of the project.

There are two types of tables: the individual tables written after each session, and a complete table reviewing the whole project.

The tables have been written separately for each class, since we considered they differed in their practices despite both were following the same structure. Moreover, both groups worked different topics of sound: one group worked on water as a barrier of sound, whereas the other class worked on animals and sound, focusing on diverse aspects such as: how do animals communicate without vocal cords, how whales communicate under water, etc.

Final table 6è A

Table 1. Scientific and discursive practices IBS&E Teaching Unit									
Educational level: 6th grade					Topic: sound and animals				
Scientific practices	Inquiry questions	Discourse practices							
		Identifying	Describing	Questioning	Hypothesizing	Explaining	Justifying	Argumenting	Defining
Asking questions	Do you think we hear the same as animals? Can we hear underwater?	x		x					
		Students do a brainstorming of questions about animals and sound; then they join them in groups of similar topic, and finally choose the one they prefer. Each group has a different question. Eg: How do animals communicate without vocal cords? How does the sound of whales travel underwater? How do bats know where things are?							
Developing and using models	What do we know about sound? How do you think the sound of whales is? What would happen if/when listening to a sound inside and outside water?			X	X				X
		Students do some research (books, internet...) in order to develop their hypothesis. To do so, they look for information regarding how is the sound, its characteristics, how animals communicate, as well as models of sound.							
			X	X		X			

Planning and carrying out investigations	What do I need to do? How are we going to measure? How do we represent the data? What materials do we need?	Students have to develop their experiment in a written form before actually doing it; they have to develop accurate hypothesis based on models and evidences, list the materials, choose the variables to develop, select how they will collect data, etc.						
Analyzing interpreting data	What has happened? What the data tell us? What can we say about our initial hypothesis?		X			X		
Constructing explanations	How can you explain what you have found out?					X	X	
Communicating	How are you going to present your findings?							

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Final table 6è B

Table 1. Scientific and discursive practices IBS&E Teaching Unit									
Educational level: 6th grade				Topic: water, a barrier for sound					
Scientific practices	Inquiry questions	Discourse practices							
		Identifying	Describing	Questioning	Hypothesizing	Explaining	Justifying	Argumenting	Defining
Asking questions	Do you think we hear the same inside than outside water? How do we hear? Better? Worse? Louder?	x		X					
		After choosing the topic of “Water, a barrier for sound”, students started asking questions they were interested on, and that they wanted to answer: Do we hear the same under inside than outside water? Our voice is louder/ softer under water? How fish “speak” under water? The teacher had to guide the questions, since some students started focusing on the characteristics of the sound of water, and not on how is sound heard under water. Finally, they chose two questions to develop: “Can we hear sound underwater as outside? Can we listen better under mineral, tap or salty water?”. Groups choose either question one or two.							
Developing and using models	What do I know about sound? What would happen			X	X	X	X		
		Students used linguistic models in order to develop appropriate hypothesis. In whole group conversation, they talk about what they think may happen regarding the questions formulated with their own knowledge (not looking for external information). In that way, they construct their own model of sound.							

	<p>when using different types of water?</p> <p>What do I know about writing hypothesis?</p>								
<p>Planning and carrying out investigations</p>	<p>What do we need to do?</p> <p>What materials do we need?</p> <p>How are we going to collect results?</p> <p>How do we represent the data?</p>		x	X		x			
<p>Students start developing their experiments according to the question they want to answer and their hypothesis. They focus on choosing the materials and developing the procedure of the experiment. Also, they have to think carefully about the variables they are taking into account, and so what they are going to focus on when doing the experiments; volume and clearness of sound. They also decided how to collect the results and how to represent the data.</p>									
<p>Analyzing interpreting data</p>	<p>What has happened?</p> <p>What the data tell us?</p> <p>What can we say about</p>		X				X	X	
<p>After developing the experiment, students collect the results in graphs or drawings and in written form. They have to argument why they got some results or others.</p>									

	our initial hypothesis?								
Constructing explanations	How can you explain what you have found out?						X	X	X
		They develop some conclusions based on the results and comparing with their initial hypothesis. In order to understand better the results obtained, they are able to search for some theoretical information about sound and water.							
Communicating	How are you going to present your findings?		X			X	X	X	
		During the last session, students present their experiments to the rest of classmates, they expose their results and conclusions, and compare them to other classmate's results to check if they are similar or not.							