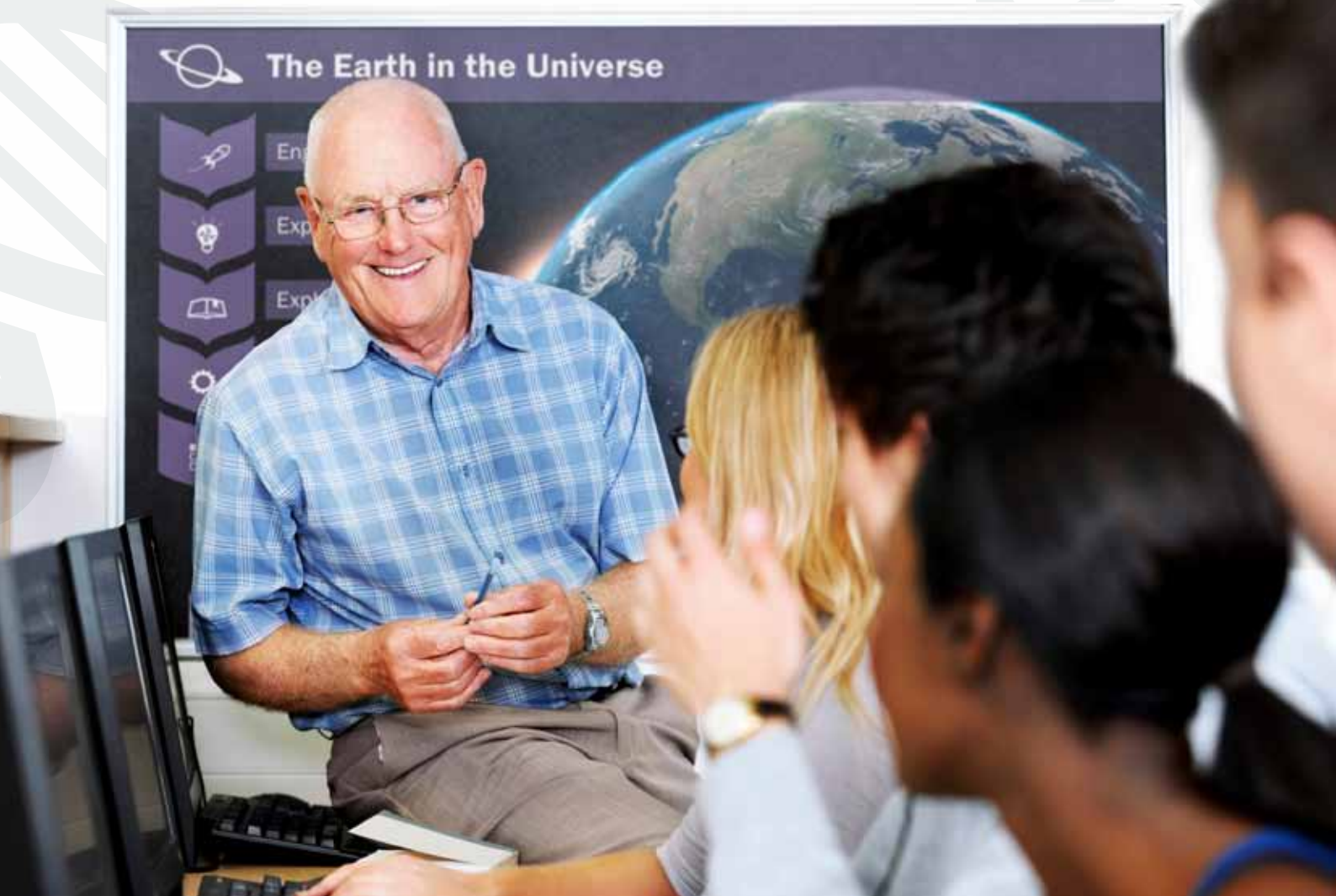




Science Bits

Upgrade Your Science Class





Introducing Science Bits

*Designed to suit the students' learning needs
Easy to use and implement in the classroom
Developed to fire up your science class*

Science Bits is a repository of multimedia science lessons that goes beyond the textbook to provide a series of didactic proposals which will enhance your classroom experience.

Features

- 💧 Interactive multimedia resources for dynamic and participative learning: 3D models, videos, audio recordings, animations, simulators, and virtual experiments.
- 💧 Hundreds of self-correcting exercises and other resources for effective learning.
- 💧 User-friendly tools to track student achievement accurately.
- 💧 Lessons focused on crosscutting concepts and disciplinary core ideas.
- 💧 Predict-Observe-Explain activities with real videos and lab simulators.
- 💧 Printable version available for students.
- 💧 Complete teacher resources and guides at every step.



Simultaneous
access to both
English and
Spanish versions

↑ What Is Science Bits?

Science Bits materials offer a user-friendly method for promoting learning through inquiry and implementing new technologies in the science class.

↑ Science Bits provides teachers with lessons that help them teach science in a way that engages their students.

Based on the constructivist 5E model of learning and aiming at the development of key competencies, Science Bits lessons use a wide range of high-quality interactive multimedia content to develop an inquiry-based, learning-by-doing method.



* Benefits

Designed to work with a projector or a digital whiteboard



Science Bits is conceived and designed to make work in the classroom easier and to get the most out of the digital format. It enhances student motivation and promotes real learning through its interactive learning-by-doing approach.

For students who do not have computers in the classroom, Science Bits offers a printable version of all the content and activities that are available in the digital version. This printable version allows students to follow along as the teacher displays the content on the whiteboard.

Using Science Bits on a projector or digital whiteboard enriches the teacher's presentation. Its extensive array of multimedia resources (illustrations, 3D models, videos, audio recordings, animations, and experiments) also promotes interaction with the student body.



Single-Celled Organisms

Many-Celled O

Evalu

Designed to work from the student's computer

Teachers have user-friendly tools on hand to accurately track student achievement.

Science Bits promotes the educational use of computers among students. With Science Bits, computers can either substitute traditional textbooks or become a complementary tool with a high educational value.



5E Science Bits 5E Lessons

An easy and effective way to implement the constructivist 5E model of learning

- Science Bits resources are based on lessons which are clearly organized according to the friendly 5E Model.
- Learning objectives aim at skill development through virtual and hands-on practices, and focus on internalizing crosscutting concepts and disciplinary core ideas.
- The nature of science and research is integrated into every phase of a “learning-by-doing” process.
- Complete activity guides are provided at every step to help teachers successfully implement the lessons.

What Is the 5E Model of Learning?

The 5E learning model is a constructivist model with five stages: **Engage, Explore, Explain, Elaborate, and Evaluate**.

The concept behind the model is to begin with students’ current knowledge, to make connections between this current knowledge and new knowledge through inquiry, to provide direct instruction of those concepts that students would not be able to discover on their own, and to provide students with opportunities to demonstrate their understanding through practice.

Created by the Biological Sciences Curriculum Study, the 5E model has been used in the United States since the 1980s in elementary, middle, and high schools. Tests of the 5E instructional model against other forms of science instruction demonstrate evidence of increased mastery of conceptual learning, skill development, and a higher interest in science.



Cover

Tap students’ prior knowledge

Includes a visual index of each of the 5E sections in the unit. Each cover section includes an initial activity to make sure the student has the prior knowledge necessary to start the lesson.



Engage

Grab students' attention and interest

A motivating video presents a situation familiar to the students, introduces some initial concepts, and points out some misconceptions. Then an activity based on the video mobilizes the students' prior knowledge.



Explore

Construct new knowledge through inquiry

A guided inquiry-based activity challenges students' initial knowledge and concepts. In this level, we can find virtual experiments, interactive explorations, Predict-Observe-Explain video activities, and many other resources.



Explain

Present concepts formally and complete exercises

Here, ideas that have been learned both intuitively and through discovery are formally presented in a systematic manner, using a wide range of multimedia resources. Every concept developed in this section is accompanied by interactive exercises that aim at consolidating what has been learned by means of practice.



Elaborate

Apply concepts and procedures in practice

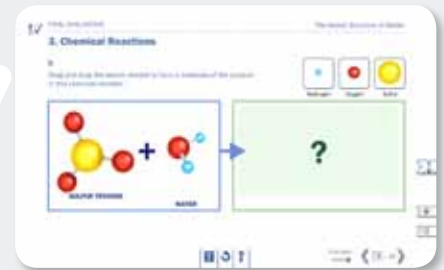
This section presents a task consisting of an activity-problem to be solved. The task requires the application of the concepts, attitudes, and procedures learned by the students in the unit.



Evaluate

Review and evaluate new knowledge

As a means of closure, this section includes a video which goes over the material taught in the unit, as a final revision. It then presents a final self-correcting test based on the principles of skill assessment.



🕒 1-Hour Lessons

Science Bits' 5E unit content is also divided into **shorter lessons designed to be tackled during a single class period**. These lessons are neatly organized according to their subject area and learning goals.

Science Bits includes many types of lessons. Among others, there are lessons designed to provide an appealing introduction to the new concepts that will be developed later, lessons that expand upon previously introduced knowledge, and lessons that review and evaluate the acquired knowledge. All these lessons include activities that can be completed by students either in class or after school.

Starting the Investigation

To please the king, Archimedes had carry out the investigation and write a full report of what he has done, and how to fix the stone.

The king is a curious man. He is not satisfied in science, so he gives experts people to explain everything to him in detail. Archimedes has to bear this in mind, too.

Put yourself in Archimedes' shoes. Plan the measurements, carry them out using the simulation and write the report that the king wants to read.

The report must include:

1. Objectives
2. Theoretical basis
3. Material needed
4. Procedures and justification of each step taken
5. Final conclusions

Inquiry-based activities

Almond Fact Sheet

Look up information about the almond tree and its growth cycle, and prepare a digital fact sheet showing the following information:

- Scientific name of the species
- Period in which it performs photosynthesis
- Flowering period
- Type of pollination
- Fruit ripening period
- Harvesting and processing of fruit

Get pictures of at least five almond trees and send to your fact sheet.

Contextualized projects

Applying the Procedure

These videos show different methods of separation that we applied to a sample of "dirty water".

Use them as a reference in making your own videos. Suggest alternatives and improve on the techniques shown.

Real experiments

Bonobo Genome Sequenced

Her name is Isidra, a female bonobo at Leipzig zoo in Germany. She has gone down in scientific history as the first of her species to have her genome sequenced, meaning that the chemical letters that form it have been revealed.

After humans, chimpanzees, orangutans, and gorillas, bonobos are the last of the great ape species to have its genome sequenced.

It is believed that, by comparing the genomes of these apes, it will be possible to track down the genes behind their distinctive traits.

Of special interest is the comparison between bonobos and chimps. They are very similar in terms of appearance, and yet very different in behavior: chimps are aggressive, whereas bonobos are friendly. In a way, we humans share traits with both of them.

Humans, chimps, and bonobos each have about 28,000 genes. Humans and chimps share almost 99% of their genomes, whereas chimps and bonobos share about 99.6%.

Reading comprehension activities

No Two Years Are Alike

These graphs, called climatographs, show the monthly average rainfall and temperature of Italy's town from 2005 to 2015.

Do the years with good harvests have specific weather characteristics? Discuss with the rest of the class.

Activities based on graphs

Short Activities

Science Bits content includes a large number of self-correcting interactive exercises, activities based on documentary videos or video experiments, interactive animations, videos, lab simulators, and many other multimedia resources.

All these resources are an organic part of the Science Bits units, but they can also be accessed independently, if teachers prefer to use them as a complement to their textbooks.



The screenshot shows a digital interface for a virtual experiment. On the left, there is text: "Do plants have mechanisms for detecting the presence of light? Can plants be observed to 'bend' towards light?" Below this, it says "This experiment will learn areas to answer these questions." and "In what ways do the experimental conditions in each box differ?". On the right, there is a 3D illustration of two identical boxes, each containing a potted plant. The left box has a light source on the left side, and the right box has a light source on the right side. At the bottom right, there are navigation icons and the text "Return to Main" and "Next".

Virtual experiments



The screenshot shows a digital interface for a Predict-Observe-Explain activity. The title is "Heating and Cooling a Solid". Below the title, it says "Carefully observe the following experiment." and "Describe what you see:". There is a video player showing a laboratory experiment where a blue substance is being heated in a beaker over a Bunsen burner. Below the video, there are two text input fields for the user to describe what they see and what they think would happen if they heat the substance more.

Predict-Observe-Explain activities



The screenshot shows a digital interface for a bibliographical project. The title is "What is the Popularization of Scientific Knowledge?". Below the title, it says "Albert Einstein was one of the most celebrated scientists of the twentieth century. His ideas completely changed our way of understanding the world." and "Unfortunately, his reputation exaggerates the true understanding of his theories, leading a famous quote from Einstein refers to the fact: 'The general public understands something unless you've said it in five minutes.'" There is a portrait of Albert Einstein on the right. Below the text, it says "Science activities for answers to the questions we ask ourselves about the world we live in. However, these answers must be formulated in a more comprehensible language, and this is the substantial role that scientists need to fulfil." and "Popular science aims to present scientific concepts and knowledge in a manner which is more accessible to a general audience, using simple but accurate explanations." At the bottom right, there are navigation icons and the text "Return to Main" and "Next".

Bibliographical projects



The screenshot shows a digital interface for a simulator. The title is "Virtual Lab". Below the title, it says "Apply the Kinetic-Molecular Theory to examples 1 and 2 and predict the behavior of gases." and "Do not stop the experimental process!". There is a grid of icons representing different substances and equipment: 1. Water, 2. Ice, Dry Ice, Dry Ice, Dry Ice, 3. Solid water, 4. Helium gas, 5. Oxygen gas, 6. Carbon dioxide, 7. Phosphorus, 8. Sulfur. At the bottom right, there are navigation icons and the text "Return to Main" and "Next".

Simulators



The screenshot shows a digital interface for an audiovisual experiment. The title is "What is Science?". Below the title, it says "DOING SCIENCE". There is a video player showing a young boy in a green shirt looking through a magnifying glass at a purple flower. At the bottom right, there are navigation icons and the text "Return to Main" and "Next".

Audiovisual experiments



Teacher Guide

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All Science Bits lessons include **complete teacher guides**, with directions for use, detailed proposals for each activity, lesson time scheduling, and solutions.

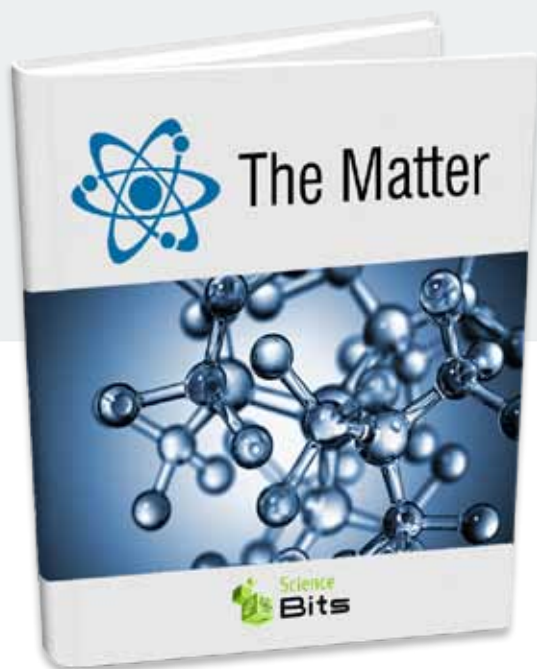
These guides are exclusive for teaching staff and are of great help for those users who have just started working with this type of resource.

The whiteboard content includes:

- SEPARATION OF MIXTURES
- Pure Substances and Mixtures
- Homogeneous Mixtures
- To separate the components of a homogeneous mixture, one of the following methods can be used. These are called **physical** methods of separation.
- Vaporization
- Distillation
- Chromatography
- Distillation (with a diagram of a distillation apparatus)



Workbook



If students do not have computers in the classroom, Science Bits offers a **print workbook** which includes all the content and activities that are available in the online version. This way, students can follow the lesson being shared on the digital whiteboard and use this resource for revision or study.

These workbooks are organized into thematic clusters and have been designed to replace textbooks.

Examples of workbooks:

- Matter
- Earth and the Universe
- The Diversity of Life

The following units are included in *the Matter* workbook:

- Mass, Volume, and Density
- Changes of State
- Pure Substances and Mixtures
- A World of Particles
- Substances Change
- Atomic Structure of Matter

Available in Spanish and English



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