Teachers' Guide

English with *Science Niblets*
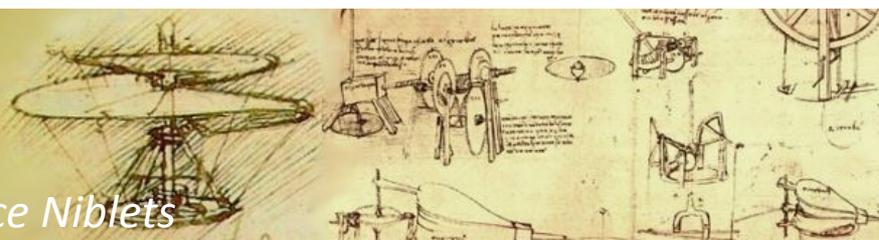
Dear teachers and instructors,

Thank you for downloading these free supplementary materials for learners of English as a Foreign Language (EFL).

Science Niblets was created in 2011 as an online popular science magazine for a global audience of people who are interested in discovering the fundamentals of how the world works. However, the editors soon recognized the potential for using *Science Niblets* articles as authentic sources in content-based instruction with English Language Learners (ELLs). Science and technology are seen by Western educators as critical to international economies and social development (National Science Board 2007, Zitzelsberger 2012), and learners should have access to relevant learning materials regardless of native language. Because of the genre's clear writing style and explanation of technical terms, popular science publications seem like an unintimidating source of science material for the ELL curriculum. However, as of June 2012, there is no popular science publication that provides learning materials specifically for ELLs.

These materials attempt to fill this gap. Select *Science Niblets* articles have been supplemented by relevant activities and additional authentic materials that encourage intercultural discussion and the use of the four receptive and productive language skills: reading, listening, writing and speaking. In this teachers' guide, I will lay out the theoretical and pedagogical framework that underlie the materials. The materials themselves consist of a lesson plan for the teacher and a learner worksheet as printable pdf files. The lesson plans may contain hints and suggestions in *italics* as well as additional graphics that instructors can use to inspire creative output from the learners.

Please feel free to contact me with questions, comments, or submit your own lesson plans to supplement a *Science Niblets* article. We would like to bridge the gap between the fields of science education and foreign language education by making English with *Science Niblets* an interdisciplinary and collaborative effort.

Sincerely,

Devon Donohue-Bergeler, Editor

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Theoretical Foundation

Several theories of second language acquisition informed the development of the materials for English with *Science Niblets*. The Input Hypothesis states that humans learn languages by receiving comprehensible input (Krashen, 1985). The supplemental materials provide authentic videos and text in order to provide this input. The Output Hypothesis then argues that learners should also produce language in order to negotiate meaning in culturally appropriate ways and to reflect on language use (Swain 1985). The many productive activities in these materials reinforce this idea.

The linguistic theory that most influences these materials is functionalism (Halliday, 1984), in which the target language is used as a tool for negotiating meaning and for communication about science, not as a system to be analyzed on its own. For this reason, there is no explicit treatment of grammatical topics. It is also assumed that English with *Science Niblets* will be used as a supplement to other materials according to the needs of the learners, and that students can consult other resources if they prefer to focus on grammar explicitly.

Instead of providing an analysis of language, the materials attempt to engage students by using cognitivist (Chomsky, 1968), constructionist (Papert & Harel, 1991), and socio-constructionist (Vygotsky, 1978) learning theories. Cognitivist activities, such as making semantic maps and graphic schemes, help students to organize and process new information. A constructivist and socio-constructionist approach is used when activities help students to activate previous knowledge and social norms, then to connect these with their own personal experiences and cultural background.

The use of socio-constructivism is also reflected by the fact that most of the activities are done in groups or as a class. The target language is to be acquired while using it within a social framework. For example, scientific topics are framed by everyday topics and intercultural considerations. Students are encouraged to discuss aspects of the presented chapter topics with each other and compare them with similar things in their own experience. This approach facilitates self-awareness and reflection of different cultures and sub-cultures without judgment.

Task and Content-Based Approaches are the main language teaching methods used in the learning material. The materials focus on cultural and scientific content, not specifically on language content. Vocabulary is introduced in context through videos, texts, or other authentic sources, while integrating listening, speaking, reading, and writing activities in culturally appropriate ways (Horowitz, 2013, p. 77). Relevant activities reinforce and recycle the vocabulary.

For example, creating semantic maps help ELLs to process words in association with their previous knowledge and to negotiating meaning. Students will later use the vocabulary in a creative exercise under the heading "relate and create".

Pedagogical Foundation

English with *Science Niblets* materials are free and available to anyone with internet access. These materials are designed for use in classes with students at an intermediate proficiency level. Depending on the specific users, these lesson plans can be used most effectively within the framework of Content-Based Instruction or Sheltered Instruction (Horwitz 2013). ELLs in a content-based environment can be guided using scaffolding activities like semantic maps, graphic organizers, and other visualization techniques (DeLuca 2010, Horwitz 2013). However, because these learning materials were designed as a supplement for use in EFL or Content-Based Instruction courses, it is not useful to examine curricular requirements, as these can vary greatly with such a global audience.

Because they attempt to connect science to everyday life, the lesson plans mostly cultivate Basic Interpersonal Communication Skills (BICS). However, they also lay the groundwork for Cognitive Academic Language Proficiency (CALP) (Cummins, 1999). The texts in *Science Niblets* introduce scientific lexical items and concepts that are reinforced in comprehension questions. Students are also encouraged to hypothesize about possible outcomes, which is an important step in the scientific method.

In the sample chapter about roller derby, the author picked a cultural topic that relates specifically to a female sport and the current third wave of feminism. In this way, girls and women, who traditionally are less science-oriented (Zitzelsberger 2012), can be encouraged to engage with science. Other topics are gender neutral, yet still aim to draw on the learners' personal experience in order to foster curiosity and motivation to explore scientific topics.

Working Outline of EFL Supplement to *Science Niblets*

Last update: July 2012

Unit Topic	Science Niblet	Scientific Topic	Cultural Topic	Communicative Skills	Intercultural Skills	Social Forms
Physics	text	Centrifugal force	Roller Derby	Oral and written communication about scientific topics, vocab. in context	comparisons, labeling positions in sports, relating target culture to personal experience	individual, pairs, groups, class discussion
	text	Light refraction	Rainbows	Oral and written communication about scientific topics, vocab. in context	comparisons, analysis of symbols, relating target culture to personal experience	individual, pairs, groups, class discussion
Technology						
Biology						

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