

Making On-line Science Course Materials Easily Translatable and Accessible Worldwide: Challenges and Solutions

Wendy K. Adams · Hisham Alhadlaq · Christopher V. Malley ·
Katherine K. Perkins · Jonathan Olson · Fahad Alshaya ·
Saleh Alabdulkareem · Carl E. Wieman

Published online: 30 December 2010
© Springer Science+Business Media, LLC 2010

Abstract The PhET Interactive Simulations Project partnered with the Excellence Research Center of Science and Mathematics Education at King Saud University with the joint goal of making simulations useable worldwide. One of the main challenges of this partnership is to make PhET simulations and the website easily translatable into any language. The PhET project team overcame this challenge by creating the Translation Utility. This tool allows a person fluent in both English and another language to easily translate any of the PhET simulations and requires minimal computer expertise. In this paper we discuss the technical issues involved in this software solution, as well as the issues involved in obtaining accurate translations. We share our solutions to many of the unexpected

problems we encountered that would apply generally to making on-line scientific course materials available in many different languages, including working with: languages written right-to-left, different character sets, and different conventions for expressing equations, variables, units and scientific notation.

Keywords Simulations · Science education · Research · Languages · Websites · Online resources · Translation

Introduction

As a part of the PhET Interactive Simulations Project a method was created for translating the PhET science and math simulations and then hosting them on the PhET website (<http://phet.colorado.edu>). This approach works because the underlying science is universal and it is only the words and norms used to represent it that must be translated. In this paper we present the current translation process and discuss the pitfalls we encountered along the way. By documenting the process, we hope others can avoid many of the difficulties we encountered while creating such a tool.

The PhET Interactive Simulations Project is a substantial and growing suite of professional quality simulations (currently ~97) for teaching and learning science. The simulations are written in Java or Flash and are distributed from the PhET website at *no cost* to users, with roughly 13 million uses in the past year. The majority of PhET simulations are for teaching physics, but there are a growing number in chemistry, biology, math and other sciences. PhET simulations provide a high degree of interactivity in terms of user control, dynamic feedback, and multiple representations. The simulations enable

W. K. Adams (✉)
Department of Physics, University of Northern Colorado,
Greeley, Co 80639, USA
e-mail: wendy.adams@colorado.edu

H. Alhadlaq · F. Alshaya · S. Alabdulkareem
The Excellence Research Center of Science and Mathematics
Education, King Saud University, PO Box 2458,
Riyadh, Saudi Arabia

H. Alhadlaq
Department of Physics and Astronomy, College of Sciences,
King Saud University, PO Box 2455, Riyadh, Saudi Arabia

C. V. Malley
PixelZoom, Inc., Boulder, Co, USA

K. K. Perkins · J. Olson · C. E. Wieman
Department of Physics, University of Colorado, Boulder,
Co 80309, USA

C. E. Wieman
The Carl Wieman Science Education Initiative, University
of British Columbia, Vancouver, BC V6T 1Z3, Canada