

# NetLogo Web: Bringing Turtles to the Cloud

**David Weintrop**, *dweintrop@u.northwestern.edu*  
Learning Sciences, Northwestern University

**Arthur Hjorth**, *arthur.hjorth@u.northwestern.edu*  
Learning Sciences, Northwestern University

**Corey Brady**, *cbrady@northwestern.edu*  
Learning Sciences, Northwestern University

**Uri Wilensky**, *uri@northwestern.edu*  
Learning Sciences, Computer Science and Complex Systems, Northwestern University

## Abstract

This workshop will be a hands-on introduction to the recently released NetLogo Web platform. NetLogo is a widely used agent-based modelling (ABM) environment that has widespread use in classrooms and research laboratories around the world. The NetLogo Web project brings this popular platform into the cloud, making it fully accessible through any modern browser. This means netbooks, tablets, and even smart phones, can now serve as platforms for designing, implementing, and running powerful agent-based models. The goal of this workshop is two-fold: (1) introduce learners to the next iteration of NetLogo and (2) demonstrate the pedagogical and expressive power of having a fully functional ABM environment in the browser.

## Keywords

NetLogo; Agent-based Modelling; Complex Systems; Online Learning Environments

The currents of educational technology are steadily pushing learning environments off of hard drives and standalone platforms and lifting them into the cloud. By providing browser access to learning tools hosted on the Internet, the technological barrier to entry can drop dramatically, as web-browsers that support that latest technical specification are becoming increasingly ubiquitous and available on diverse and inexpensive devices. Along with wider and easier access, moving learning environments online also allows integration with existing web-based frameworks and learning environments and access to other cloud-based resources, including online data repositories, distributed computing networks, and multimedia libraries with embeddable videos and images. In this workshop, we introduce the recently released NetLogo Web platform (Wilensky, 2015), a JavaScript and HTML5-implementation of the NetLogo agent-based modelling language and environment (Wilensky, 1999), that supports the authoring and running of NetLogo agent-based model inside a browser.

NetLogo is one of the mostly widely used agent-based modeling languages, and provides modelers a “low threshold, high ceiling” environment for modeling complex systems across a wide range of domains (Tisue & Wilensky, 2004; Wilensky & Rand, 2014). It is currently used for educational purposes from as early as middle schools and for “serious research” in laboratories around the world. With NetLogo Web, this powerful learning and research environment moves into the cloud, opening up a new set of possibilities for the environment and its users.

This workshop is for researchers, designer, and educators who currently use NetLogo or are considering using NetLogo in the future. We will focus on how you can benefit from the existing NetLogo models library and library of extensions, while also benefitting from having a purely cloud-based application. During the workshop, we will introduce attendees to the basics of agent-based modeling with NetLogo, including featuring popular models from the NetLogo Models Library and activities that modify and extend existing models. After covering basic NetLogo functionality, we will highlight a number of the powerful new capabilities that are possible due to the environment being situated in the cloud. For instance, because NetLogo Web relies completely on standard web technologies, including HTML, CSS, and JavaScript. This means that NetLogo Web models

can be restyled with new CSS rules. More importantly for both teachers and for educational researchers, models in NetLogo Web can be controlled with custom JavaScript calls, and embedded into existing webpages and online educational frameworks. For example, Figure 1 shows a pair of customized NetLogo Web models that have been embedded into a larger online assessment framework designed to measure learners' computational thinking capabilities (Weintrop et al., 2014). This approach makes the collection of student responses and reflections as easy as clicking button. The workshop will also demonstrate examples of NetLogo Web models that can fetch real-time data from online databases and use that data to control the runtime behavior of the model. Similarly, we will show how NetLogo Web can be used to publish data generated by a model in real-time, so it can be interpreted by other online data analysis tools. Finally, we will show how the new NetLogo Web platform integrates with NetLogo making it possible to take advantage of features only available in the original NetLogo (like access to the large NetLogo Extensions library), as well as how you can convert existing NetLogo models into online NetLogo Web models.

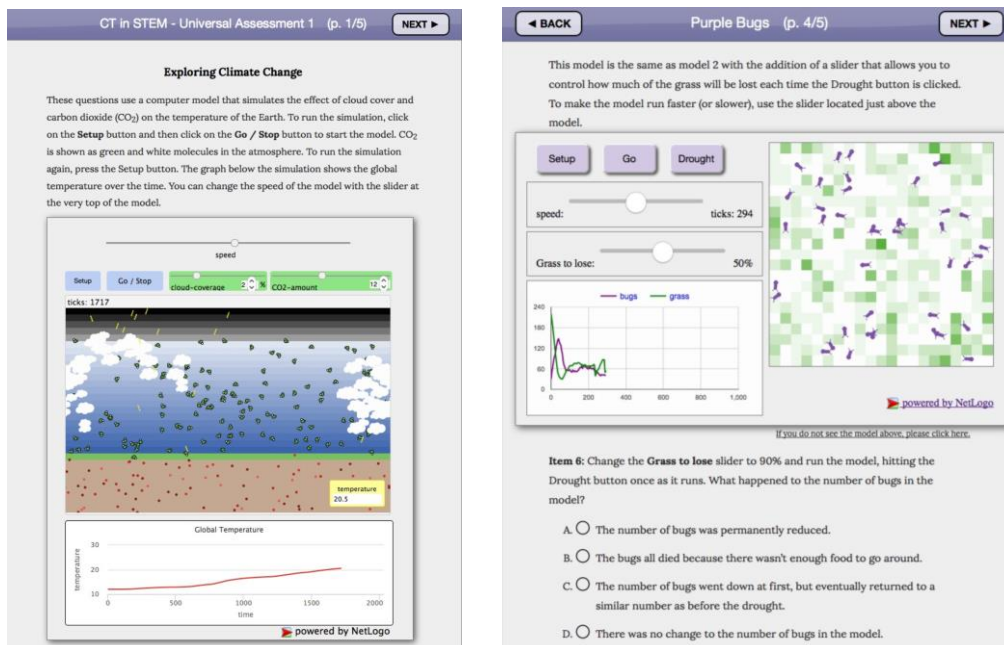


Figure 1. A pair of NetLogo Web Models embedded within the Computational Thinking in STEM Assessment Framework

## References

- Tisue, S., & Wilensky, U. (2004). NetLogo: A simple environment for modeling complexity. In *International Conference on Complex Systems* (pp. 16–21).
- Weintrop, D., Beheshti, E., Horn, M. S., Orton, K., Trouille, L., Jona, K., & Wilensky, U. (2014). Interactive Assessment Tools for Computational Thinking in High School STEM Classrooms. In D. Reidsma, I. Choi, & R. Bargar (Eds.), *Proc. of INTETAIN 2014, Chicago, IL, USA* (pp. 22–25).
- Wilensky, U. (1999). *NetLogo*. Evanston, IL: Center for Connected Learning and Computer-Based Modeling, Northwestern University. <http://ccl.northwestern.edu/netlogo>.
- Wilensky, U. (2015). *NetLogo Web*. Evanston, IL: Center for Connected Learning and Computer-Based Modeling, Northwestern University. <http://www.netlogoweb.org>.
- Wilensky, U., & Rand, W. (2014). *Introduction to Agent-based Modeling*. Cambridge, MA: MIT Press.