Journal of Sustainability Education
Vol. 19, December 2018 – February 2019
ISSN: 2151-7452

A Research Coordination Network's Impact on Sustainability Open Education

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Abstract: The research coordination network (RCN) – Climate, Energy, Environment and Engagement in Semiarid Regions (CE3SAR) is a NSF funded five-year project (2012 to 2016, extend to 2017). One goal of the RCN CE3SAR project is to enhance sustainability education in South Texas. To achieve this goal, the RCN CE^{3}SAR steering committee adopted two strategies: creating learning objects and supporting open education. This article reports the process and methods of creating and publishing RCN CE^{3}SAR sustainability learning objects as open education resources.

Keywords: learning object, sustainability education, research coordination network, South Texas, course design, open education resources, water, environment

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Introduction

The research coordination network (RCN) – Climate, Energy, Environment and Engagement in Semiarid Regions (CE^3SAR) is a NSF funded five-year project (2012 to 2016, extended to 2017). The purpose of the RCN CE^3SAR is to form a robust research, educational and engagement network of regional universities, research centers and institutes. RCN CE3SAR project is led by Texas A&M University-Corpus Christi in partnership with Texas A&M-Kingsville, University of Texas Rio Grande Valley, Texas A&M University-San Antonio, Texas A&M International University, Southwest Research Institute, Texas A&M University in College Station, and Texas State University. The Research Coordination Network (RCN) focuses on interdisciplinary collaboration across multiple institutions. There are more than 200 scientists, researchers, educators, experts, stakeholders, and concerned individuals who have joined the RCN.

One important goal of the RCN CE3SAR is to enhance sustainability education in South Texas. To achieve this goal, the RCN CE^3SAR steering committee adopts two strategies: creating learning objects and supporting open education.

The core values of open education are sharing and open access. It may reduce students' education cost and save educators' time of course creation through sharing educational resources. At the same time, open access effectively broadens the scope of learners. Anyone may access and use the educational materials free via internet. Developing open sustainability educational resources may greatly enhance sustainability education and deliver knowledge about sustainability to general publics.

Learning Objects

A learning object is a digital entity that can be reused for instruction and to support learning (Wiley, 2000). Originally, we planned to create six 3-credit hour courses on sustainability. In May 2013, we hosted a RCN CE^3SAR education virtual charette to learn the teaching needs of faculty in RCN CE^3SAR. Based on the participant feedback during the virtual charette, faculty were very interested in the curriculum that they could incorporate into their courses and somewhat less interested in building a full course to be offered elsewhere. Instead of creating 3-credit hour courses, we decided to create standalone learning objects on different sustainability topics. The duration of each learning object is 5 to 10 minutes. Figure 1 shows the course structure.

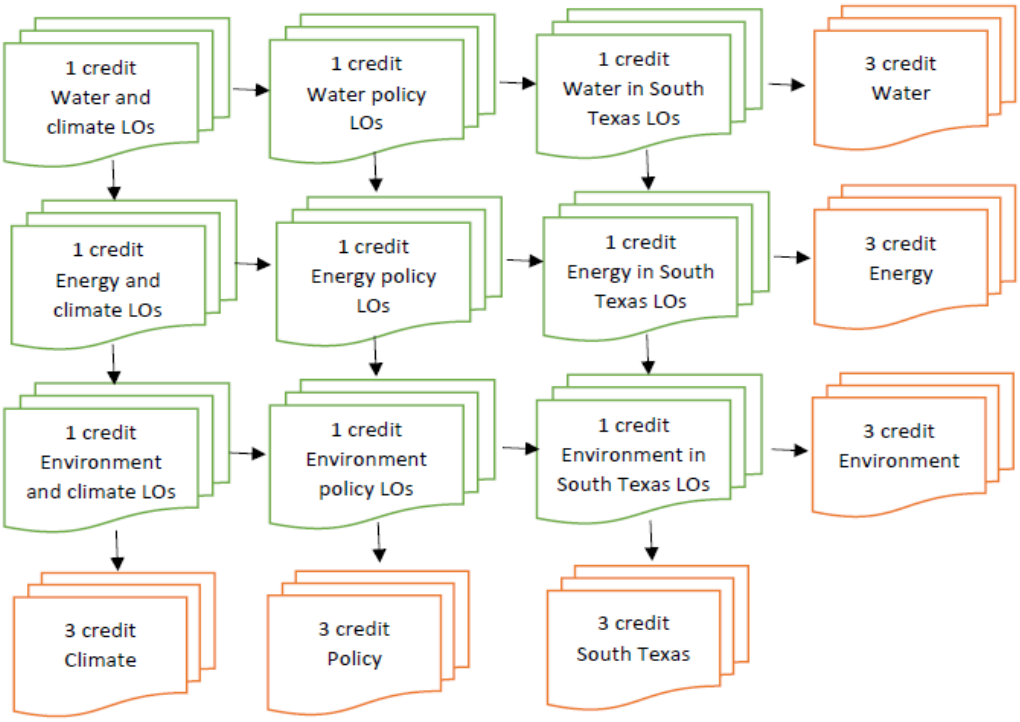

Figure 1. RCN CE[3]SAR sustainability courses structure

During the charette, we identified 9 topics that faculty were interested in. The learning objects on each topic can be built up into one 1-credit hour mini-course. A set of 9 1-credit hour online courses could be designed to snap together (like Lego's) into 3-credit hour courses when desired. Figure 1 shows a 3x3 grid with three topics (water, energy, environment) along one side of the grid and three facets (climate change, policy, South Texas) along the other side. Moving down or across the grid creates 6 obvious 3-credit hour courses, with other combinations possible of course.

Learning objects creators are faculty from different universities and institutions in the RCN CE[3]SAR. To achieve a better learning outcome, we invited Dr. Rudy Rosen to conduct a pilot test, creating learning objects on all water topics. Dr. Rudy Rosen is a Visiting Professor and Director of the Institute for Water Resources Science and Technology at Texas A&M University in San Antonio. He created 111 learning objects in video format. These learning objects cover the three water topics and each video clip can be tagged by key words and indexed into one or several water topics. The contents of these learning objects are based on an open text book, Texas Aquatic Science (http://texasaquaticscience.org/), published by Dr. Rudy. These learning objects are accessible via YouTube: Aquatic Science Lessons with Dr. Rudy Rosen (https://www.youtube.com/channel/UCHUOHiJ2dprZEWl3mutVS2g/playlists?view=1&shelf_id=0&sort=dd).

Dr. Rudy's learning objects are good examples of RCN CE[3]SAR sustainability learning objects in video format. However, learning objects may be in any formats, such as animation, video, webpage, PowerPoint slide, and image. Dr. Kenneth Tobin created 11 learning objects about South Texas in animation format. These animations cover several topics, such as water, energy, and environment. The learning objects created by Dr. Kenneth are also accessible via

YouTube: Center for Earth and Environmental Studies - TAMIU (https://www.youtube.com/channel/UCzpB3s90SJitMCoigUoeDIQ).

Open Education

In support of open education, we decided to make all the learning objects to be open educational resources (OERs). OERs are "any type of educational materials that are in the public domain or introduced with an open license. The nature of these open materials means that anyone can legally and freely copy, use, adapt and re-share them" (United Nations Educational, Science and Cultural Organization, 2017). We use the following ways to make these learning objects OERs.

We have published the learning objects in three channels. (1) YouTube: OERs can benefit both teachers and learners. We encourage the learning object creators to publish learning objects. through YouTube. The Aquatic Science Lessons video clips created by Dr. Rudy Rosen have had more than 20000 views in two years (June 2015 to June 2017). These video clips can easily be combined into a curriculum through a learning management system, such as Blackboard; (2) RCN CE^{3}SAR learning object repository (LOR): an LOR is a digital application to store, manage, and make accessible, learning objects (Barnes, et al, 2008). The Texas A&M University□Corpus Christi (TAMU□CC) Repository (https://tamucc-ir.tdl.org/tamucc-ir/) is an open online site for storing and sharing digital content created by the TAMU□CC community. This repository is also serve as a learning object repository. The learning objects created through RCN CE^{3}SAR project is stored and managed in the RCN CE3SAR Course collection (https://tamucc-ir.tdl.org/tamucc-ir/handle/1969.6/730) in the TAMUCC Repository. The RCN CE3SAR Course collection stores learning objects, related metadata, and reference materials such as open textbooks. The learning objects in this collection are downloadable and ready for faculty to reuse. (3) RCN-CE3SAR Sustainability Courses Website (http://sustainabilitycourse.org/) is especially designed to promote these learning objects. It presents not only learning objects and curricula, but also policies about using these learning objects. The website is user friendly for both learning objects creators and users. Creators can publish and tag their learning objects on this website. Users can download a learning object and learn who can use it and how to use it.

Clarifying Copyright

Copyright governs the usage of RCN CE^{3}SAR learning objects. We encourage the creators to use creative commons licenses to declare who can and how to use their learning objects, such as reuse with or without modification and allow or not allow remix. We also publish the property right statement and using policy on YouTube, the learning object repository, and the course website. The goal of creating RCN CE^{3}SAR learning objects is to support open education on sustainability. All the learning objects are free to access and to reuse for educational purpose with giving credits to the creators. Some creators also allow users to remix and modify their learning objects.

The RCN CE^{3}SAR project was a five-year project (2012 to 2016) with one-year extension. Besides the completed learning objects on water topics and South Texas overview, the learning objects on other topics were created and in the editing and reviewing stage. Once they are completed, the learning objects will be published through YouTube, RCN CE^{3}SAR learning object repository, and the RCN CE^{3}SAR course website.

Using open educational resources is a good practice in sustainability education field. The RCN CE3SAR project sets an example of supporting sustainability education by using learning objects and open access principles.

Reference

Wiley, D.A. (2000), Connecting learning objects to instructional design theory: a definition, a metaphor, and a taxonomy, in Wiley, D.A.(Ed.), *The Instructional Use of Learning Objects: Online Version*. Retrieved from http://reusability.org/read/chapters/wiley.doc

United Nations Educational, Science and Cultural Organization. (2017). *What are Open Educational Resources (OERs)?* Retrieved from http://www.unesco.org/new/en/communication-and-information/access-to-knowledge/open-educational-resources/what-are-open-educational-resources-oers/

Barnes, S., Li, F., Polyakov, S., Xu, H., & Moen E. W. (2008). A Repository for Learning Objects: Supporting the Reuse and Repurposing of Redesigned Courses and Their Content. In Grove, A. (Ed.), *71st ASIS&T Annual Meeting: Vol. 45. People Transforming Information - Information Transforming People.* Retrieved from: http://thecblor.unt.edu/files/ASIST_2008_THECB_Paper_final_25Jan2008.pdf