



Utilizing the UN Sustainable Development Goals in First-Year Seminar Courses for STEM-Linking Course Learning Communities

Vignon Oussa¹, Jennifer Mendell², Alyssa Deline³, Borianna Marintcheva²,
Thomas P. Kling⁴, Laura Ramsey⁵, Martina Arndt⁶

Departments of Mathematics¹, Biology², Chemistry³, Physics⁴, Psychology⁵, College of Science and Mathematics⁶

Bridgewater State University, Bridgewater, MA 02325



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Abstract: Four writing-intensive, inquiry-based, three-credits seminars were created to serve as the hub for linked learning communities for first-year students in STEM. Based on United Nations Sustainable Development Goals (UN SDGs), the seminars engaged students in socially-relevant modeling, lab work, and public presentations. The seminars were designed to foster a communal view of science and mathematics, both in terms of the importance of collaboration to STEM success and the application of STEM to real-world problems. Course structures and sample materials will be shared, along with preliminary analysis from a randomized control trial comparing students in the seminars to a control group of peers. In fall 2021, students who participated in the seminars reported increased awareness of the UN SDGs, valued teamwork more highly, and earned more credits and higher grades than control group students. Supported by NSF 2020765, these seminars are part of a study of the effectiveness of learning communities.

MATH 199: Math for Social Dynamics

This seminar, on mathematical modeling, social dynamics, and social justice, aims to provide students with concrete examples of how mathematics can be used to study critical societal issues such as segregation and social injustice.

Modules are built around a central thematic question: **“Is Computational Modeling useful in studying complete social systems and phenomena?”**

Three modules (social systems and modeling, economy, and segregation) are guided by

- A literature review
- Class discussions
- Guided computational experiments



UN SDG 1: End poverty in all its forms everywhere.

UN SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

BIOL 199: Clean Water, A Basic Human Right

This seminar integrates biological lab work and public health by understanding water, water sanitation, and water-borne illness. While many people have gained access to improve water sanitation in the past three decades, water borne diseases continue to cause 500,000 deaths per year.

Students read and keep reflective journals on topics that include “What Water is Safe?” and “What does Female Involvement in Water and Sanitation Mean and Why Do We Care?” **The seminar culminates in “Surviving a Zombie Apocalypse”** where students must deliver clean water to a population somewhere in the world by

- Researching current infrastructure
- Identifying materials and labor available
- Planning for scale, building a water filtration system, and testing it



UN SDG 6: Ensure availability & sustainable management of water & sanitation for all.

BIOL 199: HIV: Knowing is Everything

This seminar integrates basic concepts from biology, public health and social sciences to examine the impact of HIV on our society. Discussions focus on HIV biology, public health aspects of HIV management and disease prevention.

After gaining a basic understanding of the world of HIV, **students work collaboratively to create a campus-wide campaign for World HIV/AIDS Day** (December 1). Course activities building to this event include

- Information literacy skills built through digesting documentaries, popular media, and scientific articles
- Class discussions
- Individual research papers and group public campaign work



UN SDG 3: Ensure healthy lives and promote well-being for all at all ages

UN SDG 10: Reduce inequality within and among countries

CHEM 199: Sustainable Nanotechnologies

This seminar helps students discover how unique material properties unlocked at the nanoscale allow us to grow more food, provide clean water, and protect the environment.

“How can the tiniest technologies solve some of the world’s largest problems?” Student teams consider one of four UN SDGs, then research, design solutions and educate their classmates through

- Blog posts
- Oral presentations
- Applying nanomaterials to solve world challenges



UN SDG 2: End hunger, achieve food security and improved nutrition & promote sustainable agriculture

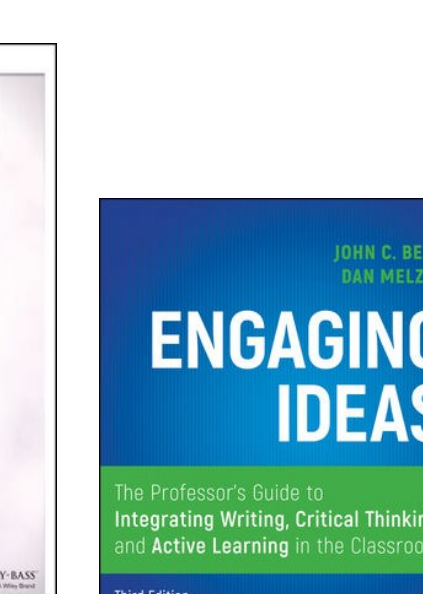
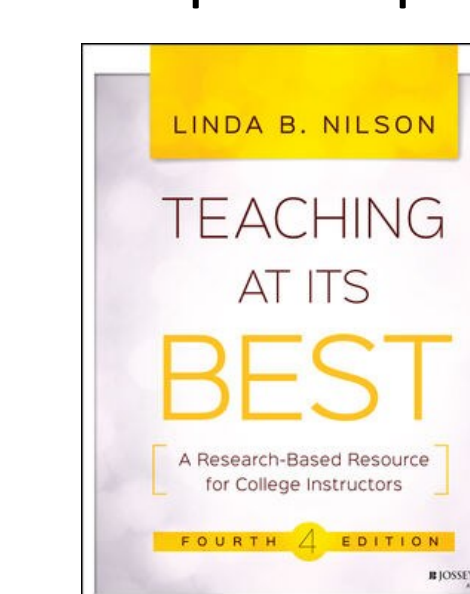
UN SDG 6: Ensure availability & sustainable management of water & sanitation for all

UN SDG 7: Ensure access to affordable, reliable, sustainable & modern energy for all

UN SDG 13: Take urgent action to combat change & its impacts

Faculty & Course Development

Emphasis placed on



- * project- or inquiry-based learning
- * group- or team-based assignments
- * social relevance
- * scaffolding writing & oral assignments

Nilson’s *Teaching at its Best*
Bean’s *Engaging Ideas*

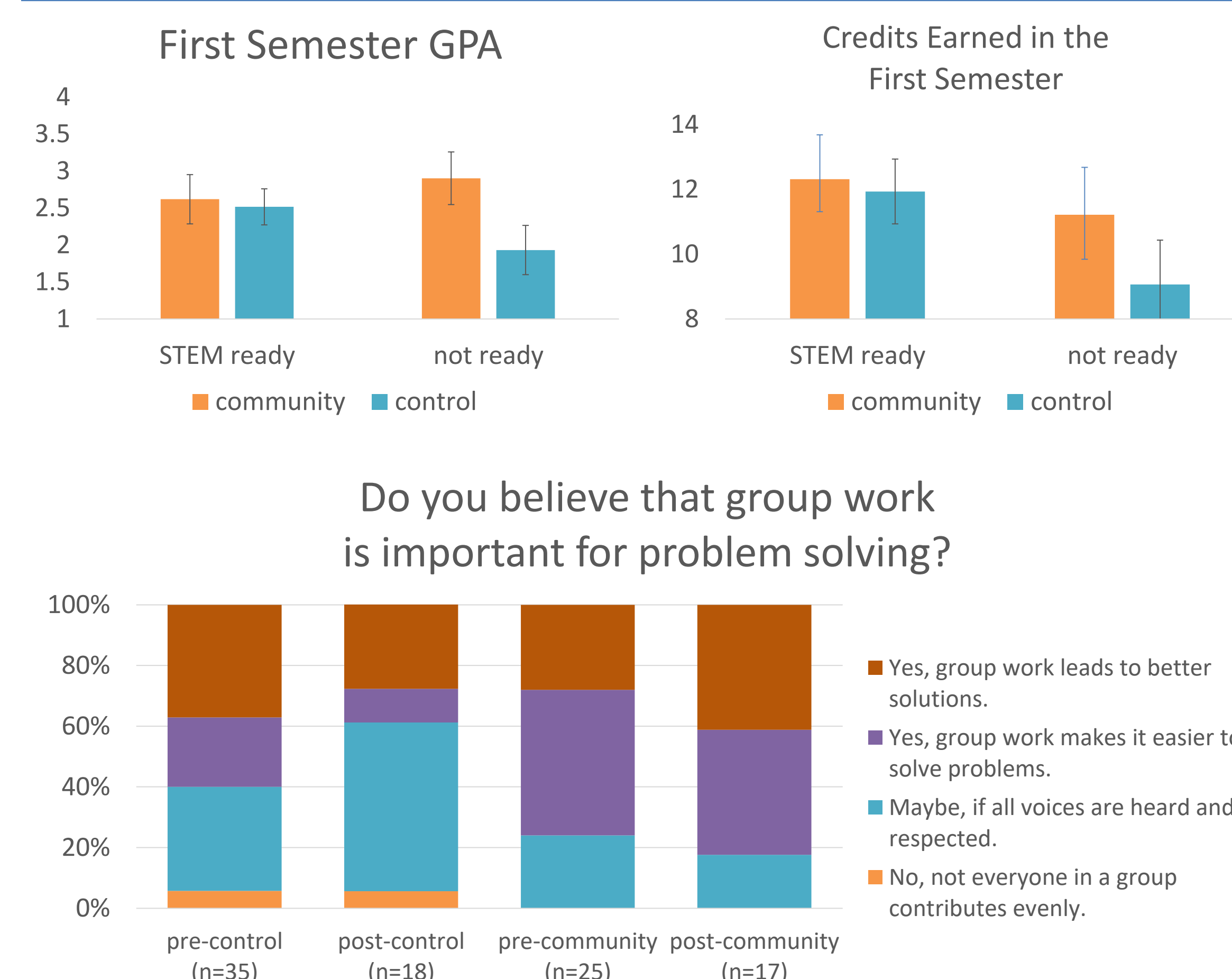
We love these books!

Study Methodology and Aims

UN SDG Seminars are the central hub in linked course communities for first semester students that includes

- A UN SDG-themed Seminar
- An appropriate mathematics course
- Either the 1st course in the students major or a communications course

Using **matched random assignment**, all incoming first-year science and mathematics majors participated in either a linked course community or a randomly created schedule. We then tested the impact of participation on GPA, retention, social belonging, and attitudes about science and mathematics.



More info: Click the QR codes for class materials or email tkling@bridgew.edu & lr Ramsey@bridgew.edu