



CENTER FOR THE INTEGRATION OF RESEARCH, TEACHING, & LEARNING

PILLARS

Three ideas are at the foundation of the CIRTL Network: Teaching-as-Research, Learning Community, and Learning-through-Diversity.

TEACHING-AS-RESEARCH

The improvement of teaching and learning is a dynamic and ongoing process, just as is research in any STEM discipline. At the core of improving teaching and learning is the need to accurately determine what students have learned as a result of teaching practices. This is a research problem, to which STEM instructors can effectively apply their research skills and ways of knowing. In so doing, STEM instructors themselves become the agents for change in STEM teaching and learning.

Teaching-as-Research involves the deliberate, systematic, and reflective use of research methods to develop and implement teaching practices that advance the learning experiences and outcomes of students and teachers.

LEARNING COMMUNITY

Learning communities bring people together for shared learning, discovery, and the generation of knowledge. Development of a learning community is fostered by shared discovery and learning where, rather than relying on traditional “expert centered” lecture formats, participants learn collaboratively and come together to achieve learning goals. Learning communities develop when the interactions among learners are meaningful, functional and necessary for the accomplishment of the “work” within the community. Learning communities flourish when implicit and explicit connections are made to experiences and activities beyond the program in which one participates. Finally, the success of learning communities rests on welcoming the diverse backgrounds and experiences of learners in such a way that they help inform the group’s collective learning.

LEARNING-THROUGH-DIVERSITY

The CIRTL Network’s contributions to diversity in STEM are founded on the principle that excellence and diversity are necessarily intertwined. Faculty and students bring an array of experiences, backgrounds, and skills to the teaching and learning process. Effective teaching capitalizes on these rich resources to the benefit of all, which we call “Learning-through-Diversity.”

At the same time, CIRTL recognizes the reality that existing social and educational practices do not always promote equal success for all learners. Thus, creating equitable learning experiences and environments requires intentional and deliberate efforts on the part of present and future faculty. The CIRTL Network is committed to developing a national STEM faculty who model and promote the equitable and respectful teaching and learning environments necessary for the success of Learning-through-Diversity.

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TEACHING-AS-RESEARCH

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Teaching-as-Research involves the deliberate, systematic, and reflective use of research methods to develop and implement teaching practices that advance the learning experiences and outcomes of students and teachers.

Participants in teaching-as-research apply a research approach to their teaching practice. Conceptual steps in the teaching-as-research process are:

1. Learning foundational knowledge. (What is known about the teaching practice?)
2. Creating objectives for student learning. (What do we want students to learn?)
3. Developing an hypothesis for practices to achieve the learning objectives. (How can we help students succeed with the learning objectives?)
4. Defining measures of success. (What evidence will we need to determine whether students have achieved learning objectives?)
5. Developing and implementing teaching practices within an experimental design. (What will we do in and out of the classroom to enable students to achieve learning objectives?)
6. Collecting and analyzing data. (How will we collect and analyze information to determine what students have learned?)
7. Reflecting, evaluating, and iterating. (How will we use what we have learned to improve our teaching?)

The application of teaching-as-research is meant to lead STEM instructors to a continuous process of discovery and change throughout their careers.





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LEARNING COMMUNITY

Learning Communities bring people together for shared learning, discovery, and the generation of knowledge. Within a learning community (LC), all participants take responsibility for achieving the learning goals. Importantly, learning communities are the process by which individuals come together to achieve learning goals. These learning goals can be specific to individual courses and activities, or can be those that guide an entire teaching and learning enterprise.

The following four core ideas are central to the learning community process:

- **Shared discovery and learning.** Collaborative learning activities where participants share responsibility for the learning that takes place help the development of a learning community. Rather than relying on traditional “expert centered” lecture formats, practitioners should include collaborative learning techniques so learners can see their contribution to the learning goals.
- **Functional connections among learners.** Learning communities develop when the interactions among learners are meaningful, functional and necessary for the accomplishment of the “work” within the courses or learning activities (rather than serving as “window dressing” or simply as a “feel good” activities). Moreover, meaningful connections must extend throughout the entire learning community—for example, among students, post-docs, faculty, and staff—rather than simply among cohort- or role-related peers.
- **Connections to other related learning and life experiences.** Learning communities flourish when implicit and explicit connections are made to experiences and activities beyond the course or program in which one participates. These connections help situate one’s learning in a larger context by solidifying one’s place in the broader campus community of learners and life experiences. These connections decrease one’s sense of curricular and personal isolation.
- **Inclusive learning environment.** Learning communities succeed when the diverse backgrounds and experiences of learners are welcomed in such a way that they help inform the group’s collective learning. Whenever possible, activities should be sought that help participants reach out and connect with others from backgrounds different from their own.





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LEARNING-THROUGH-DIVERSITY

The literacy and engagement of all students in science, technology, engineering, and mathematics is a priority goal for U.S. higher education. The Center for the Integration of Research, Teaching, and Learning (CIRTL) seeks to contribute to this goal by enabling present and future STEM faculty to enhance the learning of all students whom they teach irrespective of, but not limited to, preferred learning styles, race, ethnicity and culture, gender, sexual orientation, disabilities, religion, age or socioeconomic backgrounds.

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At the same time, CIRTL recognizes the reality that existing social and educational practices do not always promote equal success for all learners. Thus, creating equitable learning experiences and environments requires intentional and deliberate efforts on the part of present and future faculty. CIRTL is committed to developing a national STEM faculty who model and promote the equitable and respectful teaching and learning environments necessary for the success of Learning-through-Diversity.

To achieve these goals, CIRTL provides development experiences, programs and resources that promote the abilities of present and future faculty to:

- Know the diverse backgrounds of their students and their implications for learning.
- Identify curricular, teaching and assessment practices that promote learning for all.
- Draw upon the diversity of their students to enhance and enrich the learning of all.
- Recognize existing inequities, and promote an equitable, inclusive and respectful climate for learning.

These aims require specific attention of the practitioner to:

- Practitioner-participant interactions – such as inclusion and engagement of the ideas of all participants; respectful teaching behaviors; accessibility for all participants; mentoring of less experienced practitioners.
- Participant-participant interactions – such as welcoming and respectful inclusion in collaborative work; respect for the ideas of all and recognition of their value; accessibility in activities that occur outside of the primary learning environment.
- Participant-content interactions - such as how participants experience content; how content can be adapted and varied; and how exploring novel contexts for presentation can enrich the experience of participants and practitioners alike.

