

University of Minnesota Duluth
Swenson College of Science and Engineering (SCSE):
Addressing SCSE student retention and graduation rates through
authentic disciplinary experiences

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University of Minnesota Duluth

Swenson College of Science and Engineering (SCSE): Addressing SCSE student retention and graduation rates through *authentic disciplinary experiences*



Federally recognized tribal lands in the Northwoods



Tribal Land **Treaty Boundary*** **Tribal Adaptation Menu team member** **Northwoods**

*On treaty lands, tribes have the right to hunt, fish and gather.

Source - U.S. Fish and Wildlife Service, Tribal Adaptation Menu, the Climate Change Response Framework

We collectively acknowledge that the University of Minnesota Duluth is located on the traditional, ancestral, and contemporary lands of Indigenous people. The University resides on land that was cared for and called home by the Ojibwe people, before them the Dakota and Northern Cheyenne people, and other Native peoples from time immemorial. Ceded by the Ojibwe in an 1854 treaty, this land holds great historical, spiritual, and personal significance for its original stewards, the Native nations and peoples of this region. We recognize and continually support and advocate for the sovereignty of the Native nations in this territory and beyond. By offering this land acknowledgment, we affirm tribal sovereignty and will work to hold the University of Minnesota Duluth accountable to American Indian peoples and nations.

UMD

**SWENSON COLLEGE
OF SCIENCE & ENGINEERING**

UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover

University of Minnesota Duluth

Swenson College of Science and Engineering (SCSE):

Addressing SCSE student retention and graduation rates through *authentic disciplinary experiences*

Academic Departments:

- Biology
- Chemistry and Biology
- Earth and Environmental Sciences
- Mathematics and Statistics
- Physics and Astronomy
- Chemical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering
- Mechanical and Industrial Engineering

Institutional Partnerships:

- Large Lakes Observatory (LLO)
- Iron Range Engineering Program
- Water Resources Science
- Advanced Materials Center
- Air Force ROTC Aerospace Studies
- Natural Resources Research Institute (NRRI)
- Minnesota Sea Grant

SCSE Demographics:

- Regional Comprehensive University
- 3200 Undergraduate Students
 - 15% from underrepresented backgrounds
 - 21% Pell Eligible
- 200 Graduate students, primarily Masters seeking
- Third largest college in the University of Minnesota System

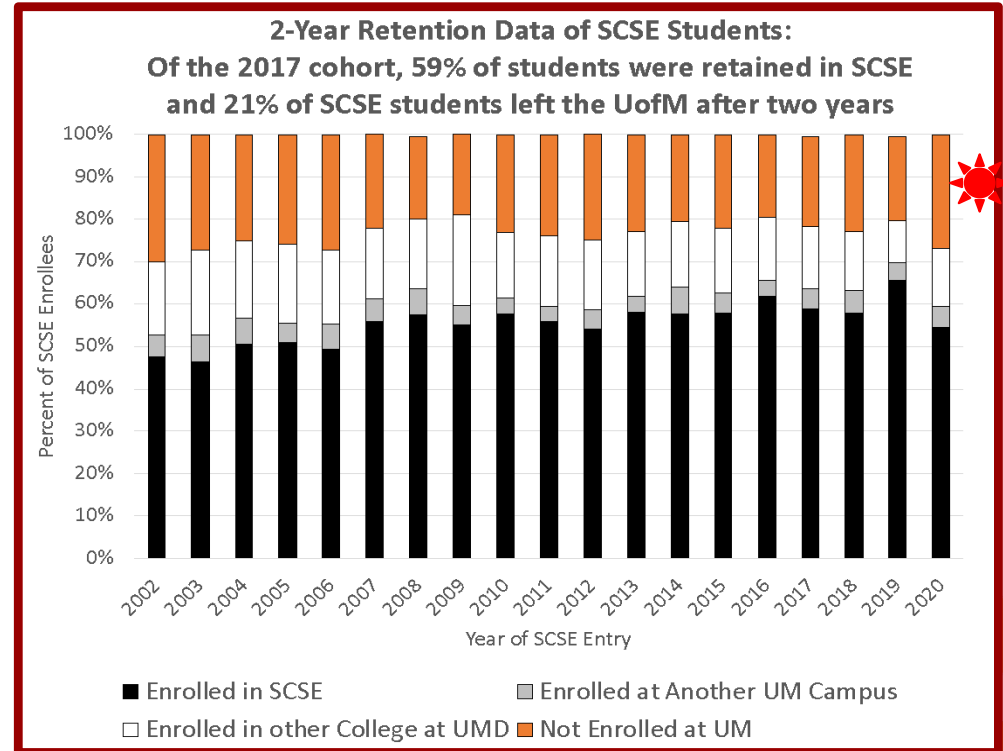
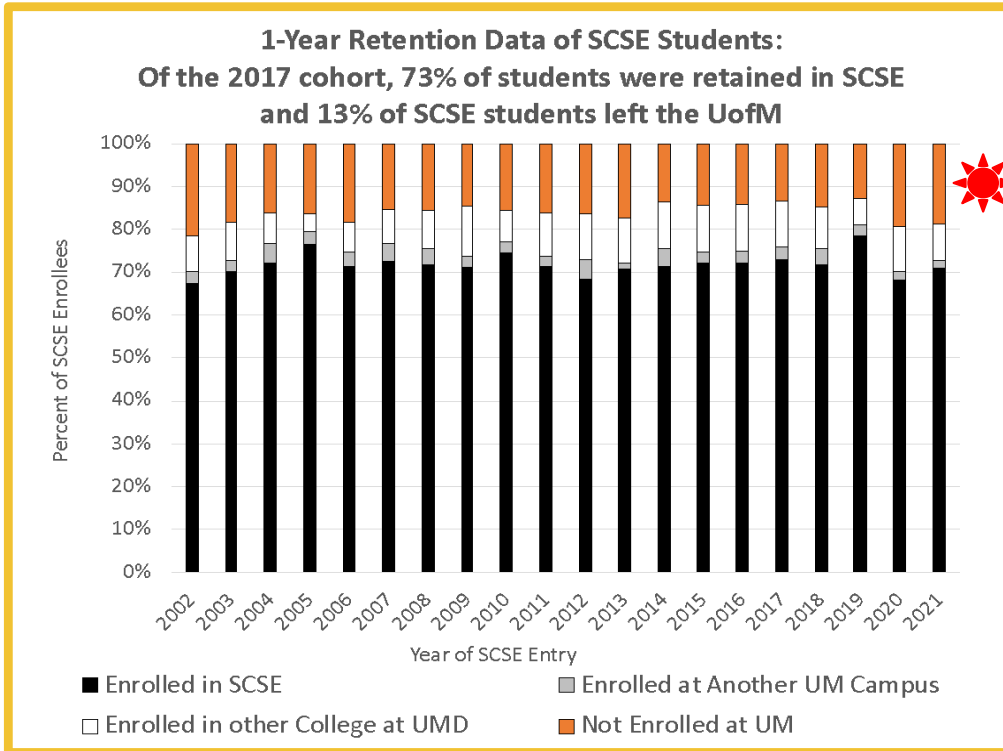
Swenson Family Donation

A large five-year gift focused on increasing research experiences for first and second year undergraduates

How do we best use these fund?



Swenson Funding: Addressing SCSE student retention and graduation rates through *authentic disciplinary experiences*



Of the 2017 SCSE first-time first-year cohort, 53% graduated from SCSE in five years.

13% left the UofM system after one year (orange bars, left)

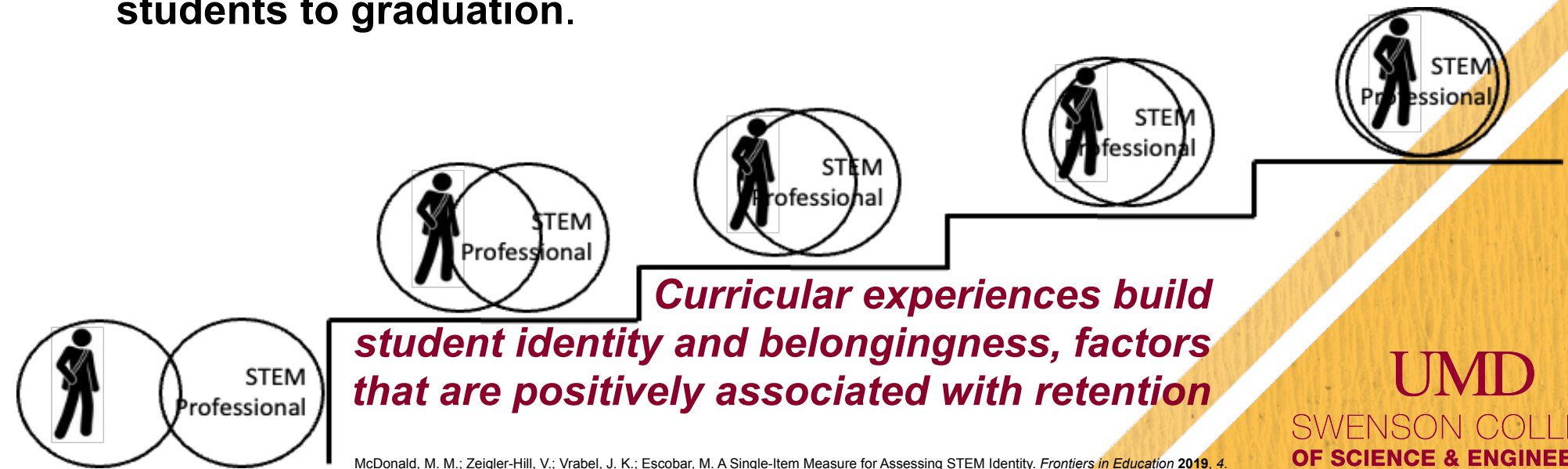
21% left the UofM system after two years (orange bars, right)

Incorporating **Swenson Signature Experiences (CUREs, VIP, other programs)** in the first- and second- years and vertically integrated throughout the undergraduate curriculum can improve student retention and graduation rates and the quality of the program for all students.

Program Goal:

Signature Swenson experiences in every discipline

1. Every student participates in an authentic disciplinary experience in their **first year of the program**.
2. Swenson experiences continue through a student's entire degree program, defined as **vertical integration**, with a particular focus on **improving sophomore experiences**.
3. The experience is **inclusive with no barriers to participation**; programs should strive for automatic enrollment in these experiences, with no special section for specific groups required.
4. The experience is **cost neutral** after the piloting and implementation period.
5. The experience serves to **enhance recruitment, retention, and persistence of students to graduation**.



McDonald, M. M.; Zeigler-Hill, V.; Vrabel, J. K.; Escobar, M. A Single-Item Measure for Assessing STEM Identity. *Frontiers in Education* 2019, 4.

Program Implementation and Timeline:

Academic Year 2023-24: The Imagination Phase

By the end of AY 2023-24, all departments will plan and develop (*not implement*) curriculum for first year majors in their discipline. At minimum, the curriculum will include a discipline-appropriate project/research approach/module/etc that:

1. Engages students in skills, activities, problem solving, and/or research specific to their discipline, resulting in discoveries that are new to the student and potentially to the instructor,
2. Provides opportunities for students to work in teams using best practice pedagogical approaches for team creation and instruction, and
3. Emphasizes the discovery of new knowledge (for the student and/or instructor) and the iterative process of professional work, incorporating failure, critique, revision, and growth as an essential part of the experience.

Additional approaches to consider include project outcomes that result in broad relevance of results outside the classroom, support of faculty scholarship and exploration, mentoring and leadership development, and long-term involvement in disciplinary work.

Academic Year 2024-25: The Piloting Phase

During AY 2024-25, departments will pilot curriculum for entering first year students. The pilot may involve all first-year students or a portion of first year students, allowing the department to phase in the curriculum and compare previous and new approaches.

Departments will develop plans for vertical integration of the curriculum so that the student learning outcomes achieved in the pilot are carried through a student's degree program.

Academic Year 2025-26: The Piloting Phase

Pilots will be continued with changes incorporated based on the first pilot year.

Academic Year 2026-27: The Implementation Phase

Full implementation of curriculum. Administrative tasks such as tagging courses for student tracking, finalizing catalog requirements, etc., will be completed.

Academic Year 2023-24: Imagination

Disciplinary experiences
Collaboration
Discovery and Iteration

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