# Active Learning Environments Support STEM Education

A post-occupancy study of North Dakota State University's A. Glenn Hill Center for STEM Education builds awareness of how physical environments influence 21st century learning goals and encourages new explorations into active learning experiences in undergraduate classroom designs.

## Overview

Learning is more effective when it is activity-based and done collaboratively. While students must still learn to work independently, collaborative learning allows students to "exceed what can be attained alone" (Falchicov, 2007, p. 129). Classroom space design can effectively support both collaborative, active learning for students and active learning pedagogies for faculty.

As North Dakota State University (NDSU) started the design process for the new A. Glenn Hill Center for STEM Education in Fargo, North Dakota, one primary goal was to maximize collaborative learning and student engagement through physical layout and design. To achieve this goal, BWBR (in collaboration with local firm Zerr Berg Architects) created a facility specifically designed with active learning classrooms, STEM laboratories, and a variety of collaboration spaces that support student needs.

The facility featured five types of active learning classrooms with varying features and design strategies to support flexibility for instruction.

*AT A GLANCE*

*Project Type*
**Higher Education**

*Location*
**Fargo, ND**

**119,500**
*Square Feet*

*Completion*
**2016**

## Methodology

A post-occupancy study completed by BWBR staff in partnership with NDSU faculty explores ways in which the building and classroom spaces support learning and teaching experiences. The study focused on identifying classroom features and design strategies that enhance opportunities for student collaboration and student-faculty interactions for active-learning coursework.

To gather feedback on the classroom features and design, faculty were invited to participate in a focus group. Additionally, an online survey was sent to all faculty who have taught in an A. Glenn Hill Center classroom. The research team aimed to balance perspectives of the teaching-learning experience, inviting students who had courses hosted in the new facility to participate in a focus group as well as an online survey.

## Findings

The most effective design strategies for supporting student collaboration in the classroom were found to be **room layout** and **room size**. Of the five layouts measured, the enhanced active learning classroom (with multiple monitors, white boards along the perimeter, large round tables, and mobile seating) was rated as the most effective by both faculty and students. The classroom style ranked as second most effective featured mobile seating with attached work surfaces and a central podium in the room.

Additional elements and features that faculty identified for engaging student-to-student collaboration and student-faculty interaction included white boards (both mounted on the perimeter of the room and handheld boards provided with student tables) and the ability to share information on multiple monitors.

Both students and faculty found **flexible furniture arrangements** in classrooms conducive to learning through the ease of group formation. Nearly 40% of faculty consider mobile chairs to be an effective means for encouraging student collaboration.

Findings from the focus groups and surveys revealed training was essential for success. Faculty need training on the provided technology and on the features of the spaces to optimize active learning instruction and the use of the new classrooms.

More than **64%** of students*

*indicated the new* **classroom layouts** *enhanced their* **active learning experience** *and engaged them in collaborative learning*

**25%** of students

*further remarked that* **technology** *(projectors, screens, access to equipment) makes A. Grenn Hill Center a* **positive & productive** *learning center.*

**responding to the survey*

## Impact and Insight

Overall, students and faculty express high satisfaction with the STEM facility. NDSU's facility investment in STEM education is well-received as a sense of pride by faculty and as a desired study destination by students. Active learning strategies are enhanced by the availability of classrooms and spaces designed specifically to amplify the impact of active learning approaches. While many faculty are still adjusting course pedagogies to incorporate more active learning, students welcome more active participation during class as part of their learning experience.

### Recognition

***2017 Merit Award***

*American Institute of Architects - North Dakota*

### Reference

Falchicov, N. (2007). The place of peers in learning and assessment. In D. Boud & N. Falchikov (Eds), *Rethinking Assessment in Higher Education* New York: Routledge.

*BWBR supports research across all areas of our practice to inform design decisions and build knowledge about occupant and building performance.*