

# WHAT'S IN A BUILDING NAME?

Understanding Student Achievement in our Learning Spaces

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# LEARNING OUTCOMES

1. Identify student and learning space characteristics that relate to student achievement
2. Identify features of large learning spaces that may promote or hinder academic achievement



# Learning Environment Design Impact Study

## Learning Environments & Technologies Team

### Goal:

Investigate UB central and departmental classrooms to seek evidence of learning space design on student achievement

### Phases:

1. Visual Exploration
2. Secondary Exploratory Data Analysis
3. Large Learning Space Study (ongoing)



# Visual Exploration

## Data:

- Courses from FA 2014 to SP 2019
- 53 buildings across all UB campuses

## Goal:

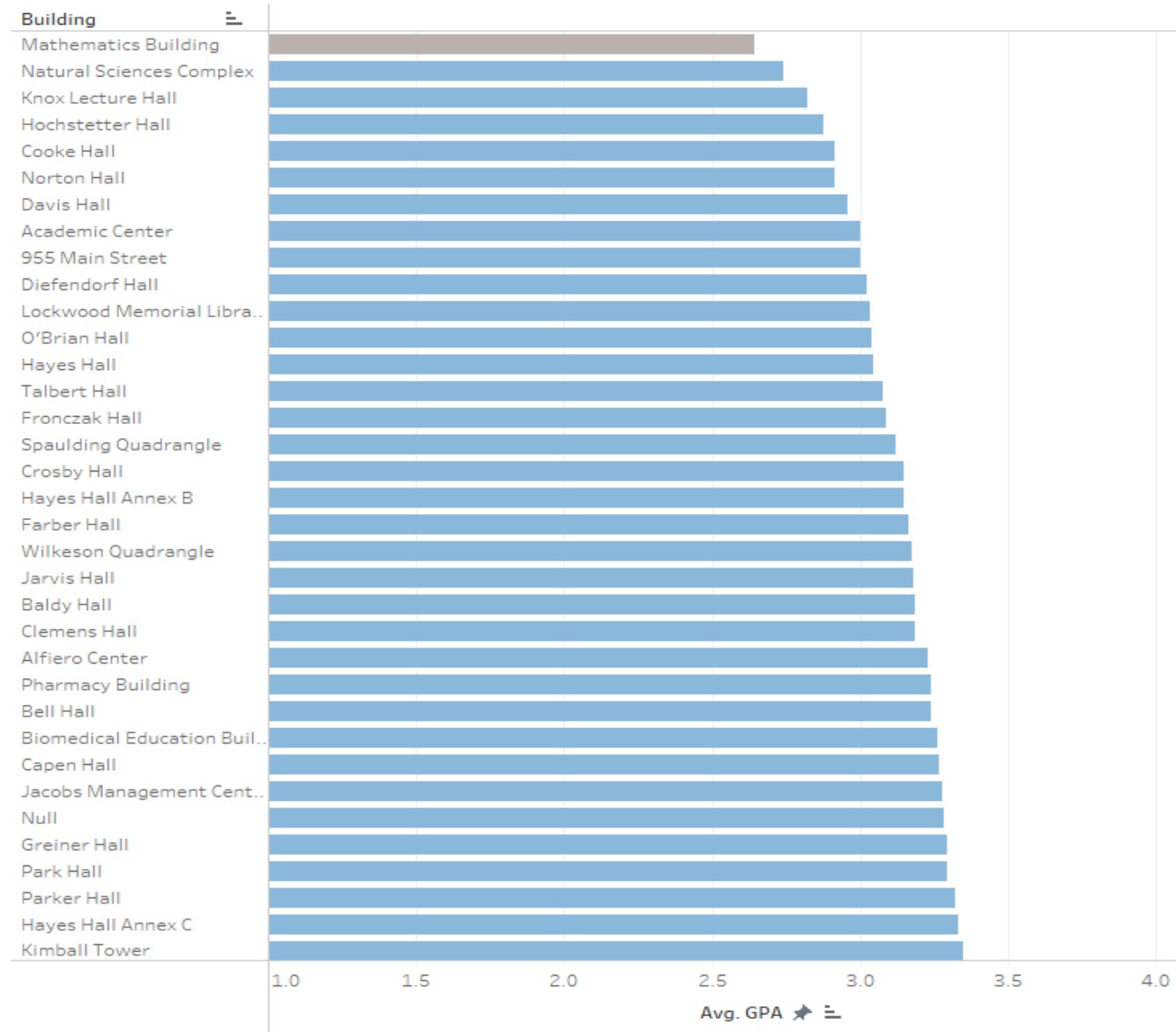
- Identify buildings and classrooms with lowest average GPAs
- Identify patterns that may explain variation in GPA to inform future project phases



# Patterns

- Average GPAs across all years tend to be a C or better, with small building variation
- Buildings hosting **large, introductory, or STEM courses** had the lowest GPAs
- NSC is selected as a case study classroom
  - 225, 201, 210, 215, 220 among the lowest scoring spaces

Building GPAs



What do you notice?

# Additional Considerations

1. Some **introductory and/or STEM** courses had low average GPAs, **regardless of learning space**
2. For buildings with **high GPAs**, performance seemed to be based on the **course** rather than learning space
3. Variation within courses and classroom may be attributed to instructor



# Secondary Exploratory Data Analysis

## Goal:

- Determine whether learning space renovation is related to student GPA
- Is gender and/or race/ethnicity related to GPA?

## Data:

- Pre & post renovation data in Alumni 88 and 90
- 3 years before and after renovation
- Descriptive statistics and correlations



# Alumni 88 – Renovation in 2016

## Pre-renovation ( $n = 831$ )

- Average student GPA was 3.34 (SD = .89)
- Identifying as female was significantly and positively related to GPA, but the effect was weak.

## Post-renovation ( $n = 1168$ )

- Average GPA increased to 3.42 (SD = .86).
- Identifying as a female was significantly and positively related to GPA
- Identifying as a minority student was significantly and negatively related to GPA

**Small GPA increase**



# Alumni 90 - Renovation in 2016

## Pre-renovation ( $n = 253$ )

- Average student GPA was 2.91 (SD = .99)
- Identifying as female was significantly and positively related to GPA, but the effect was weak.

## Post-renovation ( $n = 2481$ )

- Average GPA increased to 3.26 (SD = .97).
- Identifying as a female was significantly and positively related to GPA
- Identifying as a minority student was significantly and negatively related to GPA

**Notable GPA increase**

# Additional Considerations

1. GPAs were higher post-renovation, on average, but causality cannot be determined
2. In Alumni 90, inflated sample size post-renovation may account for higher GPAs
3. Due to the nature of data collection and secondary analysis, pre-post tests for significance could not be conducted
4. Sample consisted of undergraduates, omitting analysis of academic level



# Large Learning Spaces Study

Utilizing NSC as a case study building, students in learning spaces with plans for upcoming renovation were sampled during Spring 2022 to determine the longitudinal role of renovation on student achievement.

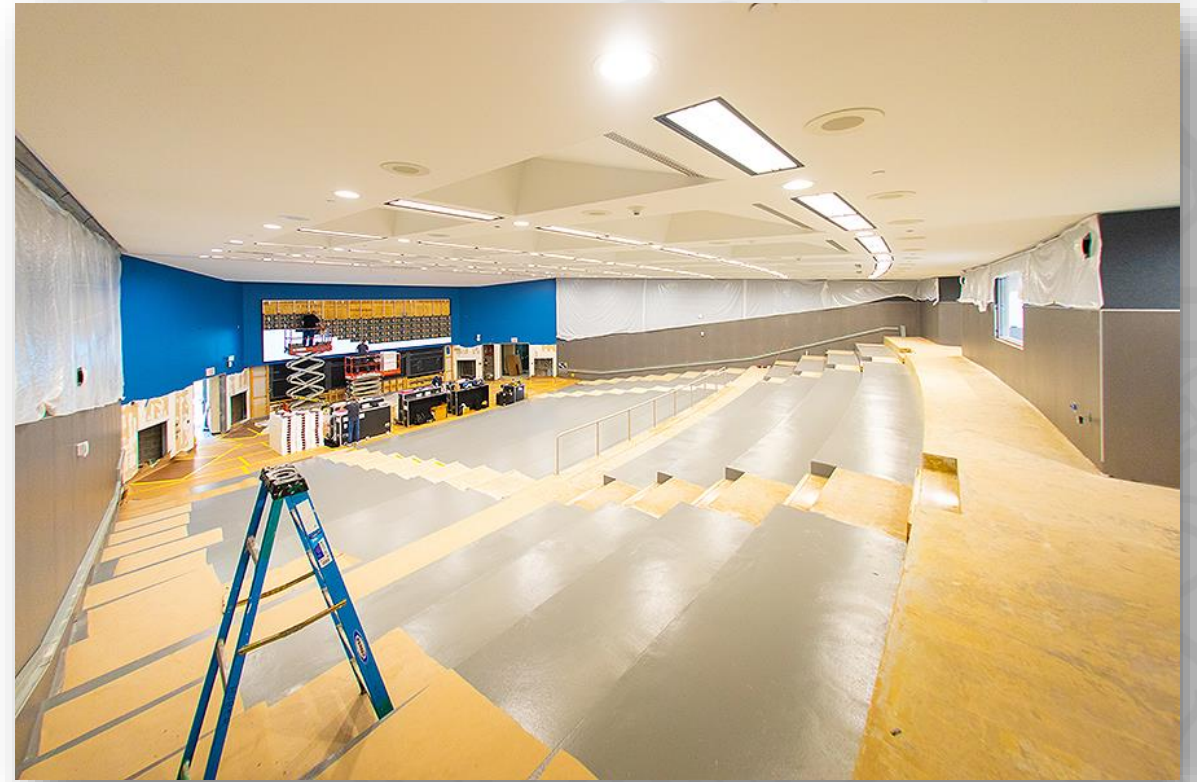
## Main Research Question:

Are student demographic characteristics or perceptions of learning space features related to GPA?



# Learning Space Features & Perceptions

- Comfortably see & hear the instructor or display
- Internal & external noise disturbance
- Adequacy of writing surfaces, seating, and proximity to other students
- Access to wifi and outlets
- Ease of groupwork/idea sharing
- Temperature & lighting promote learning
- Feeling safe and comfortable in the space



# Sample

- 505 students who attended one or more courses in **NSC 210**, **220**, and/or **215** during Spring 2022
- Students with missing demographics or did not finish the survey were removed
  - Academic level, race/ethnicity, gender identity, and cumulative GPA
- The final sample consisted of **343 students** who were 54.2% White, 50.7% male, and 88.9% undergraduate



# Data Analysis

- Most learning space feature items were measured on a 5-point Likert scale
  - 1 = strongly disagree; 2 = somewhat disagree; 3 = neither agree nor disagree; 4 = somewhat agree; 5 = strongly agree
- Higher average scores represent higher degrees of agreement with the item statement.
- Listwise deletion utilized for missing data
- Descriptive statistics and bivariate correlations conducted for continuous survey items



# Descriptive Statistics

1. On average, students tend to **somewhat agree** that they can comfortably **see the instructor and digital display** in all three learning spaces.
2. Students tended to **neutrally/somewhat agree** with a majority of remaining items, including that they **felt safe**, could **hear the instructor** comfortably, had access to **wifi**, and had **adequate writing surfaces and space** to complete activities independently or with others across all three learning spaces.



# Continued

- Internal & external **noise disturbance** was not widely prevalent
- Students **somewhat disagreed** with their willingness to use standing desks, if available.
- Students tended to **neutrally/somewhat disagree** that **access to outlets** was sufficient
- Classroom **chairs were uncomfortable.**
- **NSC 215** had lowest degree of student satisfaction
  - Students disagreed that the overall feeling of the space was positive





# Bivariate Correlations- NSC 210

- N = 117
- Identifying as an **undergraduate student** was significantly related to **lower GPAs** compared to their graduate student counterparts
- Having adequate **writing surfaces**, **sufficient space** to complete activities, access to **wifi**, and feeling **comfortable** in the space were significantly but weakly related to increased cumulative GPAs
- All learning space features were significantly related to feeling **safe and comfortable** in the learning space



# Bivariate Correlations- NSC 215

- N = 87
- Being able to comfortably **hear and see the instructor and display**, having access to **wifi**, feeling **comfortable**, and having **lighting quality** that promoted learning were significantly and positively related to increased GPA
- Reported **outside noise disturbances** from next door rooms or hallways was significantly related to lower GPAs
- All learning space features were significantly related to feeling **safe and comfortable** in the learning space



# Bivariate Correlations- NSC 220

- N = 91
- Identifying as an **undergraduate student** was significantly related to **lower GPAs** compared to their graduate student counterparts
- Only **feeling safe** in NSC 220 was significantly related to **increased GPAs**
- **All features**, except internal noise disturbance, were significantly related to **overall positive feelings** of the space.



# Summary Points

- Students had overall positive/neutral feelings about classroom features, except for access to outlets and comfort of chairs
- Many classroom features & student demographics were not related to GPA
- Findings regarding correlations with GPA may be due to factors not included in this study (personal factors, other coursework, major, etc.) or small sample sizes by space
- Future classroom renovations may include improving outlet access and furniture quality



# Future Directions

- Survey will be repeated post- renovation to identify how perceptions and relationships have changed
- Standardize and repeat this process across other learning spaces
- Conduct focus groups with students surveyed to reflect on their responses

