

## IUPUI Classroom Needs Analysis 2018

# IUPUI Classroom Needs Analysis 2018

*ANASTASIA S. MORRONE*



IUPUI Classroom Needs Analysis 2018 by The Trustees of Indiana University is licensed under a Creative Commons Attribution 4.0 International License, except where otherwise noted.





# Contents

Executive Summary	1
IUPUI CLASSROOM NEEDS ANALYSIS COMMITTEE MEMBERS	1
KEY FINDINGS	2
RECOMMENDATIONS	4
IUPUI Faculty Survey – 2018	
Purpose, Methods, and Respondents	7
PURPOSE	7
METHODS	7
RESPONDENT CHARACTERISTICS	8
RESPONDENT CHARACTERISTICS BY POSITION	9
Frequency of Instructional/Pedagogical Strategies	10
USE OF INSTRUCTIONAL/PEDAGOGICAL STRATEGIES ALMOST EVERY OR EVERY CLASS	11
Importance of Classroom Attributes	12
CLASSROOM ATTRIBUTES VERY/EXTREMELY IMPORTANT	13
Most Important Classroom Attributes	15
Faculty Focus Group Report	
Purpose, Methods, and Participants	18
PURPOSE	18
METHODS	18
PARTICIPANT CHARACTERISTICS	19
PARTICIPANT SCHOOLS	19
ACADEMIC LEVEL OF COURSES TAUGHT	20
NUMBER OF STUDENTS IN CLASSES TAUGHT	20
ACTIVITIES DURING CLASS MEETINGS	20
Analysis	22
Salient Findings	23

IUPUI Student Survey	
Purpose, Method, and Participants	28
PURPOSE	28
METHODS	28
PARTICIPANTS	28
Frequency of Instructional/Pedagogical Strategies	30
Importance of Classroom Attributes	31
Problematic Classrooms at IUPUI, According to Students	33
Reasons of Liking the Classroom	35
Faculty Interviews: Mosaic and Standard Classrooms	
Purpose and Methods	37
PURPOSE	37
METHODS	37
Findings	38
Mosaic Senior Faculty Fellow Feedback	
Purpose and Methods	41
PURPOSE	41
METHODS	41
Findings: Tools to support active learning	42
SELECT DETAILED RESPONSES	42
Findings: Changes to traditional spaces to support active learning	44
SELECT DETAILED RESPONSES	44
Findings: Most significant issues in classroom support and development	46
SELECT DETAILED RESPONSES	46
Classroom Needs Analysis Focus Group Questions	48
Notes, Learning Space Examples	50
History of Active Learning Classrooms	58
MOSAIC INITIATIVE	58
MOSAIC FACULTY FELLOWS	59
ACTIVE LEARNING CLASSROOMS AT IUPUI	60

# Executive Summary

In August 2017, Executive Vice Chancellor Kathy Johnson charged the IUPUI Classroom Needs Analysis committee with conducting a year-long study that would: “gather broad input from faculty and students on the types of classrooms we need at IUPUI to best support instruction ... and to outline your recommendations for the types of classrooms that we need to best support instruction at IUPUI.”

The intent of this classroom needs analysis report was to comprehensively examine faculty and student perceptions of physical teaching and learning environments across IUPUI. We used mixed methods procedures that encompassed large-scale faculty (N=1,170) and student (N=502) surveys, nine faculty focus groups (N=39 total faculty), an IUPUI Mosaic Faculty Fellows focus group, and individual faculty interviews (N=6).

The analysis revealed that faculty most frequently adopted the following pedagogical strategies: interactive lecture, class discussion, collaborative learning, and group activities. These findings indicate that even in lecture-room settings, classroom designs should provide enough flexibility to facilitate group discussion and collaboration activities.

Provided with an opportunity to identify learning spaces on IUPUI's campus that are particularly problematic, students referenced buildings erected during the 1970s as being most in need of renovation. Learning spaces in particular need of improvement include Cavanaugh Hall, the Engineering and Technology Building, Lecture Hall, and the Nursing Building.

As IUPUI considers future designs for classroom spaces, input from faculty and students is critical. The IUPUI Classroom Needs Analysis committee is grateful to the faculty and students who provided us with the insights presented in this report.

The report first presents key findings and recommendations, and then follows with detailed summaries from each of the studies we conducted.

## IUPUI CLASSROOM NEEDS ANALYSIS COMMITTEE MEMBERS

### **Anastasia Morrone, PhD**

Associate Vice President, IU Learning Technologies

Dean of IT, IUPUI

Professor, Educational Psychology

### **Silvia Bigatti, PhD**

Professor, Social and Behavioral Sciences

### **Nicole Collins**

Associate Registrar, IUPUI

### **Michele Hansen, PhD**

Assistant Vice Chancellor, Institutional Research and Decision Support

Adjunct Associate Professor, Psychology

### **Debora Herold, PhD**

Senior Lecturer, Psychology

**Douglas Jerolimov, PhD**

Instructional Design Consultant, IUPUI Center for Teaching and Learning

**Julie Johnston**

Director, Learning Spaces, IU Learning Technologies

**Brian Krohn, PhD**

Associate Professor, Tourism, Conventions and Event Management

**Tiffany Roman, PhD**

Research Assistant, IU Learning Technologies

**Terri Tarr, PhD**

Director, IUPUI Center for Teaching and Learning

## KEY FINDINGS

The following are a synthesis of the key findings from the IUPUI Faculty Survey (administered spring 2018 to a census of all IUPUI faculty excluding the School of Medicine), faculty focus group and interview results, and an IUPUI Student Survey.

**Faculty Survey**

- Classroom spaces should be designed based on the predominant teaching strategies and methods used to enhance student learning and success at IUPUI. Almost half (47%) of faculty survey respondents indicated that they used interactive lectures in almost every class, and 22% indicated they use interactive lectures in every class. The vast majority of faculty also use engaging discussions (45% almost every class and 28% every class). Many faculty members also reported that they frequently employed collaborative learning and group activities (33% almost every class and 16% every class). *These findings suggest that spaces that allow for a combination of lecture and group activities/collaborative learning may be ideal.*
- The type of pedagogy embraced by faculty seemed to influence the classroom attributes that were most important to them. The top five classroom attributes rated very important or extremely important were as follows:
  - I. Adequate visibility within a space from students to presenters, to course content, to demonstrations, and to other students (72%)
  - II. Space that allows easy movement of all students within the space to support and facilitate interactions (67%)
  - III. Space that allows for robust sharing of visual data by making it easily available, visible, and/or readable by all students (64%)
  - IV. Furniture with adequate work surface to accommodate several devices and materials that students might bring the class (60%)
  - V. Seamless management of audio/visual content by instructors and learners across multiple output systems including installed displays, computers, and mobile devices (59%)

**Faculty Focus Groups and Faculty Interviews**

- Faculty desire technology that is working, easy to use, and reliable. (similar to V above)
- Faculty desire flexible spaces and moveable furniture that allows them to interact with students and facilitate group activities. (same as II above)

- One out of five comments reflected on a specific aspect of writing surfaces in the classroom as being a top priority. More often faculty refer to white/chalk boards, but a significant number also refer to having adequate desk/table space for students to take notes or complete work. (same as IV above)
- Focus group results also suggested that future classroom spaces should include rooms that work for both lecture and group activities as well as configurable/flexible classroom arrangements. Faculty also noted that whiteboards are desirable for faculty and student use.

## Student Survey

- According to the student survey, future classroom spaces should include furniture with adequate work spaces to accommodate multiple devices, high technology with many screens, adequate visibility within space, ways to hear and communicate clearly, the ability to move chairs around, enough surface space to write, comfortable temperatures, access to electrical power for devices, and locations that are convenient for students.
- Survey results suggest renovating particularly problematic classrooms and avoiding designing classrooms that are dimly lit, with uncomfortable seats and outdated technologies.
- The classrooms students identified as their favorite classrooms were: Business SPEA 2001, 2003, 2005, Hine Hall 118, and Cavanaugh 349. All of these classrooms are Mosaic classrooms.
- The classroom spaces identified as problematic by students are situated within 1970s buildings at IUPUI that have been identified as most in need of renovation, including Cavanaugh Hall, the Engineering and Technology Building, Lecture Hall, and the Nursing Building:

### **Cavanaugh Hall**, particularly the 2nd floor, and the **Nursing Building** (n=168)

- Crowded learning environment (e.g., difficulty moving without disrupting classmates)
- Limited physical configurability for large/small group discussions and seminars
- Lack of windows and natural light
- Uncomfortable seats
- Desks are too small
- Temperature issues (e.g., poor air conditioning, can be stuffy or hot)
- Building disrepair (e.g., ceiling tiles are falling out)
- Certain technologies are outdated

### **Business building** (n=57 [third floor n=22; second floor n=16])

- Crowded learning environment; students have difficulty exiting seating
- Limited power outlets for student use
- Rolling desks are too small
- WiFi connections are “horrible,” negatively impacting lectures and student presentations
- Temperature issues present within building (e.g., too hot)

### **Lecture Hall** (n=47 [first floor was most frequently mentioned])

- Limited power outlets for student use
- Chairs are small, uncomfortable, stained, and broken
- Air conditioning is loud and distracting
- Inadequate space for personal items within classrooms
- Reported difficulties in moving around
- Tables are too small; difficult to take notes

### **Engineering and Technology Building (n=21)**

- Crowded learning environment
- Tables do not offer much space
- No place to store personal items
- Uncomfortable chairs
- Limited power outlets for student use
- Reported difficulties in viewing board

### **Basement rooms (n=20)**

- Dim lighting
- Tablet chairs are too small; difficult to take notes
- Dated furniture
- Crowded learning environment, which limits group discussion
- Limited power outlets for student use
- WiFi connections are poor

## **RECOMMENDATIONS**

### **Student and Instructor Movement**

The classroom attributes rated most highly by faculty and students include adequate workspace and the ability to move freely through the space. These findings lead to the recommendation, when feasible, to equip classrooms with tables/chairs with sufficient workspace per student in lieu of tablet arm chairs. In addition, appropriate square footage per student is of critical importance to enabling active learning and ease of movement within the classroom. As such, the number of students assigned to classrooms may need to be reduced from the current benchmarks in order to provide adequate movement of students within a given learning space. Classrooms that require immediate attention are the Lecture Hall spaces, in which student movement is hindered through the stadium seating configuration. Lecture Hall rooms can be adapted in a manner similar to Hine Hall 118, which enable students to collaborate within each other while situated within a tiered setup.

### **Collaboration and Affordances**

The faculty and student surveys indicated that lectures without participation are the least common – thus providing validation that we should continue to build spaces that maximize the following: classroom discussions, interactive lectures, enabling instructors to demonstrate or provide a simulation of how something works, and collaborative learning/group activities.

The campus should continue to explore large active learning classroom designs that facilitate interactive lecture, and identify expansion of these affordances throughout the campus. Lecture Hall 104 has been a popular addition to the active learning classrooms available at IUPUI. The remaining lecture hall classrooms could be considered for upgraded interactive features.

Additionally, to support collaborative learning activities, all classrooms should have sufficient whiteboards and markers for use by both instructors and students. Dedicated storage areas for consumables (e.g., whiteboard markers) and monitoring of the storage areas will enable instructors to better facilitate student use of whiteboard collaboration spaces. Projection screens that block the use of whiteboards should be avoided whenever possible.

### **Adequate Access to Power and Comfortable Learning Environments**

As we continue to renovate our spaces, we must continually be aware that today's students will bring multiple mobile devices to class. Adequate space to accommodate multiple devices is critical. To futureproof our classrooms, we need sufficient electrical power and Wi-Fi to accommodate the increasing use of mobile devices for instructional purposes in the classroom. Solutions include electronic power embedded into collaborative tables, as seen in Hine Hall 118. Other power solutions include free standing vertical electrical power stations, as seen in the Immersive Showcase Classroom in University Hall (AD 1000). Alternative solutions may include wireless charging mats or charging pads for mobile devices. In addition to providing access to power outlets and adequate writing space, future renovations should also ensure that students are in comfortable environments (e.g., seating) to accommodate and not distract from learning. To help further define what types of furniture are most comfortable to students, we suggest the IUPUI Classroom Committee work with the University Architects Office (UAO) to solicit feedback from students about their preferences for different types of classroom furniture and to use the students' feedback to inform the purchase of new furniture.

### **Growth of Informal Learning Spaces**

Informal student spaces should be intentionally designed to complement active learning classrooms, so they become extensions of the learning environment. We recommend that the IUPUI Classroom Committee consider simultaneously renovating space directly outside of classrooms when the opportunity arises. As students increasingly engage in collaborative group work, small breakout areas adjacent to classroom spaces would provide much needed areas for students to engage in team-based learning.

### **Prioritizing Campus Renovations**

The classroom buildings identified as most problematic should be prioritized by the IUPUI Classroom Committee for upgrades. [This interactive map](#) indicates the placement of the current active learning classrooms across the IUPUI campus.

# IUPUI FACULTY SURVEY – 2018

The IUPUI Faculty Survey report was directed by Dr. Michele Hansen, the Assistant Vice Chancellor of Institutional Research and Decision Support for IUPUI.

Robbie Janik, the Assistant Director of Survey Research and Evaluation, along with Declan Gilmer, a Graduate Assistant in Survey Research and Evaluation, compiled the following findings.



# Purpose, Methods, and Respondents

## PURPOSE

To measure indicators related to employment satisfaction, satisfaction with services, and engagement in high impact practices in order to better understand faculty experiences at IUPUI.

## METHODS

Survey administered to census of all full-time and part-time faculty (excluding School of Medicine) in spring 2018.

## RESPONDENT CHARACTERISTICS

	<b>All Respondents</b>	<b>All Invited</b>
<i>Female</i>	54.1%	52.6%
<i>Male</i>	45.9%	47.4%
<i>White</i>	78.5%	77.4%
<i>Asian</i>	10.0%	10.1%
<i>Black/African-American</i>	6.5%	8.1%
<i>Two or more races</i>	2.6%	2.4%
<i>Hispanic/Latinx</i>	2.3%	1.8%
<i>Full-time tenured/tenure track</i>	40.7%	30.7%
<i>Full-time non tenure track</i>	31.8%	26.4%
<i>Part-time/adjunct</i>	27.5%	42.9%
<i>Liberal Arts</i>	17.6%	15.2%
<i>ENGT</i>	10.9%	11.5%
<i>Science</i>	11.2%	11.0%
<i>Dentistry</i>	6.9%	9.0%
<i>Social Work</i>	6.8%	7.0%
<i>Nursing</i>	6.3%	5.7%
<i>Business</i>	5.3%	5.0%
<i>Law</i>	2.2%	4.5%
<i>PETM</i>	4.3%	4.1%
<i>Informatics</i>	3.8%	3.9%
<i>Education</i>	3.6%	3.8%
<i>SPEA</i>	3.9%	3.7%
<i>Public Health</i>	4.3%	3.6%
<i>Herron</i>	3.6%	3.3%
<i>SHRS</i>	2.8%	3.1%
<i>University Library</i>	1.8%	1.2%
<i>Philanthropy</i>	1.2%	1.2%
<i>UGE</i>	0.8%	1.1%
<i>Other</i>	2.8%	2.2%
<b>N</b>	<b>1170</b>	<b>2380</b>
<b>Response Rate</b>	<b>49.2%</b>	<b>–</b>

- Participants approximate the demographic characteristics of IUPUI faculty as a whole.
- Faculty from every School participated in the survey.
- Full-time faculty, particularly those who are tenured or on tenure-track, were more likely to respond than part-

time faculty.

## RESPONDENT CHARACTERISTICS BY POSITION

	<b>Tenured/tenure- track Faculty</b>	<b>Full-time non tenure track Faculty</b>	<b>Part-time/adjunct Faculty</b>
<i>Female</i>	43.5%	62.1%	60.6%
<i>Male</i>	56.5%	37.9%	39.4%
<i>White</i>	74.2%	78.0%	85.7%
<i>Asian</i>	15.5%	9.1%	2.8%
<i>Black/African-American</i>	5.7%	7.5%	6.5%
<i>Two or more races</i>	2.1%	3.0%	3.1%
<i>Hispanic/Latinx</i>	2.5%	2.4%	1.9%
<b>N</b>	<b>476</b>	<b>372</b>	<b>322</b>
<b>Response Rate</b>	<b>65.1%</b>	<b>59.2%</b>	<b>31.5%</b>

- A higher percentage of female faculty is found among full-time non tenure-track faculty and adjuncts compared to tenured/tenure-track faculty.
- Part-time/adjunct faculty has a higher percentage of white faculty compared to the other two types while tenured/tenure-track has a higher percentage of faculty who identify as Asian especially when compared to adjuncts.

In the following analyses comparisons will sometimes be made using the categories of STEM faculty as well as Health and Life Sciences (HLS) faculty. STEM faculty consists of those from the Schools of Engineering & Technology, Informatics, and Science. HLS faculty contains persons from the Schools of Nursing, Public Health, Dentistry, Physical Education & Tourism Management, and Health & Rehab Sciences. Faculty from the School of Medicine were not included in this survey upon request from the School. The HLS category is also limited in that the majors of Health Information Management (School of Informatics) and Healthcare Engineering Technology Management (School of Engineering & Technology) are considered Health and Life Sciences majors – but faculty teaching those majors could not be included, as faculty are not identified by department to protect confidentiality.

# Frequency of Instructional/Pedagogical Strategies

	Never	Rarely	Occasionally/ Sometimes	Almost every class	Every class
<b>Lectures</b> – instructor presents course content to the students with limited student participation	11.3%	25.0%	32.5%	22.2%	9.0%
<b>Interactive Lecture</b> – instructor presents course content with periodic planned opportunities for student interaction with the content	2.6%	5.5%	23.7%	46.7%	21.6%
<b>Discussions</b> – instructor engages students in discussions about the course content	1.4%	4.9%	20.6%	44.7%	28.4%
<b>Case-study, project, and problem- based learning</b> – students work on assignments that involve analysis and reflection on complex problems or cases	6.3%	9.0%	39.8%	33.0%	11.9%
<b>Collaborative learning and group activities</b> – students work in pairs or small groups to discuss course concepts, develop and integrate concepts, and/or complete assignments	6.6%	9.5%	35.4%	32.5%	15.9%
<b>Demonstrations and simulations of course content</b> – instructor shows students how a process works within a particular discipline	8.2%	13.2%	39.0%	28.3%	11.3%

- All faculty were asked to think of a class they have regularly taught when describing how often they utilized the above techniques.
- Interactive lectures and discussions are the two most popular strategies with more than two-thirds of all faculty using them in either almost or every class.
- Lectures with little participation by students are the least common with more than one-third of respondents utilizing that technique either rarely or never.

## USE OF INSTRUCTIONAL/PEDAGOGICAL STRATEGIES ALMOST EVERY OR EVERY CLASS

Percentage of faculty who report they employ the following techniques almost every class or every class	Tenured/ tenure- track faculty	Full-time non tenure track faculty	Part-time/ adjunct faculty
<b>Lectures</b> – instructor presents course content to the students with limited student participation	34.2%	32.8%	23.9%*
<b>Interactive Lecture</b> – instructor presents course content with periodic planned opportunities for student interaction with the content	65.3%	74.5%**	65.5%
<b>Discussions</b> – instructor engages students in discussions about the course content	72.3%	72.9%	74.8%
<b>Case-study, project, and problem-based learning</b> – students work on assignments that involve analysis and reflection on complex problems or cases	42.7%	46.8%	46.4%
<b>Collaborative learning and group activities</b> – students work in pairs or small groups to discuss course concepts, develop and integrate concepts, and/or complete assignments	45.3%	50.5%*	51.2%
<b>Demonstrations and simulations of course content</b> – instructor shows students how a process works within a particular discipline	35.2%	40.5%*	45.9%**

\*\*\*p<.001; \*\*p<.01; \*p<.05, group compared to tenured/tenure-track faculty

- Adjunct faculty (24%) are significantly less likely to use frequent lectures that limit student participation, compared to tenure/tenure track faculty (34%).\*
- Interactive lectures are most likely to be employed by full-time non-tenure track faculty with three- quarters using the technique almost every class or every class.
- Demonstrations and simulations almost every or every class are significantly more likely to be used by part-time/ adjunct faculty (46%) and full-time non tenure track faculty (41%) compared to tenured/tenure-track faculty respondents (35%).
- Male faculty are significantly more likely to use lectures with limited participation almost every or every class compared to female faculty (40% vs. 24%)\*\*\* while female faculty are more likely to utilize collaborative learning and group activities almost every or every class (54% vs. 43%).\*\*\*
- Faculty from STEM disciplines (40%) are significantly more likely to employ lectures with limited student participation at least almost every class compared to non-STEM faculty (28%).\*\*\*
- STEM faculty are less likely compared to other faculty to utilize discussions (61% vs. 77%)\*\*\* almost every or every class period.

Although it has a relatively low N of 42 faculty respondents, faculty from the School of Education are significantly more likely than other faculty at IUPUI to utilize the techniques of discussions (95% vs. 72%)\*\*\* and collaborative learning (90% vs. 47%).\*\*\*

# Importance of Classroom Attributes

	Not important at all	Slightly important	Moderately important	Very important	Extremely important
Adequate visibility within a space from students to presenters, to course content, to demonstrations, and to other students	3.7%	3.1%	20.7%	44.5%	27.9%
Space that allows easy movement of all students within the space to support communication and to facilitate interaction	6.2%	7.0%	19.7%	40.3%	26.7%
Furniture that is easily movable and configurable to support a range of learning activities	10.3%	9.8%	21.0%	32.7%	26.2%
Furniture with adequate work surface to accommodate several devices and materials that students may bring	7.7%	11.0%	21.8%	34.8%	24.7%
Abundant writable surfaces to facilitate interaction for students and groups (e.g., white boards)	6.8%	10.9%	25.6%	35.1%	21.6%
Space in which all students have access to electrical power to support the wide variety of technologies used in learning activities	10.7%	14.0%	25.9%	26.5%	23.0%
Space that allows for robust sharing of visual data by making it easily available, visible, and/or readable by all students	5.5%	8.1%	22.7%	36.6%	27.0%
Instructors and learners able to seamlessly manage audio/visual content across multiple output systems including installed displays, computers, and mobile devices	8.4%	10.0%	22.6%	33.9%	25.1%
Able to record presentations, group interactions, or conversations with local and remote students and make these artifacts accessible asynchronously	23.3%	19.8%	27.6%	18.4%	10.9%
Location of classroom is convenient for me as the instructor (e.g., being close in proximity to my campus office or easy to get to from off campus locations)	7.3%	9.9%	27.2%	33.2%	22.4%

- The most important classroom attribute to faculty overall is having visibility from students to presenters/course content/demonstrations and other students with almost three-quarters of all respondents rating it as being very or extremely important.
- Having a space to allow easy movement of students to support communication and interaction is also rated highly with two-thirds (67%) of all faculty rating it as very or extremely important.
- The attribute rated not as important to faculty is the ability to record their classes and have the recordings available later with almost one-quarter of faculty respondents (23%) rating it as not important at all.

## CLASSROOM ATTRIBUTES VERY/EXTREMELY IMPORTANT

Percentage of faculty who report that the following items are very or extremely important	Tenured/ tenure-track Faculty	Full-time non tenure track faculty	Part-time/ adjunct Faculty
Adequate visibility within a space from students to presenters, to course content, to demonstrations, and to other students	71.2%	75.9%**	70.1%
Space that allows easy movement of all students within the space to support communication and to facilitate interaction	60.9%	73.5%***	69.0%**
Furniture that is easily movable and configurable to support a range of learning activities	52.9%	68.0%***	57.4%
Furniture with adequate work surface to accommodate several devices and materials that students may bring	54.3%	66.6%***	59.3%
Abundant writable surfaces to facilitate interaction for students and groups (e.g., white boards)	55.0%	60.3%*	54.8%
Space in which all students have access to electrical power to support the wide variety of technologies used in learning activities	43.4%	58.0%***	48.8%
Space that allows for robust sharing of visual data by making it easily available, visible, and/or readable by all students	59.2%	69.7%*	63.6%
Instructors and learners able to seamlessly manage audio/visual content across multiple output systems including installed displays, computers, and mobile devices	49.8%	66.4%***	64.9%***
Able to record presentations, group interactions, or conversations with local and remote students and make these artifacts accessible asynchronously	24.3%	37.0%***	28.1%
Location of classroom is convenient for me as the instructor (e.g., being close in proximity to my campus office or easy to get to from off campus locations)	57.4%	61.1%*	45.5%**

\*\*\*p<.001; \*\*p<.01; \*p<.05, group compared to tenured/tenure-track faculty

- Full-time non-tenure track faculty are significantly more likely than tenured/tenure-track faculty to rate a classroom attribute as very or extremely important on every item.
  - Some of the largest differences include the importance of having furniture that is easily movable and configurable (68% vs. 53%)\*\*\* and a space where students have access to electrical power to support a wide variety of technologies (58% vs. 43%).\*\*\*
- Tenured/tenure-track faculty (50%) are significantly less likely to rate being able to manage technology across multiple output systems as very or extremely important compared to both full-time non-tenure track (66%) and part-time/adjunct faculty (65%).\*\*\*
- Female faculty are significantly more likely to rate 8 of the 10 items as very or extremely important to their classroom compared to male faculty.
  - The largest differences were found for having a space that allows easy movement to support communication and interaction (74% vs. 59%)\*\*\* and the room being equipped with furniture that is easily movable and configurable (69% vs. 47%).\*\*\*

- Faculty in STEM schools rate the two items regarding space in the classroom – having easy movement of students to support communication and interaction (53% vs. 72%)\* and furniture that is easily movable and configurable (40% vs. 65%)\* – as significantly less important than faculty in non-STEM related Schools.
- Faculty in the Health and Life Science schools (41%) are significantly more likely to rate being able to record presentations, interactions or conversations as very or extremely important compared to non-HLS faculty (26%).\*
- Faculty from the School of Public and Environmental Affairs (54%) are significantly more likely to report having access to electrical power to support a wide variety of technologies as not at all or slightly important compared to other faculty (23%) at IUPUI.\*
- The majority of education faculty (77%) rate electrical power access to support technologies as very or extremely important at significantly higher rates than other IUPUI faculty (48%).\*



# Most Important Classroom Attributes

All faculty were also presented with one open-ended question asking them to describe their most important features of the classroom. A total of 481 comments and verbatim responses were coded into themes. Many responses were an elaboration of one or more of the options presented in the quantitative matrix. The most common themes are presented below. Please note that percentages will total more than 100% due to comments containing multiple themes.

- **Technology** (249 comments, 52% of all comments)
  - Slightly more than half of all faculty comments indicate some form of technology in the classroom as being the most important (88 comments were related to general/non-specific technology, 3% of technology comments).
  - Many times faculty express that they would like to have “working” or “reliable” technology while others prefer technology that is “easy to use”.
  - This mostly concerns audio/visual equipment and/or computers available to project images and videos onto a screen (48 comments were related to general audio/visual needs, 19.3% of technology comments).
    - Several comments specifically mentioned projectors (56 comments, 22.5% of technology comments) and screens (34 comments, 13.7% of technology comments)
  - The ease of access and functionality of Canvas (10 comments, 4% of technology comments) is also mentioned especially for online
  - Ability to reliably access Internet (25 comments, 10% of technology comments) was a common theme as
  - Many faculty noted that electrical outlets (22 comments, 8% of technology comments) were crucial to technology use for both instructors and students.
  - Other comments (27 comments, 8% of all technology comments) stated the importance of compatibility between software and equipment, a smart board or smart podium, software for various teaching needs/ disciplines, and the ability to record lectures and student presentations.
- **Ability to customize/rearrange space** (167 comments, 35% of all comments)
  - The next most important classroom characteristic is being able to have “various configurations” of furniture and the overall space with slightly more than one-third of all faculty comments reporting this
  - Many faculty list this feature in order to be able to better “interact with students” as well as “creating spaces for small group activities”.
  - Faculty describe a need for their space to be “flexible” and a desire for students to be “collaborative” in the classroom.
- **Space Size** (121 comments, 25% of all comments)
  - Somewhat related to the ability to rearrange a classroom is the importance of the size of the space to
  - Many faculty mention having “adequate” or “enough” space that allows “easy movement” of students into different formations.
  - Faculty also speak to having enough space for students so they “are not cramped” as well as having enough space in between students when taking exams.
- **Writing surfaces** (95 comments, 20% of all comments)
  - One out of five comments reflect on a specific aspect of writing surfaces in the classroom as being a top
  - More often faculty refer to white/chalk boards but a significant amount also refer to having adequate desk/ table space for students to be able to take notes or complete
  - The most frequently mentioned priority was having “enough white or blackboard space”. Most do not indicate

a preference but refer to it as a white

- Many also speak of making sure that there is chalk available, “access to markers that work”, and “functional erasers”

# FACULTY FOCUS GROUP REPORT

# Purpose, Methods, and Participants

## PURPOSE

The purpose of the faculty focus groups was to gather input from IUPUI faculty about the usefulness of particular classroom features and configurations in supporting their teaching strategies, in order to guide the design and development of future IUPUI classrooms. The focus group data gathering and analysis was completed by Terri Tarr, Director of the Center for Teaching and Learning, and Douglas Jerolimov, Instructional Consultant at IUPUI.

## METHODS

Faculty recruitment for the focus groups used a purposeful sampling approach. CTL had previously contacted school deans for names of faculty members in leadership roles related to teaching and learning in their school. Those school representatives were asked to provide names of faculty who are thoughtful about teaching and learning and might be good candidates to participate in focus group discussions. They were told that appropriate candidates for the focus groups would ideally include:

1. Faculty who teach in IUPUI's General Inventory classrooms (classrooms scheduled by IUPUI's Registrar)
2. Faculty members of any rank or status (e.g., full- or part-time, tenured, tenure-track or non-tenure track)
3. Faculty interested in joining in a focus group discussion with other faculty about their teaching approaches, and how classroom spaces might be designed to facilitate their teaching and student learning

Terri Tarr or Douglas Jerolimov personally invited those faculty whom each school listed. Some school contacts who were invited to participate did not send names of potential focus group participants, so the CTL also recruited participants via an email invitation to a list of associate faculty. Invited faculty were given multiple focus group dates and were able to register for their preferred date.

The focus group guiding protocol began with questions to elicit information about faculty practices in the classroom, and then moved to generating a discussion about the effectiveness of various classroom designs, configurations, furniture, digital affordances, and other features. To spur faculty discussion, a slide deck displayed images of a variety of classroom designs and affordances.

In spring 2018, ten focus groups were conducted with a total of 43 full-time and part-time faculty members. Due to technical difficulties, data from one of the focus groups was not available for analysis; therefore, this report is based on data from nine focus groups and the 39 faculty members who participated in those focus groups. Center for Teaching and Learning staff and IUPUI Classroom Needs Analysis Committee members facilitated and took notes during the focus groups, which were also recorded. Analysis took into account both transcripts from the recordings and notes taken during the focus groups. See the Back Matter of this report for the [focus group protocol](#), the [learning space examples](#) used to prompt discussion, and [a handout](#) given to participants to record their thoughts about the learning space examples.

## PARTICIPANT CHARACTERISTICS

Female	22	56.4%
Male	17	43.6%
Adjunct Instructor	2	5.1%
Lecturer	13	18.8%
Senior Lecturer	1	2.6%
Visiting Lecturer	1	2.6%
Assistant Professor	5	12.8%
Associate Professor	6	15.3%
Professor	4	5.8%
Clinical Assistant Professor	4	5.8%
Clinical Associate Professor	2	5.1%
Visiting Clinical Associate Professor	1	2.6%

- 56% of participants were female; 44% were male
- Participants represented a wide variety of ranks
  - 38.4% of participants were tenured or tenure-track
  - 38.4% of participants were non-tenure track in a lecturer category
  - 17.9% of participants had a clinical rank
- Part-time faculty were underrepresented, comprising only 5% of the sample

## PARTICIPANT SCHOOLS

	Number of Participants
Science	11
Engineering & Technology	9
Philanthropy	4
SPEA	4
Business	3
PETM	3
Education	3
Liberal Arts	1
Nursing	1

- STEM fields were overrepresented in the focus groups

## ACADEMIC LEVEL OF COURSES TAUGHT

Undergraduate level only	25	64.1%
Both undergraduate and graduate level	13	33.3%
Graduate level only	1	2.6%

- 97.4% teach at the undergraduate level
- 35.9% teach at the graduate level

## NUMBER OF STUDENTS IN CLASSES TAUGHT

Small only	14	35.9%
Small and medium	8	23.1%
Small, medium, and large	6	15.4%
Small and large	5	12.8%
Medium only	2	5.1%
Medium and large	2	5.1%
Large only	1	2.6%

- Small=under 50; medium=50-99; large=100+
- 84.6% teach some small classes
- 46.2% teach some medium-sized classes
- 35.9% teach some large classes

## ACTIVITIES DURING CLASS MEETINGS

Group Work	34	87.2%
Lecture	25	64.1%
Discussion	23	59.0%
Problem-solving	13	33.3%
Project Work	7	17.9%
Student Presentations	6	15.4%
Video	5	12.8%
Teaching Demonstration	4	10.3%
Peer-led Team Learning	3	7.7%
Case-based Instruction	3	7.7%
Student Peer Review	2	5.1%
Peer Instruction	2	5.1%

- Group work was reported by the largest number of participants
- Lecture and discussion were reported by over half of the participants
- Problem-solving was reported by one-third of the participants
- All but one participant who reporting lecturing also reported using other non-lecture activities
- Activities named by single participants are not listed here and tended to be fairly specific

# Analysis

Focus group questions were designed to elicit each faculty member's own classroom practices before introducing them to images showing examples of classroom configurations, furnishings, and affordances. The images, presented after faculty members articulated their classroom practices, were meant to inform a discussion about more and less useful/desirable features and configurations of classrooms. The classroom spaces shown were characterized as "aspirational," meaning innovative spaces meant to help faculty members imagine new possibilities for teaching and learning approaches. Focus group protocols structured questions and activities such that faculty would carry out their main discussion about the benefits and challenges of particular classroom arrangements after classroom image prompts were shown. But faculty members instead engaged in rich discussions of the benefits and challenges of classroom image prompts during our presentation of the images, typically carrying on a discussion associated with each image in turn. Approximately 25 images were shown to faculty, revealing various classroom arrangements and features.

With only a few exceptions, the 39 faculty members in the focus group discussions identified active and collaborative learning strategies as their primary teaching approaches. They understood the classroom to be a site of active learning; this was the context within which faculty situated their comments about the benefits and challenges associated with the classroom configurations, furnishings, and affordances on display in the images.

Textual artifacts include:

1. Focus group transcripts
2. Moderator notes (one of the two moderators present at each focus group discussion took notes on the interactions)
3. Faculty member notes related to specific images shown (a handout encouraged faculty members to write notes associated with each classroom image)

Analysis began with a close reading of the transcripts generated from the focus group discussions, and yielded a list of recurring topics within the following categories:

1. Classroom Room Experience/Characteristics
2. Furnishings
3. Digital Affordances
4. Classroom Convenience
5. Writing Surfaces
6. Specific Classrooms
7. Classroom Activities
8. Images (Numbered)



# Salient Findings

These findings resulted from our analysis of the texts generated:

## 1. Rooms that work for both lecture and group activities

*Facilitator: Based on everything we talked about, if you could name one most important classroom feature that would really impact your pedagogy, what would the one thing be?*

*Faculty 1: Okay. Being able to easily switch from lecture to group work.*

*Facilitator: Okay.*

*Faculty 2: Seconded.*

*Facilitator: Same?*

*Faculty 3: Third.*

*Facilitator: Good one.*

*We then break out into the large class again....my...students...give presentations. They inevitably do use PowerPoints and so technology really comes in to play at that point but really, like the others, I enjoy having very flexible spaces so when students do break into small groups they can do so easily.*

- Although faculty strongly identified as adherents of active and collaborative learning strategies, they also sought room configurations and affordances conducive to lecturing.
- They sought unimpeded views from the presenter to all students and among all students in the classroom.
- Even when asking students to undertake active learning or collaborative activities, they reasoned that an instructor needed to be situated at a “focal point” (or “front”) of the classroom in order to direct group activities or to conduct lectures as needed. A focal point for the class also improved instructor, guest, and student presentations and demonstrations.

## 2. Configurable classroom arrangements

*...having a flexible environment is really critical and being able to have moveable pieces of furniture that can come together, separate, be stacked however, like in order to create the environment for that moment because everyone single class I change the configuration, depending on what methods that we're teaching.*

*Here's my thing about the moveable furniture, and this is just is general...I don't get the movable furniture thing I think if they designed it well the first time we shouldn't have to move it around...If the chairs move around and they want to shift tables that's fine. But this whole desk moving thing I think is just a giant pain.*

- Many faculty members preferred classroom spaces that featured easily configurable table-and-chair arrangements in order to facilitate student collaboration.
- Some noted disadvantages of flexibility, especially that they did not want to be responsible for moving furniture because it takes too much time.

## 3. Uniform chairs and tables within a room

*Well, I mean, they all have preferences. I would be uncomfortable with a room where a third of the class knew that if they*

*had a class beforehand, they were going to be a little later than their fellow students [and] wouldn't be able to get a place for their laptop. Or they wouldn't be able to get a place to take notes on a hard surface.*

*We talked about equity for learners, and equity of all kinds, and here we're inviting inequity. You know. Who's gonna get the ottoman?*

- Faculty members overwhelmingly sought rooms with uniform chairs and tables, rather than a variety of seating options.
- Focus group participants worried that additional and diverse seating options—such as sofas/couches, stools, tables of varying heights and sizes, armchairs, café end-tables, and coffee-tables—would provide more comfortable options but carried the drawback of hindering learning when the entire class was asked to undertake assigned activities that require table space (e.g., for collaboration using large-form papers, laptop computers, etc.).

#### **4. Tables**

*I like moveable tables. I think when they're individual desks it's difficult for [students] to actually group together and get group work done especially since they don't have a flat surface, and it's working on something together that's tough.*

- Faculty expressed an interest in tables with sufficiently large work surfaces to accommodate devices and other materials, and with casters to make them easier to move.
- Others wanted tables that come apart to form desks or tables that could be moved into one long table.
- A few expressed an interest in temporary partitions for the tables to limit student-to-student visibility during exams.

#### **5. Desk/chair combinations**

- Many participants indicated a preference for chairs with casters and storage space for student backpacks or other materials.
- They also thought it important to have chairs that would fit students of all sizes.

#### **6. Instructor-dedicated whiteboards and projection screens**

*There have been times where I have been assigned to a room where the only whiteboard is behind the screen. It's inconvenient and also, I look foolish because when I write something, I have to let down the screen and it doesn't stay, and then when you want to use the PowerPoint, you have to let it back up.*

- Faculty members sought plenty of instructor-dedicated whiteboards and projection screens (or monitors) and often wanted more than currently available to them.
- Faculty needed access to both whiteboards and projection screens/monitors when presenting lectures or directing active-learning or group activities.
- They did not think it useful when the whiteboards were located behind projector screens or when instructor-dedicated whiteboards also doubled as projector screens.

#### **7. Whiteboards for student use**

*We would need way more whiteboards. Nowhere near enough whiteboards.*

*Yeah, for the intro physics, they would be using whiteboards exclusively because ....Physics, math, chemistry, and a few other fields, it's much, much harder for students to collaborate at a keyboard than it is on whiteboard because they can't draw... In the time it takes to write down something...it's easy [to draw something]. On the whiteboard, I can just write it down.*

*On a computer, it takes two minutes to type up. It becomes a roadblock to everything. Same goes with drawing chemical structures.*

*I would rather see the whiteboards on more than one wall. In other words in this circumstance if we want the students to interact and share things, the whiteboards need to be close to the space they're working with.*

- Faculty members, especially instructors who teach in the sciences, found whiteboards to be the most important affordance for student collaboration.
- They reasoned that diagrams and formulas are much more difficult to write and manipulate without a reliable and user-friendly tablet and monitor arrangement. Of course, markers needed to be reliably available to students.
- They wanted whiteboards positioned near students.

## **8. Technology**

*But yeah. I would love to have the control wherever my technology is being controlled, I would like to be able to control the lights. Definitely better sound; the sound is horrible in the classrooms. It just doesn't ... but if you had that one stop control center, that would be ... it's easy.*

- Faculty were interested in document cameras and other kinds of digital display capabilities (associated monitors), but were mostly keen to ensure that projection capabilities (visual and audio) in a room actually functioned reliably.
- They thought it was important to not overdo technology.
- They wanted easy access to troubleshooting instructions or technical support when they ran into technical difficulties.
- Faculty wanted increased Wi-Fi bandwidth to accommodate more devices simultaneously.
- Faculty wanted the ability to record both what's on the computer and what's on the board, and to record working group interactions.
- In computer labs, faculty liked the idea of computers/monitors that can be raised or lowered into the table to allow students to see one another or to provide space when students bring their own devices.

## **9. Circulation**

*Another feature that I like is that there's a wide center aisle parallel to the stage, so that's one more row of students that I can get to. But if I had my wish, I would be able to walk comfortably down every aisle...I mean, right now, if a student chooses to sit in the middle of the row, there's no way I can talk to that student. If they really want to never have to talk to me, there are safe zones in the room. I like students to feel safe, but I like them to feel safe based on the way I interact with them, not based on my inability to do so.*

*I think it goes back to the desks and the chairs, and the ability not to have them walk up and down rows, right? So just to be able to move. I feel like I'm walking up and down rows, and I'm tripping over book bags and I'm stepping over water bottles, right? So just if you have those chairs, where like I said the no chairs or the bumper chairs where things are under people's feet, you're not tripping over stuff, so you can kind of walk around in a more comfortable [way].*

- Instructors wanted sufficient space to move up and down aisles or among student groups in order to monitor student and group progress and/or to connect with students.
- The number of aisles, the narrowness of aisles, impediments in the aisles (e.g., student backpacks), and "messy" aisles in configurable spaces were seen as hindrances to circulation.

## **10. Student access to electrical outlets**

*My favorite is my students have figured to pull out the little dinosaur ... what's that thing called? The overhead projector, because it has multiple plugs in the side of it. So my projector keeps moving. I finally was like, "What are you guys doing with that?" They're like, "We're plugging in!" So they just moved that old ... 'cause we still have the overhead projector in our classroom on top of having the dock projector and all that. But they wheel that thing around, plug it in. It has four outlets on the outside of it. But that was a huge issue as well.*

*I think speaking to that is the idea of giving them [students] the supports they need. I think the first rule is around technology. If they're coming from work all day, if they're coming from two of the classes that they have to use their computer the whole time, they're gonna need to have the ability in a classroom setting that might be affected from outside to plug in, to get connected, to re-power up. I mean that would be the only thought I have to that. Just we're busy lives, busy people. We ask them to be ready to [work] and ready with what they have. And the classroom space to accommodate that, that would be one thought. Just having adequate ways that they can recharge, literally and in both senses of the word.*

- Faculty members expressed concern that students often don't have access to electrical power in the classroom.
- They were interested in more outlets on tables or power strip towers.

## **11. Lighting**

- Faculty wanted to be able to control lights either from instructor consoles or, even better, through mobile devices from anywhere in the room.
- They wanted lighting so students can see what's on the screen.
- They expressed interest in natural lighting.

## **12. Floor surfaces**

- Faculty members sought surfaces that were quiet, cleanable, and comfortable such as quiet tile or carpeting.
- When the surface is tiered, they did not want the tiers to be too steep.

## **13. Classroom convenience for faculty members**

- Convenience often was defined as proximity to the spaces that a faculty member inhabited on campus—spaces which were diverse and dispersed, especially if the faculty member held an adjunct appointment or had class meetings across the campus.
- Some wanted rooms to include some capacity (e.g., a locker) to store materials that were commonly used for student collaborative activities—folders, paper, pens, flip charts, markers, etc.—otherwise the instructor needed to carry all these things from office or automobile to class.
- Convenience was also defined by the proximity of the classroom to restrooms, sites where students and faculty could purchase food, water fountains, etc.

## **14. Classroom convenience for students**

- Instructors were often concerned about the convenience of classrooms for students.
- One way in which they imagined or defined the convenience of classrooms from the student learner's perspective was the proximity of classrooms to spaces where students joined together to study and collaborate before and after class-meetings—often in discipline-specific groups.
- This could mean proximity to informal learning spaces where students of a particular discipline collected and collaborated, and it could mean proximity to the instructor's office or workspace (if an adjunct faculty member).

# IUPUI STUDENT SURVEY

# Purpose, Method, and Participants

## PURPOSE

The purpose of the IUPUI Classroom Needs Analysis Survey, distributed to IUPUI's students, was to gather the perspectives and experiences of students in IUPUI's current learning environment.

The IUPUI Student Survey data was gathered by Tiffany Roman and the analysis and reporting were carried out by Meina Zhu, graduate research assistant in UITs Learning Technologies at Indiana University.

## METHODS

An online survey was delivered through Qualtrics to 6,551 IUPUI students in summer 2018. As of August 2018, 502 students had responded; data collection is ongoing to increase the response rate. Students who received the survey share a commonality in that they participated in a course that was taught in a designated Active Learning Classroom (Mosaic) in spring 2018. The survey questions asked students to speak to the instructional strategies employed by one instructor within the designated Mosaic classroom. Students also identified features of classrooms that they valued.

## PARTICIPANTS

Among the 502 participants, approximately two-thirds of respondents (66%) were female. Most of the participants (89%) were undergraduate students (see Figure 1). The participants were evenly distributed among different grade levels.

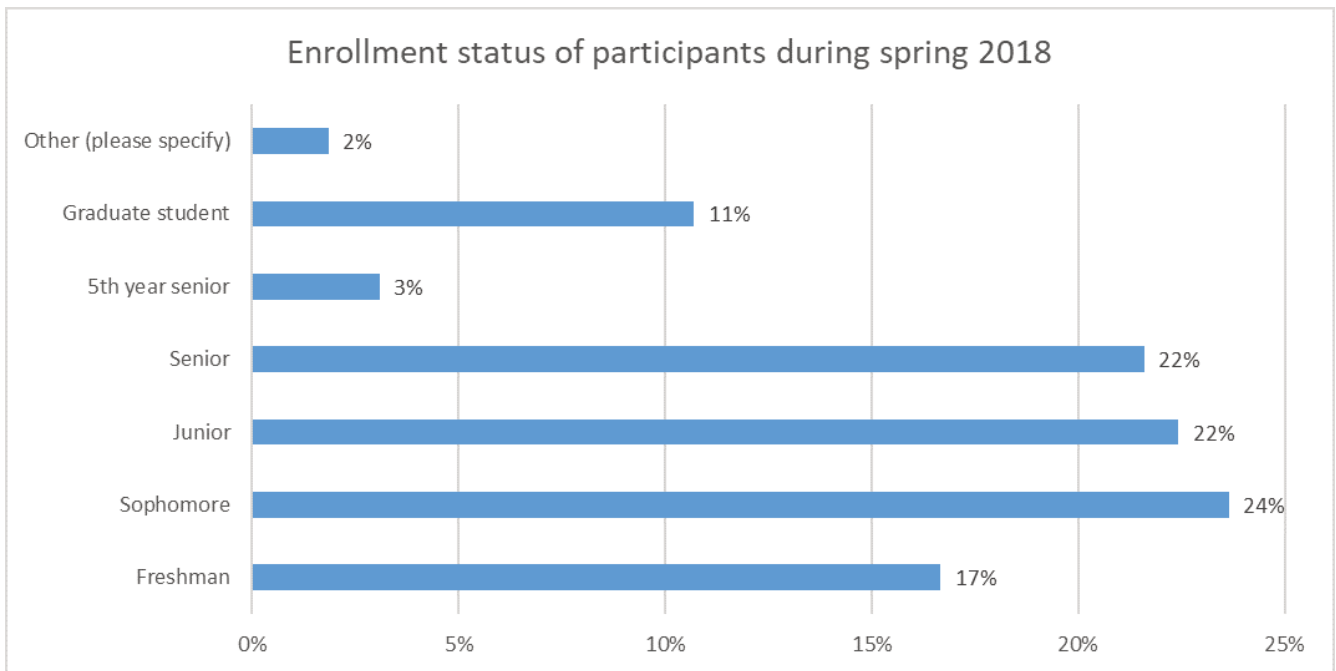


Figure 1. Enrollment status of participants during spring 2018

# Frequency of Instructional/Pedagogical Strategies

A Likert-scale from 1 (never) to 5 (every class) represents the frequency of instructional strategies observed in a spring 2018 course. The results of the student survey aligned with faculty perceptions, as interactive lectures (M=3.87) and discussions (M=4.01) were the most frequently used instructional strategies. Reconfiguration of classroom furniture was the least frequently employed instructional approach that students cited, with more than 60% of student respondents stating that the technique was either rarely or never used by their instructor (see Table 1).

Question	Never	Rarely	Occasionally/ Sometimes	Almost every class	Every class
Discussions – The instructor engaged us in discussions about the course content	2.3%	7.8%	17.7%	30.7%	41.6%
Interactive lectures – The instructor presented course content with periodic opportunities for us to interact with the content	0.8%	5.8%	27.6%	37.5%	28.4%
Demonstrations and simulations of course content – The instructor showed us how a process works within a particular discipline	3.5%	12.6%	31.1%	32.6%	20.2%
Collaborative learning and group activities – As students, we worked in pairs or small groups to discuss course concepts, develop and integrate concepts, and/or complete assignments	8.9%	11.6%	26.6%	30.3%	22.7%
Case-study, project, and problem-based learning – As students, we worked on assignments that involved analysis of and reflection on complex problems or cases	7.8%	11.3%	33.6%	25.8%	21.4%
Lectures – The instructor presented course content with limited student participation	9.9%	23.9%	24.7%	20.4%	21.2%
Sharing of student work using technology in the room – As students, we had the opportunity to share our work electronically in class with our peers (e.g., Solstice software, group presentations)	22.9%	21.1%	26.7%	17.6%	11.8%
Whiteboards use – The instructor directed us to use wall mounted whiteboards or portable whiteboards for small group work	22.5%	22.9%	26.2%	15.9%	12.4%
Reconfigure classroom furniture – The instructor directed us to rearrange tables/chairs for purposes of discussion or collaboration	39.5%	21.7%	18.6%	11.2%	9.1%

Table 1: Frequency of instructional/pedagogical strategies the participants' instructors used



# Importance of Classroom Attributes

Students assessed the importance of classroom features on a Likert-scale ranging from 1 (not important at all) to 5 (extremely important). Students rated that having access to adequate work surfaces for multiple devices/materials (M=4.54) was most important, followed by adequate visibility within a space (M=4.41), the ability to hear and communicate clearly (M=4.38), adjustable/comfortable seating (M=4.20), and electrical power access (M=4.09) (see Figure 2). Findings from the student survey indicate that students require adequate work space to carry out note taking and learning activities, while supported by comfortable seating and access to power outlets. Students assigned less weight to classroom features that provide storage spaces for personal belongings and access to adjacent informal learning areas (see Table 2).

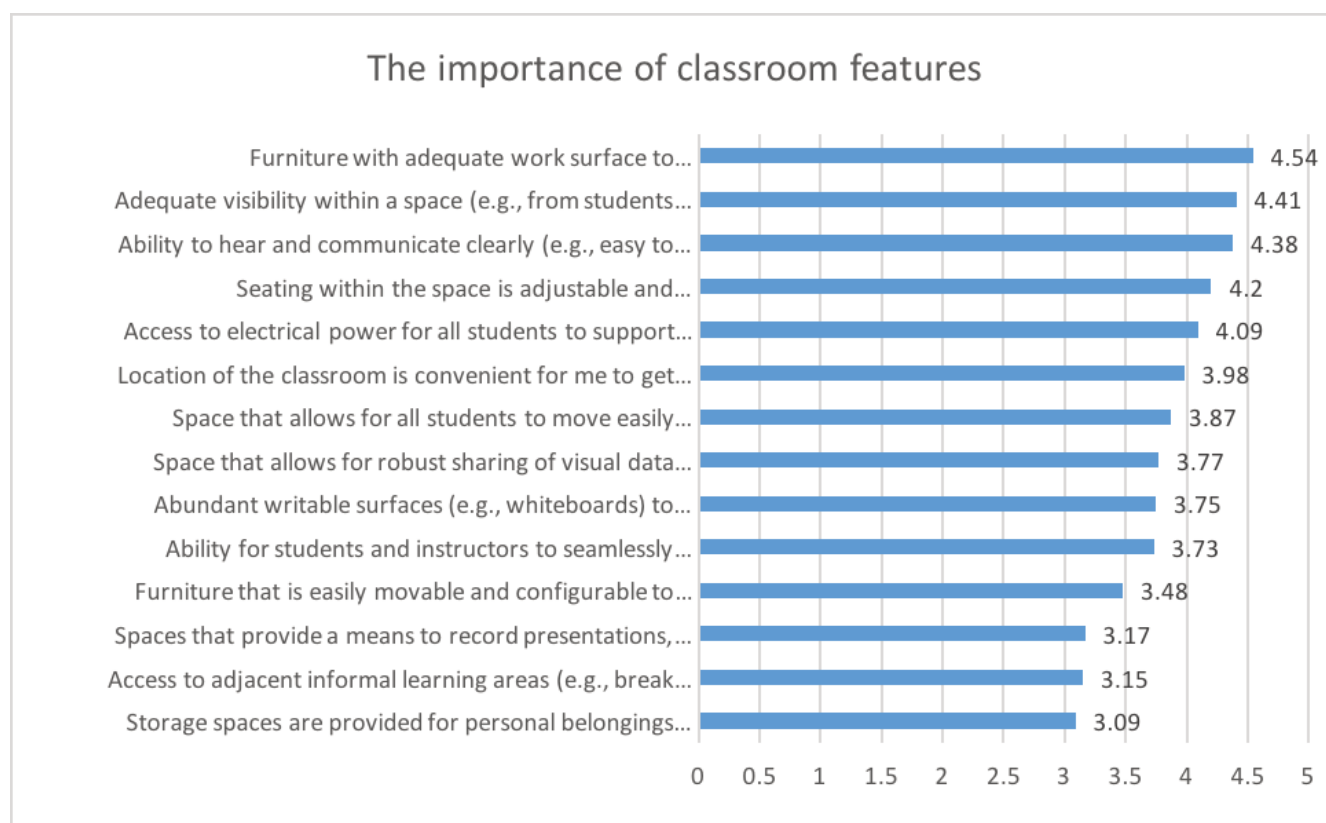


Figure 2. The mean score of the importance of classroom features

Question	Not important at all	Slightly important	Moderately important	Very important	Extremely important
Furniture with adequate work surface to accommodate multiple devices and materials that you may bring to class.	0.0%	1.0%	6.2%	30.9%	61.9%
Adequate visibility within a space (e.g., from students to instructors, to course content, to demonstrations, to other students)	0.0%	1.2%	5.4%	44.2%	49.2%
Ability to hear and communicate clearly (e.g., easy to hear from back of room, push to talk microphones available in large spaces)	0.4%	3.1%	10.3%	30.3%	56.0%
Seating within the space is adjustable and comfortable for extended lengths of time	0.4%	5.0%	14.6%	34.0%	46.0%
Access to electrical power for all students to support the wide variety of technologies used in learning activities	1.7%	6.6%	18.1%	28.8%	44.9%
Location of the classroom is convenient for me to get to as a student	1.0%	8.5%	20.8%	31.1%	38.6%
Space that allows for all students to move easily around the classroom (e.g., to support communication, to facilitate interaction)	1.0%	7.0%	29.0%	29.4%	33.5%
Space that allows for robust sharing of visual data making it easily available, visible, and readable for all students	1.7%	9.7%	26.3%	34.8%	27.6%
Abundant writable surfaces (e.g., whiteboards) to facilitate communication when working with other students and groups	2.3%	11.3%	26.2%	29.3%	30.9%
Ability for students and instructors to seamlessly manage audio/visual content across multiple output systems (e.g., installed displays, computers, mobile devices)	1.7%	10.9%	28.0%	32.1%	27.4%
Furniture that is easily movable and configurable to support a range of learning activities	5.6%	13.8%	31.9%	24.9%	23.9%
Spaces that provide a means to record presentations, group interactions, or conversations with local and remote students, and make those artifacts accessible asynchronously	8.7%	22.3%	31.1%	19.6%	18.4%
Access to adjacent informal learning areas (e.g., break out spaces for short collaborative meetings, after-hours study spaces)	8.0%	20.6%	35.2%	21.0%	15.2%
Storage spaces are provided for personal belongings (e.g., under seat, designated location within the room)	9.3%	25.9%	29.0%	18.5%	17.3%

Table 2. Importance of classroom attributes

# Problematic Classrooms at IUPUI, According to Students

(open-ended question)

All survey participants were asked if they found any classrooms on IUPUI's campus to be problematic. If students responded yes, they were prompted to identify the classroom(s) they disliked and identify any issues they encountered with the learning space. A total of 335 comments were recorded and analyzed according to emerging themes. The classrooms spaces identified as problematic by students were situated within 1970s buildings on IUPUI's campus that were identified as most in need of renovation, including Cavanaugh Hall, the Engineering and Technology Building, Lecture Hall, and the Nursing Building. A summary of findings is presented below.

**Cavanaugh Hall** (particularly the 2nd floor) and **the Nursing Building** (n=168; 33% participants):

- Crowded learning environment (e.g., difficulty moving without disrupting classmates)
- Limited physical configurability for large/small group discussions and seminars
- Lack of windows and natural light
- Uncomfortable seats
- Desks are too small
- Temperature issues (e.g., poor air conditioning, can be stuffy or hot)
- Building disrepair (e.g., ceiling tiles are falling out)
- Certain technologies are outdated

**Business building** (n=57; 17% participants) (third floor n=22; second floor n=16)

- Crowded learning environment; students have difficulty exiting seating
- Limited power outlets for student use
- Rolling desks are too small
- WiFi connections are "horrible," negatively impacting lectures and student presentations
- Temperature issues present within building (e.g., too hot)

**Lecture Hall** (n=47; 14%) (first floor was most frequently mentioned)

- Limited power outlets for student use
- Chairs are small, uncomfortable, stained, and broken
- Air conditioning is loud and distracting
- Inadequate space for personal items within classrooms
- Reported difficulties in moving around
- Tables are too small; difficult to take notes

**Engineering and Technology Building** (n=21; 6%)

- Crowded learning environment
- Tables do not offer much space
- No place to store personal items

- Uncomfortable chairs
- Limited power outlets for student use
- Reported difficulties in viewing board

**Basement rooms** (n=20; 6%)

- Dim lighting
- Tablet chairs are too small; difficult to take notes
- Dated furniture
- Crowded learning environment, which limits group discussion
- Limited power outlets for student use
- WiFi connections are poor

# Reasons of Liking the Classroom

(open-ended question)

All students were asked to identify their favorite classroom at IUPUI and explain why it was their favorite. The top five favorite classrooms reported were: Business/SPEA 2001, Hine Hall 118, Business/SPEA 2005, Business/SPEA 2003, and Cavanaugh Hall 349.

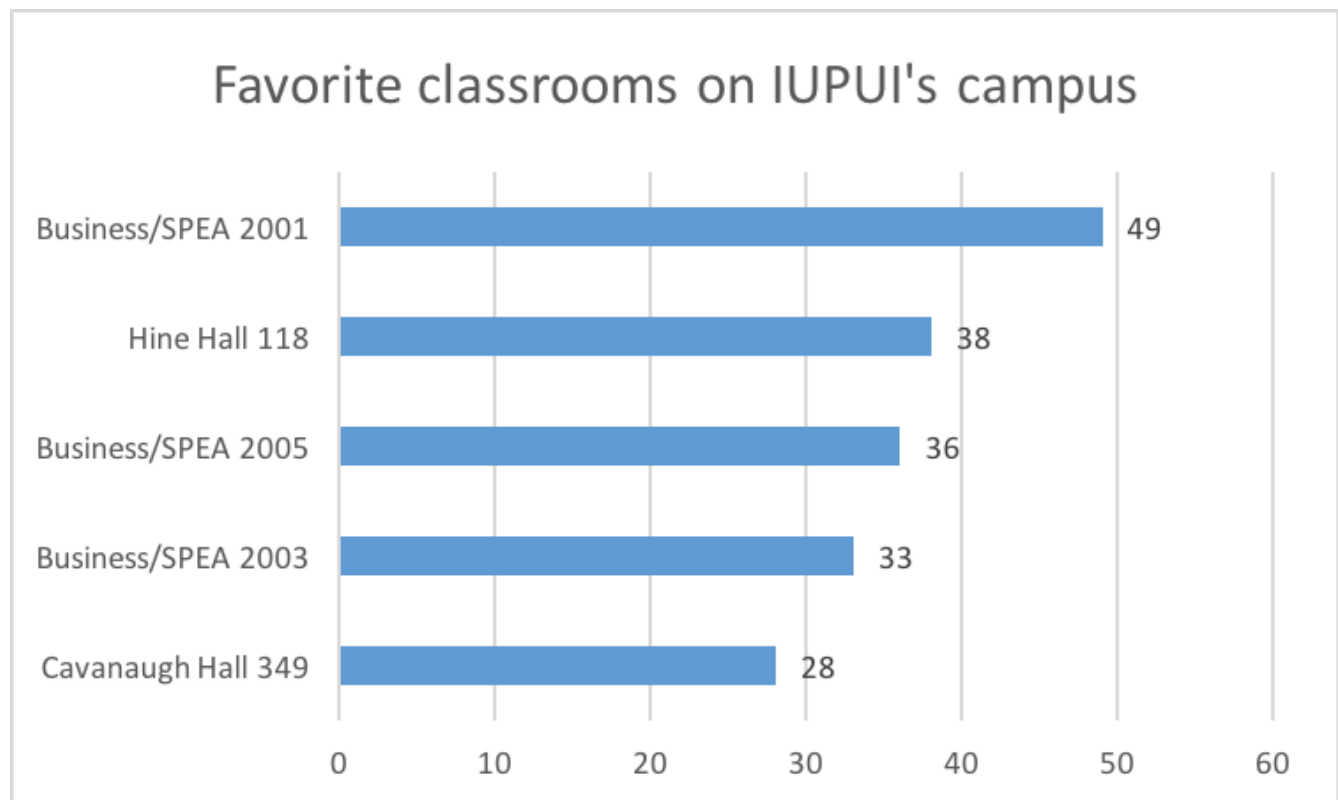


Figure 4. Favorite classrooms on IUPUI's campus, as identified by IUPUI students

A total of 359 comments and responses were coded into themes. Many responses were an elaboration of one or more of the options presented earlier in the student survey when students were asked to select desired features. The most common themes are presented below:

- Comfortable chairs
- High tech classroom with many screens
- Enough space to write, move, and store things
- Ability to move chairs around
- Easy to see the teachers and projection screen
- Easy to hear
- No temperature related issues (AC/heat)
- Access to power outlets
- Desks/chairs easily regroup for individual and group work
- Windows

# FACULTY INTERVIEWS: MOSAIC AND STANDARD CLASSROOMS

# Purpose and Methods

## PURPOSE

The purpose of the individual faculty interviews was to gather the perspectives and experiences of IUPUI faculty who taught the same course content in ALC and non-ALC spaces. The faculty interviews and analysis were completed by Debora Herold, Senior Lecturer, Department of Psychology.

## METHODS

In fall 2017, certain IUPUI faculty were randomly assigned to teach the *same* course in their area of expertise in two different learning spaces – a Mosaic active learning classroom (Hine Hall 118) and a general inventory classroom. At the end of the semester, these same faculty members were invited to participate in one-on-one interviews on their experiences. Individual faculty interviews were conducted with six total instructors from the departments of psychology, business, engineering and technology, and liberal arts.

# Findings

Analysis of the faculty interviews revealed commonalities and differences in teaching approaches. Five out of six instructors reported that they regularly combine short lectures with group discussion and collaborative activities. Only one course, *Ethics and Diversity*, was primarily discussion-based. Two faculty members cited using interactive tools such as Top Hat/clickers with their students. Surprisingly, only two out of six instructors felt they had to employ slightly different teaching strategies in the different learning environments (Mosaic vs. traditional) mainly due to technology enhancements that were not available in the general inventory classroom.

In terms of the features within the Mosaic classroom that facilitated teaching and learning activities, instructors valued having sufficient space to move around easily. All faculty members noted that the layout of the room, which included rows of tables as well as oval collaboration tables with embedded power outlets, facilitated group work well and provided students with ample space for their items. One faculty member stated that she appreciated Solstice, which allowed students to easily project their work to their peers, whereas a different interview participant liked the multiple projection screens at the front of the classroom as it enabled different content to be displayed at the same time.

Even though the Mosaic classroom had particular advantages, some classroom features made aspects of teaching and learning difficult. For example, all of the interviewees mentioned that the large space was prohibitive for students who sat in the back of the room, which was at such a distance that seeing course content and hearing the instructor became problematic. To address this challenge, one professor suggested having more projection screens. A lavalier microphone could also be beneficial as it would amplify an instructor's voice. Another challenge of the Mosaic classroom was its stadium-style seating, which requires students with accessibility issues to position themselves in front of the classroom. Instructors also commented that it was challenging to quickly move between groups because of the distance between the tables.

In terms of advantages of the regular classrooms, instructors noted that the smaller general inventory classrooms meant students could both see and hear well and felt connected. Some instructors appreciated that, in some classrooms, students had movable chairs and stationary tables, whereas others felt there were too many rolling chairs. Overall, instructors felt that the regular classrooms better facilitated large group discussions. They also appreciated the ease with which they were able to see all their students. On the negative side, instructors complained that the regular classrooms lacked space to move around and group work proved more challenging. Other issues in the regular classroom were primarily technically-oriented, as faculty members were limited to using one projector and students did not have ample access to power outlets. In terms of aesthetics, the rooms were not as visually pleasing as the Mosaic learning space.

Two thirds of the interviewees suggested that a "smaller version" of Hine Hall 118 would be ideal. For example, Hine Hall 118 could be improved if the classroom space was more compact, but still offered students the ability to move around. Half of the interviewees did not find it challenging to teach in two different types of classrooms in the same semester, whereas two interviewees noted difficulties in preparing varied learning activities for the different environments. Only one instructor was neutral on teaching in the different classroom contexts.

When offered the option to select their preferred classroom teaching space, most of the instructors selected Hine Hall 118 over their general inventory classroom, although IT 167 and BS 2007 were also noted as ideal spaces. The instructors reported they used the wall-mounted whiteboards, the large projection screens, the wireless network access, the movable student seating, and the document camera most frequently in a given week. In addition, two instructors noted using collaborative displays and Solstice for their classes.

Half of the interviewees felt that the classroom's location was not important; five out of the six study participants



considered classroom features to be more important. Four out of six interviewees thought the affordances/layout of furniture for group work (e.g., moveable chairs) was important. The following classroom affordances were cited as essential:

- Sufficient space for group work and instructor movement
- High-quality whiteboards with markers
- Strong classroom acoustics
- Solstice/ability for students to share their desktops
- High-quality internet connection, two projectors/screens
- HDMI connectors for faculty laptop
- Faculty control of lighting (especially lowering lights at front of the room)
- Power outlets for students

# MOSAIC SENIOR FACULTY FELLOW FEEDBACK

# Purpose and Methods

## PURPOSE

The purpose of Mosaic Faculty Fellow focus groups was to create recommendations for IU classrooms, including Mosaic Classrooms and traditional spaces.

## METHODS

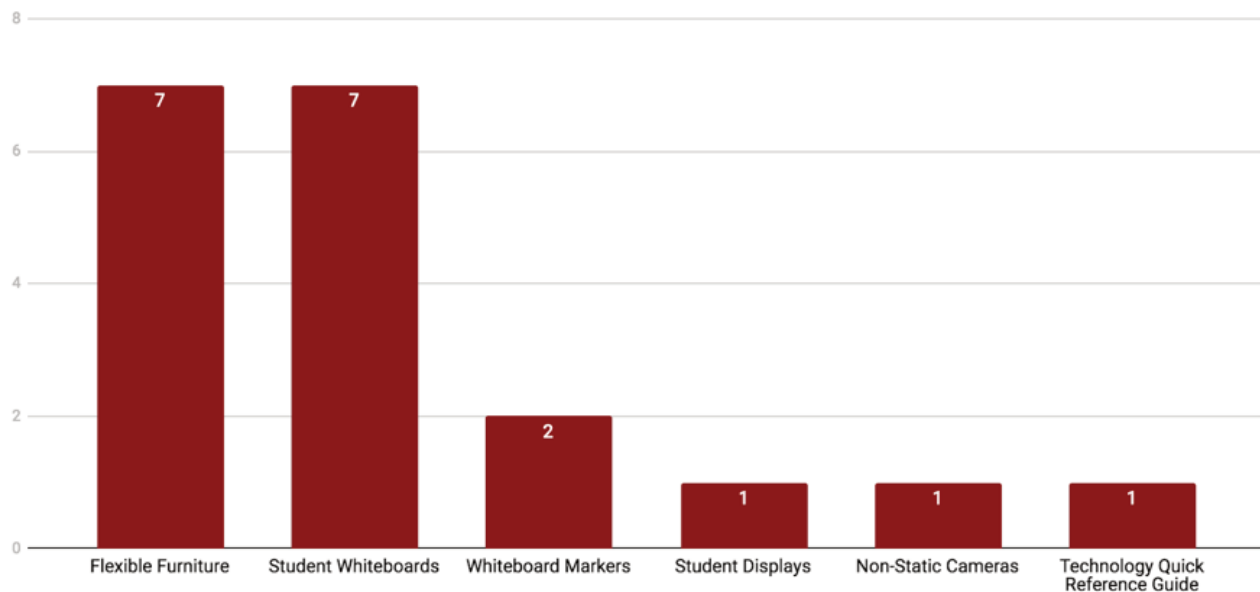
The 2017-18 IUPUI Faculty Fellows (Cohort 4) responded to the following prompts:

1. Which two tools would you pick to put in multiple classrooms to support active learning? Why?
2. What small changes can be made to traditional spaces to support active learning?
3. What do you see as the most significant issue(s) we need to address as we move forward with support and development of IU classrooms?

# Findings: Tools to support active learning

Prompt 1: Which two tools would you pick to put in multiple classrooms to support active learning? Why?

Summary: Top 2 Tools to Support Active Learning



## SELECT DETAILED RESPONSES

### Flexible furniture

- I would select furniture first, because without the ability to move freely within a classroom or to form functional student groups, the other tools are of little use.
- I think that furniture such as the Steelcase Node line, which makes moving around fast and easy, . . . allows for easy and quick room reconfigurations.
- Comfortable chairs with wheels . . . like the chairs in LC 1618 [which are] so easy for the students to learn in because they are not distracted by discomfort and they lose no time in forming small groups by wheeling away from the table and reconfiguring into sharing circles. But then you'd need tables that supported such chairs.

### Student Group monitors

- I would select the table computer/monitors second. Students seem more engaged with the small table screens than with just the large room screen.

### Technology Quick Reference Guide

- A quick reference info guide at workstations to help students independently navigate technology and a quick reference guide for faculty as to a vision of what resources can be used and a contact to someone for

troubleshooting. It could even be a QR format that can easily be linked to our IUPUI website for updates and other resources.

### **Whiteboards**

- As we continually work in groups and use Design Thinking approaches (Brainstorming, Journey Mapping, Prototyping, etc.) the ability to form various groupings of students and to display work visually is essential. By displaying work on whiteboards, students benefit from learning from others and develop the capability to express the meaning of their visual representations.
- I think that group-based whiteboards and markers would be one tool to promote collaborative and consensus building learning.
- Large standing whiteboards with telescoping legs – These can be used as standalone whiteboards that can be moved or positioned in different parts of the classroom, including on tabletops if the legs are shortened. These large whiteboards allow for maximum flexibility in terms of assignments, small groups, and room configuration in a way that personal whiteboards or large fixed ones do not. While I love the aesthetics of glassboards, I am now an advocate for the whiteboards that are depicted in the images.

### **Non-static camera**

- Some sort of camera, similar to a GoPro, that is not static to enhance the broadcasting of motor activities [that are] similar to how a document camera can be used, but higher definition, so that skills can be demonstrated and either recorded for feedback, learning or used in distance education.

# Findings: Changes to traditional spaces to support active learning

*Prompt 2: What small changes can be made to traditional spaces to support active learning?*

The only consensus of responses on this question, mentioned in five responses, was to increase space/amount of square footage per student. All other responses were each mentioned once.

## SELECT DETAILED RESPONSES

### **Reduce capacity/increase per student square footage**

- I know this seems next to impossible from a registrar point of view, but comfortable space enhances collaboration. Remove unnecessary equipment or bulky items to [create] more space.
- Students need space to move, [to] spread out [their] learning materials and comfortably move throughout the room for group activities. The standard fixed table classroom creates the context where the only communicator in the class is the instructor. When there is space for the instructor and students to move, they recognize that they are part of the learning experience for the entire class.
- Reduce the number of students we try to fit into traditional classrooms if there are other rooms that can accommodate larger numbers of students. (increase per student square footage)

### **Selection of furniture and affordances**

- Remove the unwieldy tables and uncomfortable chairs. Replace them with smaller tables and comfortable chairs with rollers.
- Adding packs of small group-based whiteboards to each room would be one way to encourage active learning behaviors.

### **Classroom arrangement**

- [Student learning could be enhanced] if classrooms were oriented into a U-shape with chairs and tables . . . so everyone could see each other.
- Redesign the traditional classroom spaces for more aisle space to allow for the formation of small groups that allow the faculty member to visit with each student.

### **Screen display**

- The option and ability to record multiple screens
- Smart boards that can display on big screens. For example, the LE101 whiteboards are pretty useless for drawing on. The students in the back can't see [them] because of size and distance. The overhead projector and the document camera are not recorded.

### **Location of classrooms**

- Reassign classroom spaces in blocks of other classrooms or spaces in which students frequent, like the Mosaic classroom I'm teaching in currently, which is housed in the library and close to computer banks and our coffee shop on campus. Having classrooms so close ... noisy traffic areas is awfully distracting for the students.

Additionally, individual Fellows suggested that improved WiFi coverage, lighting, acoustics that could absorb excessive sound, and temperature are all environmental enhancements that should be considered when assessing changes needed within traditional spaces.

# Findings: Most significant issues in classroom support and development

*Prompt 3: What do you see as the most significant issue(s) that we need to address as we move forward with support and development of IU classrooms?*

## SELECT DETAILED RESPONSES

### **Enrollment vs. Classroom space**

- Fewer students per square foot. Allow room to move around. Stop designing classrooms that are clearly set up as traditional forward-facing, all-in-a-row lecture rooms.
- Class size and room size, my access to students individually or in small groups, ability of students to form working groups, visibility in terms of being able to see what is being presented to the room – those are the big ones for me. The equipment is icing, but the ability to interact with students on a smaller scale is the cake. It is so easy for a student to be invisible or at least not be engaged in a large class setting.

### **Designing for active learning**

- The eradication of rooms, such as CC 236 at IUPUC, that work against active learning pedagogical strategies. These rooms can be redesigned or re-purposed. The students are the beneficiaries of this investment, and you make faculty lives much easier and happier!
- The giant screens in these lecture rooms take up a lot of space, leaving little area for white boards.
- The biggest challenge is moving away from classroom layouts which best serve lecture and toward those layouts which facilitate collaboration and communication. As always, [it's also a challenge to infuse] the latest technology into the classroom (e.g., VR, AI, Electronic Whiteboards, etc.) and help professors change their paradigms for how students learn. Of course, the cost of transforming classrooms is a continuous barrier.... At the same time, if we choose to be on the leading edge of learning, we must create those spaces to enable optimum learning experiences.

### **Faculty and Student Voice**

- Allow faculty and students to have a voice in what they need to enhance learning in their classroom. Some courses could benefit from adaptations more than others and by asking the users their preferences and not focusing strictly on campus location or capacity, we could share our spaces better.

### **Commitment to active learning pedagogies and professional development support**

- The faculty would need to embrace the new setup of classrooms to engage student learning and utilize the space ... to produce the maximum amount of student engagement.
- Professional development for instructors [should] keep pace with [enhancement of] the features of the room. Even if an instructor is not in a dedicated Mosaic room, there are things instructors can do to engage their students in active learning. Much of this actually starts with the basic design and goals of the course, before the instructor even enters the classroom.



- Need to ensure that teachers assigned to Mosaic classrooms enact active learning pedagogies.

# Classroom Needs Analysis Focus Group Questions

This section is written for discussion facilitators. The questions are tailored to instructors who teach face-to-face courses, not in computer labs, other kinds of laboratories, clinical settings, or solely online courses.

1. What kinds of courses do you teach (introductory surveys, seminars, upper division topical courses, or graduate-level)? How many students are typically in your classes?
2. What kinds of activities do your students experience in a typical class meeting? [Discussion facilitators record the different types of activities mentioned. Those listed activities will be used in the questions below.]

**Note:** Show the slideshow below with exemplars of existing and aspirational classrooms at IUPUI to show focus group participants the range of features that can be available in classrooms.

Introduce this activity by saying to participants: We are going to show you photographs of various classrooms and classroom attributes. Please consider how well the different attributes would work for your teaching approach.



An interactive or media element has been excluded from this version of the text. You can view it online here:

<https://iu.pressbooks.pub/iupuiclassrooms2018/?p=258>

[Click here](#) to download a PDF version of the slideshow above.

Classroom features to show:


- a. Different kinds of seating – tablet-arm chairs, Steelcase “bumper car”, other types of chairs on casters or without casters
  - b. Tables – multi-person rectangular tables, individual tables that may be combined to form tables for groups of various sizes, tables with and without casters
  - c. Display technologies – individual tablet white boards, white boards on casters, wall-mounted glass or whiteboards, digitally based affordances that allow sharing of student work with groups and class (e.g., Solstice, Crestron), touch screens, others
  - d. Web conferencing collaborative affordances (e.g., eagle eye)
  - e. Room configurations – amphitheater style with tablet arm chairs, law- or business-style amphitheater with long tables, amphitheater style with affordances for collaboration (e.g., Hine Hall 118), scale-up rooms with round tables, rooms with pod arrangements of tables that seat 6 to 8 and feature collaborative digital display affordances (e.g., LE 104), seminar style with conference table,
  - f. Various seating capacities of classrooms exhibiting some or all of the characteristics described above
  - g. Other
3. Those of you who [insert instruction approach mentioned, e.g., lecturing], what classroom features would help facilitate that type of approach? [Repeat, as needed, to address all of the teaching activities mentioned in question 2)
  4. What classroom features would not work well for the teaching approach(es) you use in the classroom?
  5. How important is proximity of the classroom to your office or other locations that you inhabit on or off campus? (e.g., being close in proximity to your campus office or easy to get to from off-campus locations).


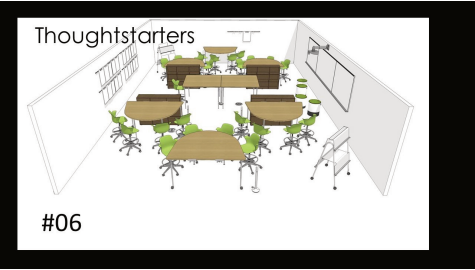


6. What does convenience mean to you in terms of classroom location? (e.g., in what building is your office? and what classroom buildings meet your criteria for convenience?)
7. What other classroom features are important to you?





# Notes, Learning Space Examples




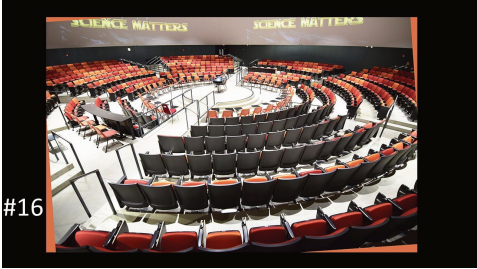
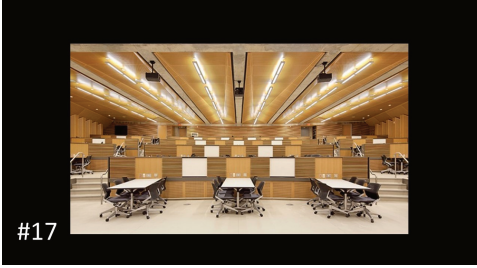
Name: \_\_\_\_\_

**2018, April 23**  
**IUPUI Classroom Design Focus Group**

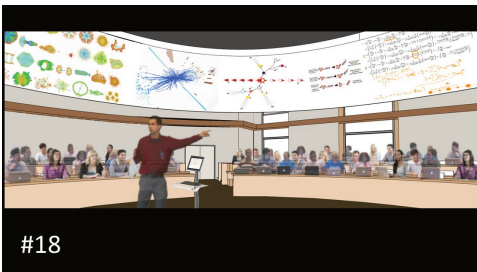
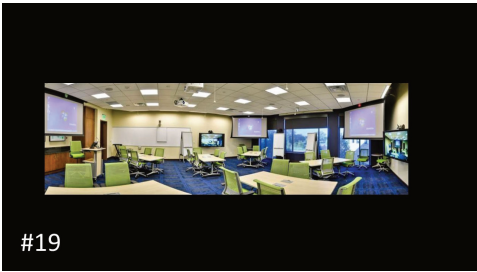


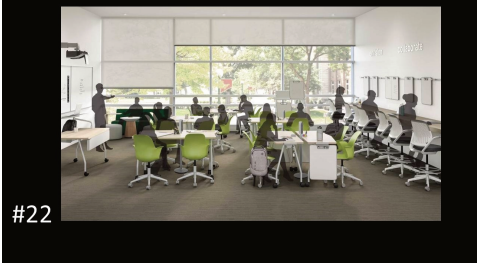

Slide no.	Image	Comments
01	<p>Thoughtstarters</p>  <p>#01</p>	
02	<p>Thoughtstarters</p>  <p>#02</p>	
03	<p>Thoughtstarters</p>  <p>#03</p>	
04	<p>Thoughtstarters</p>  <p>#04</p>	

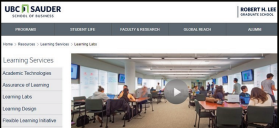



05	 <p>Thoughtstarters</p> <p>#05</p>	
06	 <p>Thoughtstarters</p> <p>#06</p>	
07	 <p>#07</p>	
08	 <p>#08</p>	


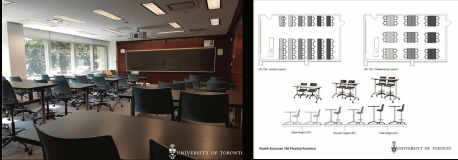
09		
10		
11		
12		

13	 <p>#13</p>	
14	 <p>#14</p>	
15	 <p>#15</p>	
16	 <p>#16</p>	
17	 <p>#17</p>	



18	 <p>#18</p>	
19	 <p>#19</p>	
20	 <p>#20</p>	
21	 <p>#21</p>	
22	 <p>#22</p>	
23	 <p>#23</p> <p>Active Learning Classroom</p> <p>Andy Kahar The Ohio State University Assistant Director of Learning Environments</p>	

24	<p>UBC Sauder Learning Labs. 2015 Crestron Award winner</p>  <p>#24</p> <p>Rob Peregudoff Director Learning Services University of British Columbia <a href="https://youtu.be/AA5abddw">https://youtu.be/AA5abddw</a></p>	
25	<p>Active Learning Classroom Redesign</p>  <p>#25</p> <p>Nicole Weber Director of Learning Technology University of Wisconsin Whitewater</p>	
26	<p>New Technologies Flex Space</p>  <p>#26</p> <p>Nicole Weber Director of Learning Technology University of Wisconsin Whitewater</p>	
27	<p>School of Business Trading Room</p>  <p>#27</p> <p>Laurie Fox Assistant Director and Manager of Educational Technology SUNY Geneseo</p>	
28	<p>Active Learning Classroom</p>  <p>#28</p> <p>Chuck Haberle Asst VP for Academic Affairs, Academic Facilities and Technology Planning Providence College</p>	
29	<p>New Technologies Flex Space</p>  <p>#29</p> <p>Laurie Fox Assistant Director and Manager of Educational Technology SUNY Geneseo</p>	

30	<div><p>Immersive Synchronous Communication Lecture Hall</p><p>#30</p><p>Matthew Wile Associate Director Digital Classroom Services Rutgers University</p></div>	
31	<div><p>Active Learning Classroom</p><p>#31</p><p>Steve Bailey &amp; Kate Sotek University of Toronto Director (ACE) &amp; Classroom Design &amp; Development (ACE)</p></div>	

# History of Active Learning Classrooms

To leverage the benefits of face-to-face learning, learning space design requires considerations of pedagogy, space, and technology (Radcliffe, 2008). Active Learning Classrooms (ALCs) are one approach that universities and colleges consider when creating or remodeling learning spaces. ALCs feature movable furniture, accessible whiteboard space, and technology enhancements with various designs and configurations (Beichner et al., 2007; Dori & Belcher 2005; Parsons, 2016; Whiteside, Brooks, & Walker, 2010). ALCs are intended to support students' active interaction, engagement, and problem-solving skill development (Baepler et al., 2016; Beichner, 2014; Parsons, 2016). The affordances of ALCs promote collaborative, active, and student-centered learning, which emphasizes social interaction in knowledge construction (Dillenbourg, 1999; Littleton & Haikinen, 1999; Palincsar, 1998). The learning approaches that are supported by ALCs include cooperative learning (Johnson & Johnson, 2009), team-based learning (Michaelsen, Knight, & Fink, 2002), collaborative project-based learning (Bell, 2010; Blumenfeld et al., 1991), and collaborative problem-based learning (Barrows & Tamblyn, 1980; Hmelo-Silver, 2004; Savery, 2006).

Comparative studies from early initiatives such as North Carolina State University's SCALE-UP, the University of Minnesota's PAIR-UP, and Massachusetts Institute of Technology's (MIT's) TEAL initiative show that students have positive learning outcomes in ALCs (Beichner et al., 2007; Brooks, 2012; Dori & Belcher, 2005). As a result, the number of higher education institutions that adopt active learning classrooms is increasing (Beichner & Cevetello, 2013). More than 200 U.S. institutions currently have ALCs (Beichner, 2014).

## MOSAIC INITIATIVE

Indiana University's Mosaic Active Learning Initiative supports innovative classroom design, research, and comprehensive support for all IU classrooms. The Mosaic Initiative started in fall 2015 and publicly launched at IU Bloomington in January 2016 (Morrone et al., 2017). In September 2016, the Mosaic Initiative expanded to the Indiana University-Purdue University Indianapolis (IUPUI) campus.



**IUPUI's Immersive Classroom: AD 1000.** The Mosaic Active Learning Classroom at IUPUI, AD 1000 provides faculty and students with a touchscreen, interactive wall monitor that can be coupled with Mersive Solstice for display of student work from any device.

---

As the name of the initiative suggests, the Mosaic Initiative supports a variety (mosaic) of classroom designs rather than encouraging a single-configuration approach, such as North Carolina State University's SCALE-UP.

## MOSAIC FACULTY FELLOWS

The Faculty Fellows program is a core component of the Mosaic Initiative. The program provides an opportunity, over the course of a full academic year, for faculty to engage in active learning practices in their own teaching and with other Mosaic Fellows, as well as contribute to the development of learning spaces across Indiana University. The first cohort of IUPUI Mosaic Fellows was formally selected in 2016.

Goals of Mosaic Faculty Fellows:

- Prepare faculty to teach in active learning spaces by exploring various instructional strategies and approaches
- Build a community of faculty members who collaborate on their own teaching and mentor colleagues on exploring and refining pedagogical practices
- Promote evidence-based teaching through the encouragement of research on teaching and learning activities in ALCs
- Create faculty leaders to guide the development of new learning spaces on campus



---

**IUPUI's Mosaic Faculty Fellows** gather together as a cohort to discuss teaching strategies within active learning spaces.

---

For faculty members who teach in active learning classrooms but are not part of the Mosaic Faculty Fellows program, can participate in the following offerings through the Mosaic initiative:

- Mosaic classroom workshops
- Open classroom sessions to observe actual courses in Mosaic classrooms
- Interactive tours of a variety of active learning classrooms to explore different designs and technologies
- One-on-one or group consultations (on request)

## ACTIVE LEARNING CLASSROOMS AT IUPUI

As of summer 2018, there are 18 Mosaic Active Learning Environments and 12 Mosaic technology-enhanced classrooms for instructor and student use (out of a 188 classrooms total at IUPUI). The capacity of these classrooms varies. The Mosaic designated rooms can accommodate 20 to 106 students, with most rooms serving 20 to 54 students; the Mosaic technology enhanced classrooms accommodate a range of 20 to 54 students. The Mosaic Active Learning Environments at IUPUI are equipped with movable chairs and movable tables, whereas the Mosaic technology-enhanced classrooms have more fixed seating arrangements, such as large circular tables, lab configurations with monitors that can be lowered, or U-shaped collaborative tables with large wall-mounted monitors for sharing of small group work. Both types of learning environments include whiteboards, projection screens, and accessible power outlets for charging of electronic devices.