Faculty Perceptions of Learning Spaces

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For comments/questions, contact:
Craig Zywicki,
Assessment and Data Analyst
Phone: 765-496-0418
E-Mail: czywicki@purdue.edu
Executive Summary

Purdue University is a leader among peer institutions in design, development, and use of learning spaces. This commitment is reflected in the dedication of resources to enhance learning experiences, by building an active learning center in the heart of campus. While higher education at Purdue has thrived for nearly 150 years, the recent drive to transform education at Purdue moves instructors towards more research-based, student-centered teaching and learning practices.

Results from previous studies of learning spaces at Purdue challenge the common assumption that active-learning spaces ubiquitously support best teaching practice and suggest considerations for faculty professional development and learning space assignment. This study advances prior findings by compiling the voices of Purdue faculty interested in the development of learning spaces. These instructors possess valuable insight that can inform how to improve the scheduling, use, and function of learning spaces. Specifically, this study gathered data on instructor’s perceptions of self-efficacy, pedagogy, physical characteristics of learning space, the learning space scheduling process, and classroom technology.

Key findings include:

- Instructors seek to use learning spaces that align with their desired pedagogical approach.
- Physical features in, and personal/peer experiences with assigned learning spaces affect instructors’ course planning, use of time in class, and their teaching efficacy.
- Instructors seek greater transparency and understanding of room scheduling practices.
- There is no single learning space that will satisfy all pedagogic needs. Mechanisms need to be in place to better match instructor, pedagogy, and learning space.
- Recommendations address the voiced strategies that may strategically maximize the use of traditional and active learning spaces on campus.

Study Personnel

Purdue Libraries:

- Tomalee Doan, Associate Dean, tdoan@purdue.edu
- Michael Flierl, Assistant Professor, mflierl@purdue.edu

Discovery Learning Research Center:

- Loran Carleton Parker, Assessment Specialist, carleton@purdue.edu
- Lindley McDavid, Postdoctoral Research Associate, mmcdavi@purdue.edu

Office of Institutional Research, Assessment, and Effectiveness:

- Diane Beaudoin, Director of Institutional Assessment, beaudoin@purdue.edu
- Craig Zywicki, Assessment & Data Analyst, czywicki@purdue.edu

Acknowledgements

Thank you to the instructors who participated in this study. Our study design prevents us from identifying participants, but we hope they see their voices reflected in the words of this report.
Introduction

Background

Purdue University is dedicating significant time and resources to improve classroom pedagogy and learning, including capital improvements to renovate or create active learning spaces that support student-centered pedagogies. Two notable examples of Purdue’s commitment to transforming learning include:

- IMPACT (Instruction Matters: Purdue Academic Course Transformation), a course re-design program, which seeks to “redesign foundational courses by using research findings to create student-centered teaching and learning environments.”
- On-going renovation and construction of learning spaces, including the Wilmeth Active Learning Center (the WALC).

Significant research is ongoing to understand the impact of student-centered learning approaches on various metrics of student success. Three units—Purdue Libraries, the Discovery Learning Research Center, and the Office of Institutional Assessment—are actively collaborating to complete a series of research studies about the impact of learning spaces at Purdue. To date, this series of studies includes the four approved IRBs listed in Appendix 1. This report summarizes the third study in the series.

Purpose

The purpose of the first study was to examine what, if any, connection existed among learning spaces and instructor perceptions of their own teaching effectiveness, their perceptions of student engagement, and their satisfaction with teaching. We examined faculty (N=148) perceptions of self-efficacy for student-centered practices, teaching experiences, and student engagement in active- and traditional-learning spaces. That study found that there were significant connections among these variables and that instructor perceptions of their effectiveness, their students’ engagement, and their satisfaction were strongly linked to the learning space. Additionally, there were significant negative correlations among these variables when examined across spaces. For example, the more confident faculty were in their teaching abilities in a traditional learning space, the more likely they were to hold negative perceptions of their teaching effectiveness and student engagement in active learning spaces, as well as, experience lower levels of teaching satisfaction in active learning classrooms (and vice versa). These results suggest that instructor “success” in learning spaces is linked to the confidence they feel in the learning space. The results indicate that learning space, in and of itself, is not sufficient to support student-centered practices, and challenges the assumption that faculty who are highly effective in traditional learning spaces will be equally successful in active learning spaces. The study suggests that faculty development of teaching confidence and skills are learning space dependent. These findings have implications for developing effective classroom space assignment policies and for scaffolding instructor transition between spaces through learning space-specific training. Thus assigning even very confident instructors to spaces that they were not prepared to teach in (active or traditional) could produce negative results for both faculty satisfaction and effectiveness. However, the first study did not allow us to describe the mechanisms through which faculty develop confidence in their ability in different learning spaces (self-efficacy) or how their experiences with learning spaces are both influenced and informed by their philosophical views toward and practical approaches to teaching and learning.

Through a qualitative approach, the purpose of this study was to obtain descriptive data from instructors about their perceptions of learning spaces and the effects space has on their teaching and students’ learning. Our primary research question was: How does classroom design affect faculty perception of their teaching practices?

Purdue University administration, faculty, and staff may look to this report for:

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1 For more information about IMPACT, see: Redesigning Education IMPACT (http://www.purdue.edu/impact/)
2 For more information about the WALC, see: Wilmeth Active Learning Center (https://www.lib.purdue.edu/walc/)
• Descriptions of instructors’ lived experiences scheduling and utilizing learning spaces on campus, including both traditional and active learning spaces.
• Perceptions of faculty agency in regard to adapting their pedagogical approach to match an assigned learning space, or adapting an assigned learning space to match their pedagogical approach.
• Perceptions of classroom features, e.g. instructional technology.
• Greater understanding of the relationship between student learning and learning spaces.

Finally, this study serves as a foundation for future research on learning spaces at Purdue University, including the potential for innovative research of spaces in the new Wilmeth Active Learning Center (the WALC).

Definitions

For this study, a Learning Space is any physical space where learning occurs. Traditional Learning Spaces at Purdue University are classrooms designed for traditional lecture-based instruction to be the dominant instructional method used by the instructor. Most classrooms are designated as traditional learning spaces unless specifically designed with a different focus.

Active Learning Spaces are classrooms with specific features designed for facilitation of active learning. According to Prince\(^3\), the core aspects of Active Learning are “student activity and engagement in the learning process. Active learning is often contrasted to the traditional lecture where students passively receive information from the instructor” (p. 223). Purdue University\(^4\) describes active learning as a teaching and learning pedagogy focused on:

- Collaboration between students and instructors.
- Students and instructors being mutually responsible for knowledge and academic success.
- Teaching and learning methodology characterized by students’ engagement in activities requiring greater responsibility for knowledge gains.
- An enriched learning environment with close proximity between teaching and study space.

For a current list of active learning classrooms at Purdue University, see Appendix 2.

Two clarifications:

- The spaces described by participants within this study predominantly include classrooms designated as teaching spaces by the university, but participants also referred to other formal types of learning spaces (e.g., laboratories, library, instructor’s office, etc.) or informal spaces (e.g., residence, food court, outside, etc).
- Learning is not space dependent. Learning may occur in any space, even if the space is not designated as a learning space by Purdue University.

Use of classroom within this report refers to any classroom, regardless of design or features. Use of “active learning space” or “active learning classroom” refers to spaces and classrooms possessing the specific features designed for facilitation of active learning.

Whereas a Teacher-Centered paradigm relies on lecturing for the transmission of knowledge from instructor to student, a Student-Centered paradigm relies on student engagement and feedback to actively involve students in their own learning.


\(^4\) Source: Wilmeth Active Learning Center (https://www.lib.purdue.edu/walc/)
Active Learning Strategies are specific facilitation methods used by an instructor to facilitate student-centered teaching practices. Among many possible strategies, common active learning strategies include: think-pair-share, group discussions, one-minute papers, or mini-lectures followed by an activity.

Self-efficacy is a construct of Social Cognitive Theory\(^5\) that describes a person’s perception of their ability to be effective at a given task. In this report self-efficacy (or efficacy) is used to describe instructor’s perceptions of their abilities facilitate student learning in their classrooms and courses.

The use of Participant(s) within this report describes the perspectives of participants in the study. The use of Instructors or Faculty represent a general reference to the group of Purdue University faculty.

They/Their is used within the report as gender-neutral pronouns, in place of “she/hers” and he/his.”

Brief Methodology

The research team designed this study based on experiences gathering and analyzing data in two preceding studies. Our collective knowledge, skills, talents, and background enabled us to build upon various strengths including various curricular backgrounds, leading us to conceptualize this study from multiple perspectives. The resulting focus group protocol appears in Appendix 3. Prior to conducting focus groups, we obtained approval of the data collection procedures from Purdue’s Institutional Review Board.

Faculty were recruited to participate in focus groups if they:

1. Taught in an active learning space during the 2014 and/or 2015 academic year and
2. Showed interest in learning space research by completing the survey used in the Effect of Space on Faculty Teaching study, the first study in the series.

194 faculty qualified for the study and 61 responded to an email invitation to participate. Table 1 shows a distribution of participations based on basic demographics.

<table>
<thead>
<tr>
<th>Table 1. Basic Demographics of Study Participants</th>
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<tbody>
<tr>
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<td></td>
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<tr>
<td>IMPACT Participant</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Experience</td>
</tr>
<tr>
<td>Less than 4 years</td>
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<tr>
<td>4 or more years</td>
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<tr>
<td>Sex</td>
</tr>
<tr>
<td>Female</td>
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<tr>
<td>Male</td>
</tr>
<tr>
<td>Home Unit</td>
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<tr>
<td>College of Agriculture</td>
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<tr>
<td>College of Education</td>
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<tr>
<td>College of Engineering</td>
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<tr>
<td>College of Health &amp; Human Sciences</td>
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<tr>
<td>College of Liberal Arts</td>
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<tr>
<td>College of Pharmacy</td>
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<tr>
<td>College of Science</td>
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<tr>
<td>College of Veterinary Medicine</td>
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<tr>
<td>Purdue Polytechnic Institute</td>
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<tr>
<td>School of Management / Other</td>
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<tr>
<td>Tenured or Tenure Track</td>
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<tr>
<td>Yes</td>
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<tr>
<td>No</td>
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</table>


<table>
<thead>
<tr>
<th>Rank</th>
<th>Participants</th>
<th>Invitees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Rate</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>9</td>
<td>14.8%</td>
</tr>
<tr>
<td>Associate Professor</td>
<td>26</td>
<td>42.6%</td>
</tr>
<tr>
<td>Full Professor</td>
<td>16</td>
<td>26.2%</td>
</tr>
<tr>
<td>Lecturer</td>
<td>10</td>
<td>16.4%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Fourteen, one-hour focus groups with two-to-five participants in each group were conducted by Lindley McDavid, Loran Parker, Craig Zywicki, and Michael Flierl during the spring 2016 academic period. In hopes of allowing participants to focus in depth on the topics of the interview, we purposefully created interview groups that were homogeneous on one of two characteristics that we thought would be relevant to the study: participation in IMPACT and amount of teaching experience. However, this type of grouping was not always possible due to scheduling constraints. Our final sample of focus groups contained one group in which all the participants had been IMPACT fellows, five groups in which all the participants had at least 10 years of teaching experience, two groups in which all the participants had less than 10 years of teaching experience, and six groups with no single unifying characteristic.

Focus group recordings were transcribed and coding commenced soon thereafter. Michael Flierl, Lindley McDavid, and Craig Zywicki—representing each of the three partnering units—completed the analysis based on coding procedures described by Saldaña using NVivo software. Concept coding was used to create and define the observed nodes and for the first coding iteration. Pattern coding was used for subsequent coding iterations. Loran Carleton Parker, Tomalee Doan, and Diane Beaudoin contributed throughout the process by suggesting study design content and analysis steps, questioning and clarifying interpretations, and/or providing additional background information. Appendix 4 contains the structure we used to code the data and reach consensus.

We organized the results based on aggregations of interviewees’ responses and disassociated any identifications from these aggregations. Out of respect for the confidentiality guaranteed to interviewees, we used only a few de-identified quotes within this report. We anticipate using the data and results in multiple publications or presentations beyond this internal institutional report.

## Results

Results appear in four sections, the first three driven by the original research question, followed by a section discussing room scheduling. While many instances occurred where two or more participants’ perspectives aligned or overlapped, contrasting or conflicting perspectives emerged due to:

- Differences in course content.
- Differences in participants’ perspectives regarding how to teach or how students best learn course content.
- Contrasting perceptions regarding the physical features in classrooms.
- Varying strengths, training, past experiences, and knowledge across participants.
- Extent of overall teaching experience, and the amount of experience teaching within an active learning space.
- Amount of experience facilitating learning through use of active learning strategies, regardless of classroom space(s) used.

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Collectively, these possible explanations represent a varied understanding of the use of and preferred features within learning spaces. We strive to preserve the spectrum of their perspectives by presenting a few example responses that best represent the participants’ overall voice.

How does classroom design affect faculty perception of their teaching practices?

Faculty may develop their perceptions of teaching practice through a variety of formal or informal experiences. Consider the Purdue University IMPACT program as a sample formal strategy for groups of faculty to design and develop teaching and learning experiences. In IMPACT, faculty go through a backwards design process to:

1. Develop learning outcomes based on what they want students to learn,
2. Decide on acceptable evidence of learning, and then
3. Create learning experiences to achieve desired learning outcomes.

Based on participants’ responses, classroom design affects instructors’ perceptions of learning spaces within any step of a course design/redesign. For example, an instructor using a classroom for the first time may see how features in this classroom enable them to achieve different learning outcomes not possible in a previously used classroom. However, the modernization of learning spaces on campus is not always aligned with pedagogical improvement. Instructors putting the time into development of their courses—such as the effort required by backwards design—expect to teach in classrooms that support their preferred pedagogical methods.

Faculty perceptions of the importance of learning spaces are strongly influenced by the degree to which they attempt to use student-centered teaching practices. Faculty attempting to integrate student-centered approaches report their efforts were optimized when in active learning spaces. On the contrary, participants relying on lecture-based practices often deemphasized the importance of space to their teaching practices. For example, consider the participants who shared:

“I’ve had to give up on some things that I wanted to be able to do or the quality of the interaction I would do my best to try and adapt but there is only so much you can do in a space...But it’s not enough to say I want an active learning room. We need to be able to specify which active learning rooms meet our needs.”

“It would not make one bit of difference to me. I prepare my class in terms of content to be covered and topics and units and how much time to spend on them, and we don’t do things like experiments or use sinks or anything else, or it’s a lecture discussion class and the setting wouldn’t matter. It does not matter to me.”

Active-learning pedagogies require more space than more passive traditional lecture-based teaching methods. According to Porter, the space needed per student is 13 square feet in a traditional classroom, and around 28 square feet in an active learning classroom. Active learning spaces are also perceived by participants to be in high demand at Purdue University. Assigning instructors to spaces containing the features best fitting their pedagogical practices represents the best economical and practical use of space resources on campus.

Figure 1 depicts the interplay between learning space, instructor teaching practices, and use of university resources. The horizontal axis represents a continuum of instructor teaching practices ranging from individuals who rely solely on traditional strategies to individuals who rely extensively on student-centered practices. The vertical axis represents a continuum of learning space design that ranges from traditional learning spaces to active-learning spaces.

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This model provides a few important considerations:

1. An ideal use of university resources is depicted in the area “when space and instructors match.” Here, instructors who do not use active learning practices are assigned to traditional learning spaces, and instructors who rely on student-centered practices are assigned to active-learning spaces.

   “Having been in a very good [active-]learning type of environment you can really do the most things. If I had to go back into a room where the chairs are all bolted to the ground or whatever, then I feel like I’ve been compromised as an instructor because I can’t tap into a lot of things that I think are very beneficial to students and that would be frustrating. On the other hand, I have a number of colleagues that love that environment because that’s what they’ve always had, that’s what they’ve always been comfortable with. So moving to an environment and even thinking about trying something with cooperative learning is a scary thing for them. So you’re likely to see people going both ways.”

2. The center area “when space and instructors match” also represents the potential for instructors who might be less inclined or experienced in using student-centered practices to be challenged to use these practices because they were assigned to an active-learning space. This area expands as the continuums approach the higher ends, representing the flexibility perceived within spaces by instructors with greater knowledge and interest in using active learning strategies.

   “I had taught the traditional lecture format, but over the years I had been working to sneak in interactive things wherever I possibly could. So, once I got a classroom space that worked it was
just like the natural progression. So I guess if you really – I could see where people are coming from, but for me it was like, ‘Finally, we've got something that's so wonderful.'"

“And my fear is that because we don’t have enough of those spaces that some of our same young faculty are going to go back to that traditional [mode] and once they’re in that mode they’re not going to want to come out of it. Because anybody that’s been in that traditional mode for a long time and then tried something new like a collaborative [mode], it’s a big transition and it's a scary transition for a lot of people. So, it’s hard to help people make that. So that’s part of why I think we need to have more spaces of this nature.”

3. The upper left area of the figure represents a waste of university learning space resources, where instructors who are unskilled or uninterested in using student-centered strategies are assigned to active-learning spaces. This mismatch could limit opportunities for other instructors, who are better suited for this space and to better utilize this resource.

“We’re fighting for [active-learning] classrooms. And the other frustrating part to me is that sometimes some of my colleagues want to use this space because it’s a nice space but they don’t use any of the active learning facets of it. They just like it because it’s a new classroom and it’s really nice and things like that. They don’t want to go in the old 1950 looking classroom. And that’s frustrating. If they’re not taking advantage of what this is designed for that’s problematic.”

4. The lower right area of the figure also represents a waste of university resources, where instructors who are skilled and interested in using student-centered strategies are assigned to traditional learning-spaces.

“So typically in our core courses we have 150 students, and I like to do group work and active learning but I’m always placed in a room that is not conducive to that. It is usually a large lecture class that doesn’t have anything movable. A lot of it is more theater type seating.”

“But I don’t think I could expect active participation in discussion in a room where the seats were inflexible, immovable. You can’t discuss in a room where you’re lined up in rows and columns. You have to see each other, pick up on non-verbals, facial expressions and so on.”

Although some faculty may feel constrained by their space assignment, others have the skill and efficacy to use student-centered strategies independent of space. However, active-learning spaces are more likely to enable instructors to facilitate using student-centered teaching and learning practices.

“I make do with any classroom I get. I tell my students that I don’t lecture. I facilitate discussion, and we have a lot of discussions. If I’m in a typical lecture hall, even stadium seating, I make students turn their chairs or at least twist to talk to other people. I teach one course that has demonstrations, and not just for the students [to] watch. But I've had students have to stand up in their seats and do different things, and I just make do with it. In some of my smaller class sizes, when I’m in the active learning space and definitely walking around, the students are moving around [and] switching up seats. So that style actually helps facilitate what I’m trying to do, but I’m all about active learning. I manage to figure out how to do that in a constrained environment.”

Participants understood there are more factors considered in scheduling than just a match of space to their pedagogical intentions. The personal preferences they express within the scheduling process may not align with institutional, departmental, student, or other preferences or needs. Nonetheless, participants described their preferred classrooms based on what they perceived as needed features within the classroom. While analyzing instructors’ needs, we found:

1. Needs differ across instructors. A single classroom, or a single classroom feature, may meet needs for one instructor but not for a peer instructor.
2. Needs vary for a single instructor teaching different courses.
3. For any single instructor with multiple space options, their needs may be met differently within each space. Consequently, instructors want to provide input during room scheduling processes to increase the likelihood of meeting needs.

Although study participants expressed many ways in which learning spaces meet their needs, we coded more than twice as many statements demonstrating how assigned classrooms did not meet needs. These instances frequently represented situations of “skill waste” shown in Figure 1 (for example, when an instructor redesigned a course through IMPACT, but the assigned classroom limited the their ability to meet new learning outcomes). Note that “skill waste” does not always imply dissatisfaction; rather, these mismatches indicate that the instructors see potential in student learning not realized as a result of learning space design.

As instructor needs were highly individualized, the development of a list of needs would not accurately represent the needs of all instructors; however, we were able to summarize how to better meet the needs of instructors by pairing a voiced unmet need with a voiced solution, as shown in Table 2. In Table 2, examples of needs not met appear in the left-hand column and an offered solution to meet needs appear in the right-hand column.

**Table 2. Stated Pairings of Instructors’ Needs**

<table>
<thead>
<tr>
<th>Instructors’ needs are less likely to be met when:</th>
<th>Instructors’ needs are more likely to be met when:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms are assigned late during course planning or changed after planning began.</td>
<td>Space assignments confirmed prior to or before instructors begin course planning.</td>
</tr>
<tr>
<td>Instructors do not know the physical features of a space, or features change without them knowing.</td>
<td>They have background knowledge of or can easily find out the physical features of a space.</td>
</tr>
<tr>
<td>Instructors are not aware of promising practices for use of a space.</td>
<td>They have learned, or have the opportunity to learn, from other instructors who previously used the space.</td>
</tr>
<tr>
<td>Space does not align with instructors’ pedagogy, or they do not have time to change their pedagogy to align.</td>
<td>Space aligns with their pedagogy.</td>
</tr>
<tr>
<td>Space features are not as expected, such as furniture arrangement, whether technology is working, etc.</td>
<td>Space features are maintained as expected.</td>
</tr>
<tr>
<td>Space cannot be adapted for different purposes (ex: lecture and group work).</td>
<td>Space is flexible for multiple purposes.</td>
</tr>
<tr>
<td>The arrangement or occupancy does not enable them to reach all students.</td>
<td>They can move within the space to reach students.</td>
</tr>
<tr>
<td>Space availability does not accommodate preferred days/times.</td>
<td>Availability accommodates preferred days/times.</td>
</tr>
<tr>
<td>Location on campus does not accommodate either the instructor or students.</td>
<td>Location on campus is easy for students and instructors to access in a timely manner.</td>
</tr>
<tr>
<td>Desired technology does not exist, or is not working.</td>
<td>Desired technology is available in a room.</td>
</tr>
<tr>
<td>Space does not have accommodations for instructors or students with disabilities.</td>
<td>Space accommodates universal design.</td>
</tr>
<tr>
<td>Students’ space is too small to accommodate resources instructors expect students to use.</td>
<td>Students’ furniture accommodates the resources (notebooks, textbooks, devices, etc.) instructors expect them to use.</td>
</tr>
<tr>
<td>Transitions between courses or during a course create wasted time.</td>
<td>Transitions (between activities or to start/end a class) occur efficiently.</td>
</tr>
<tr>
<td>Basic needs are not met, such as safety, heating/cooling, lighting, etc.</td>
<td>Basic human needs are met.</td>
</tr>
<tr>
<td>Scheduling policies/processes are unknown, unclear, inconsistent, etc.</td>
<td>They communicate clearly with their scheduling deputy and/or understand scheduling processes/policies.</td>
</tr>
</tbody>
</table>
Instructors’ needs are less likely to be met when:  
Instructors’ needs are more likely to be met when:  

<table>
<thead>
<tr>
<th>Space impedes engagement or discourages students’ focus.</th>
<th>Space enables the desired instructor-to-student engagement, or peer-to-peer engagement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distractions impede the instructor or students’ focus.</td>
<td>Distractions are minimized or non-existent.</td>
</tr>
<tr>
<td>Space does not accommodate their desired methods or limits creativity.</td>
<td>Space allows creativity and preferred teaching methods.</td>
</tr>
<tr>
<td>Space adversely affects perceived self-efficacy.</td>
<td>Space has a positive effect on perceived self-efficacy.</td>
</tr>
</tbody>
</table>

**What is the impact of classroom design on faculty feelings of self-efficacy and satisfaction with their teaching practice?**

As we analyzed the data regarding faculty self-efficacy and satisfaction, several key concepts emerged from the analysis. The sections below explore each key concept and their relationship to learning spaces.

**To what extent does instructors’ skill level and interest align with the features in learning spaces?**

When considering the matching of an instructor to space as shown in Figure 1, a match depends on the skills/interests of the instructor and the features existing within a space; however, there are more factors to consider than just matching instructors with spaces. For example, a skilled lecturer assigned to a large, traditional lecture hall may be perceived as making good use of the space if:

- They intend to lecture for most or all of the time.
- They use the audio and visual technology to effectively communicate material during their lecture.
- Student enrollment justifies the room size needed, and attendance is regularly high.

Furthermore, this instructor may be perceived as maximizing the space, relative to all instructors teaching other courses in other spaces on campus at the same day/time.

The extent to which instructors make use of a space depends on prior knowledge and experiences, and their ongoing development of skills and knowledge. Of particular interest, some participants expressed interest in the WALC, which they perceive to contain many options to use active learning strategies; however, without training specific to the WALC spaces, it is likely the first users of the WALC in fall 2017 will succeed only to the extent that their prior experiences prepared them for the WALC. The second round of the WALC users in spring 2018 will be able to learn from the successes and mistakes that occurred in fall 2017, if there is a mechanism in place to provide this support.

Other factors mentioned by participants that support or undermine their motivation to use features in classrooms include:

- Regardless of their level of experience or the space, instructors who believe they have greater control in their planning and use of a space are more likely to identify how to implement their pedagogy successfully, compared to those with lower perceived locus of control.

  “I think the students make it work. If you want to do active learning in Class of 50, somehow they magically make it work, but you have to be willing to accept that it will work. You have to go in with the mindset that it will work.”

- Differences may appear in instructors’ perceived fit to their needs between departmental and institutional spaces. Departmentally assigned spaces are more likely to contain features desired by departmental faculty.

  “There’s a difference between central and departmental [spaces. In my college, we had] control of our lab. And so the faculty all got together and yes we met with architects, but they listened to what we said. It was more at the local level.”

- The extent to which an instructor perceives they can affect student engagement based on features in a learning space.
“If you arrange your rooms so that they can sit off in the corner and play their games, they’re going to do that.”

- Limitations on the expected uses for a space.
  “...the attitude of the building where we’re in, I was in a classroom that at a certain point had a notice, ‘Please do not move the table. This is a seminar-style room.’”

- Comfort with different layouts of technology and technology features within a learning space.
  “It freaked me out to have all the monitors around. I’m going, I don’t know, they're all looking everywhere and it's like no one’s focusing.”

- The time required to learn how to use and become comfortable with classroom features in a learning space.
  “There’s ways that we can accommodate but all of these things take extra time and effort on our part. We have to care enough to take those actions.”

- Willingness to solicit and use feedback from students or peer instructors.
  “Several years ago I had the students – I asked about four students that had been in different semesters of the class that I was teaching. I said, ‘I want to learn more about how I can improve my class.’ So I said, ‘If I take you out for dinner will you give me your time to give me ideas about the class?’ So we went to Olive Garden, we got a nice big table. We spread out. I came with a bunch of materials written and questions for them. And they gave me all sorts of ideas.”

**How does a teaching philosophy affect use of learning space, and vice versa?**

Instructors described the reciprocal relationship between their teaching philosophy and assigned learning space. A teaching philosophy is unique based on their view of students, knowledge of learning processes, and expectations about what it takes to teach well. The possible relationship between teaching philosophy and learning space underscores the importance of space in either undermining or supporting, or stalling or enhancing instructor’s approach, influencing their perceptions and use of learning spaces. For example:

- Willingness to try active learning strategies.
  “I’ve been in these rooms almost eight years, and I’m constantly thinking about how to try to do it better. There’s no real getting used to it I guess in some ways because you’re just trying to think about what your new workaround is going to be.”

- Learning space features changing how an instructor thinks learning may occur.
  “I think is really important, to have activities that bring different viewpoints out so you're not just saying this is right or wrong. It's just a different viewpoint. So there’s a safe place to experiment. Especially with a lot of our courses, there might be 20 options for a potential challenge that you have, and just the fact that, gee, I never thought of that.”

- Active learning spaces feeling less like school and more like a work environment, enabling students to develop skills that are essential in their careers.
  “When you think about what you do in your class and what are the essential skills that are not specific to your fields, but valuable in your fields – like the [skill] that they need to know – what other skills are you helping them develop or practice in class that are transferable to the work environment?”

- Use of teams may change how students expect to be engaged in class.

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“We start by kind of talking to them about what they can expect about how team behavior will change over the course of a team’s time together, and about how they’re likely to be nice to each other early on, but they’re going to run into conflict at some point, and then we start talking about strategies for dealing with the conflicts that arise. We also have them [write] expected behavior[s], and how they’re going to handle that behavior when it goes awry. They bring out that document periodically over the course of the semester, and revise it, and think about it. They also do team member evaluation of themselves three or four times a semester, so it gets in the feedback.”

- Starting new faculty in active-learning spaces helps develop a teaching philosophy based on modernized spaces.

“I want to get the young faculty into these new learning spaces so they start out right from the get-go, they don’t start with the traditional approach. They start thinking about a [student-centered] approach because that’s really what’s going to help the students in the long run.”

How do instructors plan for a course, and what do they need to know about the space during planning?

Participants described planning for their course occurring:

1. Before an academic period begins and/or
2. Within an academic period, based on adapting to the course content and students over time.

Moreover, the time and effort going into planning differed by participant, based on:

- When an instructor finds out they will teach, and in what space on campus.
- An instructor’s prior experience teaching the course or a similar course.
- An instructor’s prior experience teaching in the assigned classroom, or a space similar to assigned classroom.
- Time available to plan.
- The extent to which an instructor must plan to feel prepared to teach.

When asked when they want to know about their classroom assignments, responses ranged from “As soon as I know I am teaching.” to “By the first day of class.” to “It does not matter when.” In general, availability of information about classroom space before or early in the planning accommodates most instructors; although some participants may never feel they knew far enough in advance.

“I find out where my space is before I do anything in terms of planning. The content sort of rolls, but when I figure out what I’m going to do with the time I have on any given day, it’s totally based on whatever room I get assigned.”

“We know from all sorts of areas of life, from how we plan our events, how we plan our houses... that certain kinds of space configurations invite certain kinds of interactions. So that’s something we have to realize.”

According to participants with experience using both active learning and traditional strategies, active learning strategies require more time and effort to plan. Moreover, active learning strategies may require more assessment and adaptation during an academic period. These adaptations could be as simple as in-the-moment changes based on observing students’ behaviors during an activity.

“You do have to plan. The first week, after I was in the room and I was like, ‘Okay, that’s not gonna work,’ so I had to plan ahead to order those things and then to bring them to the room every class I taught.”

A change in room assignment can seriously affect the planning and execution of learning activities.

“Being able to plan for a space, I think, is really important for your instructional design, to know what space you’re going to be in and have the space to plan for that particular space. ’Cause
Even when I jump from active learning classroom to active learning classroom, I still have to facilitate a different use of the space.”

Most participants expressed a desire to improve their courses through use of active learning strategies, but some found it difficult to improve if the classroom did not accommodate their plans, or if they were required to move from a room that better supported their plans. Hence, familiarity with a learning space may enable continuous course improvement. For example:

“If you convert all your materials over so you can do an active learning type of approach and then you suddenly get assigned to a traditional classroom that’s all locked down, that’s very frustrating. [You] go through all that effort and [you are] not really be able to take advantage of all the effort you put into this class to make it much improved. I’ve been lucky because I’ve been teaching in the same classroom for a while too and it has all the right [features] for what I want to do. But if I was to suddenly get assigned to a different classroom it would be frustrating.”

What training and support do instructors need to make effective use of features within learning spaces?

The study participants openly provided feedback about their experiences with training or support they received, and many alluded to on-going support they want in the future. Participants’ opinions skewed favorably towards the provision of more training and support for faculty.

Many study participants received support provided by staff or faculty from CIE, Teaching and Learning Technologies (TLT)9, and/or the Purdue Libraries. In general, the support instructors use depends on the resources they know are available. For example, some participants used the “help number” posted in classrooms to get the immediate support needed (often to fix a problem). Other participants built relationships with one person on campus for support, and this person became a gatekeeper for more support.

Participants referred to two modes of training. First, a resource-based approach that is (or could be done) through reference materials online or posted in a classroom. Second, an in-person approach based on workshops or one-on-one consultations. Participants shared that in-person training enables instructors to obtain individualized support for topics that they think are relevant to their own teaching. Participants suggested such training could cover:

- What features are available in a space.
- Options for facilitation of learning activities.
- Use of any hardware or devices installed in a space. Specifically:
  - Differences in devices between rooms.
  - Creative uses for technology.
- How to connect personal devices (laptops or tablets, wireless microphones, etc.) for audio/visual needs.
- Setting up or using software installed on the computer.
- Using clickers or internet-based applications.
- Storage options for resources (such as PowerPoint slides).
- Strategies for instances when technology fails.

Training may change what instructors “need” in learning spaces. For example, after receiving training, an instructor may feel better equipped to implement their training in rooms with either certain features or greater flexibility.

“I was planning to buy my own whiteboards because I was afraid they would put me back in the non-active learning [spaces], and I was like, ‘Please don’t do this to me. I need some materials to teach my class.’ I guess that IMPACT [participants] have priority.”

“I have a room right now in which the projector, [and] the screens, are right next to the instructor’s console and so I feel like I’m trapped in that corner. If I walk out in front in the

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9 For more information, see: ITaP Teaching and Learning Technologies web site (https://www.itap.purdue.edu/learning/)
students more, it’s right in my face...I’m looking at the projector light. The whole time I can’t see."

Finally, for all of the previously listed training topics, many instructors want to know variations or best practices, including what has worked well or not worked well for other faculty.

“We learn from each other a lot. I think that, one of the things that would help is the idea of having group discussions on rooms, and so maybe even have an optional meeting [for faculty]. Like, ‘I’m gonna use... ‘ you know, you’re assigned to this space, and then everyone who teaches in that space has a discussion, because that – wouldn’t that be nice? If you taught after me and I always would put it back to where it was, and then you always put it back to what I had or something, you know what I mean?”

How do perceptions of the space—by an instructor, peer instructor, and students—affect efficacy for teaching and learning?

Many spaces on campus have reputations for the degree to which they support or undermine best teaching practices. Faculty referred to specific learning spaces as especially frustrating to their pedagogical approach, and how spaces in the WALC may better meet their needs.

“My absolute worst experience was in Wetherill 200 and I refuse to teach in that room. You can give me a room the same size anywhere else but I will not do that room.”

“I think it’s just disheartening when you hear... how advanced Purdue is and then you’re in a classroom that doesn’t allow you to do anything that they say that we’re doing. They put up project IMPACT so much in the classrooms that they use, and then the new building they’re putting in the center of campus, but there are so many other spaces that are neglected.”

“When you work in a functional classroom, it’s so different. The classroom that I’m lucky enough to work in sometimes has tables and so the students are sitting around on tables but they also each have a projection board. So I can have four or five groups doing the same thing at the same time and sharing their results. And you can do some compare and contrast across and it significantly improves the exchange between the students and the learning process.”

“My teaching style and materials that I cover, are best handled in a room with seats that can be arranged in a circle and then pushed out of the way if there’s some kind of a demonstration that I want to provide or have the people stand up and say or do or mingle or whatever it is. But that’s all I want, all I need.”

Instructors’ perceived teaching self-efficacy builds upon their abilities and skills, and their knowledge about learning spaces. When new to a learning space, instructors may gain knowledge about teaching practices within a space from other instructors.

“I’m not the highest tech person in the world. So I would be interested in knowing what other folks have done and how they’ve used the equipment in ways that I wouldn’t have known.”

Summative assessments like exams can be an issue for some active learning spaces. Academic integrity requires students to complete their own work during individual exams, but the flexible furniture can make it difficult to monitor academic integrity.

“That is an issue. So we have basically tables that are like this [students facing one another] in that room, and so if you’re going to give an exam in that room, and that room is at capacity, then you’ve got students across from each other trying to take an exam. So that means you have to give an evening exam even if the students don’t want it and even if the professor doesn’t want it. So, I think, in the future there might be some exam rooms set aside that you could use just for exams or quizzes.”

“I had an exam on Thursday and there was one group of students at a table that really like each other. It’s to capacity at that little table and I remember during the exam thinking, ‘Oh no. That’s
Finally, instructors are curious to know how learning spaces will be assigned in the WALC. This is especially pertinent for instructors who desire to implement best teaching practices as the WALC provides new opportunities to meet their needs and support their use of active learning strategies.

**What classroom attributes and features do faculty believe contribute to or limit their teaching efficacy?**

When considering features of spaces, participants differentiated between requirements and preferences. Prior experiences and feedback in learning spaces help instructors to identify their teaching efficacy, including their:

- Strengths or limitations in pedagogical skills,
- Level of knowledge in the course content and discipline,
- Confidence in teaching ability, and
- Ability to use the features of a learning space to support student learning.

We sought to understand which learning space features contribute to instructors’ teaching efficacy.

**Which learning space features are desired?**

Appendix 3 lists the categories of learning space features desired by participants and also shows the variety of feature descriptions expressed during focus groups. Appendix 3 collectively represents all participants, but the desired features for any instructor is highly individualized and prioritized differently from instructor to instructor. Required features appear as the highest priorities to an individual instructor, who may advocate for certain requirements to be met during room scheduling. For example, consider the following technology and location needs shared by two participants:

- An instructor who requires access to a specific computer program, which is installed in very few spaces on campus due to the high cost of software licensing.
- An instructor who cannot expose samples to changes in temperature requires use of a classroom in the same building where the samples are stored.

Beyond defensible required needs such as these, preferences are also sortable by priority. The extent to which any instructor perceived their needs are met by the classroom they are assigned affects their teaching-efficacy.

“So I guess one thing that I would say with you, I do a lot with the computers too and give them an exercise and they work collaboratively. I don’t try to do that, and if I know I’m going to be in a traditional lecture hall, I just don’t try.”

“You adapt to what you have and you adapt to the class sizes, and what the expectations of your departments are. But I do find that the classroom does definitely affect how I feel about the class, how confident I am that I’m getting the job done that I’m supposed to be doing.”

**What is the ideal design of a learning space?**

Most focus group sessions closed by asking participants to identify their ideal design for learning spaces. Upon requesting their ideal design, very few “pie in the sky” ideals were shared—participants’ kept their ideals mostly realistic. Hence, Appendix 3 already contains many of the ideal features of learning spaces desired by instructors, and Appendix 5 contains the additional features desired based solely on the prompt to identify their ideal.

Learning spaces are not one-space-fits-all; however, the value of considering an ideal space contributes to:

- Clarifying what are requirements or preferences.
- Determining a priority order for ideal needs within a space.
- Determining which space is closest to the ideal.
- Future renovations of old or construction of new learning spaces.
When ideal circumstances align, as modeled by Figure 1, instructors are empowered to create the best active learning experience for a diverse group of learners.

**How should faculty contribute to design of classrooms?**

Participants generally understand reasons why they all cannot access/reserve their ideal space, but some feel instructors’ needs, ideas, and prior experiences are not considered during planning for the development of new or remodeling of existing learning spaces. This concern emerged from participants who felt they were not asked for input, and from participants who provided input they felt was not undervalued and ignored. Yet the varied needs of instructors illustrates the difficulty in addressing all instructors’ interests and ideas when developing new learning spaces.

Overall, faculty feedback regarding the design processes for new learning spaces was not positive. Participants believe there is room for improvement in classroom design and expressed a strong desire for more faculty input. Faculty comments regarding dissatisfaction with space use and design fell into several categories:

- Perception that design decisions are made by architects and administrators who do not have experience using existing spaces, and will not use the new space.
- Need for design that accommodates the demands of learning spaces designed for departmental-, college-, or institutional-level needs.
- Implementation of new technology falls behind the pace of advancements in technology.
- Confusion about the rationale for modifying or renovating a space.
- Confusion about institutional priorities, and the impact of one initiative on other initiatives.
- Participating in IMPACT to redesign a course, but still being assigned to a space that does not accommodate their planned course redesign.

“...but that’s how they’re building [classrooms] still. They’re, that one weird thing leftover from having the teacher at the front of the classroom is having the computer station for the instructor in the corner.”

“I say just as research equipment has to be up to date, so [does] educational equipment. It needs to be a built-in cost that we can’t have overhead projectors in our rooms until 2012 or something? They’ve replaced them with the doc cams, but it may be that in three years doc cams [are] obsolete, and they just need to realize that you’ve got to keep up.”

**Scheduling**

Perceptions of room scheduling itself did not exist as its own specific research question; however, this was a reoccurring concern for most participants.

“The good and bad of this is we have more and more of our faculty doing more active learning. That’s great. The downside is we don’t have enough spaces for everybody.”

Most study participants believe classroom features contribute to or detract from their intended learning goals, highlighting the importance of effective scheduling. Greater awareness and improvement of scheduling processes would help facilitate instructor’s intended learning goals, regardless of the type of learning space.

**To what extent are faculty aware of scheduling policies and procedures?**

Participants feedback indicates low awareness of class scheduling procedures at Purdue. Based on the breadth of scheduling knowledge expressed by participants, currently available resources (like this [Class Scheduling website](http://example.com/scheduling) from the Office of the Registrar) lack details needed for clear understanding of the scheduling process.

Observed contrasts in awareness of policies and/or procedures resulted from:

- Length of time at Purdue. Newer instructors were less aware of room options than the experienced instructors.
• The varied manners in which teaching assignments are determined, when instructors know their teaching assignments, and how logistics are determined.

• Different perceptions of agency. In general, participants felt they possessed minimal control or input during scheduling and generally wanted both more control and input.

• Differences between institutional, college, and departmental procedures.

In many instances, participants referred to a scheduling deputy as the person who is the gatekeeper to room scheduling. However, not all participants know who the scheduling deputy is for their department or that the deputy can advocate for their needs when scheduling their course. Additionally, there are perceived differences in the power of individual scheduling deputies to meet scheduling and learning space needs. Yet many faculty mentioned that communication with this person may be the best strategy to get into a desired space.

“There’s no mechanism to actually rate a classroom. It’s not in teacher evaluations and there’s no way for an instructor to actually give feedback. So that dialogue that I have with my scheduling deputy is basically the only squeaky wheel moment I’ve got to say, ‘This is absolutely terrible. Don’t ever put me there again.’”

“If your scheduling deputy remains the same person and you have a relationship, that can work great. But I remember a few years ago all of a sudden my space... the schedule deputy was actually trying to be helpful, but she actually moved me to a worse classroom. So yeah. That’s a point of potential problem. Definitely. If it’s working great, it’s magic.”

“I understand that they have a lot of things to balance, but it seems that what they are doing is that somewhere, at some point in time a list of rules was laid down and they simply go down that checklist and make their distributions according to that checklist. And I don’t know when the last time that checklist was ever revisited.”

What input do faculty want during room scheduling?

“If I was the one who was managing [active learning spaces], I’d want to see your instructional plan for the semester, and not just a verbal promise of what’s going to happen. I’d want to know that you have a plan, because these spaces I think, there are not enough of these [active learning] spaces, and I think the people who are best prepared to do [active learning] should be in those rooms.”

Faculty desire to use classrooms fitting their pedagogical approach. They want to give input into the space options best matching their needs, yet some participants felt there was no process to advocate for their learning space needs. For example, an instructor of a large enrollment course may prefer to facilitate their class activities in groups, but they are unaware how to request a space that meets their desire to integrate this teaching practice.

“I’ve been given like 12 classes in spaces that were not designed for the type of class I was teaching and that is very hard. It’s hard on everyone and so I guess that kinda constrains you if you have to use certain like a lecture and everyone is sitting in little pods versus trying to get interaction. It’s hard to get a good match between your teaching style and the classroom because you’re just told the classroom and there you go.”

Multiple participants recommended a revised scheduling process to help match instructors to spaces that best fit their needs; however, while Figure 1 models the match of instructors’ skills to spaces, it is just one of many scheduling considerations, such as instructor availability, student availability, availability of other courses, enrollment capacities, distance and time between classes, custodial schedules, and so on. Overall, instructors would like to have access to more information on what classrooms are available and how to request a specific learning space.

“It would be nice if we had a catalog or a list of all the active learning rooms, what the features are, and pictures of the room from several angles. Then we could make a list of what are our top
five choices and what are a list of the ones that will absolutely not work for us at all and then they could figure that out.”

“I also just don’t know what all of the rooms are on campus...and I don’t have time to walk to all of them to go and look, but if we can have a list of features, I definitely want pictures, too.”

Which components of scheduling are perceived to be effective?

From the participants’ perspectives, other considerations are important, but the emphasis for scheduling should be on the match of the space to their desired pedagogy. For example, suppose you plot every instructor-space assignment occurring on Mondays-Wednesdays-Fridays at 9:30am in Figure 1. For this day and time combination, the room assignment process works best when most assignments fall within the matched area and few assignments fall within the skill/interest waste area. The optimization of space-instructor matches reflects a room assignment process that effectively and efficiently uses learning spaces on campus.

There exists a conflict between room capacity for traditional space use, and the capacity for some desirable active learning strategies. For example, instructors planning to use group work desire movable furniture accommodating space between groups, which consumes more square footage in a room than furniture designed for traditional lecture-based learning where furniture stays aligned within rows. Hence, for two spaces with the same square-footage, the space designated as an active learning space results in a lower room capacity.

In some spaces, the same furniture may accommodate active learning or lecture-based learning. In these cases, rooms need:

- A traditional learning room capacity (likely higher), based on the total number of seats available, and
- An active learning room capacity (likely lower) based on some seats left unused to leave as buffers between groups and to create space for the instructor to move around the room.

“If it is a regular lecture, many times we want them to...talk or collaborate with each other, it’s impossible to do it in those rooms in Recitation. So sometimes when they say, ‘Okay. Capacity is for 40.’ Yes you can fit 40 chairs.”
Recommendations

The following recommendations are possible solutions to challenges described in this report. They either came directly from participants, or emerged during the coding process as solution to challenges that participants mentioned. Solutions range from addressing a specific concern that influences a small portion of instructors to a system-wide concern that affects a large portion of the instructors on campus. For some recommendations, a simple change in communication may be all that is needed to address a problem, or clarify if a solution is already in progress.

To Help with Planning

1. Document classroom space features with pictures, and share online for easy reference.
2. Document options for using features in a learning space, based on practices of current and past users.
3. Determine the earliest reasonable date by which room assignments can be distributed to instructors. Advertise this date to faculty each academic period.
4. When maintenance or technology repairs are submitted, send the notice and updates to all instructors scheduled to use the classroom. This notice will help all instructors, not just the one who submitted the request, to adapt as needed. This communication confirms for instructors that the issue is known and is being addressed.
5. Contact all instructors new to Purdue University to offer space training and/or support before they begin teaching.

For the WALC

6. Set reasonable expectations for the first users of the WALC or any other new learning space. It is likely the first users might only take advantage of features that they are familiar and confident to implement. In addition, methods to communicate lessons learned by the first users to future users enables faculty to improve upon earlier successes and prepare for expected challenges.
7. For the WALC rooms (and other newly renovated spaces), develop faculty learning communities (FLC) based on each type of space (or space configuration) for instructors scheduled to use the space. Possible outcomes of this FLC could be:
   a. Pre-semester planning and idea sharing about use of the space.
   b. Mentoring, from prior users to new users, about how to use the space.
   c. Determining (and documenting) best practices for use of the space.
   d. Peer observations (for feedback, not evaluation) to learn from each other.

For Room Scheduling

8. Assign instructors to spaces containing the features best fitting their pedagogical practices via:
   a. An application process where instructors interested in active learning spaces can identify the features required to accommodate their intended learning outcomes.
   b. An algorithm that balances instructor needs with other existing scheduling considerations.

   These steps represent a move toward balancing the economical and practical use of space resources on campus.
9. Make transparent all policies and processes used to assign courses and instructors to spaces.
10. Define and share institutional priorities for room scheduling, and provide channels for all scheduling deputies to be equally influential in room assignment policies.
11. Discourage instances where an individual “squeaky wheel” is served outside of the institutional priorities.
12. Create two room capacities for spaces, based on a “fixed” furniture usage of the room, and “movable” furniture usage. For example, in a room with individual movable desks, determine the capacity if the desks are arranged in rows, and a capacity if the desks are arranged in groups.
For Continuous Room Improvement

13. Solicit and Integrate instructor feedback into renovation/construction design processes. Provide feedback to explain why ideas can or cannot be implemented.

14. Attempt to stay at or ahead of the pace of technology development.

Further Research

15. Solicit feedback regarding the Instructor-Space Match model shown in Figure 1, to:
   a. Develop how to adapt it to scheduling within the WALC and other active learning spaces, or for all campus classrooms.
   b. Determine if it explains or adds to theory about teaching efficacy.
   c. Determine whether it can be used to assess effectiveness of scheduling at Purdue.

16. Based on experiences with instructors in this study, we recommend using a focus group format to gather additional targeted input about scheduling policies and practices.

Conclusions

Many findings of this report are rooted in the Instructor-Space Match model shown in Figure 1. This match models an instructor-centered approach to learning-space assignment and supports a room scheduling process that fosters more instructors to implement best teaching practices.

Efforts to develop uses of any space type may improve instructors’ teaching and students’ learning experiences. Focusing institutional, departmental, and pedagogical efforts on more reflective and intentional use of learning spaces will better support student learning. This can be done in a variety of ways, some highlighted avenues for improvement appear in this report.

Recent renovation and construction of active learning spaces motivate on-going study of any learning spaces on campus. For example, further research and assessment of the WALC will continue to shape best practices for pedagogical approaches in the WAlC learning spaces.
## Appendix 1. Summary of ALS Studies

<table>
<thead>
<tr>
<th>Title</th>
<th>Purpose</th>
<th>Participants (Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effect of Space on Faculty Teaching (IRB: 1504015993)</strong></td>
<td>“To examine faculty perceptions of self-efficacy to use student-centered practices in active learning and traditional spaces, and test if self-efficacy predicts faculty perceptions of their self-efficacy for student-centered interactions, engaged behaviors of students, satisfaction with their teaching, and use of student-centered practices.” ¹⁰</td>
<td>Instructors (Survey)</td>
</tr>
<tr>
<td><strong>Comparing Teaching and Learning in Active Learning Spaces and Traditional Classroom Spaces (IRB: 1505016055)</strong></td>
<td>To develop in-depth understanding of innovative instructors’ perceptions of how classroom spaces impact active learning pedagogy.</td>
<td>Instructors (Interviews)</td>
</tr>
<tr>
<td><strong>Assessing Faculty Perceptions of Classroom Spaces (1510016573)</strong></td>
<td>To obtain and understand instructors’ perceptions of the effects space has on their teaching and students’ learning.</td>
<td>Instructors (Focus Groups)</td>
</tr>
<tr>
<td><strong>Influence of Learning Space and Physical Design on Students' Interactive Learning (1602017231)</strong></td>
<td>To determine the ways in which physical design of active learning spaces influences students’ interactive learning.</td>
<td>Instructors (Interviews) Students (Survey)</td>
</tr>
<tr>
<td><strong>To be determined...</strong></td>
<td>Additional studies as needed for thorough research of active learning spaces in the WALC.</td>
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</table>

Appendix 2. Active Learning Classrooms at Purdue University

Note: The following list of rooms is based on a list of institutionally controlled active learning spaces. This list is not identical to the list of “Collab Rooms” maintained by the Registrar’s Office; the "c" notation next to a classroom indicates if the classroom appears in the Registrar’s list. Departmentally controlled active learning spaces (ex: ME 1130) are not listed.

<table>
<thead>
<tr>
<th>Classroom</th>
<th>Configuration</th>
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<tbody>
<tr>
<td>ARMS B061</td>
<td>Turn2Team</td>
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<tr>
<td>BCHM 105c</td>
<td>Media Sharing</td>
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<tr>
<td>BRNG 1242</td>
<td>Flexible</td>
</tr>
<tr>
<td>BRNG 1243</td>
<td>Flexible</td>
</tr>
<tr>
<td>BRNG 2275c</td>
<td>SCALE-UP</td>
</tr>
<tr>
<td>BRNG B243c</td>
<td>SCALE-UP</td>
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<tr>
<td>BRNG B247c</td>
<td>SCALE-UP</td>
</tr>
<tr>
<td>BRNG B261</td>
<td>Flexible</td>
</tr>
<tr>
<td>GRIS 102c</td>
<td>Eye2Eye</td>
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<tr>
<td>GRIS 118</td>
<td>Flexible</td>
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<tr>
<td>GRIS 125</td>
<td>Media Sharing</td>
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<tr>
<td>GRIS 134</td>
<td>Turn2Team</td>
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<td>SCALE-UP</td>
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<tr>
<td>HIKS B853</td>
<td>6Round</td>
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<tr>
<td>HIKS G980D</td>
<td>6Round</td>
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<tr>
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<td>KNOY B019c</td>
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<tr>
<td>LYLE 1150</td>
<td>Flexible</td>
</tr>
<tr>
<td>LYLE 1160c</td>
<td>SCALE-UP</td>
</tr>
<tr>
<td>LYNN G210</td>
<td>Custom: Modified SCALE-UP</td>
</tr>
<tr>
<td>MATH 215</td>
<td>Flexible</td>
</tr>
<tr>
<td>ME 1130</td>
<td>Turn2Team</td>
</tr>
<tr>
<td>ME 2004</td>
<td>Flexible</td>
</tr>
<tr>
<td>NISW 149</td>
<td>Turn2Team</td>
</tr>
<tr>
<td>NISW 157</td>
<td>Turn2Team</td>
</tr>
<tr>
<td>NLSN 1195</td>
<td>Eye2Eye</td>
</tr>
<tr>
<td>POTR 141c</td>
<td>Custom: Modified LearnLab</td>
</tr>
<tr>
<td>PSYC 3102</td>
<td>Media Sharing</td>
</tr>
<tr>
<td>RPHI 162c</td>
<td>SCALE-UP</td>
</tr>
<tr>
<td>SC 114</td>
<td>Flexible</td>
</tr>
<tr>
<td>STEW 314</td>
<td>SCALE-UP</td>
</tr>
<tr>
<td>STEW 320</td>
<td>SCALE-UP</td>
</tr>
<tr>
<td>UNIV 001</td>
<td>Flexible</td>
</tr>
<tr>
<td>UNIV 003</td>
<td>Flexible</td>
</tr>
<tr>
<td>UNIV 017</td>
<td>Flexible</td>
</tr>
<tr>
<td>UNIV 019</td>
<td>Flexible</td>
</tr>
<tr>
<td>WALT (27 spaces under construction)</td>
<td>Eye2Eye, SCALE-UP, Turn2Team, Boiler-Up, 6Round, Flexible</td>
</tr>
<tr>
<td>WTHR 420c</td>
<td>Media Sharing</td>
</tr>
</tbody>
</table>
## Appendix 3. Required or Preferred Classroom Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Variations in How Instructors Described the Feature</th>
</tr>
</thead>
</table>
| **Student furniture** | • Flexible to create desired groupings of students (ex: 6round, flexible, eye-to-eye, etc).  
• Easily movable without creating extra noise.  
• Space for students’ personal items.  
Accommodating of human differences (ex: body size, handedness, etc) |
| **Instructor furniture** | • Options to be in more than one place within a room and still have access to technology.  
• Flexibility to move around a space, and still be heard and seen.  
• Mixed preferences for fixed versus mobile podiums. |
| **Space between furniture** | • Space for instructor to reach any individual student.  
• When arranged in small teams, space between teams to decrease distractions and for the instructor to reach all teams.  
• Space between students to minimize academic dishonesty (ex: for exams). |
| **Convenient location on campus** | • Proximity to the instructors’ office.  
• Convenient location based on where students are coming from before class, or going to after class. |
| **Climate control** | • Heating or cooling to a comfortable temperature, regardless of time of day or number of people within the space.  
• Adjustable. |
| **Natural lighting** | • Ability to see outside, but not distracted.  
• Option to adjust lighting if too much (ex: to reduce screen glare). |
| **Artificial lighting** | • Bright enough for all to see clearly, including instructors to see students.  
• Dimmable to accommodate visuals.  
• Adjustable from multiple locations in room (ex: by door and by instructor podium). |
| **Outlets** | • Enough for all students and their various devices.  
• Available throughout a space, to minimize spread of cords. |
| **Audio/Acoustics** | • Option to use a microphone, and access to the microphone.  
• Ability to project easily/clearly without a microphone.  
• Speakers projecting clearly and loudly to all students.  
• Sound deafening for group work.  
• Minimized sounds from outside the room (ex: sound from neighboring classroom, hallway noise, construction/outdoor noise, etc). |
| **Boards** | • Preferences exist for chalk and dry erase.  
• Access to working markers of various colors or chalk.  
• Mobile boards for students.  
• Quantity of board space not obstructed by screens.  
• Smart board option to record notes. |
<table>
<thead>
<tr>
<th>Feature</th>
<th>Variations in How Instructors Described the Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technology: Hardware</strong></td>
<td>• Projectors and Screens:</td>
</tr>
<tr>
<td></td>
<td>o Available in any space.</td>
</tr>
<tr>
<td></td>
<td>o Options to project multiple items simultaneously (ex: PowerPoint and document camera)</td>
</tr>
<tr>
<td></td>
<td>o Clearly visible to all students, regardless of location in room.</td>
</tr>
<tr>
<td></td>
<td>o Option to connect and project from an unwired device (ex: iPad).</td>
</tr>
<tr>
<td></td>
<td>• Document Camera:</td>
</tr>
<tr>
<td></td>
<td>o Available in any space.</td>
</tr>
<tr>
<td></td>
<td>o Option for it to be out of the way.</td>
</tr>
<tr>
<td></td>
<td>• Video:</td>
</tr>
<tr>
<td></td>
<td>o Able to play anything online, disc, or tape.</td>
</tr>
<tr>
<td></td>
<td>o Teleconferencing options.</td>
</tr>
<tr>
<td></td>
<td>• Computer:</td>
</tr>
<tr>
<td></td>
<td>o Need a quicker start-up time.</td>
</tr>
<tr>
<td></td>
<td>• Change what gets loaded automatically to decrease start-up speed.</td>
</tr>
<tr>
<td><strong>Technology: Control</strong></td>
<td>• Consistent controls across all rooms.</td>
</tr>
<tr>
<td></td>
<td>• Quick references for use of control.</td>
</tr>
<tr>
<td></td>
<td>• Training to use controls.</td>
</tr>
<tr>
<td></td>
<td>• Connections for any PC or Mac device.</td>
</tr>
<tr>
<td><strong>Technology: Internet</strong></td>
<td>• High speed for wired instructor devices.</td>
</tr>
<tr>
<td></td>
<td>• Strong WiFi for student devices.</td>
</tr>
<tr>
<td></td>
<td>• Capacity to handle full classroom using Hotseat or another online application.</td>
</tr>
<tr>
<td><strong>Technology: Software</strong></td>
<td>• Basics available in every classroom.</td>
</tr>
<tr>
<td></td>
<td>• Ability to view listing of advanced software in rooms.</td>
</tr>
<tr>
<td></td>
<td>• General dislike for tediousness of Blackboard, but appreciation for variety of features.</td>
</tr>
<tr>
<td></td>
<td>• Remote access to files, but lacking confidence they are always accessible.</td>
</tr>
<tr>
<td><strong>Technology: Other</strong></td>
<td>• Ability to record courses.</td>
</tr>
<tr>
<td></td>
<td>• Accommodations for distance learning.</td>
</tr>
<tr>
<td><strong>Support</strong></td>
<td>• Awareness of who to contact for technology or maintenance.</td>
</tr>
<tr>
<td></td>
<td>• Knowledge of room issues as far in advance as possible.</td>
</tr>
<tr>
<td></td>
<td>• In-person training regarding use of room features.</td>
</tr>
<tr>
<td></td>
<td>• Online references explaining room features and how to use them.</td>
</tr>
<tr>
<td></td>
<td>• Encouragement to help faculty use new features. (So old features can be removed. Ex: overheard projector.)</td>
</tr>
<tr>
<td><strong>Other features and general layout</strong></td>
<td>• Instructor-to-student visibility regardless of location in the room.</td>
</tr>
<tr>
<td></td>
<td>• Easy to empty/fill a room during 10 minute break during classes.</td>
</tr>
<tr>
<td></td>
<td>• No obstructions (ex: pillars).</td>
</tr>
<tr>
<td></td>
<td>• Accurate clocks.</td>
</tr>
<tr>
<td></td>
<td>• Occupancy differences for chairs in rows versus movable chairs to create active learning teams.</td>
</tr>
<tr>
<td></td>
<td>• Access to resources for demonstrations (ex: sink and water).</td>
</tr>
<tr>
<td></td>
<td>• Lockable storage option to minimize transporting frequently used supplies.</td>
</tr>
</tbody>
</table>
### Appendix 4. Coding Structure and Definitions

<table>
<thead>
<tr>
<th>Parent Node</th>
<th>Child Node</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor</td>
<td>Locus of Control</td>
<td>Feeling of empowerment. Awareness and use of autonomy. Perceptions of ability to maximize resources, motivation to change pedagogy/space, energy.</td>
</tr>
<tr>
<td>Instructor</td>
<td>Self-Efficacy</td>
<td>Perception of abilities/skills, perception of ability to affect change in environment, confidence, self-evaluation, self-awareness of effectiveness.</td>
</tr>
<tr>
<td>Instructor</td>
<td>Teaching Philosophy</td>
<td>Pedagogy, apart from space. Use of student feedback; implementation of student feedback.</td>
</tr>
<tr>
<td>Instructor</td>
<td>Training</td>
<td>Preparation to be able to teach with specific pedagogy, in specific spaces, using specific technology, etc. Awareness of best practices in spaces used.</td>
</tr>
<tr>
<td>Instructor</td>
<td>Perception of Student Experiences</td>
<td>Instructors’ perceptions of students' experiences, apart from space.</td>
</tr>
<tr>
<td>Pedagogy</td>
<td>Ideal</td>
<td>Specific pedagogical strategies (Different? Innovative?) that can be accommodated by the space.</td>
</tr>
<tr>
<td>Pedagogy</td>
<td>Planning</td>
<td>Course and content development, adapting pedagogy to the space, adapting plans within a semester.</td>
</tr>
</tbody>
</table>
| Pedagogy    | Space accommodates | Pedagogy fits within space. Space enhances:  
- Instructor-student interaction.  
- Student-student interaction.  
- Learning environment.  
- Flexibility.  
- Student learning.  
- Student persistence and motivation. |
| Pedagogy    | Space does not accommodate | Pedagogy does not fit within space. Space does not enhance, or detracts from: (See list above.) |
| Physical    | Design | Involvement in construction/renovation of classroom spaces. Collecting and using feedback/requests. |
| Physical    | Ideal | Specific desires (wants) presuming minimum needs are met. Physical space alternatives, or innovative/effective uses of physical features. |
| Physical    | Needs Met | Needs for physical features of a room are met, including:  
- Boards  
- Layout  
- Lighting  
- Plugs  
- Seating  
- Mobility  
- Temperature  
- Other: __________  
Praise for space accommodating desired pedagogy. How space aids facilitation of teaching/learning. |
<p>| Physical    | Needs Unmet | Needs for physical features of a room are not met. (See list above.) Complaints/concerns about space accommodating desired pedagogy. How space aids facilitation of teaching/learning. |
| Physical    | Required Needs | Minimum physical space needs based on course curriculum and pedagogy. |
| Scheduling  | Effectiveness | Accuracy, fairness, transparency, best use of space, and access. |</p>
<table>
<thead>
<tr>
<th>Parent Node</th>
<th>Child Node</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheduling</td>
<td>Efficiency</td>
<td>Understanding of process, steps in process. Central vs departmental control or space. Transitions between courses in a space, or movement from one space to another.</td>
</tr>
<tr>
<td>Scheduling</td>
<td>Perceptions of Agency</td>
<td>Level of control, input, responsiveness, priorities.</td>
</tr>
<tr>
<td>Scheduling</td>
<td>Policy/Process</td>
<td>Understanding and awareness of institutional priorities, policies, and processes for room scheduling. Impact of institutional priorities/policies/processes on instructors and courses. Awareness of processes and policies.</td>
</tr>
<tr>
<td>Technology</td>
<td>Ideal</td>
<td>Specific desires (wants) presuming minimum needs are met. Different or innovative technology.</td>
</tr>
<tr>
<td>Technology</td>
<td>Needs Met</td>
<td>Hardware or software needed by instructors, needs currently met. Praises about technology. How technology aids facilitation of teaching/learning.</td>
</tr>
<tr>
<td>Technology</td>
<td>Needs Unmet</td>
<td>Hardware or software needed by instructors, needs not currently met. Complaints/concerns about technology. How technology inhibits facilitation of teaching/learning.</td>
</tr>
<tr>
<td>Technology</td>
<td>Required Needs</td>
<td>Minimum technology needs based on course curriculum and pedagogy.</td>
</tr>
</tbody>
</table>
### Appendix 5. Additional Ideal Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Variations in How Instructors Described their Ideal</th>
</tr>
</thead>
</table>
| **Student furniture**         | • Unlimited configurations to accommodate any activity.  
• Multiple options for shared surface space (ex: tables) versus individual space (ex: desks) and easy transitions between them.  
• No fixed seats in any classroom.  
• Furniture that lasts.  
• Space and the option for students to use standing desks if preferred.  
• Comfortable seating, but not too comfortable to make students fall asleep.  
• Writable surfaces on desks/tables. |
| **Instructor furniture**      | • Additional furniture for instructors to sit with any group of students (i.e., not standing over them).  
• Lockable storage space in classrooms with:  
  o Separate spaces for each instructor’s supplies, and  
  o Shared spaces for shared supplies (microphone, markers, etc). |
| **Conveniences for students** | • Short distances to traverse between classes, so no student is ever late or needs to leave early.  
• More travel time between classes.  
• Storage space for students’ coats, bags, etc. |
| **Audio/Acoustics**           | • For large rooms, microphones that pick up and project students’ questions.  
• Acoustics to block out all sound during group work, except the sound within your own group.  
• No distractions from outside the classroom. |
| **Boards**                    | • Every wall is writable.  
• Unlimited and accessible supply of dry erase markers |
| **Technology**                | • Whole wall touch screens.  
• Reliable technology that is regularly upgraded.  
• Ability to project any person’s device to groups or the whole class, regardless of location in room or device. |
| **Other features and general layout** | • For large rooms, a layout that creates an aspect ratio where no students are far from the instructor. For example, a semicircle, versus many, narrow rows.  
• No communication dead spots.  
• Reconfigurable walls.  
• Space and supplies for instructors to do demonstrations (ex: lab) in classroom.  
• Placements of an instructor station that maintains visibility.  
• Flexibility to accommodate any desired instructor-to-student or student-to-student(s) interaction. |
| **Support**                   | • Support staff readily available in every building. |
| **Policies/Practices**        | • General consideration of future users of the space and the expectation that all room content will be respected.  
• Lower room capacity per square foot, to leave more space for flexibility and movement. |
Appendix 6. Focus Group Protocol

1. How does the classroom space impact your instruction?
   a. Do you feel more effective in one type of space versus another? Why?
   b. Do different types of spaces change the types of instructional activities you use?
   c. Do different types of classroom spaces change how you use technology?
   d. Can you provide some examples?

2. When you are planning and preparing for your course:
   a. At what point do you think about the space, and what are you thinking about?
   b. What type of information about classroom space would be valuable to you? For example:
      i. Training resources?
      ii. Support?
      iii. Availability?
      iv. Process for securing space?
      v. Features of space?
      vi. Different use models/exemplars for the space?
   c. (If not answered…) How much thought do you give to the classroom space?

3. How do you think classroom space impacts:
   a. Student engagement in classroom activities?
   b. Student learning?
   c. Student persistence/motivation?

4. What features of a classroom space do you feel increase your teaching efficacy? Please provide some examples.
   a. Think about the tables, chairs, and desks, where the instructor is positioned in the classroom, the audio/visual system, lighting, sound quality and technological capabilities.

5. What features of a classroom space limit your teaching efficacy?
   a. Think about the tables, chairs, and desks, where the instructor is positioned in the classroom, the audio/visual system, lighting, sound quality and technological capabilities.

6. Describe the ideal classroom for your course(s).
   a. Think about the tables, chairs, and desks, where the instructor is positioned in the classroom, the audio/visual system, lighting, sound quality and technological capabilities.
   b. Give examples of how this classroom would enable the most important features of your course/instructional practice.
   c. Which classroom that you have taught in or have knowledge of comes most close to this ideal?
      i. Why?
      ii. In what areas would this classroom need to be improved in order to meet your ideal?