Activating Library Classrooms: Evaluating Formal Learning Spaces for Active Learning and Student Engagement

Julie M. Porterfield
Penn State University

Stephanie Diaz
Penn State University

Rebecca Miller Waltz
Penn State University

Funded by the Association of College & Research Libraries through a 2018 Academic Library Impact Research Grant, the Activating Library Classrooms: Evaluating Formal Learning Spaces for Active Learning and Student Engagement project endeavored to evaluate the design and use of formal learning spaces situated within Penn State University Libraries. Researchers evaluated seven library classrooms and interviewed seven faculty collaborators at six Penn State University campuses in order to identify areas of strength and growth for formal learning spaces. The results affirm the significance of formal learning spaces in libraries and how they can demonstrate academic libraries' abilities to partner in university curricula and student success.

Executive Summary

Funded by the Association of College & Research Libraries through a 2018 Academic Library Impact Research Grant, the Activating Library Classrooms: Evaluating Formal Learning Spaces for Active Learning and Student Engagement project endeavored to intentionally evaluate the design and use of formal learning spaces, or classrooms, situated within Penn State University Libraries. The goal of this evaluation was to create a plan for adapting existing formal learning spaces and creating new learning spaces within University Libraries that truly facilitate active learning. The fiscal constraints and increasing calls for accountability in higher education. Universities and colleges are being urged to adopt standards and measures to enable them to assess and improve the effectiveness of their teaching and learning practices.

Researchers evaluated seven library classrooms and interviewed seven faculty collaborators at six Penn State University campuses in order to identify areas of strength and growth for formal learning space design at Penn State University Libraries. The small size of the learning spaces, the rigidity of the furniture in these spaces, and the lack of natural light within the learning spaces were identified as major areas for growth. The major strength discovered within this study is how valued these learning spaces as well as the campus collaborations they inspire are; this study affirms the significance of formal learning spaces in libraries and how they can demonstrate academic libraries' aspirations and abilities to partner in university curricula and student success.

This report details the goals, methods, findings, and conclusions of this project, and is intended for anyone thinking critically about formal learning space design, particularly in libraries. While this study was exploratory and ultimately identified additional questions and areas for research, it provides a realistic starting point and replicable process for librarians, educators, administrators, and other colleagues interested in exploring and enhancing their own learning spaces by using a lens of active learning, collaboration, and student engagement.

Project Overview

In 2017, the Association of College & Research Libraries (ACRL) published *Academic Library Impact: Improving Practice and Essential Areas to Research*, a report describing ACRL's "action-oriented research agenda" developed to help libraries better support student learning and success and to also communicate this work and libraries' value to higher education stakeholders (Connaway, Harvey, Kitzie, & Mikitsh, p. 1). Directly after the publication of this report, in 2018, ACRL offered small grants to support librarians doing research in the areas identified by the research agenda in the report. These Academic Library Impact Research Grants were intended to support projects that would

Julie M. Porterfield is Instruction and Outreach Archivist, Penn State University Libraries.

Stephanie Diaz is Reference and Instruction Librarian, Penn State University Libraries.

Rebecca Miller Waltz is Head of Library Learning Services, Penn State University Libraries.

demonstrate the impact of a library's work and also enhance daily practices related to student learning and success.

The *Activating Library Classrooms: Evaluating Formal Learning Spaces for Active Learning and Student Engagement* project was awarded funding through a 2018 Academic Library Impact Research Grant to evaluate the design and use of formal learning spaces (classrooms) throughout Penn State University Libraries (PSUL) in order to adapt existing, to develop new learning spaces that facilitate active learning and to demonstrate our leadership, expertise, and impact to the Penn State University (PSUL) community. With these objectives, researchers leading this project were matching our assessment to our institution's mission, and enhancing teaching and learning, two of the six priority areas for research identified by the 2017 *Academic Library Impact: Improving Practice and Essential Areas to Research* report.

Our research questions driving this project were:

- *How well are our library classrooms designed to support and enable active learning?*
- *How do our library classrooms affect and facilitate student engagement?*
- *What role do our library classrooms play in our faculty collaborators' perceptions of our impact on student learning?*

Our objective was situated within current strategic efforts at PSU. PSU is engaged in a University-level initiative to increase the number of active learning spaces on each campus and decrease the number of large, lecture-style classroom spaces. In order to do this, a subgroup of the PSU Learning Spaces Leadership Committee, on which this project's primary investigator serves, has been charged with evaluating learning spaces in order to gauge their ability to facilitate active learning. Further, the PSUL Instruction Steering Committee recently released a new program document that emphasizes the use of active learning in information literacy sessions. The Activating Library Classrooms project directly supports these University and library-level strategic efforts, leverages PSU's multi-campus organization, enables the investigators to examine learning spaces within the context of the diverse, unique student populations at each campus selected for the project, and empowers PSUL to enhance student engagement through library space design and through leadership in the area of active learning classrooms.

Background & Literature Review

An academic library, which can be described as a "thriving and open-ended learning hub that brings together information, engagement, and technology," often plays a leadership role in learning space conversations on its campus (Head, 2016). Many academic libraries are full of intentionally designed informal learning spaces where students can study alone, collaborate with peers, and even engage in new methods of information creation in spaces like the Penn State University Media and Maker Commons, which are located in Pattee Library on the University Park campus (Bennett, 2015; Head, 2016; Nitecki & Simpson, 2016; Turner, Welch, & Reynolds, 2013). However, many academic libraries also include formal learning spaces, or classrooms, where course-integrated information literacy instruction, among other types of teaching and learning, happens.

Librarian teaching practices have evolved from direct instruction and simple database demonstrations to active learning methods that support critical thinking, but, in many cases, library classrooms have not kept pace with this evolution. Currently, many classrooms at Penn State University Libraries resemble traditional computer labs with little room for students to move around, collaborate with each other, or engage with library instructors. While we know that this computer lab design does not support the type of teaching and learning we value and want to practice, we have not devoted the time or space to exploring better designs for our classrooms. Further, while many Penn State librarians are using innovative and engaging new teaching strategies, we have also failed to devote time and space to really learning how to use our formal learning environments well.

All of this is unfortunate, because libraries present the perfect opportunity for experimental learning space design use (Karasic, 2016; McKinstry, Hornby, & Richards, 2014). Libraries stand outside of official curricular structures, so constraints such as student evaluations (SRTEs) do not impact the design of our space or the pedagogies we use in that space; this means we have freedom to experiment and fail forward without serious repercussions. Libraries stand at the intersection of many disciplines, which means any innovations we employ in the design of our space and pedagogy, and in our approach to teaching and learning, have the potential to reach and influence instructors and students across the University. In other words, academic libraries are the perfect incubators, catalysts, and platforms for radical ideas about learning spaces, teaching, learning, and student success. For these reasons, academic libraries and those who play any role in designing them have a responsibility to pay special attention to the formal learning spaces situated within them.

Research Methods

In order to investigate our three research questions, we originally identified three research methods. First, we used the EDUCAUSE Learning Spaces Rating System (LSRS) to evaluate the spaces identified for inclusion in this study (Felix & Brown, 2011). Next, we planned to develop and use a formal classroom observation protocol to observe information literacy sessions and other learning events in

each of the spaces identified for this study. Finally, we created and used a formal interview protocol in order to interview the faculty instructors of the courses we observed and to gain insight into what our spaces might communicate to the faculty about our priorities, our expertise, and our ability to impact student learning.

Classroom Evaluations

In total, seven library classrooms at six Penn State campuses were observed and measured using the LSRS version 2, Part B. The LSRS includes a list of measurable criteria that is used to study how well a classroom accommodates active learning and teaching methods. Only "Part B: Environment, Furnishings, Layout, and Technology" of the LSRS was used to evaluate classrooms (see Appendix A). Because the classrooms were located at different Penn State campuses, each with their own unique histories, contexts, and various stakeholders, it was not helpful or feasible to collect the data for "Part A: Campus Context, Planning, and Support Considerations" of the LSRS version 2. Though, when possible, we recommend that Part A be completed to facilitate comprehensive discussions about the motivations for and design of library classrooms. The authors measured and documented the space with yardsticks or tape measures, took photographs, and rated each classroom at the time the site was measured. This often involved adjusting lighting, testing audio/visual equipment, and measuring desk space. Scores were recorded during the site visits in electronic LSRS worksheets.

Faculty Interviews

The researchers conducted seven interviews with non-library faculty for whom a librarian had recently taught one of their classes. The faculty represented each of the following Penn State campuses, **Abington, Altoona, Behrend, Harrisburg, Scranton,** and **University Park**. The authors sent emails to librarians at the 6 campuses and asked the librarians to suggest the name of a faculty member who might be willing to participate in an interview about the library classroom. Interviews were conducted in-person, and when possible, in the library classroom to encourage detailed feedback. All of the faculty interviewed were familiar with the library classroom space. The interviews were recorded using digital voice recorders. Faculty were asked 8 questions that were focused on the subject's perceptions of the library classroom, their perceptions of classroom space on campus, and how well they felt the library classroom supported student learning. The interview questions are listed in Appendix A.

Instruction Observations

Initially, the researchers planned to observe library instruction sessions in each of the classrooms being studied. However, following the first-class observation, the researchers decided that due to the complex nature and confounding variables involved in library instruction and student learning, they would pursue additional instruction observations. Active learning in a class session is dependent upon the personality of the students in class, the pedagogical choices of the librarian and faculty member, and a number of other factors. Although class observations would likely produce a wealth of data on student learning from library instruction, the researchers felt that they would not meaningfully contribute to the discussion on classroom design for the purposes of this study.

Data Analysis

As stated earlier, the faculty interviews were recorded using digital voice recorders. The interview audio files were initially transcribed using the automated transcription software, Nuance Dragon Professional, and later manually corrected by one of the researchers. The research team utilized the transcribed interview data to complete a qualitative analysis. Using grounded theory as a foundation, the team implemented a constant comparisons data analysis method to identify thematic codes in the interview data (Glaser & Strauss, 1967; Corbin & Strauss, 2014). As a tool for this work, NVivo analysis software was used to facilitate the coding process and store the coded data.

Data Storage

The collected data (audio files, transcripts, and LSRS scoresheets) were uploaded and shared among the authors in Box, a secure, subscription and cloud-based storage service made available by Penn State.

Ethical Considerations

Our research protocol met the criteria for exempt research and was approved by the Institutional Review Board at the Pennsylvania State University. Information about the study was provided to faculty and verbal consent was obtained in person before interviews began. To protect the privacy of interview subjects, personally identifiable information, such as names, were removed during the transcription process. During two faculty interviews, a librarian from the corresponding campus was present. When possible, faculty interviews were conducted without a librarian from their campus present, to limit any response bias that might occur.

Results

Learning Space Rating System

The authors revised the Learning Space Rating System (LSRS) scoresheet to include only scoring for Part B (see Appendix A for customized LSRS). The weighting was readjusted accordingly to 33.33% (formerly 20%) for each of the following sections, environmental quality, layout and furnishings, and technology and tools. The library classrooms (n=7) were assessed using only the criteria listed in these three sections. Overall, the library classrooms earned a weighted average score of 45 out of 100, and a median of 41. The highest scoring library classroom earned a score of 65 and also scored highest in each of the three sections. The lowest scoring classroom earned a score of 26 and was the only classroom to score lowest in all three sections.

Environmental Quality of Library Classrooms at Penn State

The "Environmental Quality" section of Part B of the LSRS is used to assess the following learning space features: access to daylight; views to the outdoors; interior visibility; lighting control; heating and cooling control; acoustic quality; environmental and cultural inclusiveness; and accessibility and universal design. Overall, the library classrooms scored an average of 3.4 out of 9 possible points in the environmental quality section of the LSRS v.2. The median points scored was 4. The highest scoring library classroom earned 5, while the lowest scoring library classrooms (n=2) earned 2 points.

The lowest scoring library classrooms scored low due to lack of direct access to daylight (no windows); lack of visibility within the space; inability to control heating and cooling systems; and fixed-height tables that were not wheelchair accessible. However, one of the smallest classrooms that had limited lighting control and lacked windows, scored the maximum number of points related to environmental and cultural inclusiveness. Despite low scores in other areas, the classroom featured artwork, student work on the walls, a collection of useful course reserve items and citation manuals, and other items demonstrating source evaluation concepts for library instruction.

The most common two features of classrooms (n=4) that earned average and median scores in the "Environmental Quality" section were lighting and acoustic controls. There were three features found in the highest scoring library classroom that contributed to its high score in the environmental quality section—lighting; tools and technology; and accessibility and universal design.

Specifically, the lighting was able to be adjusted off/on and was dimmable in several areas of the classroom. The room also featured two height-adjustable desks for wheelchair access. Also, the student desks featured easy-access electrical outlets next to each computer.

Layout & Furnishings in Library Classrooms at Penn State

The "Layout and Furnishings" section of Part B of the LSRS is used to assess the following learning space features: seat proximity; the ability to move through the space; seating density; flexibility of the furniture; size, quality, and flexibility of the furniture; seating comfort; movable partitions; visibility in and out of the classroom; access to adjacent informal learning areas; and the number and quality of writable surfaces, such as chalkboards or whiteboards. The library classrooms that were observed for this study scored an average of 7.6 out of 15 possible points in the "Layout & Furnishings" section, and the median points scored was 9. The highest scoring library classroom earned 11 points; the lowest scoring library classroom earned 4.

The lowest scoring library classroom lacked space in general and scored zero points in the following categories: proximity within space, movement through space, and storage space for students. The room also lacked movable partitions, windows, and unobstructed writable surfaces. The most common features of classrooms (n=4) that earned average and median scores in the "Layout & Furnishings" section of the LSRS were proximity within space (or the ability to interact with users in the space); furniture configuration and flexibility (or the presence of flexible furniture options); the ability to view inside the classroom from outside; access to adjacent informal learning spaces; and presence of writable surfaces.

The highest scoring library classroom scored higher than the others primarily due to its large size. Because of its size (1,440 ft²), the high scoring classroom was able to accommodate larger chairs, more space between desk rows, and additional equipment and furniture in general. The classroom featured chairs with student storage underneath, several whiteboards across the front of the room, and small windows leading to adjacent informal learning areas in the library. In fact, all of the library classrooms scored well on the criterion, "Access to Adjacent Informal Learning Areas," because they were located within the library itself.

Technology & Tools in Library Classrooms at Penn State

The "Technology & Tools" section of Part B of the LSRS is used to assess the following learning space features:

availability of electrical power throughout the space; network connectivity; visual displays such as projectors and projection screens; sound amplification; audio/visual interface and control; distributed interactivity (or the users' ability to work collaboratively); and session capture and access. The library classrooms scored an average of 4.9 points out of 10, and a median score of 4 points. The highest scoring library classroom earned 8 points and the lowest scoring classrooms (n=2) earned 3 points.

The lowest scoring library classroom scored low in the following criteria: sound amplification, audio/visual control, distributed interactivity, and session capture and access. It also featured a single visual display that was difficult to view in all areas of the classroom. The most common features of classrooms (n=3) that earned median and average scores in the "Technology & Tools" section were network connectivity; visual displays (projector and projection screen); sound amplification; and the ability to control audio and visual content. The highest scoring classroom featured electrical power throughout, desktop computers for each student, a projection screen highly visible in most areas of the room, appropriate sound amplification, easy access to audio/visual controls, and a microphone for the instructor.

Interviews

As previously mentioned, the research team completed a qualitative analysis of the transcribed faculty interview data, using NVivo software. The constant comparisons method of analysis revealed five primary codes: Collaboration with Librarians, Learning Space Components, Space Benefits, Space Challenges, and Space Messaging. Data points coded with each of these designations revealed important information for addressing the team's initial research questions, which, like the codes, also include the themes of space, engagement, and perception.

Collaboration with Librarians

The code Collaboration with Librarians was used to code data that addresses the working relationship between librarians and the faculty using the University Libraries teaching and learning spaces. Unlike many of the other codes, there was no need to break this code down further into statements with positive and negative connotations. Each time a librarian's work and their collaborations with faculty were mentioned during the interviews, the interviewee had only positive things to say about their experiences. While the project's research questions do not necessarily address faculty opinions of librarians' work, it does aim to uncover the relationship between library teaching and learning spaces and faculty perceptions of the impact of librarian's work on student learning. Although interviewees identified elements of library teaching and

learning spaces that might signify a negative perception of impact on student learning, all participants praised the work of their librarian colleagues. This indicates that they value collaborations with librarians, despite challenges found in library teaching and learning spaces. In particular, respondents identified value in both librarian expertise and being in a library space, even if/when it is not ideal. For example:

> *"Well I think it's crucial that we have, we use the library, and that we have such a good relationship with librarians on campus to come into the classroom. So, from like a content and what they're able to deliver, it's fabulous."*

> *"Well, I feel like to them, as second semester or first semester freshman which is my primary body, they have like little experience with the libraries and I want them to realize that it's a place, a space, a real place, and the databases are tangible, everything is accessible, and that their knowledge of the world isn't just on the surface of their screen, right? I feel like the library resources, of course to us, definitely valuable. But for these students I try to instill it. You can still go see the research librarians and ask questions, and they can give you specific articles to your, your topic without you floundering around..."*

Learning Space Components

Also significantly present among the transcription data are discussions related to specific elements, either present or not present, in teaching and learning spaces. The research team coded this data under the heading Learning Space Components with sub-codes of Pedagogy, Furniture Arrangement, Lighting, and Technology. Interview responses indicated that there is strong correlation between pedagogical preferences and the desired components of a teaching and learning space. However, for those faculty collaborators who indicated an interest in the research project's primary pedagogical themes of active learning and student engagement, furniture arrangement and flexibility were frequently cited as considerations for an ideal teaching and learning space. Data includes the following highlights:

> *"My ideal room to teach in would be in a room with tables that you could set up in a square or U-shape, but that could also be moved for interactive stuff. Because I teach a lot of drama, so I'll have students like get up and do scene stuff together so there needs, we need to be able to clear that stuff away. Also, a room that has a basic audio/visual set up, because I show a lot of clips of performances and I use visuals in my teaching a lot. So, the rooms that have more seminar set ups don't have good audiovisual stuff, and then the other rooms are just like totally like blocks of desks that are packed in too close together to move easily. So, I'm always like*

moving us into a circle and then we have to like wrestle with all the chairs to move back."

"I think that having moving pieces I guess is really helpful. Because when you have those fixed long tables or the small chairs. First of all, small chairs are really difficult sometimes they're too small and they're really difficult to maneuver. If you have students with special needs or students with disabilities, you have to hope that there is like a desk in there that's available to them, which is really not always an easy task. So and then when you have those long tables that even if they move they're still sort of hard to move and you can only move them into certain shapes and so you only have rows or you can have little squares or something. So I think that having those moving pieces like the roundtables or the tables that can move around, having chairs that are open so that students, you know, regardless of their, their mobility issues or whatever can get into those chairs. There's space for students in wheelchairs, you know."

Additionally, for participants with interest in active learning and student engagement the availability of natural light and technology were priorities for an ideal teaching and learning space:

"For the availability. I use these, this classroom for the availability of the computers."

"I really value, though, having technology like a podium computer and the ability to project material, if only for, you know, saving paper and handouts. It also just makes things logistical so that, you know, if in the middle of a lecture about MLA citation, they have a question about a particular kind of source, I can pull up the source and actually show them how to generate an MLA citation. So, it's helpful to sort of have that visual to support my instruction."

"th—well, I love natural light. I just think that's hugely helpful, and I teach a lot of early morning classes and one of things that I do first when I arrive at a classroom early is open up all the blinds, as long as they're not going to shine sun directly in the faces of my students, which I find is detrimental. But so, I think that's really, really important, just for turning on cognition and it has all these associations with metabolism and the functions of your brain, and so natural lighting's huge for me."

Space Benefits & Space Challenges

During the interviews, participants discussed some of the positive and negative attributes that they have found in teaching and learning spaces at Penn State. The research team coded this data with the terms Space Benefits and Space Challenges and indicated through sub codes whether the referenced space was found in the University Libraries,

or Campus-wide. One of the dominant sentiments found in this data is a preference for or neutral opinion of University Libraries classrooms, despite Space Challenges, because the teaching and learning spaces Campus-wide are equally challenging, or very limited in availability. For example:

"Oh, we have a huge space problem. We don't have enough space. I taught a discussion-driven small literature class my first semester in a computer lab because it was the only thing they could put me in."

"I would say. Space, to be honest, on campus in general is not really set up well for collaborative work especially in English."

"It's very difficult to find lab resources here on campus because they're always booked with classrooms. So that's why we migrate here, especially when I need [librarian's name] or a librarian to do a workshop."

"Choose to go to the library because the classrooms I have, first of all they don't have computer access, like individual computer access, and they're not set up for collaborative like research work either."

This indicates an opportunity for the University Libraries to play a leading role in shaping the design of teaching and learning spaces University-wide.

In Space Challenges, responses associated with University Libraries classrooms, participants most often noted issues to related space arrangement and flexibility, particularly as these qualities might facilitate active learning. Criticisms of library teaching and learning spaces include:

"The space itself is, is long and narrow. So, there are, you know, the rows not as wide and there are more rows in order to have the number of computers that are needed. And so, I do find that I try really hard to encourage students to sit in like the first four or five rows. They can't all fit up there, but I try and at least fill those rows first. Because it is, it's quite a distance from the podium to the back few rows, and I find that they tend to be a little bit less engaged back there."

"Yeah well, it's really difficult to get in and out. Like it's in these really narrow rows, you know, it's like a brick and mortar room. So, there's not a lot of flexibility. If students have to get up to go do something, they can't like get out. It kind of is disruptive I notice."

Finally, the Space Benefits found in University Libraries teaching and learning spaces were often associated with the relationship between library space and the expertise and resources found within it. In other words, a major perceived benefit to teaching in a library space is physical proximity to the expertise of librarians and physical information

resources found within the building, including access to technology. Examples of these associations include:

> *"I like bringing my students into the library to show like show them where the library is and to help them navigate like the space of the library itself because once they've come into the library, they're more likely to come back to the library. And I want them to be using resources, both human and material that are physically here in the library."*

> *"Uh, the other reason is that my um, students at the "X" campus have really irregular access to technology, um and really inconsistent access to technology. A lot of students, their phone is their primary computing device. So when there are lessons that involve searching using our library resources or our library databases or digital resources doing various kinds of notetaking and citation gathering. If I'm not in the library, I cannot provide them with computing technology that they'll need as easily, so the laptop cart of Google Chromebooks here is incredible."*

Space Messaging

One of the project's research questions, specifically aims to investigate what kinds of message or signal the University Libraries' teaching and learning spaces send to faculty collaborators about librarians' abilities to impact student learning and engagement. In order to analyze the collected data for this information, the research team coded responses related to perceptions of teaching and learning spaces as Space Messaging and used the sub-codes Positive and Negative to indicate the orientation of the perceptions discussed. Additional sub-codes were also used to signify whether the discussed space is a Library space or a Campus-wide classroom. Similar to data coded as Space Challenges, Negative Space Messaging data associated with both Library and Campus-wide classrooms indicate that arrangement and flexibility signify an absence of active and participatory learning to students. Faculty collaborators noted this a as specific challenge in several of the University Libraries' spaces. For instance:

> *"Well, because it is these horizontal tables, facing a screen, it really does seem oriented for listening a little bit more than engaging in conversation."*
> *"I think it says it's restrictive. I think it says, you know, like, that you sit here, you do this, you're by your--, it's very singular, you shouldn't ask for help, it's not like a give and take back and forth kind of dynamic. I think, I think it reinforces kind of the idea that this is a scary place. I should be intimidated by it. It's not open and friendly and inviting."*

While interview participants indicated negative perceptions associated with library classrooms, they were also able to highlight positive associations with the spaces. However, the survey data did not include any Positive Space

Messaging data for campus-wide spaces, only library classrooms. Similar to positive library related data found throughout the analysis, positive perceptions of University Libraries' classrooms are associated with the expertise and resources found within the physical space. Respondents indicated the library itself signifies a certain level of reverence. As summarized by one faculty collaborator:

> *"I think it also sets the tone, that research is important, and that the libraries are important by taking them outside of the classroom, into the library as well."*

Limitations

During two faculty interviews a librarian colleague was present, which might have influenced how the faculty member responded to some questions, in particular question #7, "How do you see library workshops, resources, services, and spaces contributing to your teaching and your students' learning?" (Appendix A). However, the interviewers made an effort to encourage interview subjects to express honest feedback, even if it might be perceived as negative. Additionally, perceptions and other feedback were generally not collected from librarians who teach in the library classrooms we observed.

Conclusion

The faculty collaborator interview data analysis was instrumental in addressing the themes of space, engagement, and perception found in the research team's initial research questions. More specifically, the data indicates that, although University Libraries' classroom may not be ideal, neither are the teaching and learning spaces that faculty collaborators utilize across the University. Instead, library teaching and learning space is valued for the expertise and resources found in the University Libraries. Most importantly, this value highlights an opportunity for the University Libraries to be a leader and true collaborator in matters of teaching and learning space University-wide.

Conclusions & Recommendations

From our research, it is clear that Penn State faculty view librarians as partners and have positive impressions of how library instructors, spaces, and services contribute to and enhance the student experience. In addition to continuing to focus on building and maintaining these relationships and curricular integrations, we identified short-term and longer-term recommendations and solutions for librarians engaged in or leading the learning space conversation at Penn State and other universities.

Short-term Recommendations

In order to start the conversation or begin an exploration of formal learning spaces use the Learning Space Rating System to develop a baseline understanding of the components that comprise a high-quality active learning space. The Learning Space Rating System is available as a free download on the EDUCAUSE website: https://www.educause.edu/eli/initiatives/learning-space-rating-system. For more information on what it is and how to use it, we recommend reading the article "7 Things You Should Know About…The Learning Space Rating System" (EDUCAUSE, 2015).

Once you use the LSRS, you will likely identify a number of things, big and small, that you will want to change. These changes may range from free or very cheap to very expensive. Our work on this project has identified a spectrum of changes, depending on the size of your budget, that you may want to consider making to your library classrooms in order to improve them for active learning.

Small or Non-existent Budgets

On the low-investment end, we recommend the following:
- Adding a bookshelf with books, handouts, and school supplies that students would find useful
- Adding artwork, campus photos, and/or student projects to the walls
- Adding a lockable storage cabinet
- Adding at least one height-adjustable desk for accessibility
- Adding quiet fans or a portable air conditioner for airflow and environment quality
- Arranging furniture so that student visibility barriers are minimized, and student collaboration and mobility are maximized
- Adding a whiteboard

Medium-sized Budgets

If you have slightly more funding to invest in learning spaces, we recommend the following:
- Making sure you have a projector and projection screen, fixed or mobile, in the spaces
- Adding a door with at least a small window, in order for students to be able to see in and out of the space, and in order to possibly increase natural light in the space
- Considering a fresh paint scheme that includes energizing or relaxing colors other than white

Larger Budgets

If you have even more funding to invest in learning spaces, we recommend the following:

- Investing in a cart of lightweight laptops (e.g., Chromebooks) for students to use instead of fixed desktop computers
- Consider collapsible and flexible furniture for different classroom arrangements

Long-term Recommendations

If you have both the time and the funding, and are interested in serious long-term planning related to formal learning spaces, we recommend the following:
- Evaluating and improving wi-fi accessibility
- Ensuring that rooms are designed with at least 25 square feet designated per student to allow for comfort, flexibility, accessibility, and collaboration
- Installing adjustable and dimmable lighting in various areas of the room
- Ensuring that there are electrical outlets in various areas of the room in order for every student to be have access from their seat
- Installing windows or skylights if possible to enhance natural light in the space

In addition to identifying specific architectural and design features that can support active learning, our research makes it clear that the intent and use of these spaces needs to be considered and communicated in a variety of spaces. First, as the LSRS discusses, classroom spaces need to be integrated into campus planning so that they are supported, maintained, and managed. For library classrooms, we must consider the additional element of the learning outcomes and pedagogy emphasized in these spaces; in other words, formal learning spaces in libraries need to be designed with information literacy and information literacy pedagogies in mind.

Similarly, our research indicates that knowing how to use a space is just as important or more important than knowing how to design a space. Just because a space has been designed for active learning does not mean that an instructor will know how to leverage that space or even use the best pedagogical approaches in any space. As Ramsay and Dick write in their 2019 article, "designing our faculty development opportunities to be as flexible as the spaces themselves is an important step". While our research mainly focused on the learning spaces themselves, throughout the project, we increasingly discussed and questioned the uses of these spaces. Ramsay and Dick ask, "what if faculty…were savvy, agile, and confident in a way that, regardless of [the space], they are equipped with the knowledge and skills to create just the right configurations and to deploy the best pedagogical approaches?" (2019). We wonder this, as well. The next step in our research will be to investigate this question and perhaps develop professional

development plans for those teaching in our classrooms, regardless of their LSRS score or design.

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Appendix A

Customized Learning Space Rating System

For this project, researchers used Part B: Environment, Furnishings, Layout, and Technology of the Learning Space Rating System. The rubric for this section is as follows. You can access the full Learning Space Rating System and descriptions of each criterion here: https://www.educause.edu/eli/initiatives/learning-space-rating-system

Environmental Quality	Credits	Points
	Daylight	1
	Views to the outdoors	1
	Interior visibility	1
	Lighting control	1-2
	Thermal quality	1
	Acoustic quality	1
	Environmental & cultural inclusiveness	1
	Accessibility & universal design	1
Layout & Furnishings		
	Proximities within space	1
	Movement through space	1
	Seating density	1-2
	Furniture configuration flexibility	1-3

	Work surfaces	1
	Seating comfort	1
	Movable partitions	1
	Transparency	1
	Access to adjacent informal learning spaces	1
	Writable surfaces	1
	Physical storage	1-2
	Future proofing	1
Technology & Tools		
	Electrical power	1
	Network connectivity	1
	Visual displays	1-3
	Sound amplification	1-2
	Audio/visual interface and control	1
	Distributed interactivity	1
	Session capture and access	1
Total Points Possible		35

Appendix B

Interview Questions

1. Why did you choose to hold today's library workshop in the library, rather than your usual classroom?

2. During today's library workshop, were your students more engaged, less engaged, or similarly engaged than they are when you teach them in your usual classroom?

3. What are your overall impressions of the library classroom in which your library workshop was just held?

4. What does the design of this library classroom space tell you about what happens in this space?

5. What is your favorite learning environment to teach in on campus? Why?

6. What do you think makes a learning environment or classroom space supportive of learning?

7. How do you see library workshops, resources, services, and spaces contributing to your teaching and your students' learning?

8. Is there anything else about the library workshop or our learning spaces that you'd like to share?