

Overcoming the Spatial Constraints of Flipping the Classroom at Eastern Kentucky University

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“Flipping the Classroom” is an innovative reform in education that has been implemented in many universities across the United States. Flipping promotes “active learning” in the classroom through group activities, in-class writings, and discussion, inspiring students to utilize the higher cognitive levels of analysis, application, and invention during class meeting times rather than merely those of remembering and understanding. In order to achieve the maximum effectiveness of the flipped classroom model, the physical space of the classroom must be redesigned to facilitate group work and activities, allowing for flexibility and mobility.

Unfortunately, many higher education institutions do not have the funds necessary to renovate all classrooms to best facilitate the flipped instruction style. At Eastern Kentucky University (EKU), rather than continuing with the ineffective traditional lecture method, many professors have attempted to adjust aspects of the flipped classroom model to the limitations of their traditional classroom spaces. In addition, some classroom spaces *have* been renovated, which presents opportunities for some, but not all, instructors to experience the benefits of teaching in a flexible and technologically integrated space. While budget considerations at EKU prevent the complete re-design of classroom spaces, the innovations of instructors and the presence of several active learning environments help facilitate the incorporation of flipped instruction techniques.

The History of the Flipped Classroom Movement

The flipped classroom strategy originated with the National Center for Academic Transformation (Keengwe, Onchwari, & Oigara, 2014). The model was originally based on the ideas of Piaget, who stated that “learning occurs not when a person merely copies an idea, but when a person acts on it” (as cited in Keengwe, Onchwari, & Oigara, 2014, p. xix). Accordingly, the flipped classroom model facilitates interactive learning, in which students are encouraged to

engage with and learn from peers. Passive activities, such as listening to lectures and viewing instructional videos, are conducted by individual class members outside of class. The course meeting then consists of “clarifying, extending, re-directing, and creating a product or project utilizing the new content” (Keengwe, Onchwari, & Oigara, 2014, p. 134). These activities enable students to exercise the higher levels of Bloom’s Taxonomy: analyzing, evaluating, and creating, because they are already familiar with class content before the beginning of the session.

The benefits of the flipped model are myriad. Dr. Staddon, a Professor of Biology at Eastern Kentucky University, related that “lecturing to 15 students is much the same as lecturing to 90” (Staddon, personal communication, 20 March 2014). Regardless of the number of students, helpful student-instructor interaction is precluded by the traditional lecture method. In the flipped classroom model, since teachers are no longer engaged in disseminating information from the front of the classroom, they are free to “facilitate deep discussions, watch students participate in small groups, allow time for writing and projects, and organize activities to synthesize the learning” (Keengwe, Onchwari, & Oigara, 2014, p. 137). Staddon related that utilizing the flipped classroom strategy has enabled him to establish a healthy rapport with the individuals in his classes (Staddon, personal communication, 20 March 2014). A flipped classroom also allows for immediate instructor feedback, enabling teachers to guide the learning processes of their students by addressing concerns as they arise. As students are actively solving problems and applying strategies under the supervision of their instructor, they retain the ability to ask questions and receive demonstrations instead of merely consulting their textbook or possibly succumbing to frustration.

The flipped classroom also enables students to take responsibility for their own learning. In *Flipping Your English Class to Reach All Learners*, eighth grade English teacher T. Cockrum

remarked that involved students “not only developed skills in time management by organizing their own daily and weekly schedule, they also were encouraged and supported in finding ways to personalize their learning” (2014, p. 5). By emphasizing the learning process over the mere completion of tasks, students feel motivated to take responsibility for their education. Students are also better able to manage their time through the completion of assignments during the course meeting. One student reported that her “favorite part of using the flipped classroom in English was that [she] was able to completely manage [her] work” (Cockrum, 2014, p. 5). By enabling students to use time productively and actively in class, they learn accountability and time management skills while engaging with content.

Spatial Rhetoric and Learning Theory

The discussion of space and its impact on human growth is by no means new. Lefebvre’s theory defines space as “both a product (a thing) and a determinant (a process) of social relations and actions” (Zieleniec, 2007, p. 60). Space is therefore impacted by, and *impactful on*, the subjects within. As Lefebvre argued, space is a “social reality” (as cited in Zieleniec, 2007, p. 61), and must be considered in any attempt to comprehend human development. Harvey, too, explored the concept of space, concluding that in order to examine space one must first understand how human activities and practices prompt the formation – and reformation – of spatial zones and environments. Humans’ demands upon their surroundings become “embedded and internalized within spatial forms and structures” (Zieleniec, 2007, p. 99). Space is therefore the embodiment of human values and enterprises.

Historically, spaces have been created with the intent of “delimit[ing], regulat[ing] and control[ing]” the activities and individuals who inhabit or traverse the determined area (Zieleniec, 2007, p. 61). This idea is particularly evident in Foucault’s discussion of space, in

which he asserts that space is a necessary component of any exercise of power (Zieleniec, 2007). In particular, environments for the purpose of discipline (Zieleniec uses the examples of “the barracks, the school, the prison...[and] the factory”) must be “partitioned with the aim of knowing, mastering and using space so that each individual can be assigned and know their place within the enclosed order of the institution or disciplinary sphere” (Zieleniec, 2007, 132). For most students, then, their “place” is in one of the rows of stationary desks, positioned as passive receivers of the knowledge disseminated by the figure of authority – the instructor at the front of the room. With innovations in teaching methods, however, the space of the classroom must adapt to suit humans’ changing needs.

While the traditional seating of students in forward-facing rows is effective for the lecture method of instruction, utilizing active learning in the classroom requires a much different design. Aspects of classroom configuration can facilitate or impede student learning, and thus must be considered as part of the assessment and adaptation of one’s class. For instance, students in “studio spaces,” or spaces that are characterized by “moveable furniture, tables that group students into learning teams...wireless laptops and computer projection, and wall spaces for writing or posting ideas” (Taylor, 2008, p. 218), are able to absorb concepts more adeptly than students in traditional classroom spaces.

Learning theory also supports the idea that students learn best in unfamiliar settings. Because students are accustomed to attending classes in traditionally oriented spaces, they enter the class with the expectation that the learning process will consist of the dissemination model of information distribution. Students therefore harbor preconceived notions about their roles as passive receivers of information. Studio spaces are still unfamiliar to students, and have the capacity to be rearranged to constantly produce new iterations of the space. Therefore, students

and their conceptions about the learning process are constantly challenged, causing them to engage more actively with the material and their peers (Taylor, 2008).

The physical structure of the classroom can have a “profound impact on student learning” (Lei, 2010, p. 128). The conventional lecture hall, with its long rows of stabilized hardware, contributes to a disconnect between students and teacher, making it difficult to establish a personal connection – or even eye contact. In rethinking the classroom space, the concerns of active learning and collaboration are paramount, suggesting that the forward facing, teacher-focused formation of most classrooms is insufficient for the needs of today’s learners. Lei suggested a broad, rather than long, classroom shape, designed to minimize the distance between instructor and students, as well as between lesson and learners. He also advocated “designing spaces with proportions to accommodate a variety of academic functions” (Lei, 2010, p. 129). In order to facilitate differing learning and teaching styles, the space of the classroom must be flexible.

Existing Flexible Environments

Students and faculty are rarely asked to contribute to classroom design; however, Niagara County Community College allowed a group of instructors to conceptualize an experimental, technologically integrated classroom which was then constructed for use by a developmental writing course (David, Keaton, Morris, Murphy, & Stapley, 2008). The resultant space featured 23 computer workstations arranged in a U shape around three walls of the classroom. The center of the room contained a large conference table for collaborative work and an instructor’s station, providing students easy access to both resources. The faculty also insisted on the importance of student mobility, a neglected facet of design in traditional classrooms. Instead of the combined desk and chair hardware provided to most students, the newly designed space was furnished with chairs with wheels to better facilitate students’ use of the classroom. David et al. (2008) asserted

that “the classroom’s physical arrangement, which eliminated rows, placed students side-by-side...increasing spontaneous collaborative learning” (p. 20). Interactions that typically required instructor initiation were more attractive and accessible due to the innovative classroom design.

Although David et al. did not specifically connect Niagara County Community College’s experimental classroom to the flipped class instruction style, components of their technologically innovative space mirror those suggested by flipped classroom proponents. Fickes (2013) related that research “suggests that 40 percent of the population learns best in informal settings - not the traditional setting of desks in rows” (p. 20). Accordingly, Fickes suggested that the most essential component of the flipped classroom design is flexibility. Since flipping the classroom emphasizes collaboration and peer interaction, wheeled chairs and open, easily navigable spaces are indispensable to its success.

Student-Centered Active Learning Environment with Upside-down Pedagogies

One of the earliest manifestations of the flipped classroom concept was the Student-Centered Active Learning Environment with Upside-down Pedagogies (SCALE-UP) movement, which originated in North Carolina State University’s Integrated Math, Physics, Engineering, and Chemistry (IMPEC) project in 1993 (Beichner et al., 2007). In 1997 the project was abandoned due to its inability to cater to large-size classes, but the concept was revitalized to investigate the potential to incorporate active learning into classes of up to 100 students. In order to realize this project’s full potential, classrooms needed to facilitate student-instructor interaction and collaboration not only within, but among, groups. Phase I of the classroom redesign resulted in long, thin tables with attached seats, but students were still able to avoid contact with their instructor by sitting in the middle of the row. In Phase II, traditional desks were replaced with six-foot round tables. This model provided greater flexibility, as well as more

convenient access to technological resources, as each group of students was provided with a laptop. The Phase II classroom provided seating for 54 students.

Phase III of SCALE-UP resulted in a classroom that accommodated up to 99 students. The design of this classroom was similar to the Phase II classroom, but utilized seven-foot round tables. By leaving ample space around each table, the instructor can freely circulate, and no student is insulated from contact. Beichner et al. (2007) recommended the use of laptop computers, particularly for a classroom of this size, despite their expense relative to cheaper desktop models. Laptops allow for a less inhibited line of sight, as well as providing instructors the option to ask students to close their laptops during lecture or instruction portions of class to limit the distractions of email and social media.

SCALE-UP has now been implemented in over 50 universities across the country (Beichner et al., 2007). Unfortunately, many institutions are precluded from participating in this revolutionary redesign of classroom space due to the high cost of such renovations. Operating expenses are comparable to traditional lecture-based classes, but the initial cost of equipping a SCALE-UP classroom is close to \$4,000-\$5,000 per group (table) of students (Beichner et al., 2007). This also does not include the cost of renovating the classroom, which can be considerable because a SCALE-UP class needs as much as double the square footage of traditional classrooms (Gardner, 2013).

Rooms for Engaged and Active Learning

Drawing from the principles of SCALE-UP, Michigan State University's University Classroom Committee initiated a campaign to redesign their classrooms with an emphasis on active learning (Michigan, n.d.). Designated as Rooms for Engaged and Active Learning, or REAL, these rooms are intended to encourage increased faculty and student engagement and collaboration. MSU completed construction of the first two REAL in November 2012, and the

spaces were available for tenured, tenure-track, and fixed-term faculty to request for the Spring term of 2013 (Michigan, n.d.). MSU has also developed a REAL Academy for familiarizing interested instructors with the resources and teaching methods of REAL spaces.

MSU REAL classrooms utilize semi-circular tables rather than the round tables preferred in the original SCALE-UP model. Ten tables are arranged along the walls of the room, providing seating and work areas for approximately six students each. In addition, REAL are equipped with an instructor station, four flat panel displays situated throughout the room, dual flat panel displays at each table, and multiple whiteboards (Michigan, n.d.). The integration of technology into the space represents a substantial financial investment; while the technology for a traditional lecture class at MSU might cost \$30,000, the technology for a REAL classroom can cost over \$100,000 (Gardner, 2013). Additionally, those hoping to renovate classrooms may encounter resistance due to outdated state guidelines regarding required square footage and design of classrooms; around twenty-five percent of states in the United States have not updated their criteria in the past ten years (Gardner, 2013). Despite the challenges, however, many schools have adapted the principles of SCALE-UP to cater to their unique academic challenges, including: Active Learning Communities at the University of Minnesota, Spaces to Transform, Interact, Learn, Engage at the University of Iowa, and Technology Enabled Active Learning at Massachusetts Institute of Technology (Michigan, n.d.).

Enhanced classrooms alone cannot ensure the success of the flipped classroom model, however. Instructors must understand how to best utilize the “combinational deployment of modalities and semiotic resources, which can include gesture, gaze, images and movement, alongside with language” (Lim, O’Halloran, & Podlosov, 2010, p. 235). Not only is the instructor’s position relative to the students important, but also the students’ positions relative to

resources such as blackboards, technology, and projector/flat screens. The learning process is also impacted by the instructor's movement, intended purpose of movement, and "how and where the students may move" (Lim, O'Halloran, & Podlosov, 2010, p. 236).

Pedagogical Use of Space

There are four differently defined spaces in the contemporary classroom: Authoritative, Supervisory, Surveillance, and Interactional. The Authoritative Space refers to the position (generally located at the front center of the classroom) from which the instructor conducts formal teaching and facilitates student activity. This space is also the furthest from students, which is one of the primary hindrances to student-instructor interaction. The function of this space can be observed through an instructor's return to this location when preparing to continue teaching or to disseminate additional instructions to students following the instructor's departure into one or more of the other three spaces (Lim, O'Halloran, & Podlosov, 2010).

When departing from the Authoritative Space, an instructor may choose to "patrol" the space between and around the class members, observing, but not interacting with, student activity. When the instructor "pace[s] alongside the rows of students' desks as well as up and down the side of the classroom," this activity transforms these sites into the Supervisory Space (Lim, O'Halloran, & Podlosov, 2010, p. 238). While the Supervisory Space physically locates instructors nearer students, the purely observational function of this space does not facilitate the construction and maintenance of student-instructor relationships.

Within the Supervisory Space is the Surveillance Space. This space serves roughly the same function as the Supervisory Space, but involves stationary observation. Similar to Foucault's Panopticon, the utilization of this space involves the implicit assertion of authority over the observed individuals through an "all-seeing" monitor, in this case positioned at the rear of the classroom (Lim, O'Halloran, & Podlosov, 2010). The function of this space unfortunately

precludes the development of a community of peers, as instructors constantly exercise their authority over the members of their class rather than actively facilitating interactions within and among student groups.

The most helpful for the purposes of the flipped classroom model is the Interactional Space. This space can be utilized by the stationary positioning of the instructor “alongside the students’ desks or between the rows of students’ desks” (Lim, O’Halloran, & Podlosov, 2010, p. 238). Interactional Space is most commonly used during student activities, whether individually or in groups. This space represents the closest proximity between instructor and students and “facilitates interaction and reduces interpersonal distance” (Lim, O’Halloran, & Podlosov, 2010, p. 238). This interaction may include personal consultation regarding classroom topics, clarification of previously disseminated material, or even personal interaction, developing student-instructor rapport.

Ideally, the flipped classroom would consist exclusively of the use of the Interactional Space. Unfortunately, the lack of funding many universities suffer establishes spatial limitations on those instructors interested in fully implementing the flipped model, but who are unable to utilize the few renovated classrooms on campus. As a result, instructors may continue to utilize the Authoritative, Supervisory, and Surveillance spaces of the classroom, despite their relative ineffectiveness. Three separate case studies at Eastern Kentucky University, for example, revealed that even those instructors who professed significant interest in the model still utilized the Authoritative Space in addition to, or to the exclusion of, the Interactional Space. These case studies revealed the specific hindrances of existing classroom designs at ECU and the attempts professors made to adapt their flipped curriculum to the constraints of space. Rooms were assessed on bases of size, seating/furniture arrangement, technology access/placement, and

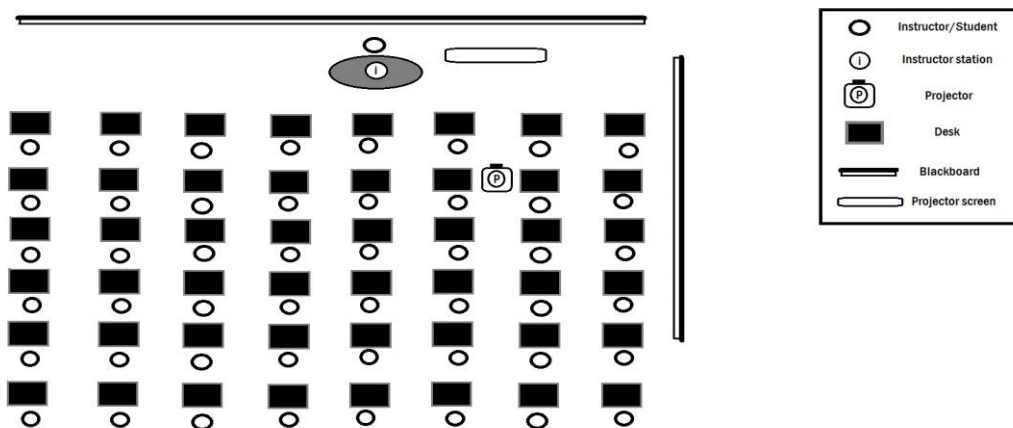
potential for mobility. Following observation of their class, instructors were interviewed as to their perceptions/frustrations regarding the limitations of their classroom space.

Case Studies 1-3

Space 1: Dr. W. Staddon's Biology 320 Classroom, A.K.A. "The Sardine Can"

Located in the Moore building, Dr. Staddon's classroom could accommodate 48 pupils in a traditional lecture class (see Figure 1). Fortunately for his students, Staddon strongly believes in the precepts of flipping the classroom and has attempted to implement flipped strategies in his course. Prior to the observation of his class, Staddon had affixed numbers, ranging one through seven, around the walls of his classroom. When students arrived, they were divided into groups and instructed to make their way around the room, with each set of students completing three of the seven activities. The material for these activities had been previously delivered in a lecture in class, although Staddon related that in the future he hopes to have students access the lecture online. Although Staddon began the class by utilizing the Authoritative Space, the remainder of the class meeting was spent in the Interactional Space.

Figure 1.



As indicated in the above diagram, Staddon teaches in a large, rectangular classroom. The 48 desks are front aligned, facing the space where a lecturer would stand in a traditional class. This facilitates instructor use of Authoritative Space, but Staddon fortunately spent limited time utilizing this space. The students' seats were the standard chair-desk combination with circular metal feet, which Melhuish described as "really uncomfortable and isolating for students" (as cited in Boys, 2011, p. 92). Not only do the desks physically separate students from one another, they also discourage rearrangement of the classroom because of their unwieldy bulk and lack of wheels. Although students were able to navigate through the cramped rows of desks in order to complete their activities, the close confines of the space hindered mobility and presented possible tripping hazards. While students briefly utilized the desks at the beginning of class, for the remainder of the time desks represented obstacles to student mobility rather than a helpful component of the classroom space.

The technology in the space is also front-aligned. A projector affixed to the ceiling faces the front of the room, which also contains a cart with hook-ups for a laptop. There was no laptop in the room at the time of the observation. Chalkboards are situated along the front wall of the room as well as along one side wall; the side chalkboards are nearly inaccessible due to the densely-packed desks. While students in groups at the front of the room were able to work together to solve problems on the chalkboard, the other groups had no choice but to make notes in their individual notebooks, which does not facilitate collaboration.

The close confines of Staddon's classroom also preclude student access to technology. Although Staddon indicated that his class would be enhanced if students were able to utilize laptops, he regretfully noted that the spatial restrictions of his classroom rendered the incorporation of technology difficult, if not impossible. Staddon also remarked that he would

prefer to break his students into more, smaller groups, but was prevented by the close confines of the classroom. The inability to form smaller student groups is significant, as a group of five people is most functional (Alexander et al., 1977, p. 703). When students must work together in larger groups, the size of the group “influences both the number who never talk, and the number who feel they have ideas which they have not been able to express” (Alexander et al., 1977). If students are not active participants in the learning process, they are much less likely to retain and apply the information covered.

Strategies for space 1. Attempting to utilize group work in Staddon’s crowded classroom resulted in clumsy and inefficient interactions between students and their course material, but there are other, more adaptable flipped strategies that an instructor in a similar environment could implement. Collaborative activities are by no means the only manner of analysis, application and invention. Working as individuals, or even in pairs, could better serve Staddon and his students in creating a flipped classroom. Despite the constraints of the Sardine Can, Staddon’s students could:

- Utilize previously learned materials to identify features on diagrams of organisms
- Create diagrams of ideal environments for studied organisms using classroom materials and a coded key, and
- Form connections between related organisms using a web to create a visual representation of materials.

Space 2: Dr. D. Cunningham’s Chemistry 101 Classroom, A.K.A. “The Amphitheater”

Dr. Cunningham’s classroom is located in the New Science Building and is capable of accommodating 80 students. Although he lectured during most of the observed class, utilizing the Authoritative Space, Cunningham related that for several previous sessions students had been

working together in groups to solve problems. Cunningham also related that he frequently requires students to complete online homework assignments prior to attending class in an attempt to familiarize his students with concepts and vocabulary before they are expected to apply this information.

Figure 2.

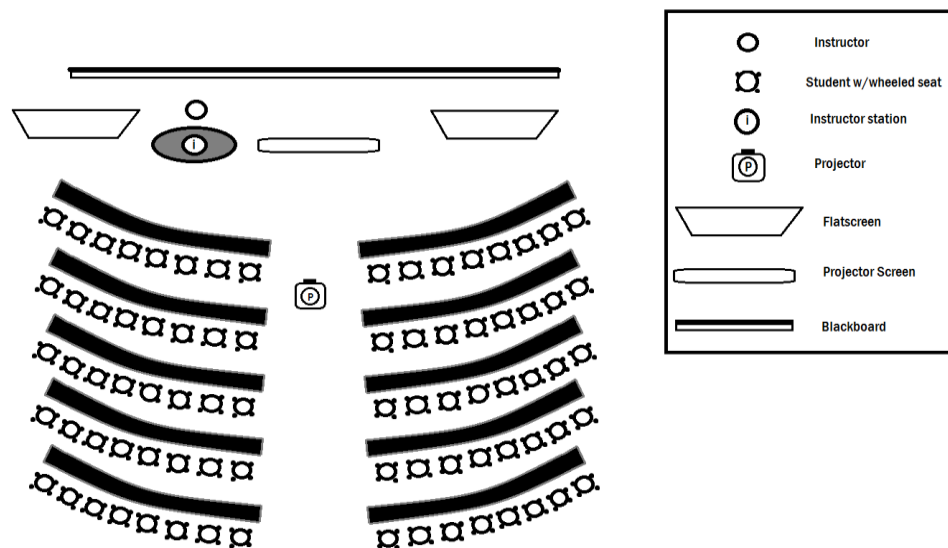


Figure 2 shows Cunningham's large, rectangular classroom. Although the students sit at tables rather than desks, these tables are front-aligned and, furthermore, are affixed to the floor, preventing any rearrangement and limiting use of the Interactional Space in favor of the Authoritative Space. The tiered floor of the classroom contributes to a configuration similar to that of an amphitheater, heavily emphasizing activity/lecture occurring at the front of the room. Although the chairs had wheels, enabling students to turn to face group members behind them, the stable nature of the tables prevented any additional movement of students or classroom furniture, making supplementary activity difficult. Furthermore, the front-aligned nature of the

classroom's design causes students to develop expectations of passive reception of content. As J. Boys relates, "A space set up for presentational delivery from the front by one person to large numbers of individuals does not prevent, but may work against, collaborative and small group activities, especially where furniture and other facilities are fixed" (2011, p. 16). Therefore, before the class has even begun, the possibility of utilizing group work already stands at a disadvantage.

Similar to Staddon's classroom, Cunningham's space features a projector affixed to the ceiling in the center of the room. A projector screen dominates the center of the front wall of the classroom. Additionally, two flat screen televisions flank the projector screen, enabling increased visibility of the information displayed by the projector. The instructor's station, also front-oriented, provides hook-ups for Cunningham's laptop, which he used to display a presentation on the three large screens. Blackboards are similarly situated along the front wall of the classroom, effectively discouraging student use. Cunningham encouraged student interaction during his lecture, but related that the content-heavy nature of his course often problematizes the organization of in-class activities.

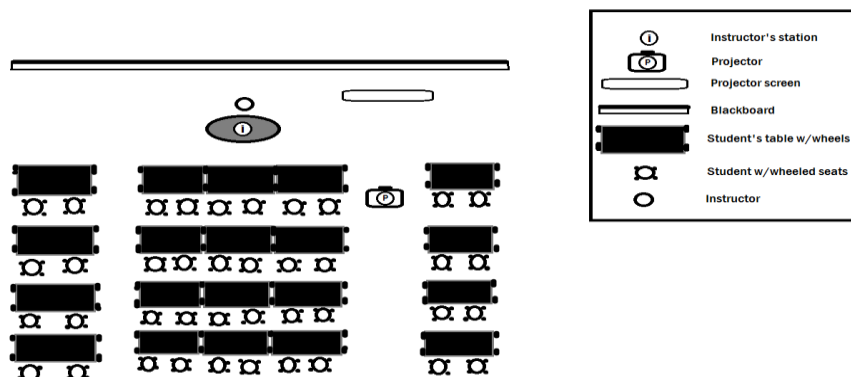
While the wheeled chairs in Cunningham's classroom facilitate some mobility and peer interaction, the affixed tables represent barriers to the incorporation of students into groups. The aisles along the sides and down the middle of the classroom provide the only open spaces, preventing students from spreading out or performing activities that involve more than solving problems together in their notebooks. Due to the difficulty of incorporating active learning strategies into a content-heavy course with a large student population, Cunningham, as many instructors, finds it easier to continue with the traditional lecture method in the majority of his class meetings.

Strategies for space 2. The organization of Cunningham's classroom facilitates certain group activities (those that group students according to their row) while precluding other orientations. The stationary nature of the classroom furnishing is prohibitive of communication among groups, although not within them. The most beneficial application of flipped strategies might therefore involve work in student groups that culminates in a return to the larger group for presentation of results. Cunningham might therefore:

- Ask student groups to each create a 3D model of a studied molecule, having each group create a different substance before rejoining the larger group to share their experiences
- Require each group to hypothesize the result of a chemical interaction before rejoining the larger group to discuss predictions and view a demonstration, and
- Require each group to create a series of questions regarding recently learned material; other student groups can then be given the opportunity to answer these questions competitively for incentive.

Space 3: Dr. K. Hood's Principles of Marketing Classroom, A.K.A. "The Spider"

Dr. Hood teaches in Eastern Kentucky University's Business and Technology Center. Hood provides her students access to partial lecture slides via Blackboard and expects them to review these materials independently. The observed portion of her class consisted primarily of her use of the Authoritative Space, disseminating lecture and facilitating discussion, with the incorporation of short video clips. Hood also frequently requires students to complete in-class assignments, actively applying illustrated concepts while retaining the potential for immediate feedback from their instructor and peers. Hood indicated that she would like to incorporate further aspects of the flipped classroom, but currently lacks the needed preparation time.

Figure 3.

Hood's classroom is large and square, accommodating approximately 40 students. Each table provides a workspace for two students; both tables and chairs have wheeled feet, allowing for easy re-organization of the classroom space. Students can utilize available resources to form groups, combining several tables and chairs into a larger workspace. The spacious aisles on either side of the center grouping of tables allow for easy mobility, and students are able to navigate without fear of tripping over desks, distinguishing this space as an improvement over Staddon's classroom. The ease with which materials can be rearranged also indicates that Hood's classroom has advantages over Cunningham's Chemistry classroom.

Despite the ability to reorganize classroom elements, the front-aligned technology in the space preferences a traditional seating arrangement and the use of the Authoritative Space. The projector, affixed to the right of the center of the ceiling, can project only to a screen located at the front-right of the classroom. The instructor station is also located at the front of the room and contains hook-ups for a laptop, which was being utilized during the observed course meeting. Chalkboards are also located at the front of the room, precluding students from utilizing the surface for group work and problem-solving. Although the room has the potential to be

otherwise aligned due to the flexible furnishings, this maneuverability alone does not guarantee a unique arrangement of space and furnishings. As Boys explains, one must determine the spatial conditions needed to facilitate teaching and learning methods and utilize the classroom intentionally (2011, p. 18). Otherwise, the flexible furnishings can become as static as traditional seating – with as little benefit. Such is the case in Hood’s classroom, wherein the technology emphasizes the importance of activity that occurs at the front of the room, which is typically lecture, and thus determines the arrangement of other classroom elements.

Hood’s classroom does, however, retain the potential for the incorporation of technology. Although the only laptop present at the time of observation was Hood’s, which was located on the instructor station at the front of the room, outlets are accessible throughout the room. The numerous outlets along the back and side walls allow for student use of technology without hindering the movement or activity of the class. The large, wheeled tables also provide convenient platforms on which to work, not only with the traditional technologies of paper and pencil, but also laptops, tablets, and smartphones.

Strategies for space 3. The primary obstacle of Hood’s classroom is the front-aligned technology. However, using strategies similar to those suggested for Cunningham’s classroom, students can complete tasks in their groups before returning to the larger group to present findings and offer inquiries. The accessible nature of the power outlets in Hood’s classroom allows students to utilize their own technology in the form of student-owned laptops, which can facilitate student group activities that need not necessarily preference the “front” of the classroom. Therefore, Hood can:

- Ask student groups to each locate an existing business model that exemplifies concepts that have been previously discussed in the course; students will then present their findings to the class
- Ask student groups to locate advertisements with previously-discussed characteristics, which can then be viewed on the front-aligned projector screen as a class, and
- Divide the class into halves (the wheeled nature of the furnishings makes this activity feasible for Hood's class) and ask each half to create a sound business model; the two halves can then debate the merits of each model and determine which adheres most strictly to learned concepts.

The Sardine Can, the Amphitheater and the Spider represent the variety of traditional classrooms available for instructors at ECU. While the designs differ, none are particularly well-suited to the flipped teaching style. There are, however, some renovated spaces available to instructors, which must be requested prior to the beginning of the semester. The next three case studies examine the space and instruction style of professors utilizing renovated classrooms at ECU. Like the traditional classrooms, these spaces were assessed as to their potential to facilitate active learning through an examination of size, classroom furnishings, technology access/placement, and flexibility/mobility.

Case Studies 4-6

Space 4: Dr. R. Carpenter's English Reading, Writing, and Rhetoric Classroom, A.K.A

"Mirrored Horseshoes"

Dr. Carpenter's class meets in an innovative "technology classroom" that has been provided for a small number of English courses in the Wallace building at Eastern Kentucky University. The class began with Carpenter's use of the Authoritative space, involving a review of the material that was covered in the previous class, namely the rhetorical appeals ethos, pathos, and logos. Students were broken into groups instructed to utilize the laptops provided for the classroom to locate examples of each of these appeals. The students then circulated through the room, stopping at each laptop to review the examples provided and receive a brief explanation from the group associated with that station. During this time, Carpenter also circulated, making use of the Interactional space. The class also had access to a collaborative Google document to which they contributed at the end of class to create a repository of examples for the different appeals.

Figure 4.

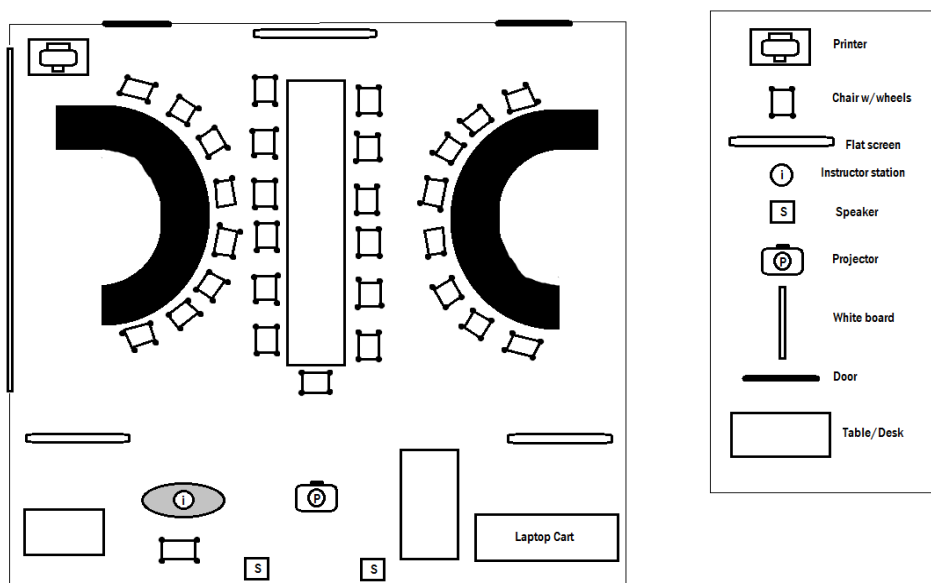


Figure 4 shows Carpenter's large, square classroom, which accommodates roughly 23 students. The classroom has a unique orientation, combining two curved tables with one long, straight table in the middle. The wheeled seating and open spaces between furnishings facilitate group work and mobility during class meetings, which in turn encourages use of the Interactional space. The students also have access to technology via the laptop cart, and the ability to utilize these tools anywhere in the room due to the prevalence of outlets throughout the space. This contributes to the incorporation of multimodal elements in the classroom, and resulted in the students' investment in all parts of the lesson.

Although the classroom arguably has a "front" due to the front-aligned projector and instructor station, there are several components of space design that contribute to de-centering the space. For instance, there is a large whiteboard located along one wall of the room which provides access to this resource to students that they would not have had were the only whiteboard located at the front of the room. Similarly, while there are flat screens at either side of the "front" of the room, there is also one located along the back wall, which helps lessen student focus on the front, or Authoritative space, of the room.

Carpenter indicated that he attempts to make use of the entire room, which also helps to de-center the typical front of the classroom. He indicated that he attempts to write on all of the whiteboards rather than merely those located behind the instructor station, but commented that some spaces are more accessible than others (Carpenter, personal communication, 2014) due to the classroom configuration. This problem of inaccessibility is why, in part, Doorley and Witthoft recommended "install[ing] dry erase surfaces all over the place." In addition, they noted that the availability of these resources "create[s] opportunities for capturing [the] serendipitous sketches and outbreking brainstorm[s]" of working students (2012, p. 190). Even in a renovated

space there are still challenges to the flipped model of instruction, which may be due, in some part, to the relatively new nature of the concept and design. However, the accessibility of technology and the flexible furnishings enhance the flipped classroom experience, particularly when compared to more traditional classroom environments.

Strategies for space 4. The flexible nature of Carpenter's classroom facilitates a number of different flipped strategies. Not only can students work together in groups, but the space also allows for communication among groups, which is beneficial to the creation and implementation of activities that fulfill the purposes of the flipped classroom. Among many other options, Carpenter can:

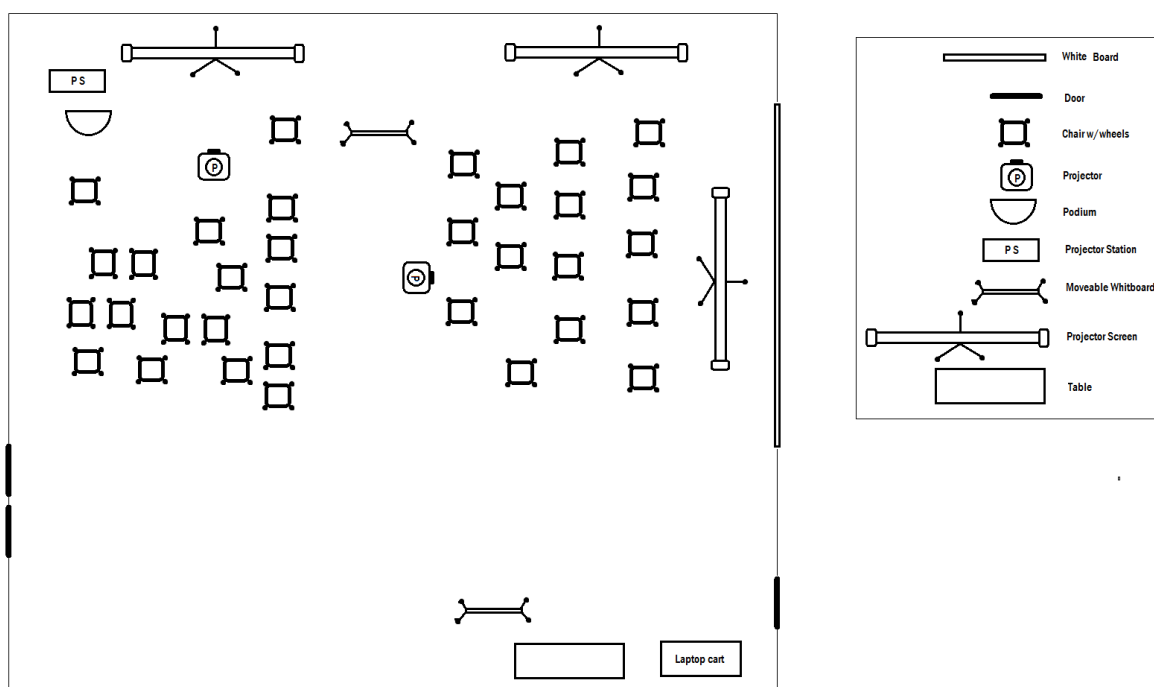
- Ask student groups to each create a diagram of one essential piece of an essay (i.e. introduction, body paragraph, conclusion); student groups can then work together to compile and finalize an essay template that all can use in their next assignment
- Ask each group to create a sample citation and write it on the whiteboard nearest their group; groups can then circulate to examine and correct other groups' examples, and
- Require each group to create an advertisement utilizing several rhetorical strategies; these advertisements can then be displayed on the classroom's flat screens for consideration by the larger group.

Space 5: L. Valley and T. Napier's Texts and Technologies of Creative Thinking Classroom, A.K.A. "The Dust Mote"

Instructors Valley and Napier teach their CRE 101 course: Texts and Technologies of Creative Thinking, in the Noel Studio's Discovery Classroom. The topic of the observed class

was rhetorical analysis and its application in students' daily lives. The majority of the class was spent engaging in paired/group activities, with the instructors primarily utilizing the Interactive space. For instance, Valley and Napier began by asking students to pair up with one another and act out different situational activities that their partner must guess, such as "being very sleepy," and "driving a car." During this time, the instructors circulated and interacted informally with students. Following this activity the class was shown a short video about rhetorical gestures and engaged in a discussion on the clip and the class activities.

Figure 5.



The Dust Mote is a large, square classroom that accommodates roughly 30 students. The chairs all have wheels and are never organized in a particular configuration, giving the impression of dust motes floating through the space. This encourages group work, as students can cluster together into distinct groups that are separate from the body of the class. In addition,

the multiple directions in which chairs are usually arranged “means there are multiple focal points, which eases up the flow of conversation” (Boys, 2011, p. 93). The extreme flexibility of the classroom furnishings also facilitates instructor’s use of the Interactive space, as they can easily navigate the open spaces around groups. This classroom also features a laptop cart, allowing students access to technology during the course period.

The Dust Mote has only a loosely defined “front” of the classroom. There is a projector station along one wall, which is also equipped with a projector screen. However, there is also a second projector that displays content on an adjacent wall of the room, also equipped with a projector screen that can be pulled down over the whiteboard. This provides multiple focal points for students, rather than dictating one area which students must always face. The room’s one affixed whiteboard is also located along a side wall of the room, rather than the front, as it is in most traditional classrooms. In addition to the stationary whiteboard, the room features two moveable whiteboards which also facilitate group work by giving students the ability to access classroom resources regardless of where their group has chosen to work. Like the chairs, these whiteboards are on wheels, which allows for innumerable configurations of the space with ease.

Valley and Napier indicated that the flexibility of the space caused them to feel more confident about assigning the class to do group work. The innovative design of the space and the colorful furnishings made it easier to engage and keep students’ attention than the same activities would in a more traditional setting. However, they lamented that the laptops, while accessible, were time-consuming to turn on and log into. This resonates with Boys’ assessment of a similar space, in which she explained, “The technology...is neither simply good nor bad, rather it was designed with specific intentions which could only partially be fulfilled” (2011, p. 99). While

this aspect of the Dust Mote may still provide some advantages, instructors utilizing this space would be wise to plan for the difficulty of incorporating the outdated equipment.

Strategies for space 5. One of the primary advantages of the Dust Mote is the accessibility of various display surfaces. When flipping their course, Valley and Napier can prioritize the use of these surfaces, as well as collaborative activities, which are facilitated by the flexible nature of the furnishings in the space. Like Carpenter, Valley and Napier have a variety of options for implementing flipped strategies. Among their options are:

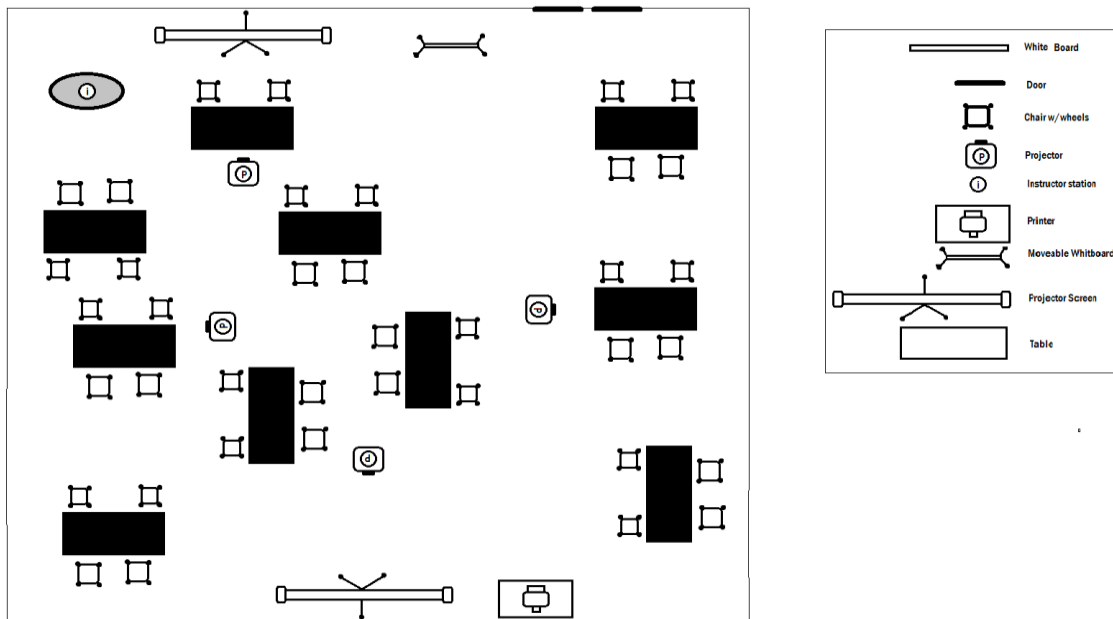
- Writing a different activity on each display surface; groups can then circulate and complete each activity
- Asking student groups to each create a list of creative thinking techniques, which they can generate on the whiteboards that encircle the room; the group can then reconvene for discussion/presentation of these ideas, and
- Writing a different discussion topic on each whiteboard; as students circulate they can add to the list of responses that their classmates have compiled related to each topic.

Space 6: B. Bell's Foundations of Learning Classroom, A.K.A. "The Turtle Colony"

Instructor Bell's orientation course meets in the basement of the Powell building. Her class introduces students to the practical elements of attending university. She began the observed class with a quiz over previously covered material, and then progressed to a discussion of Degree Works (an ECU program for determining the courses needed to obtain a certain degree). Bell began the class in the Authoritative Space, explaining the process of registering for courses, but soon began circulating through the room, utilizing the Supervisory Space. The majority of the class was discussion-based, with students writing and discussion their short- and

long-term goals. The course meeting ended with a discussion of the process of making responsible financial decisions.

Figure 6.



The Turtle Colony is a large, square classroom that accommodates roughly 36 students, although the observed class filled only half of the available seats. The rectangular tables can seat four students, a convenient arrangement for group work. The seats have wheels for easy mobility, although the tables themselves are stationary. The immovability of the tables and the narrow aisles between them detract from the flexibility of the classroom, but there are still many functional features of this space. Each table features four laptops, each with an accessible outlet, so that the students are constantly in proximity to technological resources.

Although the Turtle Colony features a table and an instructor station at the “front” of the room, low- and high-tech elements serve to destabilize this orientation. For instance, there are four projectors located in the center of the ceiling, each facing a different wall of the space. In addition, there is a moveable whiteboard that could provide a low-tech option for students to use

for the development of ideas as a group. This space therefore offers more accessible options for students to use in activities designed to promote active learning, or the implementation of the higher levels of Bloom's Revised Taxonomy. Unlike the Dust Mote, however, these elements are not easily rearranged, which limits the potential of the space and the learners within it.

Bell attested that she has experienced limitations of the space while teaching. She indicated that while the orientation of the space was amenable to group work, the dispersal of students within the space made facilitating discussions difficult. This may be resultant of the relatively few students in her course compared to the amount that could be easily accommodated in the space or may be due to the fact that "once people have had the experience of working in small groups, they find it very uncomfortable to imagine going back to the larger...settings" (Alexander et al., 1977, p. 703). That Bell's class consisted of exclusively freshmen students also precluded a greater incorporation of technology, as the students were not adept enough at manipulating multimodal elements. However, the space, while not ideal, still offers more opportunities for adaptation and manipulation, as well as access to technology, than traditional classrooms, making it therefore a preferable setting for the flipped teaching instruction method.

Strategies for space 6. As noted above, Bell's classroom facilitates communication within and among groups, while problematizing large group discussion. Therefore, the most effective flipped strategies will involve group work with the circulation of an instructor to monitor and coach individual groups of students. Bell could easily:

- Employ a jigsaw strategy whereby each group of students masters one concept; the groups are then reformed and each student must teach their new group the concept she/he has learned

- Ask each student group to master one aspect of a practical task (such as scheduling for classes); each group must then teach one other group to complete their stage of the task, and
- Ask each group to create a list of helpful advice they would offer to a new student entering college; groups can then collaborate to compile a class “advice list.”

Conclusions

The Mirrored-Horseshoes, the Dust Mote and the Turtle Colony represent opportunities for instructors to engage with content in spaces designed for flipped instruction methods. Exposing interested instructors to innovative classroom environments is essential, as instructors "can be very successful with active learning pedagogy in a studio setting even when they had not been successful in a non-studio setting" (Taylor, 2008, p. 227). Rather than succumbing to the frustrations of attempting to adapt the flipped teaching methods to the traditional classroom, instructors should be offered the opportunity to experiment with flipped teaching methods in an active learning space.

The experiences of the few instructors who have had the benefit of these new classrooms indicate the need for a circulation of instructors through these rooms. Not only do the physical aspects of these rooms facilitate intentional incorporation of flipped teaching methods, but they also have a long-term, positive impact on instructors' use of active learning in the classroom, even when they return to teaching in a traditional classroom setting. Taylor (2008) indicates that teachers who have the opportunity to teach in an enhanced learning space can "replicate some of the positive effects in traditional spaces, thus allowing institutions to maximize effects by rotating faculty and classes through studio environments" (p. 227). Although instructors may not

be able to teach full-time in active learning spaces, even minimal exposure to these resources is beneficial.

The instructors observed in the active learning classrooms corroborate this assertion. Dr. Carpenter, for example, related that he transfers the strategies that he uses in the Mirrored Horseshoes classroom to the classes that he teaches in traditional classrooms. Although the traditional spaces do not provide accessible technology like the laptops in the computer classroom, he has successfully implemented many of the flipped strategies originally attempted in the renovated classroom in low-tech ways (Dr. Russell Carpenter, personal communication, 10 September 2014). Instructors Valley and Napier also indicated that the "variance of activities" that they have developed while teaching in the Dust Mote classroom could transfer to courses held in traditional classroom settings (Leslie Valley and Trenia Napier, personal communication, 24 September 2014).

Instructor Brittany Bell, however, felt that the group work she has done in the Turtle Colony would not be easily applicable to courses taught in traditional classrooms. She also indicated that her orientation course did not possess the potential to take full advantage of the resources of the enhanced classroom. Currently, the Turtle Colony classroom is reserved exclusively for GSD courses, and Bell remarked that other courses might benefit more from the use of that space.

The six spaces reviewed here represent the variety of classroom orientations available for instructors at Eastern Kentucky University. The Sardine Can, the Amphitheater, and the Spider preclude instructors' full adaptation to the flipped classroom teaching methods. While those who teach in these spaces can incorporate certain aspects of active learning, they are unable to fully realize the potential of their flipped instruction method, and all retain the focus on the front of the

classroom, encouraging instructor use of Authoritative Space. The renovated classrooms, however, do offer advantages to those interested in the flipped instruction method. The Mirrored Horseshoes classroom is currently the only space available by request, as only Noel Studio staff can utilize the Dust Mote, and the Turtle Colony is reserved exclusively for GSD courses. In order to enhance the teaching experiences of instructors at ECU, additional spaces should be available per request of instructors, so that interested teachers can develop flipped methods through exposure to these spaces on a rotating schedule.

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