

Mapping the Hot Spots: A Zoning Approach to Space Analysis and Design

Adam Bunnell
Eastern Kentucky University
Emily Hensley
Eastern Kentucky University
ReBecca Williams
Eastern Kentucky University

Russell Carpenter
Eastern Kentucky University
Kelsey Strong
Eastern Kentucky University
Rachel Winter
Eastern Kentucky University

This article examines a preliminary approach to space design developed and implemented in Eastern Kentucky University's Noel Studio for Academic Creativity. The approach discussed here is entitled "hot spots," which has allowed the research team to observe trends in space usage and composing activities among students. This approach has yielded valuable insights into the design of flexible learning spaces that provide a point of reflection for the future.

Introduction

Space design is an important topic for higher education institutions across the United States and internationally. Recently, a number of articles, chapters, and collections have examined the design of learning spaces from many perspectives (Carpenter, 2013; Doorley & Witthoft, 2012; Martin 2010). Carpenter highlights the collaborative nature of space planning, design, and technology, while Doorley and Witthoft propose flexible approaches that preference low-tech options and encourage participants to shape their own environments for learning. Similarly, Martin encourages space designers and researchers to prioritize creativity in their learning spaces, as providing a creative space can increase student success. Space thus plays an important role in the learning process, as the physical

environment either promotes or inhibits learning (Oblinger, 2006).

Bemer, Moeller, & Ball (2009) suggest that the mobility of the space that they studied might be incorporated into the design of future active-learning spaces. This mobility is an aspect of the space that promotes learning but also one that makes space design and usage challenging to examine. Spaces like the Noel Studio incorporate mobility and flexibility into their design. Within such a flexible learning environment, however, many different activities occur on any particular day. The space is not limited to one teaching or learning practice, and students construct their learning environment. The mobility of such a space promotes a range of activities, making it difficult to determine what learning looks like and where it happens. Additional challenges, and opportunities for further examination, arise when we consider that robust learning happens when spaces are provisional and always in a state of flux (Learning Spaces Collaboratory).

While space design in higher education environments is not necessarily a new research topic, the methodologies and approaches employed to examine these spaces need further and constant development. Although empirical methods serve programs and campus spaces well and provide data that help to shape the design or redesign of future academic spaces, such as Lee and Schottenfel's recent study of library spaces (2014), we argue that provisional methods--those that are in development and are experimental--can play a significant role in the approaches that academic leaders from a variety of disciplines play as they develop and solidify future methodologies. With this point in mind, we examine and reflect on the "hot spots" research project used to assess the Noel Studio space, a 10,000 square foot, active-learning environment in the heart of ECU's historic Crabbe Library.

Adam Bunnell is a Graduate Assistant, Eastern Kentucky University.

Emily Hensley is a Graduate Assistant, Eastern Kentucky University.

ReBecca Williams is an Adjunct Professor, Eastern Kentucky University.

Russell Carpenter is Executive Director of the Noel Studio, Eastern Kentucky University.

Kelsey Strong is a Graduate Assistant, Eastern Kentucky University.

Rachel Winter is an Adjunct Professor, Eastern Kentucky University.

Spatial Context

The traditional learning environment of desks in rows--all facing the front of the classroom--is reflective of the mindset in which this configuration was first conceived following the Industrial Revolution (Walls, Schopiary, & DeVoss, 2009). Unfortunately, the environment predisposes students to expect an assembly-line process of disseminating information from the front of the classroom (Walls, Schopiary, & DeVoss, 2009). This transmission method of learning has proven less effective than that which involves students actively engaging with their peers (Hadgraft & Dane, 2014), and therefore physical characteristics of educational environments must be evaluated. Lave and Wenger assert that learning is not exclusively the domain of the classroom but also occurs through students' sharing of ideas and information with those they encounter outside of their mandated course meetings (as cited in Boys, 2011, p. 39). Moreover, Hunley and Schaller (2006) acknowledge that assessing learning spaces must take into account that teaching and learning are no longer confined to the classroom. The authors also explain that learning time can be scheduled and selected by the learner. An important aspect of the hot spots method presented here also focuses on, as Hunley and Schaller suggest, the use of learning spaces. Therefore, an evaluation is necessary of not merely those spaces intended for formal scholarship, like classrooms, but locations of informal learning as well. Many institutions have begun replacing traditional learning environments with new, innovative, "studios." Studio design prioritizes flexible, wheeled furnishings, a centralized location for the instructor that shifts emphasis from the "front" of the room, and easily accessible technology. While these elements facilitate a teaching style that focuses on active learning, the space itself, even without the presence of an instructor, impacts students' learning potentials (Taylor, 2009).

In a survey of 25 astronomy students, Taylor (2009) found that most students contended that the actual space of the studio enabled them to learn more from one another through collaborative activities. Many also stated that the "more relaxed environment" facilitated the contribution of ideas to the group, as well as each individual's capacity for retaining and implementing information (p. 224). In addition, Bemer, Moeller, and Ball (2009) find that allowing students control of the "technological spaces" encourages collaborative learning (p. 152), which suggests that not only must the furnishings be flexible and adaptable but the technological tools as well. Studio spaces prioritize social activity, which plays a major role in students' interactions and learning abilities. The social component of learning therefore constitutes an important aspect of space design, as these environments should allow students to be "happy,

productive, creative, and social" (Hadfield, Kinkead, Peterson, Ray, & Preston, 2003, p. 170) to best foster learning.

Merely the ability to physically move around a space--in contrast to a sedentary seated position at a desk--changes students' learning processes. Doorley and Witthoft (2012) relate their students' study habits in a nontraditional, less controlled environment. "They lie on the floor," the two elaborate, "perch on the backs of couches, bounce on their toes...and do chin-ups on exposed beams" (p. 23). The more flexible the space, the more comfortable students feel involving their mind and body in the learning process. Students' comfort levels, interests, and attitudes were much improved when in the studio classroom versus a traditional setting. This may result from the students' unfamiliarity with the environment, as learning theory proposes that "learners confronting the unfamiliar tend to question assumptions and develop new questions" (Taylor, 2009, p. 219). Meyer and Land likewise contend that student transition through a "potentially disorienting" space results in an enhanced potential for retentive learning (as cited in Boys, 2011, p. 42). On the other hand, if a space is *too* unusual, students may experience discomfort and uncertainty, which undermines their learning experience (Boys, p. 46). Only through careful examination of various stylistic factors can designers conceptualize an environment that best facilitates students' learning abilities.

Not only must careful analysis occur before and during the design process but continuously throughout the life of the space. For instance, the Noel Studio was the result of years of planning and collaborative efforts from faculty and administrators across campus (see Gardner, Napier, & Carpenter, 2013). It offers a creative, collaborative environment for thousands of student visitors each semester as they hone communication projects and practices (Carpenter & Apostel, 2012). This learning space was designed intentionally with a great deal of planning and thought. As the space opened and began offering services, however, administrators began to ask whether the space was functioning as originally anticipated. They began to inquire about:

- The communication and composing activities students were performing in the space
- Where students were performing what activity
- How often students were performing such activities
- To what extent students were intentional about the spaces that they chose

Attempts to study a flexible, active-learning space over time must contend with multiple difficulties, however. One such complication is that collaborative and creative learning cannot be confined to a specific area; instead, participants need to be able to move freely about the space, through different convergent and divergent phases, incorporating

collaborators, visual artifacts, and ideas throughout. Boys (2011) describes this circulation through the space as an “endlessly dynamic dance,” which forms, disperses, and reforms student groups throughout the environment (p. 60). Furthermore, the spaces being studied change, along with the students using them, and fluctuations in student traffic through the space can reveal larger trends that inform the decision-making process for spaces within a variety of institutional contexts. In addition to challenges presented over time, Felix and Brown (2011) identify the difficulties associated with developing an assessment for learning spaces as they explain their rating system approach. That is, Felix and Brown explain that learning spaces change quickly, especially across institutions and contexts. Further, the management and administration of learning spaces, they note, can present challenges, as learning spaces can underperform or work in haphazard ways.

Incorporating the use of modern methods of coordinate and photographic mapping, Harrop and Turpin (2013) examined students’ preferences for and behaviors in informal learning spaces to determine when, how, and why students use these environments. In the coordinate mapping method, students were instructed to indicate on maps what space they had visited or planned to visit that day and why (Harrop & Turpin, 2013). In the photographic mapping method, students took pictures of their favorite space and gave a rationale or suggested what they would like to change about the space (Harrop & Turpin, 2013). Observations and interviews were also conducted to gather measurements of students’ preferences and behaviors in informal learning spaces. From the data, Harrop and Turpin (2013) developed color-coded maps and tables that illustrated students’ spatial preferences at the area, floor, and building levels.

In order to assess the Noel Studio, a zoning approach to space design was developed through the multi-year “hot spots” research project, which involved a loosely scaffolded set of methods that, independently and collectively, inform understandings of the space and the potential for future decision making about adaptations and the training of those who work in the space. In addition, this process has helped the staff develop more informed talking points about how the space functions. In the pages that follow, the authors explore the hot spots approach, which provides a generative, flexible heuristic for understanding and analyzing spaces that change on a regular basis.

A Case for Examining Hot Spots

The hot spots approach is centered on the examination of learning spaces through zones, building on Inman (2010), by focusing on meaningful trends in space, activity, and technology use. A zoning approach, in this case, allows for the larger, multi-room space to be broken down into

complementary spaces and then again by areas, or zones, where students gather to compose and design projects. The zones--Greenhouse to Invention Space--allow researchers to attribute broad spatial contexts to these areas while providing enough flexibility for researchers to log a variety of composing or communication activities within each zone.

This article examines a preliminary approach to space design developed and implemented in EKU’s Noel Studio. The “hot spots” approach involved several developing research methods used to establish a more robust understanding of the space and its activities, including space observations and surveys (see Table 1).

Table 1. Hot Spots Approach

Semester	Activity	Description
Semester One	Space observations	Hourly walking rounds of each space noting the activities of students
Semester Two	Space observations part two	Hourly walking rounds of each space noting the activities of students
Semester Three	Surveys	Administered to students after consultations

Table 2. Spatial Zones

	Space	Description
A	Greenhouse	A large, open space at the center of the facility and freely available without reservation
B	Media Wall	A wall of touch-screen monitors in a high-traffic area of the space connected to the Greenhouse
C	Invention Space	A space connected to the Greenhouse with wall-to-wall dry-erase boards, magnetic tiles, and “manipulatives,” low-tech resources that facilitate learning in creative ways

These methods, although provisional, allow the observation of spatial trends in usage and composing activities among students. The “hot spots” title suggests that we are interested in tracking patterns of space usage among students or spaces where continued or consistent activities occur over time. That is, this method highlights communication activities that occur regularly. Furthermore, these activities have also prompted the research team to separate the large, complex space into “zones” as explained in the breakdown offered in Table 2.

Although provisional, this approach has yielded valuable insights into the design of flexible learning spaces that provide a point of reflection for the future. To better understand the activities students perform in a flexible environment, we will highlight findings and examples from a pilot study in the Noel Studio space.

Observations from the Hot Spots Project

The hot spots approach, although provisional, has yielded a number of insights of interest to academic space designers and planners. Mapping hot spots highlights trends in spatial activities or where students performed activities, what technology they used if any, and whether they performed activities independently or collaboratively. Developing an approach like the one offered here is an important step toward considering learning space design questions such as:

- Does the space work?
- How does space influence composing activity?
- How do we know that space matters?

In this case, we offer four broad trends that were highlighted as part of this project. Analyzing and understanding these trends will allow for further development and enhancement of this central learning space on campus.

First, students tend to consciously select the space in which they choose to work. The project revealed that 75 percent of students intentionally chose the space they used. Additionally, those who purposefully chose a space had higher productivity scores and greater experience scores than those who did not intentionally choose a space. There was also a significant relationship between intentionally choosing a space and technology, as students who were purposeful about choosing a space tended to utilize technology. We contend that this observation suggests that students are thoughtful when selecting the spaces where they choose to think, create, and communicate. If students are choosing spaces deliberately, this data can also yield further developments and spatial decisions when redesigning or re-envisioning zones where activities occur.

Second, students tend to cluster around large, touch-screen monitors on the periphery of the space (the Media Wall). The majority of technology used by students in the

Noel Studio was group-oriented, as 42 percent of students used the desktop computers and 37 percent of students used the large flat-screen monitors. The choice of large-screen, group-oriented technology highlights the value of kinesthetic and visual communication-design spaces. Furthermore, visualization activities had a significant impact on students’ composition and productivity, as those who came to the Noel Studio for this purpose had higher composing and productivity scores than those who did not. Moreover, these “visually inscribable” (Carpenter, 2014) spaces promote moving learning off of the page and into the social and kinesthetic space of large, highly public monitors. The space is designed in such a way that it promotes visualization activities from invention stages to final polishing, creating a public gallery space for communication design and related activities.

Third, students tend to design communication as individuals and in pairs in larger, open, flexible spaces. In particular, 48 percent of students used the Greenhouse space when they visited the Noel Studio, and 56 percent of students entered the Noel Studio individually. This suggests that more students who were by themselves used the Greenhouse space than expected. Noting trends in collaborative activities will allow us to shape zones for these activities in future iterations of learning spaces.

Finally, students tend to invent in small groups of two to four around low-tech dry-erase boards in the Invention Space. Specifically, 38 percent of students engaged in brainstorming activities while in the Noel Studio, and 26 percent of students came to the Noel Studio in small groups (two to four students). Furthermore, there was a significant relationship between groups of students coming and the technology they used, as fewer small groups were using technology than expected. The relationships between the space and technology employed might suggest the design of future zones and priorities for the incorporation of technologically sophisticated spaces and low-tech spaces, including how these two intersect and complement one another.

The trends examined here will help those working in the Noel Studio better articulate the relationship between space and activity. In addition, these trends will assist administrators (and students working in the space) in making important decisions about not only future iterations of zone designs within the Noel Studio but also how the university community teaches and learns within this flexible environment. While much research that examines the intersection of space and pedagogy remains to be done, these observations provide an excellent basis from which to design and develop pedagogical models that facilitate effective composing practices among students. Furthermore, understanding spatial trends through the hot spots project

MAPPING THE HOT SPOTS

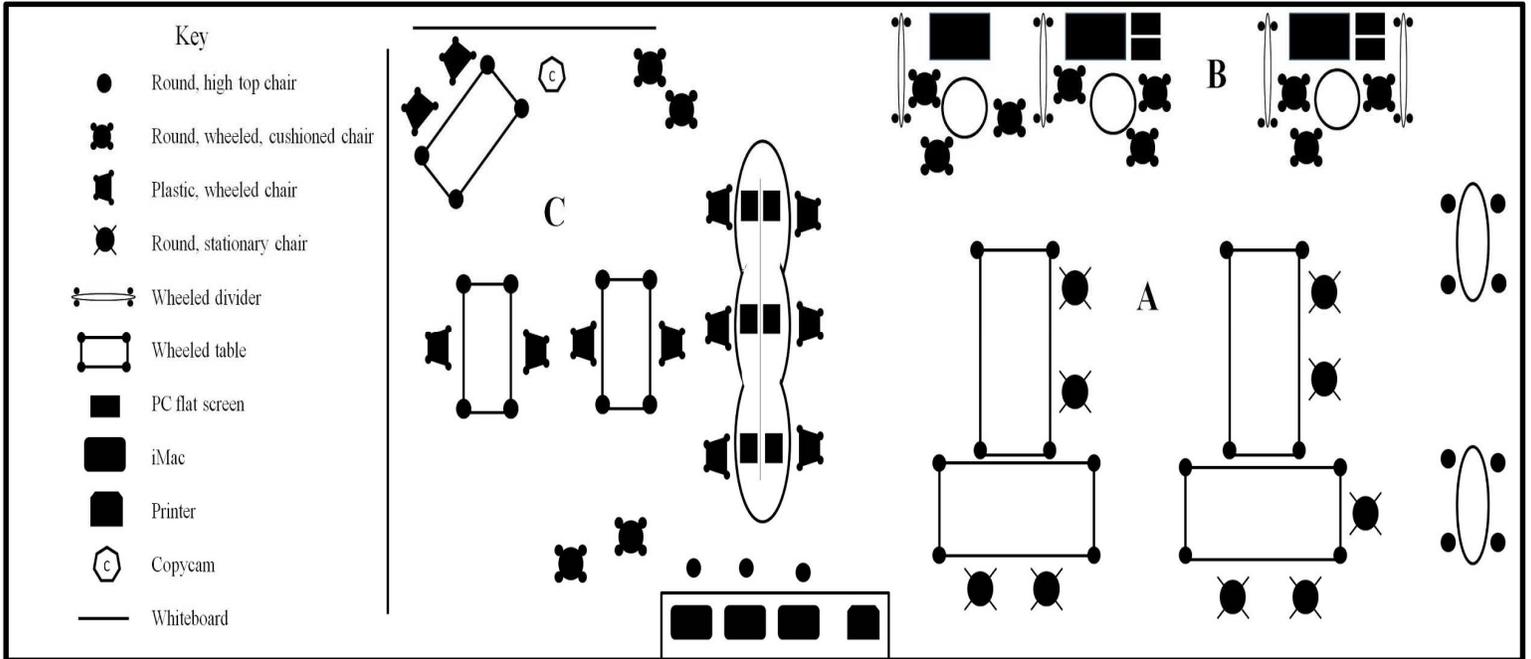


Figure 1. Diagram of the space indicating zones with corresponding key

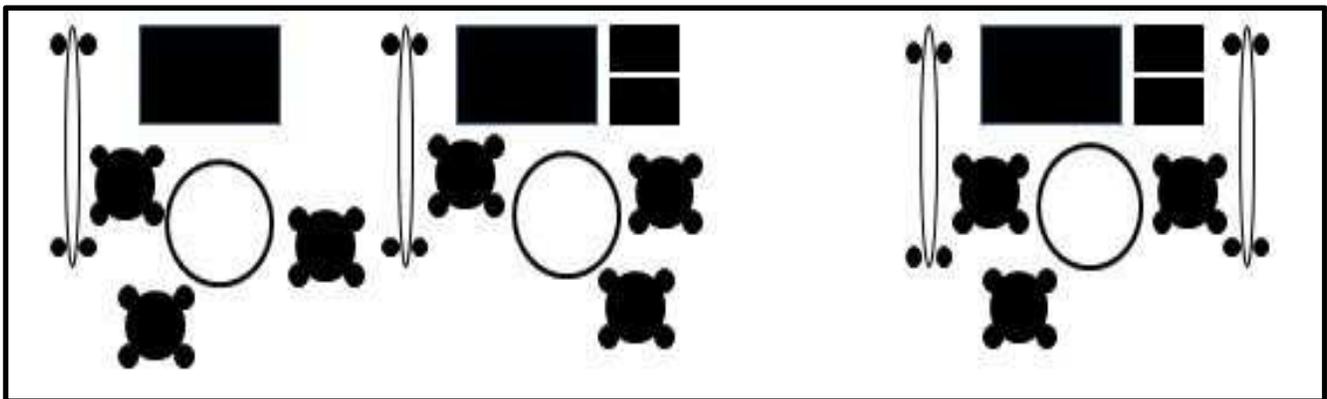


Figure 2. Diagram of the media wall

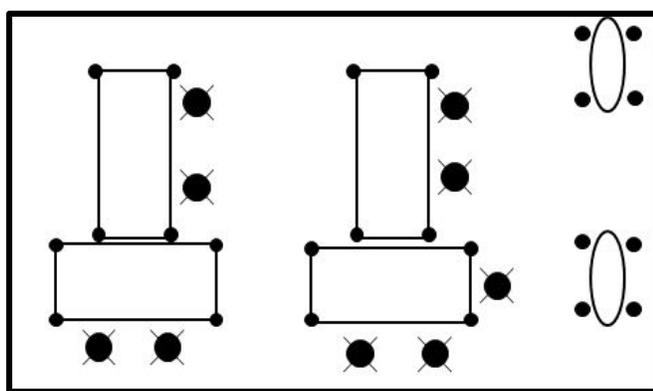


Figure 3. Diagram of the large, open space

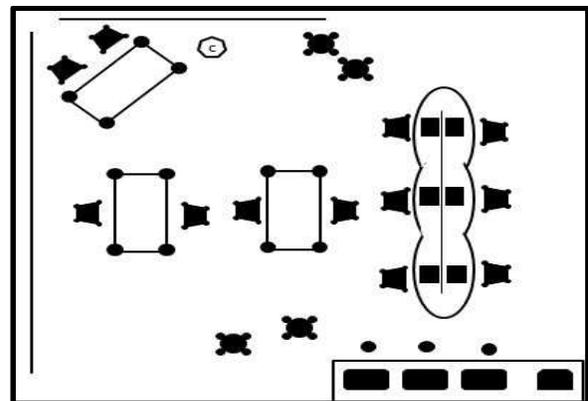


Figure 4. Diagram of the flexible, writable space

also provides an important method for examining the learning that happens when spaces are designed as mobile. The environment examined in this study changes often, and the hot spots method allows researchers to capture developing trends while comparing and contrasting activities by zone.

Implications

Why do these trends matter in the design of academic learning spaces? These trends illustrate the importance of allowing students' use of space, rather than staff assumptions and intentions for space, to inform design decisions. As observed in the Noel Studio, a majority of students intentionally chose to engage in spaces, which suggests these spaces offer unique contributions to students' learning. Moreover, student activities within learning spaces do not always align with staff intentions. For example, researchers in the Noel Studio observed a significant number of students using the large, open space of the Greenhouse for individual work, which was unexpected. The trends observed in the Noel Studio allow staff to develop a better understanding of how and for what purpose students choose the zones where they develop communication projects. With a better understanding of student engagement of space, we can more adeptly facilitate student learning.

Additionally, these trends demonstrate the value of examining space through a zoning approach. Large numbers of students visit the Noel Studio on a daily basis, as it provides space for engaging in activities at all stages of the learning process. Examining the Noel Studio as a whole would have hindered researchers' ability to connect students' engagement in activities to features of the Noel Studio's design. Through the hot spots approach, researchers in the Noel Studio were able to examine spaces at a deeper, more complex level. By dividing the Noel Studio space into zones, researchers were able to detect the specific activities occurring in each zone and to identify how those activities related to the features of the area. Thus, the hot spots approach permits researchers to not only study a space more comprehensively, but to also identify how features of a zone contribute to the learning process.

Furthermore, the hot spots approach enables researchers to examine challenging, flexible environments, as this method can be readily adapted for a variety of contexts and institutions. The Noel Studio, with its movable furniture on wheels, multiple areas that change on a regular basis, and focus on creative composing and communication activities, provides a uniquely challenging environment to study. By dividing the Noel Studio into zones, the hot spots approach allowed researchers to move past the challenges of studying a large, flexible space and to apply a method uniformly across all zones within the Noel Studio. Therefore, the hot

spots method has potential for the examination of other adaptable academic spaces.

In addition to the benefits discussed here, the hot spots approach also serves as a method for examining students' movement through spaces. Though the hot spots approach currently presents important implications in the field of space research and design, this method can be developed to assist researchers in understanding how spaces relate to one another and how these relations engage students. Thus, tracking students' movement through zones and understanding how space relations engage students are meaningful directions for the future of the hot spots approach and the Noel Studio.

Conclusion

While learning space design and assessment is an important topic, the authors focus attention on a strategy that not only allows for the examination of learning spaces but also provides a generative method that supports a constructive and collaborative approach among space designers. In addition, the hot spots approach discussed here presents a viable option for those planners attempting to study or investigate the current trends in their learning spaces, including whether the space performs as initially planned or intended. Thus, we argue that the hot spots approach reveals spatial patterns and trends, which can also open up conversations about future developments and possibilities. While many methods lean toward the prescriptive or descriptive, a hot spots approach adapts readily across institutional platforms and, in some cases, serves as a heuristic for space design or redesign.

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