

Relationships Among Spaces and People: Design Features of the Physical Learning Environment for the 21st Century

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While touring the School of Environmental Studies, a secondary school in Apple Valley, Minnesota in May of 1999, I observed a new way of organizing learning. I listened to and watched students involved in project-based learning, and who confidently demonstrated the knowledge and skills they had gained; and I marveled at how respectful the students were of their physical learning environment. The school is located in the country and is adjacent to the Minnesota Zoo. The learners were constantly going in and out of the building engaging in learning activities in the woods and ponds located on the building site. After four years, there were no stains on the carpets or other signs of wear on the facility, and the learners took great pride in the appearance and use of their school. That was the birth of my research study on the relationship of learning and the physical environment in which learning takes place. The study consisted of three phases of re-

search involving educators and architects as participants and resulted in the identification of desired design features that support and enhance collaborative, project-based learning at the community college level.

■ Does the Physical Learning Environment Impact Learning?

Wanting to take what I had seen at the School of Environmental Studies and apply it at the community college level, I arranged for an internship with an architecture firm that primarily designs educational facilities. The internship, as part of the first phase of the research, afforded the opportunity to be involved in developing a community college master facilities plan, pre-designing a new facility, and working with another architecture firm to be involved in designing a renovation of a classroom building at a community college.

Phase two of the research included attending the National

Council of Occupational Education conference and conducting interviews with two of the presenters regarding project-based learning at their college. Additionally, I participated in the Innovative Alternatives in Learning Environments International Conference in Amsterdam, which was organized by the American Institute of Architects Committee on Architecture for Education and sponsored by the National Clearinghouse for Education Facilities. An internationally renowned Dutch architect, Herman Hertzberger, opened the conference with the following statement,

"...the 'old' thinking about learning is that learners are pumped full of knowledge and that the truth comes from blackboards. The 'new' thinking is that learning is not just about acquiring knowledge and skills, but also gaining an understanding about attitudes, behavior, and communication by learning in an environment similar to living and working environments."

Reino Tapaninen, Chief Architect of the National Board of Education in Finland, introduced a case study at the conference by showing an illustration of a line of "identical blockheads" emerging in a straight row from a "block" school building. His illustration showed factory models of educational facilities and teaching to prepare students for industrial era jobs that required uniformity. What should the learning and teaching model look like for the knowledge era of the 21st century?

■ **Model for Learning and Teaching — Past or Future?**

According to Walsh (1999), five broad contemporary challenges facing today's businesses, communities, and individuals and affecting the nature of learning and teaching include the following:

- ◆ globalization, which was created by the speed with which ideas, people, capital, and cultures move with the aid of technology that erases space and borders;
- ◆ changing nature of work from an industrial era through the technology era to the current knowledge era requiring new and rapidly changing desired skills and competencies;
- ◆ changing demographics creating diverse and multi-cultural living and working environments;
- ◆ changing societal norms due to fast-paced, fragmented, and changed structures challenging traditional values and truth claims; and
- ◆ accelerating rate of change requiring the ability to learn new things, use initiative, and take charge of one's own learning.

The changing nature of work and society indicates a need for different learning and teaching processes. Skolnikoff stated in 1994 that educational institutions need to provide programs in which learners learn to think and become participants in the larger world in addition to acquiring new knowledge and skills. Learning and practicing new skills require different learning processes,

from the “more traditional classroom-based, discipline-focused, learning-by-listening approaches” to “just-in-time, life- and work-focused, and learning-while-doing” active learning processes that are linked to everyday situations (Dede, 1993, p. 3).

I conducted a literature review of active learning processes to determine what learning processes align with preparing community college learners with content and skills necessary for the rapidly changing work, family, personal and community roles and responsibilities of the 21st century. Based on the review, collaborative, project-based learning most closely aligns with developing content knowledge and skills needed for preparing today's learners. According to Bruffee (1995) collaborative learning, which is team-based, supports learning content as well as critical thinking, problem solving, teamwork, negotiating, reaching consensus, social and academic development, and creating a sense of community. Project-based learning brings relevance and meaning to the learning experience, builds relationships, uses communication and higher order thinking skills, provides use of technology, promotes creativity, links new learning to past experiences, incorporates authentic self and outside reflection and assessment, and instills lifelong learning patterns (Bruner, 1990; Dewey, 1939; Kraft, 1999; Rogers, 1969; Wankat & Oreovicz, 2000). Based on this information, what should the physical learning environment look like to support and enhance collaborative, project-based learning?

■ **Model for Physical Learning Environments — Past or Future?**

In 1995, Reeve and Smith stated that colleges that thrive and prosper in the 21st century will be those that are able to anticipate change, redefine themselves, and align their facilities to support the institution's mission and academic plan.

During the late 1960's and early 1970's when community colleges were being built at the rate of one new college per week (American Institute of Architects, 1999; O'Banion, 1997) funding for capital construction for community colleges facilities was readily available. Now, community college presidents, boards of trustees, and legislators across the country are faced with the dilemma of having aging facilities that have reached the end of their useful or safe life spans, and are needing to renovate or replace some of the buildings at a time of limited resources. According to Brubaker (1998), many of the facilities that were built during the period of rapid explosion of community colleges across America were built with concrete load bearing interior walls and exterior walls with few windows. These facilities limit the sense of community among learners, reduce the ability for learner-to-learner and learner-to-faculty interaction, and inhibit the ability to create a variety of learning environments that support active learning processes (Lindblad, 1995).

According to Strange and Banning (2001), physical structures and designs of settings either encourage or discourage participants from engag-

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ing in desired learning activities or taking full advantage of the possibilities of the learning space. A classroom with a teaching podium placed in front of rows of desks indicate a more formal, teacher directed learning process may take place. A physical learning environment with flexible furniture that supports individuals, small and large groups, and includes access to technology and other resources may indicate a more learner-directed learning process.

■ What Were the Findings from the Study?

The findings from the three phases of the study were rich and extensive. I have limited the findings presented in this article to ones that create a sense of the overall outcome. One aspect of designing physical learning environments that emerged during phase two of the research is the added value of recognizing that learning spills beyond the boundaries of the formal classroom. A few of the quotes from participants of the Innovative Alternatives in Learning Environments Conferences that brought this thinking forward are,

“Success not only happens in labs or classrooms, but also on the ‘edges’ where the interaction takes place. These can be lounges, simple benches, marker board areas, study areas, etc. Breakout space is needed adjacent to the rooms for smaller groups to work. This needs to be programmable space, as without it, the facility will lack the energy

and soul it will require to be successful. The vitality of programs depends on the support the [physical] environment gives to interaction among and between the students, faculty, administration, and community.”

“In other words, find ways that the non-traditional, non-classroom areas can support the learning process. In our own work environments, the most important discussions do not take place at our desks, but in the lunchroom, library, stairs, or lobby. We treat the schools the same way. Wherever possible, we provide opportunities for students to sit in hallways and lobbies with access to daylight and technology (high tech data/voice/video and low tech whiteboards).”

Phase one of the study provided a base of understanding of how physical learning environments are designed and the thinking that occurs during those processes. Being involved in the two conferences as part of phase two further developed the understanding gained from phase one. Wanting to specifically focus the research on the desired design features that support and enhance collaborative, project-based learning at the community college level, I conducted a two-day design studio as phase three of the study. The purpose of the studio was to ask the participants to design physical learning environments that supported and enhanced the aforementioned learning process at the desire level of education. Participants in the third phase were architects, commu-

nity college educators [faculty, a student, and administrators] and a director of a large, metropolitan science and industry museum. I held the studio in a former elementary school that has since been developed into a hotel and conference facility that also retained community use facilities such as the former gymnasium. I formed working teams, each of whom developed designs during the studio.

One team took the facility in which the studio was held and redesigned it as a neighborhood community college, named the Learning Village. The design and functionality of the building was kept in context of the community and strongly reflected the community’s needs. Some of the team’s statements included:

“...we felt it was important to stay with the history of the building and the neighborhood. It is important to retain the spirit of the building because it belongs to the community. The community area will have open access. We wanted to keep the building in context of the community... to reach out like a pinwheel to create a strong link to the community, to create extensions on the building, and to create more visibility and access to the neighborhood.”

The team took the traditional school design of a single corridor with classrooms on each side, eliminated the corridors, and created what they called learning process studios in which subject content is integrated and where the learning process is visible to those inside and outside the building. One partici-

pant asked, “Why do we keep learning hidden behind walls and doors?”

“...the studio concept increases accessibility of student areas and integrates them with public space... the studio is a showcase that can jazz up the events of things that are going on and not just the finished products because it is the process of [learning] that counts...”

The second design was described by the team as being focused on bringing the community in and out of the learning process in a collaborative way through the design of a “mainstreet” that provides freedom of movement and integration of people, processes, and products and access to all spaces. The thinking behind the design is to support collaborative, project-based learning by having adjacent spaces that provide for a coherent and cohesive learning process. An example of adjacent space is locating fabrication labs, which are sometimes considered as “messy and dirty” spaces and “clean technology” labs next to one another or in the same area designs as a laboratory suite. This adjacency assists learners with moving seamlessly from the design process to the fabrication process, test the results, and if need be, go back to the original design and determine needed changes and retest. The team advocated for learning spaces that adapted to varying group sizes ranging from small teams to larger group sizes, flexible furnishings, and could easily transition from being occupied by a team for a period of time and easily adapt to a new group and new learning activities. Another feature included in their design is what the team described as “caves” or spaces allowing individuals a

place for quiet work and reflection. The caves were interspersed throughout buildings and across the campus. One team member described aspects of the design as,

“A series of spaces for integrated, collaborative learning... I need a collaboration space for the ‘birth of concepts’. This birth space needs natural light, moveable surfaces, space for small groups ranging in size from three to fifteen, white boards and tack walls to display concepts, access to technology, access to food and beverages, and the ability to move the learning processes and products from one space to another.”

The third design was presented as a point-of-view story using words and illustrations to focus on principles for designing educational facilities. Two of the basic principles of the design process were:

- ◆ building in layers beginning with the core elements and then turning to community partners for providing additional elements
- ◆ allowing the learners or users of the space to determine what is needed

A quote from the participant supports these premises by saying,

“The armature [basic framework] creates a richness or soul of the building and a creative transformation of the building. The richness comes from what the learner does with the environment.

We should allow them to do that more by collecting the insights, desires, and intents of the learners.”

The participant cautioned there is a tendency toward over-designing physical learning environments, which ultimately limits adaptability for new uses.

The third design also focused on encouraging and supporting relationships through the design of sustainable communities where places to learn, live, work, and play are within close proximity of one another.

■ What are the Desired Design Features of the Physical Learning Environment?

What appeared to make the physical learning environment unique for collaborative, project-based learning is the need to create a system of relationships among people and learning spaces. Relationships are established through feelings of connectedness and familiarity. Building and maintaining relationships (Hendrick & Hendrick, 2000) requires skills in interpersonal communication and problem solving that results from sharing tasks, enhancing assurance, and creating social networks. A participant in the study stressed the importance of creating this system of relationships, particularly at community colleges, when saying, “...for community college students, it is important to create connections and linkages. It is easy to lose the magic of belonging.” Design of the physical learning environment can enhance relationships by providing space and structural connections or hinder relationships by being

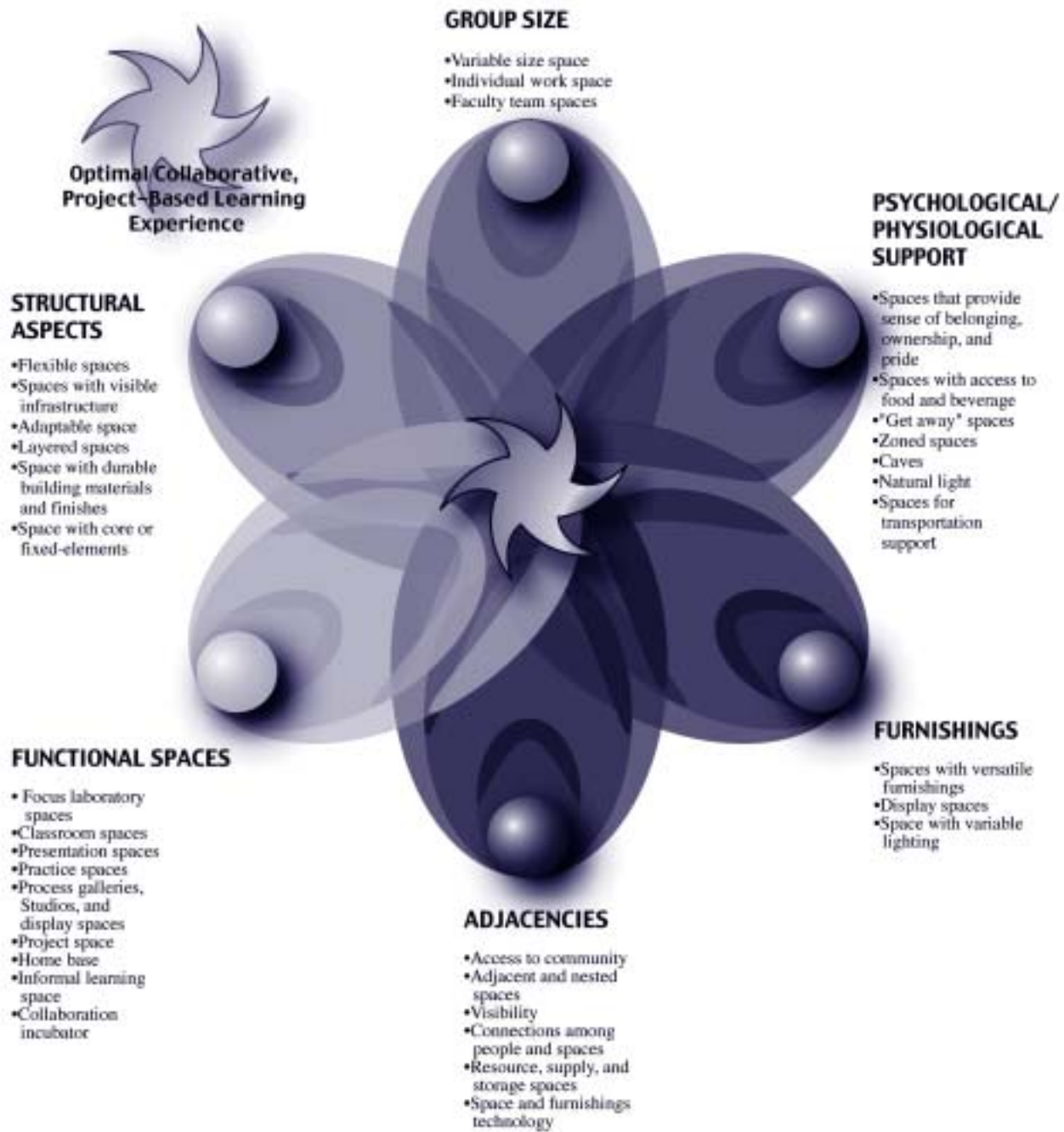


Figure 1. Design Features and Categories for Collaborative, Project-Based Learning

spatially incongruent and disconnected. Rapoport (1982, 1990) described the physical environment as a series or system of relationships among things and people that provide structure, patterns, and visible cues for expected behaviors.

During the analysis and synthesis of data from all the research activities, 32 design features that are desirable for supporting collaborative, project-based learning at the community college level emerged and were subsequently placed into six categories. Figure 1 identifies the

features and categories and illustrates the importance of the relationships among the categories to provide an optimal learning experience. Incorporating the design features into the design of a community college learning facility is only the first step. It is how the features are

used to create the relationships among spaces and people that ultimately provide the optimal learning experience. Alexander, a renowned architect and author (1979) says,

“Evidently, then, a large part of the structure of a building consists of patterns of relationships... the fact is the elements themselves are patterns of relationships and when the elements dissolve and leave a fabric of relationships behind, that is the stuff that actually repeats itself and gives structure to a building” . p. 89.

■ **Will We Remain in the Past or Look to the Future?**

Figure 1 illustrates how the physical learning environment supports and enhances an optimal collaborative, project-based learning experience by designing a fabric of relationships. An answer to the question of whether we continue to design physical learning environments based on past models or do we design based on the future, may lie in a quote from a participant in the research study. The participant said, “once you build, you are passing on old behaviors for another 60 to 70 years. Models of learning facilities today are based on visions of the past and even the ideal model is still based on the best of the past. We are stuck there.” The research provides insight into how community college administrators and planners can design learning facilities based on the future rather than continuing to design based on historical models, legislation, and practice. ■

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