Spatial Aspects of Active Learning

İpek KAY[a,1] and Mine ÖZKAR[b]
[a] *Istanbul Technical University*
[b] *Istanbul Technical University*

Abstract. This paper explores the relationship between the design of active learning places for children and intelligent environments. With focus on active learning in the digital age, it articulates various spatial relations in children's interactions with the environment. The exploration is through a proposed theoretical framework where space overarches digital tools and plays the key part in the shift to the intelligent environments of the learner-centered educational paradigm. Assuming that children generally build and share their knowledge through spatial experience, we group spatial definitions of active learning into five categories that are also schemas for physical experience. Spatial diagrams for each category are presented to guide the design bases of open-ended learning environments for children.

Keywords. Learning by doing, digital natives, self-directed learning environment, learning in digital community

Introduction

Diverse learning environments open the way for different learning experiences. Children today build knowledge in accordance with the digital environments that they are getting more and more exposed to. Ackermann observes that children "have their own ways of building and validating knowledge; of exploring, expressing, and sharing ideas; and of using the tools at their avail to find their place in the world" [1]. The learning environments now are to be designed for "digital natives" who are building knowledge with changing tools. This change is epistemic as we question "what it means to be literate, knowledgeable, intelligent, creative" in the digital culture [1] and the questioning leads to thinking about the change not as a sharp shift but a continuous process that ties our past to the future.

1. Spatial definitions for patterns of active learning

As nature and our socio-cultural environments already provide the setting for it, it is important to reclaim the physical experience in today's media ecology and build a bridge between the digital native and the pre-digital knowledge. For framing how children today adapt to and meaningfully dwell in their learning environment, we categorize five spatial definitions of active learning:

- Pluralistic Setting: Constituting a Focus

[1] Corresponding Author.

- Participative Boundary: Embodying an Inter-subjective Communication
- Bridge That Allows Interaction: Defining Fragments
- Interface That Allows Practices: Participating in Community
- Place That Envisions Body Movements: Discovering Routes.

The categories follow a path from children's inner world to their relationship with the community. The child continually accumulates experiences in "learning by doing" and transmits knowledge to the community. The last category brings the cyclic path back to the child's inner world through the role of the body.

Each category provides a framework for designers to interpret today's media ecology with conjunction of an active learning. The mutual relationship between event and place are continually generated by the experience. We review and conceptualize conditions of the way of forming a dynamic learning-scape. This study based on the actions of learning children can bring out both the physical and conceptual relationships in creating active learning environments.

1.1. Pluralistic Setting: Constituting a Focus

A pluralistic setting refers to a decentralized and multi-focal environment with regards to the different ways of seeing and learning that every child builds individually. This category resonates with a participatory design approach based on Kurt Lewin's model of Action Research [2]. Action Research is a participatory mode of understanding, based on a malleable boundary within a pluralistic approach. This method is closely related with children-centered learning approach in which every child becomes an active participant of own meaning-making process [3].

This category is the initial part of designing active learning places where every child can become a focus to reveal their own differences. By feeling the sense of belonging to a place, children directly participate in place making. Finding an area of interest is also essential to create a relationship with a place for children. Thus, the learning environment needs to be rich and multi-discipliner.

In formal education systems, classroom settings are often target oriented and complete according to a framework. Children are inevitably and almost entirely restricted to the inside world. This closed setting brings generic teaching ways with it. In contrast, a non-urban natural setting provides an open environment for children to build their own learning spaces. Since a non-urban natural setting is heuristic and multidimensional to encourage children to discover their interests and build their own knowledge [4].

In the digital age, a distributed environment can also reinforce a personalized learning that also provides a platform for knowledge networks [5]. Children can explore an area of interest to build their own place in this network. However, developing critical thinking is essential to distinguish one's own idea from generic knowledge acquisition.

Looking outwards into the environment invokes the need to form knowledge from within. In this setting, the emphasis is on what children possibly see rather than what the teacher conveys to them [6]. The natural environment provides this setting in two ways. Firstly, there is no overpowering boundary that children are forced to stay within. Children have an opportunity to control their distance with other elements in this environment (Figure 1).

Secondly, a setting as rich and open as nature provides hiding places for children where they are alone if they wish to observe, learn and evaluate on their own. Children can also utilize niches to keep objects related to what they have explored and learned (Figure 2).

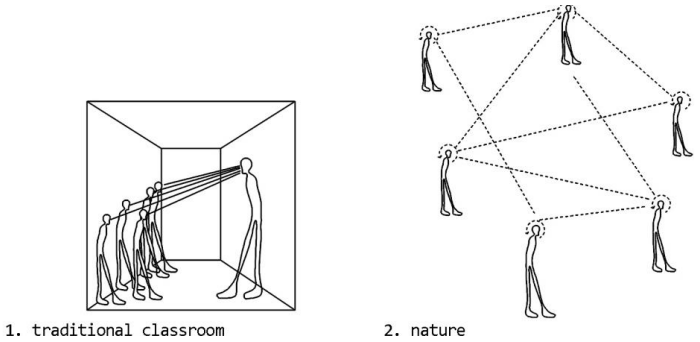

Figure 1: 1. The centralized control mechanism in the classroom, 2. Inter-connection opportunities in nature independent from a teacher.

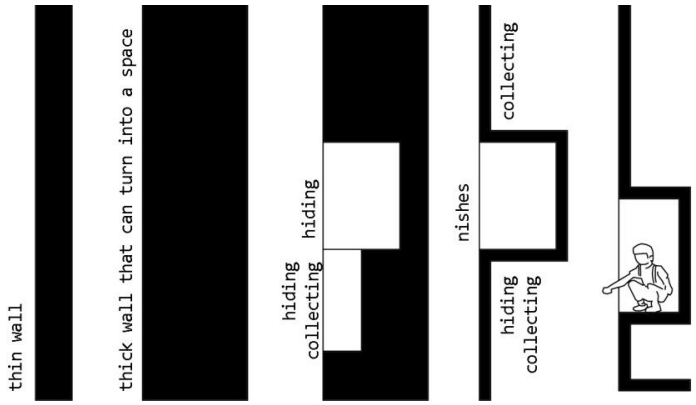

Figure 2: Space that provides niches that are randomly found in nature, for children to be alone without any interruption from place.

As a non-physical counterpart, in the abundant use of the digital media, many children today are able to create their own blogs to document and share their individual ideas. In the digital interface, these open settings introduce an active practice of constructing personal meanings and understanding. However, Ackermann [1] points out that individuals often “share before they think”. There is much room for investigating the role of digitally supported social networks in active learning.

It is obvious that pluralistic settings are essential to realize that all learning experiences are individual and a place-making activity can be a way of active learning. While a rural and natural environment provides a spatial setting to turn towards inner worlds, digital environments not only creates multi-dimensional channels to explore one's interest, but also raises doubts about whether an expression environment is enough for children to evaluate knowledge acquisition.

1.2. Participative Boundary: Embodying an Inter-subjective Communication

Participative boundary refers to the environment of an inter-subjective communication. Thus, it resonates with the notion of learning-centered approach rather than teacher-centered approach. A teacher-centered environment, where a teacher is a teller, children are only passive listeners, prevents children from actively being involved in constructing knowledge through communication with each other. Papert [7] claims that in the context of a school-dominated society, the most important effect is that "School's teaching creates a dependence on School and a superstitious addiction to belief in its methods" via teacher-centered approach. Alternatively, people with a will to do something always find a way to acquire the relevant knowledge [7].

Constructing knowledge by integrating and sharing new learning enables individuals to reconstruct their own opinion. On the other hand, the teacher-centered approach focuses on a single direction, assuming that every child should learn same knowledge with same way [8]. A participative boundary reveals emergence and nonlinear dynamics with inter-subjective movements.

Two spatial aspects shape these dynamics. Firstly, every participant of the learning environment (including the child and the adult) has equal space to express themselves. Children are encouraged to construct their own positions to share with others. This leads to a collective memory similar to culture amongst multiple individuals. Hence, in nature instead of finished and defined environments of modern formal education system, children can individually build up own experiences. They can choose specific objects to pay attention to. It enables self-direction and being active (Figure 3). In this way, each child contributes with their own responses to the environment.

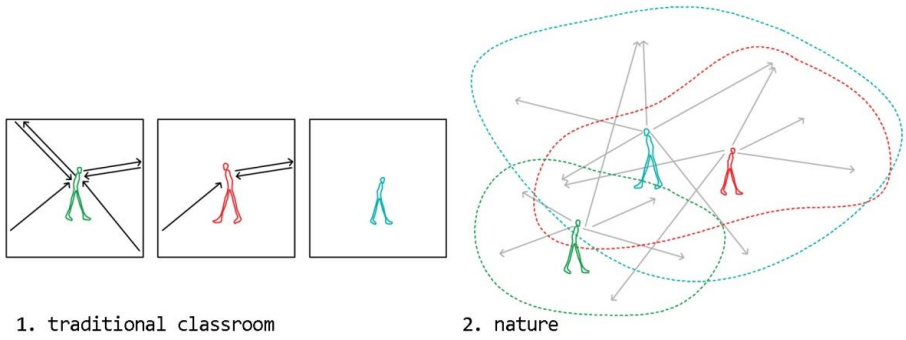

Figure 3: 1. The classroom is a limited environment to communicate 2. In nature every child can construct their environments and communications.

On the other hand, today children are growing up in a distributed media ecology where the networked public plays a central role. The networked public builds self organization and social inter-connection groups. For example online participating networks initiate online writing communities [9].

Secondly, bringing everyone to a discussion platform enhances expression. Connected settings can generate an interest-driven mechanism that children can get different opinion (feedback) from audiences who are personally interested in same context [9]. This can invent ways for everyone to meet and learn together. Our ubiquitous digital environment very well provides for such richness already, bounded

by technical as well as social protocols. However, a physical transformation is also required to open up the traditionally designed learning spaces to an abundance of relations and spatial experiences. A participative environment opens up to different experiences, and its boundary binds the multiple subjects in an interactive co-existence.

1.3. Bridge That Allows Interaction: Defining Fragments

Learning from experience constructs connection between what children do to things and what their interpretation from things in consequence [12]. The third category extends the individual in an enclosed community towards a broader culture and geography that it may be a part of. Since learning can create and bridge boundaries; it involves multiple membership and connects multiple forms of participation. There is a mutual relationship between people and the environment. Besides, this relationship builds socio-cultural dynamics. However, there is a certain disconnection between classroom learning that is based on teacher-centered approach; and socio-cultural richness where individuals can find their own interests by doing. Thus, the discovery of connections has become an important part of education [9].

Two spatial aspects are worth attention for this category. Firstly, places that can accommodate gathering reinforce the possibilities of coincidental meeting (Figure 4). In the context of spatial relations, corridors have the potential to become conducive to collective activities like a street. Similarly, courtyards can be connectors aiming to increase possibilities of encounters.

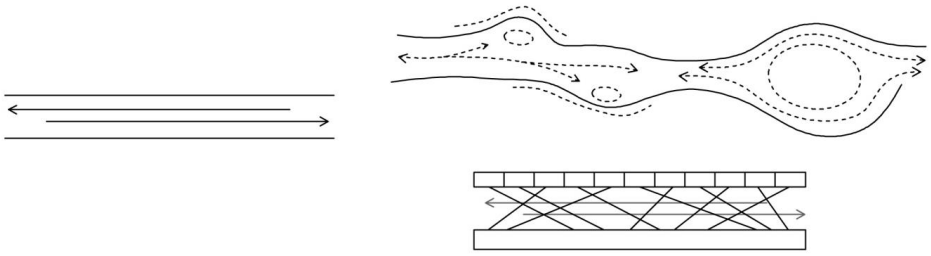

Figure 4: Place in action that includes different activities.

In the digital age, the new perspective of communication becomes a substrate for alternative embodiment for meeting. For example, online role-playing is about creating varieties of selves, about meeting new people and experiencing informal storytelling [9]. These sites have the potential to construct a learning community that supports creativity and link their own physical worlds with the wider world. If learning places co-evolve, the possibilities of meeting increases and the environment is enriched with the addition of new technological tools and interfaces [5]. With the introduction to the digital age, children are less bounded by temporal and physical constraints of interaction. In this new social sphere, outside of an authority-centered curriculum, children can explore, share ideas, find people that have similar interests simultaneously.

Secondly, if places are open to the socio-cultural environment, they provide more flexible relationships. Designing open places for interaction brings individuals of different backgrounds together who would otherwise not meet to share an opinion [1]. It can be an essential way in triggering inter-generational and dynamic learning.

For example, project-based learning is an experiential approach to engage children with investigation of authentic problems. In project-based learning, learners can decide their own approaches to a problem [11]. They can gather information from a variety of sources; hence, their learning is connected to something real. In this way, children can learn how they can communicate their acquired knowledge.

1.4. Interface That Allows Practices: Participating in Community

Dewey pointed out that learning is a life-long process that can be observed in everyday life [10]. Shared practice and culture are also parts of it. In this respect, earning belongs to the realm of experiences and practices. Thus, this interface follows the setting that is organized toward connectivity in community. Emergent structures are created by learning; they require continuity to accumulate experience. On the other hand discontinuity is essential to renegotiate meanings of experiences in order to to connect our past and future. The adopted "learning by doing" pedagogy provided a tangible framework for collecting experiences and transmitting knowledge to local community [8].

Learning does not occur only at school; "learning is an ongoing and integral part of our lives" [13]. It is a part of a child's daily experience and involves active participation in outer world through the local community. Dewey offers that most children are social beings in their community [10]. Following Vygotsky's social development theory based on social interaction [14], a child begins to learn from the surrounding people. Individual and collective becoming depends on the intellectual structure built between child and the surrounding culture [7]. On the other hand learning in school differs from reality, because situations are described via general representations [14]. Alternatively, every place can become a learning environment [15]. Street math as an informal way of learning, [16] points to a rich form of in-situ learning where children build their knowledge with reference to their social environment. Such informal learning ways can help the recognition of learning, as an activity that can occur within the flow of everyday social life.

Physically permeable places that are open the community, provide opportunities for social interactions and learning, instead of constituting an enclosed curriculum (Figure 5).

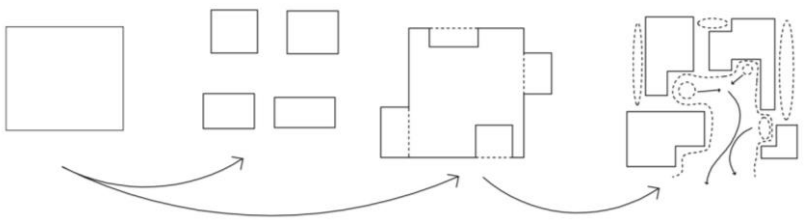

Figure 5: Constructing a relationship between learning environment and social environment.

Local elements enable the learners to be active creators of curriculum contents [5]. Curriculum framework can also be recontextualized according to the specific ethos and local community sources by learners (Figure 6). On the other hand, in the new digital media, interest-based community learning is centrifugally dispersed and cybernetically distributed into society [5].

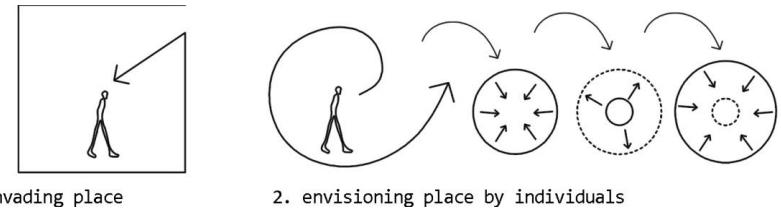

Figure 6: 1. A place that invades and imposes hierarchy and passivity. 2. Unique and dynamic environment that children can build their knowledge based on various social situations.

1.5. Interface That Allows Practices: Participating in Community

Cultural anthropologist Victor Turner shows that one knows himself better through acting, observing and participating in performance [17]. He defines the concept of "lived experience" by Wilthelm Dilthey as cumulative wisdom beyond observations and reactions. Individuals refer to their body in performance [17]. Each part of the body naturally interacts with the environment in different ways: feet walk, hands touch, eyes and ears sense, mouth communicates and expresses etc. On top of the variety inherent through many parts, the reactions of each individual are different as well. Interaction between places and performance initiates the event [18]. Dynamics of agency-place-event constantly interact with each other.

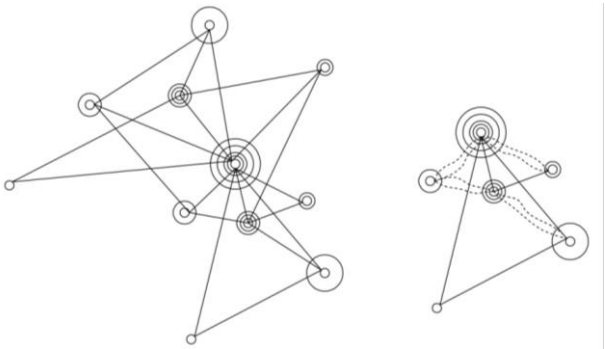

Figure 7: 1. Different networks between nodes that are belonging different individuals.

Space and schools have been providing a fertile field of research to the scholars that study spatiality; activities are intensely structured by space-time. In the digital age, "network-based technologies reveal new possibilities and meaning for interaction and participation into everyday life and learning" [5]. Nevertheless, as networks and media establish independence both from space and time, it is crucial to design environments where tools are responsive and iterative to support children's activity and bodily performance [1]. Thus, performance of the body can reconstruct a new perceived world based on multidimensional experience [19].

2. Conclusion: the intelligence in physical space

Focusing on rethinking the learning environment in the digital age, this paper identifies five categories of spatial dimensions of active learning. These categories constitute a frame to understand the transformative power of the children's performance on both the place and the individual as they simultaneously grow. (Figure 8) The frame, in turn, may be useful in designing and evaluating interactive spaces for children from an activist pedagogical point of view. The framework as it is merely projects to future work to be used in architectural design of intelligent learning environments and tested with reference to case studies.

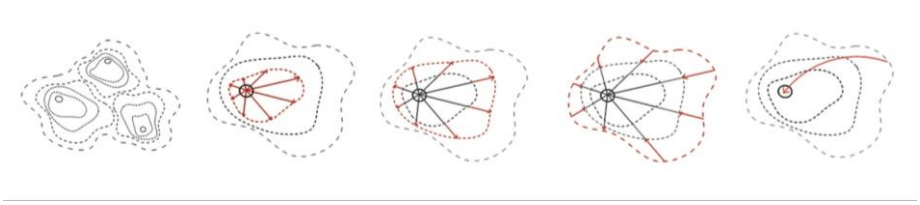

Figure 8: Illustrations of the patterns of learning of five categories towards creating spatial definitions.

While this paper does not directly dwell on particular digital technologies and how they could be used in active learning, it lays the ground on the broader framework of spatial definitions for children's performances in learning and hopes to bridge the spatial potentials of both physical and digital environments for active learning.

References

[1] Ackermann, E., Minds in Motion, Media in Transition Growing up in the Digital Age: Areas of Change (2011),website: http://www.childresearch.net/papers/pdf/digital_2011_01_ACKERMANN.pdf

[2] Sanoff, H., Community Participation Methods in Design and Planning, John&Wiley Sons, USA, 2000.

[3] Piaget, J., *The Child's Conception of the World: A 20th-Century Classic of Child Psychology*, [1947] 2007.

[4] Louv, R., Last Child in the Woods: Saving our Children from Nature-Deficit Disorder, Algonquin Books, 2005.

[5] Williamson, B., The Future of The Curriculum: School Knowledge in the Digital Age, The MIT Press, Cambridge, 2013.

[6] Schön, D., *The Reflective Practitioner: How Professionals Think in Action*, Basic Books, New York, 1983.

[7] Papert, S., Mindstorms: *Children, Computers and Powerful Ideas*, Second Edition, Basic Books, 1993.

[8] Nunes, T., Schliemann, A. D., Carraher, D. W., *Street mathematics and school mathematics and school*, Cambridge University Press, New York, 1993.

[9] Ito, Mizuko, Kris Gutiérrez, Sonia Livingstone, Bill Penuel, Jean Rhodes, Katie Salen, Juliet Schor, Julian Sefton-Green, S. Craig Watkins,. *Connected Learning: An Agenda for Research and Design*. Irvine, CA: Digital Media and Learning Research Hub, 2013.

[10] Dewey, J., *Experience and Education*, Collier Books, New York, [1938] 1963.

[11] Fogarty, R., Problem-based Learning and Other Curriculum Models for the Multiple Intelligences Classroom, Arlington Heights, IL: IRI Skylight Training and Publishing, 1997.

[12] Dewey, J., *Democracy and Ecucation*, Macmillan, NewYork, 1916.

[13] Wenger, E., Communities of Practice Learning, Meaning and Identity, Cambridge University Press, United Kingdom, 2002.

[14] Nicolopoulou, A., Play, Cognitive Development and the Social World: Piaget, Vygotsky, and Beyond, 1993.

[15] Illich, V., Deschooling Society, 1971.

[16] Papert, S.,The Children's Machine: Rethinking School In the Age of the Computer, Basic Books, 1993.

[17] Turner, V., *The Anthropology of Performance*, Paj Publications, New York, 1987.
[18] Paterson, M., Haptic Geographies: ethnography, haptic knowledges and sensuous dispositions, Progress in Human Geography, 33(6) (2009), 776-778.
[19] Vanhoutte, K., Wynants, N., Performing Phenemenology: Negotiating Presence in Intermedial Theatre, Foundations of Science, Vol.16, Numbers 2-3 (2011), 275-284.
[20] Ackermann, E., Piaget's Constructivism, Papert's Constructionism: What's the difference?, Future of learning group publication (2001), 438.
[21] Norberg-Schulz, C., *Genius Loci Towards a Phenemenology of Architecture*, Rizzoli, New York, 1980.
[22] Glasersfeldt, E. von., Ackermann, Reflections on the Concept of Experience and the Role of Consciousness Unfinished Fragments, Constructivist Foundations 6(2) (2011),193–203.