

Arranging the Room to Engage the Child and Aspects of The Environment Can Impact Performance

This section will include summaries of the literature from the field of education on the importance of room set up for learning and also will include information about the sensory affordances of objects / activities and how they can enhance performance.

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Hatice Zeynep Inan (2009). The Third Dimension in Preschools: Preschool Environments and Classroom Design European Journal of Educational Studies 1(1) 55 http://www.ozelacademy.com/EJES_vn1_Inan.pdf

The physical environment plays an important role in the lives of preschoolers with special needs. It can add a significant dimension to children's experience and development when the physical environment is carefully and knowingly arranged. The physical environment and the curriculum together enhance and support the child's ability to do something himself, take care of himself, initiate and complete activities, take control of his own actions and responsibilities, communicate and interact with others easily, and have better perceptual and motor skills. In this paper, more than a physical space, the physical environment is discussed in terms of different aspects, namely, relation of the physical environment to the curriculum philosophy, general schedule of activities, modifications, safety-security issues, different areas, placement of those areas, furniture/materials, lighting, textures/colors, and outdoor area.

Hatice Zeynep Inan, (2009). Understanding Features of Amiable Environments That Can Nourish Emergent Literacy Skills of Preschoolers Australian Journal of Basic and Applied Sciences , 3(3): 2510-2518 <http://www.insipub.com/ajbas/2009/2510-2518.pdf>

Educators and researchers are cognizant of the importance of environment and relationships and their impacts on children's gaining literacy skills . The Reggio Emilia approach values all layers of environment that surrounds preschoolers. The current study focuses on many dimensions of "classroom environment." It examines how classroom environment appears and facilitates literacy education in a

Reggio Emilia-inspired preschool. The qualitative research study involved a Reggio Emilia inspired -laboratory preschool at a Midwestern research university in the United States of America. The results indicated that a preschool classroom environment has many dimensions that preschool teachers should know about. Moreover, the study showed that the Reggio Emilia-inspired preschool offered a rich, amiable environment that satisfied preschoolers' interests, triggered their inquiries and supported their development and learning in relation to literacy.

Ya-huei Wang (2009). Open Space Learning Circle and Active Learning in English Communication Class *European Journal of Social Sciences*, 11, 3 http://www.eurojournals.com/ejss_11_3_13.pdf

The study intended to propose an open space learning circle (OSLC) classroom management to modify the traditional classroom structures and instructions in order to motivate students' interest in class participation. The open space learning circle was derived from Owen's open space technology. Through learning circle, talking sticks, empowerment, dialogism, and the law of mobility, students could have their voices heard in class discussion, hence transforming passive class learning environment to active one. The purpose of this study was to investigate whether students under the open space learning circle can experience greater satisfaction in English communication class than those under traditional classroom arrangement. Student satisfaction questionnaire and interviews were conducted to elicit students' learning reflection toward the class. The results showed that those students under the open space learning circle attained greater satisfaction in class than those under traditional class in terms of instructional objective, instruction material/method, teacher's qualities, class climate/environment, assessment, and overall satisfaction.

Sandseter, E. (2009). Affordances for risky play in preschool: The importance of features in the play environment. *Early Childhood Education Journal*, 36(5), 439-446.

The purpose of this article is to qualitatively explore the affordances for risky play in two different preschool outdoor environments, an ordinary preschool playground and a nature playground, based on Gibson (The ecological approach to visual perception, 1979) theory of affordances

and Heft's and Kytteä's (Heft in *Children's Environ Qual* 5(3) 29-37, 1988; Kytteä in *J Environ Psychol* 22:109-123, 2002, Kytteä in *J Environ Psychol* 24:179-198, 2004) extended work on this theory. Observations of risky play in two Norwegian preschools, one ordinary preschool (where play took place on an ordinary playground) and one nature and outdoor preschool (where play took place in a nature area) were conducted. In addition, the children were interviewed about their actualized affordances of risky play, their mobility license, and the constraints on risky play. The results show that both play environments afford an extensive amount of risky play among the children, and that the degree of mobility license tolerated by the staff is an important factor for the children to actualize these affordances. Differences in the qualities and features in the two play environments were found to have an impact on the degree of riskiness in the play situations. As such, the nature playground afforded a higher degree of risk in children's risky play.

Kirkorian HL, Pempek TA, Murphy LA, Schmidt ME, & Anderson DR. (2009). The impact of background television on parent-child interaction. *Child Dev.* 80(5), 1350-9.

This study investigated the hypothesis that background television affects interactions between parents and very young children. Fifty-one 12-, 24-, and 36-month-old children, each accompanied by 1 parent, were observed for 1 hr of free play in a laboratory space resembling a family room. For half of the hour, an adult-directed television program played in the background on a monaural television set. During the other half hour, the television was not on. Both the quantity and quality of parent-child interaction decreased in the presence of background television. These findings suggest one way in which early, chronic exposure to television may have a negative impact on development.

Raymond, J.(2009). Interactions of attention, emotion and motivation. *Prog Brain Res.* 176, 293-308.

Although successful visually guided action begins with sensory processes and ends with motor control, the intervening processes related to the appropriate selection of information for processing are especially critical because of the brain's limited capacity to handle information. Three important mechanisms--attention, emotion and motivation--contribute to the prioritization and selection of information. In this chapter, the

interplay between these systems is discussed with emphasis placed on interactions between attention (or immediate task relevance of stimuli) and emotion (or affective evaluation of stimuli), and between attention and motivation (or the predicted value of stimuli). Although numerous studies have shown that emotional stimuli modulate mechanisms of selective attention in humans, little work has been directed at exploring whether such interactions can be reciprocal, that is, whether attention can influence emotional response. Recent work on this question (showing that distracting information is typically devalued upon later encounters) is reviewed in the first half of the chapter. In the second half, some recent experiments exploring how prior value-prediction learning (i.e., learning to associate potential outcomes, good or bad, with specific stimuli) plays a role in visual selection and conscious perception. The results indicate that some aspects of motivation act on selection independently of traditionally defined attention and other aspects interact with it.

- An interesting link about designing educational environments more generally
http://www.futurelab.org.uk/resources/documents/handbooks/outdoor_learning_spaces2.pdf
- A Book of interest By Alison Clark Transforming Children's Spaces
Children's and adults' participation in designing learning environments

Prior to 2009

van Hof P, van der Kamp J, & Savelsbergh GJ. (2008). The relation between infants' perception of catchableness and the control of catching. *Developmental Psychology*, 44, 182-94.

The authors studied how infants come to perceive and act adaptively by presenting 35 three- to nine-month-olds with balls that approached at various speeds according to a staircase procedure. They determined whether infants attempted to reach for the ball and whether they were successful (i.e., contacted the ball). In addition, the time and distance of the ball at the onset of the catching movements were measured for the successful interceptions. The authors found that not only catching skill but also the perceptual judgments of the catchableness improved

with age; infants started to take their catching ability into account when judging whether a ball was catchable. Moreover, the authors observed that infants who made imprecise perceptual judgments were more likely to use a distance control strategy, whereas infants who made accurate perceptual judgments were more likely to use the more adaptive time strategy to control the catching movements. They conclude that the present study supports the proposal that, even in prelocomotor infants, the development of perception is intricately linked to or constrained by development in the visual control of action. Copyright (c) 2008 APA.

Woolner, P., Hall, E., Higgins, S., McCaughey, C., & Wall, K. (2007). A Sound Foundation? What We Know about the Impact of Environments on Learning and the Implications for Building Schools for the Future. *Oxford Review of Education*, 33, 47-70.

This paper reports on a literature review conducted in the UK for the Design Council and CfBT (Higgins et al., 2005) which looked at the evidence of the impact of environments on learning in schools. We have reviewed the available evidence regarding different facets of the physical environment and provided an analysis based on different areas of effect, including the extent to which different facets interact (positively and negatively) with one another. Our conclusions suggest that, although the research often indicates the parameters of an effective environment, there is an overall lack of empirical evidence about the impact of individual elements of the physical environment which might inform school design at a practical level to support student achievement. However, at a secondary level of analysis, there are indications that environmental change can be part of a catalytic process of school development and improvement. The implications of these findings for Building Schools for the Future will be discussed.

Klatte M, Meis M, Sukowski H, & Schick A. (2007). Effects of irrelevant speech and traffic noise on speech perception and cognitive performance in elementary school children. *Noise Health*. 9, 64-74.

The effects of background noise of moderate intensity on short-term storage and processing of verbal information were analyzed in 6 to 8 year old children. In line with adult studies on "irrelevant sound effect" (ISE), serial recall of visually presented digits was severely disrupted by background speech that the children did not understand. Train noises of equal intensity however, had no

effect. Similar results were demonstrated with tasks requiring storage and processing of heard information. Memory for nonwords, execution of oral instructions and categorizing speech sounds were significantly disrupted by irrelevant speech. The affected functions play a fundamental role in the acquisition of spoken and written language. Implications concerning current models of the ISE and the acoustic conditions in schools and kindergardens are discussed.

Evans, G.W. (2006). Child development and the physical environment. *Annual Review of Psychology*,57,423-451.

Characteristics of the physical environment that influence child development are discussed. Topics include behavioral toxicology, noise, crowding, housing and neighborhood quality, natural settings, schools, and day care settings. Socioemotional, cognitive, motivation, and psychophysiological outcomes in children and youths are reviewed. Necessary methodological and conceptual advances are introduced as well.

Pavese, Antonella; Buxbaum, & Laurel J. (2007). Action matters: The role of action plans and object affordances in selection for action. *Visual Cognition*, 9, 559-590.

In a series of three experiments requiring selection of real objects for action, we investigated whether characteristics of the planned action and/or the "affordances" of target and distractor objects affected interference caused by distractors. In all of the experiments, the target object was selected on the basis of colour and was presented alone or with a distractor object. We examined the effect of type of response (button press, grasping, or pointing), object affordances (compatibility with the acting hand, affordances for grasping or pointing), and target/distractor positions (left or right) on distractor interference (reaction time differences between trials with and without distractors). Different patterns of distractor interference were associated with different motor responses. In the button-press conditions of each experiment, distractor interference was largely determined by perceptual salience (e.g., proximity to initial visual fixation). In contrast, in tasks requiring action upon the objects in the array, distractors with handles caused greater interference than those without handles, irrespective of whether the intended action was pointing or grasping. Additionally, handled distractors were relatively more salient when their affordances for grasping were strong (handle direction compatible with the acting hand) than when affordances were weak.

These data suggest that attentional highlighting of specific target and distractor features is a function of intended actions.

Montesano, L. Lopes, M. Bernardino, A. Santos-Victor, J. (2007). Learning Object Affordances: From Sensory--Motor Coordination to Imitation: *Robotics, IEEE Transactions*, 24, 15-26.
http://www.robotcub.org/misc/review3/07_Montesano_Lopes_Bernardino_Santos-Victor.pdf

Affordances encode relationships between actions, objects and effects. They play an important role on basic cognitive capabilities such as prediction and planning. We address the problem of learning affordances through the interaction of a robot with the environment, a key step to understand the world properties and develop social skills. We present a general model for learning object affordances using Bayesian networks integrated within a general developmental architecture for social robots. Since learning is based on a probabilistic model, the approach is able to deal with uncertainty, redundancy and irrelevant information. We demonstrate successful learning in the real world by having an humanoid robot interacting with objects. We demonstrate the benefits of the acquired knowledge in imitation games.

Taylor Martina, Daniel L. Schwartzb (2005). Physically Distributed Learning: Adapting and Reinterpreting Physical Environments in the Development of Fraction Concepts *Cognitive Science* 29, 587-625.

Five studies examined how interacting with the physical environment can support the development of fraction concepts. Nine- and 10-year-old children worked on fraction problems they could not complete mentally. Experiments 1 and 2 showed that manipulating physical pieces facilitated children's ability to develop an interpretation of fractions. Experiment 3 demonstrated that when children understood a content area well, they used their interpretations to repurpose many environments to support problem solving, whereas when they needed to learn, they were prone to the structure of the environment. Experiments 4 and 5 examined transfer after children had learned by manipulating physical pieces. Children who learned by adapting relatively unstructured environments transferred to new materials better than children who learned with "well-structured" environments that did not require equivalent adaptation. Together, the findings reveal that during physically distributed learning, the opportunity to adapt an environment

permits the development of new interpretations that can advance learning.

De Barros, K.M.F.T., Fragosos, A.G.C., de Oliveira, A.L.B., Filho, J.E.C., & de Castro, R.M. (2003). Do environmental influences alter motor abilities acquisition? *Arq Neuropsiquiatr*, 61, (2-A), 170-175.*

The authors of this study examine environmental variables that may impact motor development. They specifically highlight the importance of sensorimotor integration in motor learning through feedback and feed forward. To examine motor learning, 100 healthy preschool age children participated in a variety of motor tasks and questionnaires were completed regarding numerous environmental variables. In addition, the effects of SES were examined as well. The motor tasks included static balance, dynamic balance, fine motor coordination activities, drawing, copying, throwing to a target, and serial finger to thumb touching. Environmental issues included variables such as attendance in public day care or private school, the place where the child spent most play time (for example in the crib, carriage, held by adult, independently on floor), types of toys available to the child, and length of time being breastfed. The researchers found that there were differences in fine motor development between children in public vs. private schooling with the children in public daycare demonstrating fine motor delays. In addition, children who were less able to move freely through their environment, such as those who were held more or placed in infant seats also had slower motor development. Lower SES and having improper toys for developmental age were also related to poorer motor development.

Grezes, J. & Decety J. (2002). Does visual perception of object afford action? Evidence from a neuroimaging study. *Neuropsychologia*, 40, 212-222.

Positron emission tomography (PET) was used to explore the neural correlates of a potential involvement of motor representation during the perception of visually presented objects with different tasks. The main result of this study was that the perception of objects, irrespective of the task (judgement of the vertical orientation, motor imagery, and silent generation of the noun or of the corresponding action verb), versus perception of non-objects, was associated with rCBF increases in a common set of cortical regions. The occipito-temporal junction, the inferior parietal lobule, the SMA-proper, the pars triangularis in the inferior frontal gyrus, the dorsal and ventral precentral gyrus were

engaged in the left hemisphere. The ipsilateral cerebellum was also involved. These activations are congruent with the idea of an involvement of motor representation already during the perception of object and thus provide neurophysiological evidence that the perception of objects automatically affords actions that can be made toward them. Besides this common set of cortical areas, each task engaged specific regions. © 2001 Elsevier Science Ltd. All rights reserved.

Vetter, P. & Wolpert, D.M. (2000). Context estimation for sensorimotor control. *Journal of Neurophysiology*, 84, 1026-34.

Human motor behavior is remarkably accurate and appropriate even though the properties of our own bodies as well as the objects we interact with vary over time. To adjust appropriately, the motor system has to estimate the context, that is the properties of objects in the world and the prevailing environmental conditions. Here we show that to determine the current context the CNS uses information from both prior knowledge of how the context might evolve over time and from the comparison of predicted and actual sensory feedback. We show that these two sources of information may be modeled within the CNS and combined to derive an accurate estimate of the context which adjusts motor command selection. This provides a novel probabilistic framework for sensorimotor control.

Bertenthal, B.I. (1996). Origins and early development of perception, action, and representation *Annual Review of Psychology*. 47, 431-459 .

Research relevant to the origins and early development of two functionally dissociable perceptual systems is summarized. One system is concerned with the perceptual control and guidance of actions, the other with the perception and recognition of objects and events. Perceptually controlled actions function in real time and are modularly organized. Infants perceive where they are and what they are doing. By contrast, research on object recognition suggests that even young infants represent some of the defining features and physical constraints that specify the identity and continuity of objects. Different factors contribute to developmental changes within the two systems; it is difficult to generalize from one response system to another; and neither perception, action, nor representation qualifies as ontogenetically

privileged. All three processes develop from birth as a function of intrinsic processing constraints and experience.

Lewis, Michael. (1992). Individual differences in response to stress. *Pediatrics*, 90 (3), 487-490.

This article focused on observing newborns and infants in response to an induced stressor (a heel-stick procedure that is performed on all newborns to screen for hereditary and metabolic disorders) one to two days postpartum. Threshold (“...the amount of stimulation necessary to produce either a negative or positive response”), dampening (“...a child’s ability to stop responding to a particular stimulus once threshold as been reached”), and reactivation (“...a child’s ability to become aroused again once arousal and dampening have occurred”) are defined and discussed. These three features of the nervous system are related to the behavioral features of temperament. To identify stable measures of reactivity, each newborn’s heel was lanced in a routine manner while an examiner observed and recorded the newborn’s reactions to the initial heel stick and to the subsequent perturbations intervals, which were rated on a 4-point intensity scale. The infants were then again reexamined at 2-months of age in relation to their response to stress (the pain of their first series of inoculations) to determine if the environment influenced an infants reactivity to a negative stimulus (pain). It was found that there was a significant relation between the threshold response and the average overall reaction to the perturbation. **The results of this study suggests that infants who are highly reactive remain so regardless of environmental influences, however, low-to-moderate reactive infants, are highly affected by their environments.** For low reactive infants, a responsive environment would result in low-to moderate reactivity, whereas a less responsive environment would result in high reactivity. The ability of infants to suppress the response to pain was negatively related to illness, which means that the more the infant was unable to suppress his or her response, the more the incidence of illness. The threshold response could not predict how long it would take the newborns to quiet.

McEvoy, M.A., Fox, J.J. & Rosenberg, M.S. (1991). Organizing Preschool Environments Suggestions for Enhancing the Development/Learning of Preschool Children with Handicaps Topics in Early Childhood Special Education, 11(2), 18-28

Appropriate skill development is one of the basic functions of preschool programs. In many instances, behavior problems in classrooms can be managed by appropriately organizing caregiving environments. For example, researchers have demonstrated that organized environments may promote increases in appropriate social interaction and decreases in disruptive behavior. The purpose of this article is to suggest ways that preschool environments can be organized to avoid behavior problems, and the implications of these arrangements for moving children from preschool to elementary school settings are discussed. In addition, the relationship between environmental arrangement and direct contingency management interventions is discussed.

Gibson, E.J. & Walker, A.S. (1984). Development of Knowledge of Visual-Tactual Affordances of Substance. *Child Development*, 55, 453-460.

Infants of 12 months were familiarized in the dark with an object of either a hard or an elastic (spongy) substance. Following 60 sec of manipulation, a visual preference test was given with simultaneous presentation of 2 films of identical objects, 1 moving in a pattern characteristic of a rigid object and 1 moving in a pattern characteristic of an elastic object. Infants handled the 2 substances differently in an appropriate manner and looked preferentially with more and longer first looks to the type of substance familiarized. A replication of this experiment with familiarization in the light yielded comparable results. A third experiment with 1-month-old infants allowed them to mouth objects of either a hard or a soft substance for haptic familiarization and then tested looking preferences with real objects moving rigidly or deforming. These infants looked longer at the object moving in a manner characteristic of the novel substance. The results, together, suggest that quite young infants detect intermodal invariants specifying some substances and perceive the affordance of the substance.

Weinstein, C.S. (1979). The Physical Environment of the School: A Review of the Research. *Review of Educational Research*,49, 577-610.

This paper reviews research on the impact of classroom environments on student behavior, attitudes, and achievement. The first section examines studies of six environmental variables: seating position, classroom design, density, privacy, noise, and the presence or absence of windows. In the second part of the paper, research conducted from an "ecological" perspective is considered. A third section focuses on the effects of open space school designs. Finally, some future directions for research are discussed, and the advantages and limitations of various research designs are summarized.

Weinstein, C. S. (1977). Modifying Student Behavior in an Open Classroom through Changes in the Physical Design. *American Educational Research Journal*, 14, 3, 249-62.

Spatial distribution of activity in a second-third grade open classroom was observed before and after a change in the physical design, to test the hypothesis that minor changes in the physical setting would produce predictable, desirable changes in student behavior. In most cases the desired behavior changes were produced.

Gingold, William (1971) The Effects of Physical Environment on Children's Behavior in the Classroom. ERIC ED120942

No significant difference of student-concrete physical environment interaction occurred with a change in physical environment. A test was made on five null hypotheses related to the change of physical environment and (1) student-concrete physical environment interaction; (2) environmental preference by students; (3) student attending behavior; (4) student movement within the classroom; and (5) student-concrete physical environment interaction relationship to temperature, humidity, atmospheric pressure, sound level, and illumination level. All data recording and collecting procedures were made through classroom visitations and observations in classes that involved academic subjects. Subjects for the study consisted of 230 elementary and junior high age students located in three separate school facilities in Wisconsin. Forty of these subjects were educable mentally retarded children. All students had been in an "old" structure for at least a month before moving to a

"new" structure. Other factors remained constant: classroom unit composition, curricula, teachers, and general time schedule.

- A Pedagogy of Connection: The Place of Play
<http://www.cecde.ie/english/pdf/Vision%20into%20Practice/Brennan.pdf>
- Optimal Learning Spaces
<http://www.oecd.org/dataoecd/38/47/43834191.pdf>
- Elegant Interior and Exterior Play Spaces for Young Children
<http://www.cecde.ie/english/pdf/Vision%20into%20Practice/Kalinowski.pdf>