Un proyecto de

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INTEDU

INFORME

Tendencias e Investigación en Espacios Educativos - Ana Mombiedro

Neuroarquitectura: Espacios educativos para adolescentes del SXXI

absotec ABSORCIÓN ACÚSTICA

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KID'S CLUSTER

SINGLADURA Mobiliario de Colectividades

Ana Mombiedro
Neuroarquitectura
Investigación
Docencia

Proyectos de Arquitectura y Diseño

13 **Casos de éxito (8 arquitectura + 5 diseño)**

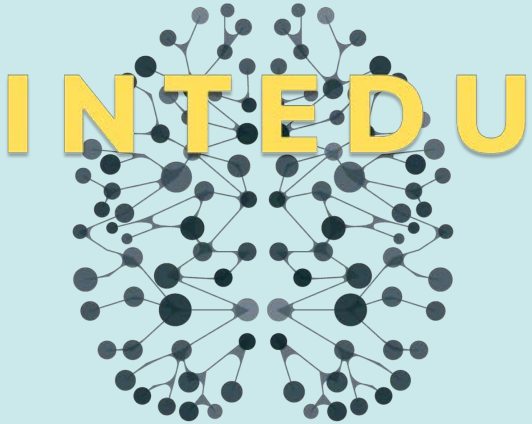
Artículos de Investigación

11 **Investigaciones clave**

Anexo I **Retos identificados gracias al proyecto INTEDU**

Anexo II **Oportunidades de INTEDU**

Anexo III **Aprendiendo de docentes entusiastas**



INTEDU

Arquitectura y Diseño

INTEDU

Arquitectura

Atmósferas de aprendizaje de vanguardia

Trend 2.1 Arquitectura

Atmósferas de aprendizaje de vanguardia

Instituto
Robert E. Bell
NY, USA

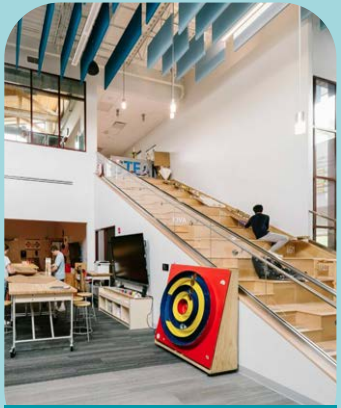
Anexo biblioteca Lea
Bridge, Londres, UK

Escuela Internacional
de Düsseldorf,
Alemania

Colegio
San Francisco de Asís
Kingston, Canada

Trend 2.1 Arquitectura

Atmósferas de aprendizaje de vanguardia



Instituto
Horace Greeley
NY, USA

Escuela colaborativa
John C. Schiffer
Wyoming, USA

Colegio Saunalahti
Espoo, Finlandia

Smart Centro de
aprendizaje e
innovación, Putuo,
China

ARQUITECTURA Anexo Biblioteca Lea Bridge. Londres.

Descripción del proyecto

Ampliación de la Biblioteca pública de Lea Bridge.

Se añade un pasillo de madera que conecta las dependencias de la biblioteca con un jardín.

Este “pasillo de aprendizaje” se convierte en un filtro entre el espacio público del parque y el espacio público de la biblioteca. Ofrece espacios para que los usuarios puedan trabajar, socializar, descansar, relacionarse y reunirse.

Vigas de madera en voladizo que tocan el edificio existente dejando un sugerente tragaluz que da continuidad lineal al espacio. El cerramiento de vidrio al exterior facilita conexión visual con el exterior y permite la entrada de claridad.

Estrategias de diseño

Transparencias

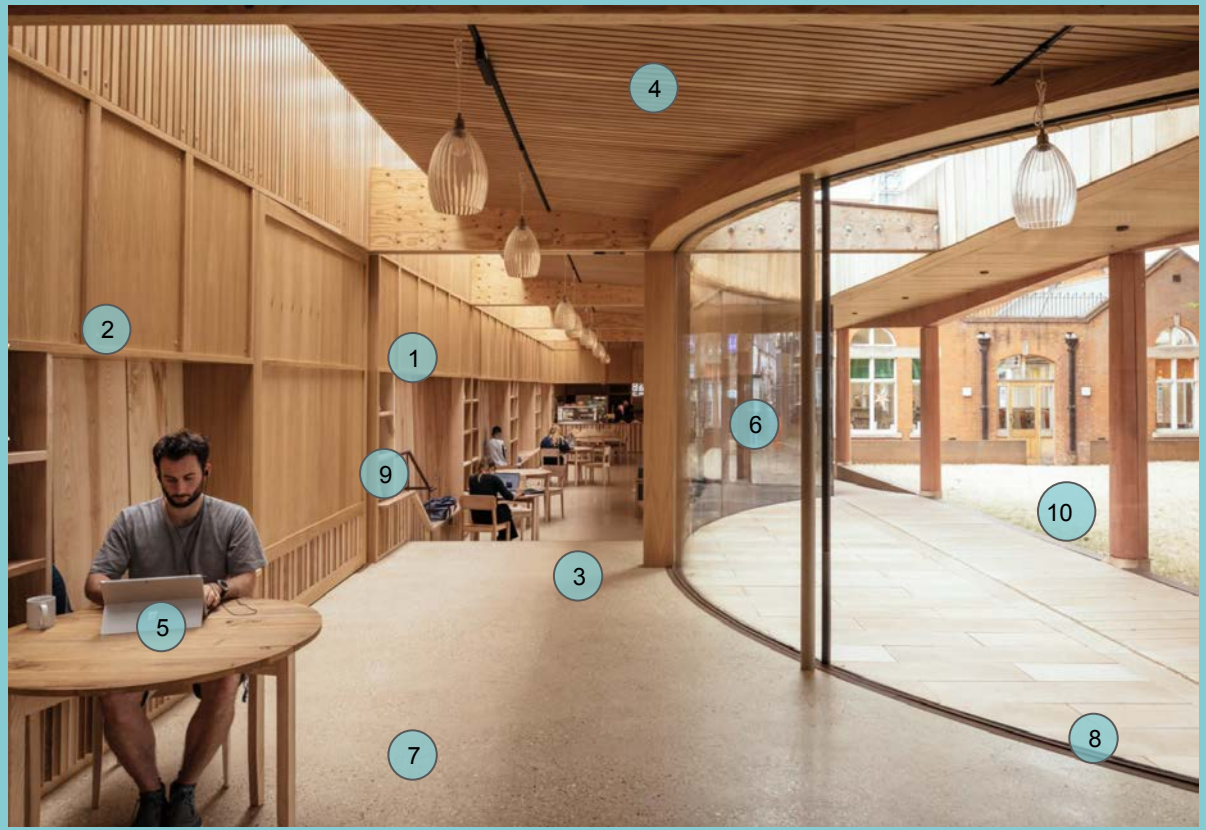
Espacio flexible

Solución acústica incluida en el diseño

Variedad de asientos

Consideración luz natural

ARQUITECTURA Anexo Biblioteca Lea Bridge. Londres.



Análisis estrategias de diseño

1. Uso de madera
2. Almacenaje comunitario empotrado
3. Continuidad visual del espacio
4. Solución acústica incluida en el diseño
5. Pasillo activo
6. Transparencias
7. Organización en bandas
8. Sutiles formas curvas
9. Escala ajustada al usuario
10. Biofilia literal

ARQUITECTURA Instituto Robert E. Bell. NY, USA

Descripción del proyecto

Transformación y ampliación de un centro de educación secundaria existente en el que se rediseñan los espacios para llevar a cabo la metodología ABP en estudiantes de secundaria (grade 6-8 en el sistema americano) además de un espacio STEAM para este mismo grupo de alumnos.

Uno de los objetivos es motivar a los estudiantes a participar en los procesos de aprendizaje ABP-STEAM

Todos los espacios proyectados, como aulas, tienen un

Each center has a collaborative brainstorming space and individual thinking space incorporated into the design enabling students to develop ideas and experience an interactive design process. Spaces are allocated for presentation, beta-testing, whole-class instruction, and gallery space to showcase products.

Estrategias de diseño

Espacio AGILE

Variedad de asientos

Variedad de atmósferas

ARQUITECTURA Instituto Robert E. Bell. NY, USA

Análisis estrategias de diseño

1. Solución acústica incluida en el diseño
2. Variedad de asientos
3. Mobiliario flexible
4. Escala ajustada al usuario
5. Transparencias
6. Conexión visual con el exterior
7. Almacenaje comunitario
8. Pizarra descontextualizada
9. Mobiliario ergonómico
10. Tecnología compartida

ARQUITECTURA Escuela Internacional de Düsseldorf, Alemania

Descripción del proyecto

Un centro con un masterplan que abarca el diseño del espacio educativo de forma holística, de acuerdo con el modelo pedagógico de la Escuela Internacional de Düsseldorf. Un espacio con una marcada identidad, que facilita el sentido de pertenencia no sólo de estudiantes sino también de docentes, con una fuerte conexión con el espacio en el que se encuentra.

Fue un proyecto de co-creación colaborativa en el que todas las partes involucradas pudieron aportar su granito de arena en el diseño. En este centro educativo el principal protagonista es la experiencia de aprendizaje que tienen los estudiantes en el día a día.

Los estudiantes pueden elegir su asiento cada día, los espacios son flexibles, como mobiliario ligero, trabajan generalmente en pequeños grupos pero siempre en espacios abiertos, algo posible de manera exitosa gracias a la excelente acústica, integrada en el diseño. Hay una variedad de atmósferas que facilitan que, sea cual sea, la tarea pedagógica en ejecución, siempre haya un sitio para llevarla a cabo de manera cómoda y sencilla. Todo esto en un entorno natural muy cerca de la ciudad de Düsseldorf.

Estrategias de diseño

Espacio AGILE

Variedad de asientos

Variedad de atmósferas

Disposición en ágora

Acústica incluida en el diseño

Consideración de luz natural

ARQUITECTURA Escuela Internacional de Düsseldorf, Alemania

Análisis estrategias de diseño

1. Pizarra descontextualizada
2. Uso de madera
3. Tecnología compartida
4. Mobiliario ergonómico
5. Mesas colaborativas
6. Contacto visual con el exterior
7. Transparencias
8. Docente en segundo plano
9. Variedad de asientos
10. Variedad de iluminación

ARQUITECTURA Colegio San Francisco de Asís en Kingston, Ontario, Canada

Descripción del proyecto

Este centro educativo católico en Ontario abogó desde el primer momento por la innovación y el aprendizaje centrado en el estudiante en la propuesta de sus espacios. En este caso no se trata de un proyecto de transformación de un centro sino que se construyó un centro desde el inicio fusionando lo que antes eran tres edificios independientes.

Teniendo en cuenta el modelo pedagógico y las metodologías utilizadas por los estudiantes, el resultado es un centro con espacios flexibles que cumple características que hemos visto en el caso de la escuela en Düsseldorf, pero adaptadas al espíritu de este caso.

Espacios de aprendizaje personalizables, donde pueden estudiar en pequeños grupos, individualmente o en grandes equipos. Los estudiantes pueden elegir dónde y cómo sentarse, tienen a su disposición espacios con diferentes cualidades hápticas y acústicas. Todo esto en un entorno agradable y estéticamente agradable.

Estrategias de diseño

Espacio AGILE

Variedad de asientos

Variedad de atmósferas

Acústica incluida en el diseño

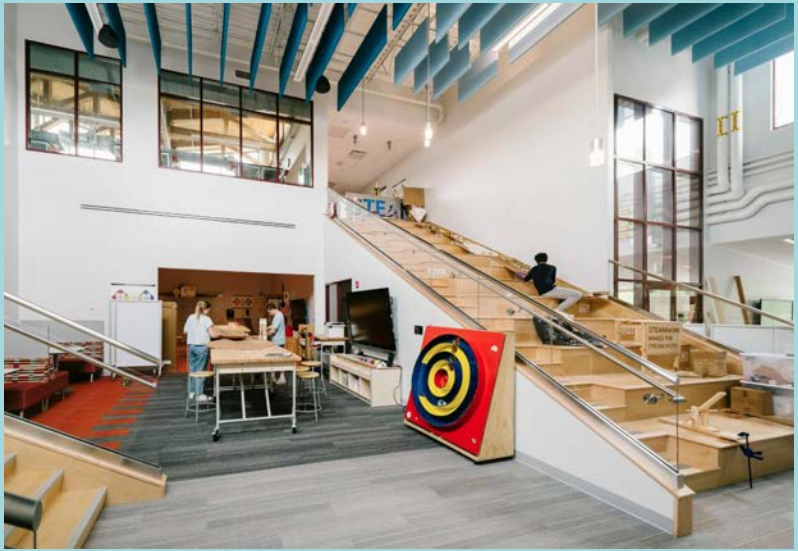
Consideración de luz natural

ARQUITECTURA Colegio San Francisco de Asís en Kingston, Ontario, Canada

Análisis estrategias de diseño

1. Mobiliario flexible
2. Sentido de pertenencia
3. Solución acústica incluida en el diseño
4. Conexión visual con el exterior
5. Atmósferas cromáticas
6. Docentes uniformados
7. Transparencias
8. Transición sin cerramientos
9. Escala ajustada al usuario
10. Uso de madera

ARQUITECTURA Instituto Horace Greeley. NY, USA



Descripción del proyecto

Bajo el lema “estudiantes que trabajan en equipo aprenden con mayor eficacia” este centro pone todo el énfasis en los espacios para el trabajo en equipo. Durante el diseño realizaron entrevistas a los docentes y entendieron que se necesitaba un espacio que refleje el currículo holístico del centro. Aunando humanidades, ciencia y tecnología con el Aprendizaje Basado en Problemas. Con una fuerte conexión con el emplazamiento en el que se encuentra (a nivel socio-cultural).

Es un centro K12 que, además de funcionar (sobre todo) con en ABProblemas, ofrece también las facilidades técnicas y académicas para que los estudiantes ofrezcan soluciones implementables en el entorno cercano. Un modelo de aprendizaje integral que es posible gracias a las instalaciones del centro. El espacio resultante facilita que los estudiantes piensen, creen, presenten sus proyectos e ideas de forma innovadora y versátil, amplificando los límites del aprendizaje de sus alumnos.

La parte más relevante del centro es el “STEAM Center” donde convergen todas estas acciones de Enseñanza-Aprendizaje.

Estrategias de diseño

Espacio AGILE

Variedad de asientos

Variedad de atmósferas

Disposición en ágora

Acústica incluida en el diseño

Pizarras descontextualizadas

ARQUITECTURA Instituto Horace Greeley. NY, USA

Análisis estrategias de diseño

1. Transparencias
2. Solución acústica incluida en el diseño
3. Sentido de pertenencia
4. Atmósferas monocromáticas
5. Variedad de asientos
6. Mobiliario ergonómico
7. Conexión visual con el exterior
8. Uso de madera
9. Tecnología compartida
10. Pizarra descontextualizada

ARQUITECTURA Escuela colaborativa John C. Schiffer en Sheridan, Wyoming, USA

Descripción del proyecto

Con un proyecto educativo que se sale de la oferta tradicional del estado de Wyoming, la escuela colaborativa John C. Schiffer facilita uan variedad de atmósferas de trabajo que permiten diferentes configuraciones del mobiliario según la actividad que se esté haciendo.

Los espacios intersticiales entre estas atmósferas es donde suceden los encuentros entre grupos de estudiantes distintos donde también pueden juntarse a conversar, trabajar o estudiar. Es un centro sin pasillos, donde los espacios de circulació son también partes de aulas. Esto facilita la conversación interdisciplinar entre estudiantes y docentes, dando lugar al florecimiento de nuevas formas de aprendizaje.

Todos los estudiantes tienen acceso a todos los espacios, es un centro de libre circulación, algo muy común en la etapa infantil y primaria, pero excepcional en espacios para adolescentes. Algo también reseñable es que este centro dispone de espacios de bajo impacto sensorial para estudiantes o docentes que lo requieran.

Estrategias de diseño

Variedad de asientos

Variedad de atmósferas

Acústica incluida en el diseño

Pizarras descontextualizadas

ARQUITECTURA John C. Schiffer Collaborative School Sheridan, Wyoming, USA

Análisis estrategias de diseño

1. Solución acústica incluida en el diseño
2. Mobiliario flexible
3. Material de aprendizaje accesible
4. Áreas de libre circulación
5. Conexión visual con el exterior
6. Tecnología compartida
7. Disposición *espacio maker*
8. Almacenaje compartido
9. Variedad de asientos
10. Transición sin cerramientos

ARQUITECTURA Saunalahti School Brinkinmäentie, Espoo, Finlandia

Descripción del proyecto

La ya clásica Saunalahti school en Espoo es una referencia dentro y fuera del país finés. Es un punto neurálgico del aprendizaje por su impoluto diseño y distribución de los espacios.
El edificio refleja los principios de la pedagogía de la educación tradicional finesa para que el espacio sea un claro apoyo a la metodología utilizada por cada docente.

Un espacio flexible en constante contacto con el exterior. Un reflejo de la filosofía educativa finesa que entiende que el centro educativo es una microciudad donde el aprendizaje sucede en torno a la socialización.

Algo llamativo es que tienen un gran porcentaje de aulas al aire libre, que los estudiantes utilizan de forma poco ortodoxa, con total autonomía.

El uso de materiales naturales, espacios articulados partiendo del gran hall de acceso, donde están el comedor y el teatro… es un centro que no sólo cumple funciones de colegio o instituto sino que está abierto a los vecinos para múltiples actividades durante todo el año. Todo esto acompañado de una clarísima distribución de los espacios lo que facilita la orientación (wayfinding) en todo momento.

Estrategias de diseño

Variedad de asientos

Espacio AGILE

Disposición en ágora

Variedad de atmósferas

Consideración de la luz natural

Consideración de la ventilación

ARQUITECTURA Saunalahti School Brinkinmäentie, Espoo, Finlandia

Análisis estrategias de diseño

1. Escala ajustada al usuario
2. Asientos ergonómicos
3. Conexión con el exterior
4. Transparencias
5. Solución acústica incluida en el diseño
6. Mobiliario flexible
7. Calefacción por suelo radiante
8. Composición del espacio multiescala
9. Variedad de iluminación
10. Áreas de libre circulación
11. Ausencia de pizarras

INTEDU

Diseño

Diseño de producto

Productos de interiorismo para el aprendizaje

Trend 2.2 Diseño
Atmósferas de aprendizaje de vanguardia

Mobiliario *ad hoc* de madera

Configuración Agile *ACTIU*

Smith System®

BackJack®

Atmósferas monocromáticas

Estructura de madera Newport School, Floridablanca, Colombia

Cada vez es más frecuente ver en centros educativos mobiliario de madera realizados de forma específica para ese espacio en concreto.

Un momento en el que el diseño de interiores y el trabajo tradicional de la madera se encuentran para dar solución a necesidades pedagógicas específicas.

Gracias a los sistemas de corte numérico, los procesos de elaboración de mobiliario *ad hoc* se han agilizado, dando como resultado ambientes de aprendizaje variados, ricos y llenos de identidad. Algo sumamente importante sobre todo si hablamos de espacios para la edad adolescente, donde lo estandarizado pierde valor.

Configuración *Agile* ACTIU

Aunque la metodología AGILE se ha desarrollado para ser implementada en el desarrollo de software, es una metodología que implica poder sacar adelante proyectos de alto rendimiento.

Esto quiere decir que es una metodología de trabajo que se centra en la implementación rápida de soluciones, para lo que se necesita que el equipo de trabajo funcione de manera eficiente y flexible.

Los espacios *agile* facilitan la generación de estos flujos de trabajo, con pizarras móviles, variedad de asientos, variedad de superficies de trabajo… Actiu ha optado por desarrollar una línea de mobiliario específicamente para esta metodología, algo muy interesante si lo pudiéramos extrapolar a entornos educativos, sobre todo en Bachillerato y por supuesto en universidad. Esta acción acercaría a los estudiantes al mundo real que les espera al salir, humanizando y aportando valor a su labor como estudiantes.

Smith System® Oodle® Seating

En los Estados Unidos han cobrado mucho protagonismo estos asientos apilables de Oodle, por su versatilidad, sencillez y capacidad de almacenamiento.

No sólo aparecen en centros educativos sino que también se ven en oficinas y en hogares.

Lo más relevante de la popularización de estos asientos, que valen tanto para interior como para exterior, es que están creando un hilo argumental entre los espacios que todas las personas transitan a lo largo de la vida.

Puedes ver estos asientos en educación primaria, secundaria, bachillerato, universidad, oficinas y hogares.

BackJack® Floor Chair

El interés por customizar el espacio y favorecer la sensación de confort de las personas, especialmente de los más jóvenes cuando hablamos de centros educativos, es uno de los alicientes para que el proyecto de la silla BackJack esté disponible en el mercado.
Algo similar a lo que sucede con el asiendo de Oodle.

Monochromatic Atmospheres Saunalahti School Brinkinmäentie, Espoo, Finlandia

Cada vez son más los proyectos de interiorismo que hacen uso del color de manera masiva para el tratamiento del espacio. El monocromatismo es una tendencia a la alza que, en el caso de los espacios educativos, se utiliza sobre todo para zonas de tránsito como es el caso de Saunalahti School en Espoo.

Una clara referencia al americano James Turrell (en la imagen su intervención en el Guggenheim de Nueva York del 2013) que ha dejado como herencia una nueva materialidad del espacio.

INTEDU

Investigación

INVESTIGACIÓN Impacto de la luz solar en el *performance* de los estudiantes

Daylighting Impacts on Human Performance in School

Lisa Heschong, (2) Roger L. Wright, Ph D. and (2) Stacia Okura

The purpose of this study was to see if we could demonstrate a clear relationship between the presence of daylight and human performance in buildings.

In this study we used a statistical technique called multivariate regression analysis, which analyzes the importance and impact of many variables simultaneously. The performance data used were gathered from three school districts. This analysis allowed us to estimate the effect of a wide number of variables and to determine which variables have no significant effect. Using this method, we established a statistically compelling connection between the presence of daylight and student performance.

The implications of the results of this study extend beyond the educational sector. We believe the conclusions may be transferable to other types of buildings, such as offices and factories, since it is really human performance we investigated. If daylighting enhances the performance of children in schools, it is not too large a stretch to suppose that it might also enhance the performance of adults in office buildings.

Background

Up through the 1950s and into the early 60s almost all school buildings in the United States were daylit, i.e., they were intentionally designed to provide sufficient interior daylight for normal daytime visual tasks. However, by the mid-1960s a number of forces came into conflict with the concept of daylit classrooms. Engineers, asked to provide air conditioning in classrooms, argued against the use of large expanses of glass and high ceilings. Educational theorists argued that a more flexible arrangement of open classrooms, grouped in large open-plan buildings, would encourage team-teaching and creative learning. Construction economists argued that schools could be built more inexpensively on smaller sites if the classrooms could be grouped together in modules, without constraints on solar orientation. Increasingly, schools were built with little or no daylight provided to the classrooms. In 1974, Belinda Collins of the National Bureau of Standards and Technology (NIST) conducted a major literature review of available research on windows, and concluded there was no conclusive evidence that windows were a necessary component of classrooms.[1]

Authors' affiliation: 1. Heschong Mahone Group, Fair Oaks, CA and 2. RLW Analytics, Inc., Sonoma, CA

More recently, daylighting has been advocated as a way to reduce lighting energy use in schools and other non-residential buildings. Turning off electric lights when sufficient daylight is available can save a significant amount of lighting energy costs. Because daylight introduces less heat into a building than the equivalent amount of electric light, cooling costs can also be reduced with appropriate daylight design.[2]

Some studies have also suggested that the presence of daylight may have a positive impact on student performance and even health. A study done in Alberta, Canada termed "A Case of Daylight Robbery" has attracted both attention and controversy, claiming that student exposure to ultra-violet light, primarily through unfiltered fluorescent sources, improves student performance and health. The study unfortunately had many methodological flaws, including lack of control for daylight contribution to the various test sites and the use of high-pressure sodium lighting as the base case condition.[3] The terminology used in the Alberta study and others has contributed to a general confusion between electrically-generated full-spectrum lighting and naturally-generated daylight.[4]

A small but more carefully controlled study in Sweden found that observed behavior and circadian hormone levels of elementary students in classrooms with daylight stayed closer to expected norms than those in classrooms with only fluorescent sources.[5] The Swedish researchers concluded that windowless classrooms should be avoided. In the United States, a North Carolina architectural firm has received attention for reporting that student test score performance improved in their daylit schools compared to neighboring non-daylit schools.[6] While these studies all have methodological limitations, they have suggested a consistently positive effect for the presence of daylight on student performance.

We set out to see if we could establish a statistically significant association between daylight in classrooms and student performance.

Study approach

Elementary schools provide an ideal setting for a statistical study of human performance relative to specific building design characteristics. Within a given district, elementary school children are instructed following a highly standardized curriculum and are measured on their progress using standardized tests.

CONCLUSIÓN

"The studies do not, however, offer any explanation of why such an effect would occur. Nor do they prove a causal relationship: it remains unknown if it is indeed the daylight, or some other tightly associated condition, which is causing the observed effects. Likewise, the addition of additional explanatory variables, such as teacher education or experience, is likely to somewhat reduce the magnitude of any effect.

Three potential pathways are suggested for a daylight mechanism that improves human performance:

- *Increased visibility*
- *Enhanced mood*
- *Improved health.*

All three are under investigation by other researchers. It will certainly require a coordinated strategy using a combination of methodologies—laboratory experimentation, field work, and population studies—to clearly delineate a mechanism.

Further studies will hopefully be able to quantify effects from other, more precisely defined, aspects of the luminous environment, and eventually create linkages to specific causal mechanisms."

Link al paper

INVESTIGACIÓN Impacto de los espacios biofílicos en el éxito educativo

THE IMPACT OF BIOPHILIC LEARNING SPACES ON STUDENT SUCCESS

Jim Determan, FAIA
Craig Gaulden Davis

Dr. Mary Anne Akers
Morgan State University

Tom Albright, Ph.D.
Salk Institute

Bill Browning, Hon. AIA
Terrapin Bright Green

Catherine Martin-Dunlop, Ph.D.
Morgan State University

Paul Archibald, Ph.D.
Morgan State University

Valerie Caruolo, AIA
Hord Coplan Macht

October 2019

This study is a collaboration of Craig Gaulden Davis, Morgan State University, The Salk Institute for Biological Studies and Terrapin Bright Green.

The purpose of this study is to examine to what extent the design of the physical learning space, enhanced with biophilic design, contributes to student stress reduction and improved learning outcomes for a middle school Math class at a public charter school in West Baltimore. The study presents findings of data collected from a biophilic classroom and a control classroom, where the physical design of each space varies—one is a traditional classroom while the biophilic classroom is enriched with views to nature, dynamic and diffuse daylight and biomorphic patterns. Data was collected by monitoring students' HRV (heart rate variation) as a measure of stress, comparing academic performance, student surveys, and student and instructor interviews.

CRAIG GAULDEN DAVIS
Architecture Planning Interiors

MORGAN STATE UNIVERSITY

salk
Where cures begin.

TERRAPIN BRIGHT GREEN

Citation: Determan, J., Akers, M. A., Albright, T., Browning, B., Martin-Dunlop, C., Archibald, P., & Caruolo, V. (2019). The impact of biophilic learning spaces on student success. Retrieved from https://cgdarch.com/wp-content/uploads/2019/12/The-Impact-of-Biophilic-Learning-Spaces-on-Student-Success.pdf

RESUMEN DE LAS APRECIACIONES DE LA INVESTIGACIÓN

Student Perceptions

- *35% of students in the biophilic classroom perceived their stress to be high compared to 67% of students in the control classroom.*
- *Students felt significantly more positive in the biophilic classroom when compared to the control classroom regarding physical space, their enjoyment of math lessons, and their level of involvement.*
- *Students claimed to feel "more relaxed", "calm", "better able to concentrate", "easier to focus" and have "more of a purpose to learn" in the biophilic classroom when compared to their other classrooms.*

Teachers' Perceptions

- *The teacher identified the shades/daylight, views to nature and the classroom's lack of clutter as contributors to student calming and attention restoration.*
- *The "peaceful" and "softness" qualities of the space are agents of her own reduced anxiety which made her a more effective teacher.*
- *The teacher hears from colleagues about the aggressive behavior of these students in classes before and after her class, but does not see this behavior in the biophilic classroom.*

Student Stress Reduction

- *The average reduction in student stress from the beginning to the end of class was much higher in the biophilic classroom when compared to the control classroom.*

Learning Outcomes

- *Improvement in average Math test scores over a 7 month period was more than 3 times higher in the biophilic classroom when compared to a control classroom.*
- *After 7 months in the biophilic classroom, 7.2% more students tested at grade level than control classroom students.*

Link al paper

INVESTIGACIÓN Satisfacción en el espacio de trabajo

Journal of Environmental Psychology 36 (2013) 18–26

Contents lists available at SciVerse ScienceDirect

Journal of Environmental Psychology

journal homepage: www.elsevier.com/locate/jep

Workspace satisfaction: The privacy-communication trade-off in open-plan offices

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ARTICLE INFO

Article history:
Available online 29 June 2013

Keywords:
Indoor environmental quality (IEQ)
Office layout
Open-plan
Privacy
Satisfaction
Post occupancy evaluation (POE)

ABSTRACT

Open-plan office layout is commonly assumed to facilitate communication and interaction between co-workers, promoting workplace satisfaction and team-work effectiveness. On the other hand, open-plan layouts are widely acknowledged to be more disruptive due to uncontrollable noise and loss of privacy. Based on the occupant survey database from Center for the Built Environment (CBE), empirical analyses indicated that occupants assessed Indoor Environmental Quality (IEQ) issues in different ways depending on the spatial configuration (classified by the degree of enclosure) of their workspace. Enclosed private offices clearly outperformed open-plan layouts in most aspects of IEQ, particularly in acoustics, privacy and the proxemics issues. Benefits of enhanced 'ease of interaction' were smaller than the penalties of increased noise level and decreased privacy resulting from open-plan office configuration.

1. Introduction

There exists a large body of literature looking at how physical environment influence occupants' perception and behaviour in office buildings. As office layout has transitioned in recent decades from conventional private (or cellular) spatial configuration to modern open-plan, the impacts on occupants and organisations have been extensively studied from a variety of perspectives in disciplines as diverse as architecture, engineering, health and psychology.

In addition to tangible economic benefits of open-plan offices such as increased net usable area, higher occupant density and ease of re-configuration (Duffy, 1992; Hedge, 1982), the open-plan office layout is believed by many to facilitate communication and interaction between co-workers by removing internal walls, which should improve individual work performance and organisational productivity (Brand & Smith, 2005; Kupritz, 2003). However there is not much empirical evidence to support these widespread beliefs (Kaarlela-Tuomaala, Helenius, Keskinen, & Hongisto, 2009; Smith-Jackson & Klein, 2009). On the contrary, a plethora of research papers identify negative impacts of open-plan office layout on occupants' perception of their office environment. For example, some longitudinal survey results have demonstrated a significant decline in workspace satisfaction (Sundstrom, Herbert, & Brown, 1982), increased distraction and loss of privacy (Kaarlela-Tuomaala et al., 2009), and perceived performance decrement (Brennan, Chugh, & Kline, 2002) after relocation of employees from enclosed workplace to open-plan or less-enclosed workplace. Moreover, the occupants in these studies didn't adapt or habituate to the change in spatial layout (Brand & Smith, 2005; Brennan et al., 2002; Virjonen, Keränen, Helenius, Hakala, & Hongisto, 2007), and many researcher draw the causal link between declining environmental satisfaction and deteriorating job satisfaction and productivity (Sundstrom, Town, Rice, Osborn, & Brill, 1994; Veitch, Charles, Farley, & Newsham, 2007; Wineman, 1982). Still other research studies attribute escalating Sick Building Syndrome (SBS) symptoms such as distress, irritation, fatigue, headache and concentration difficulties (Klitzman & Stellman, 1989; Pejtersen, Allermann, Kristensen, & Poulsen, 2006; Witterseh, Wyon, & Clausen, 2004) to open-plan office layout.

An extensive research literature consistently identifies noise and lack of privacy as the key sources of dissatisfaction in open-plan office layouts (Danielsson & Bodin, 2009; de Croon, Sluiter, Kuijer, & Frings-Dresen, 2005; Hedge, 1982). Firstly, studies based on either occupant surveys and laboratory experiment report that noise, in particular irrelevant but audible and intelligible speech from co-workers, disturbs and negatively affects individual performance on tasks requiring cognitive processing (Banbury & Berry, 2005; Haka et al., 2009; Smith-Jackson & Klein, 2009; Virjonen et al., 2007). The loss of productivity due to noise distraction estimated by self-rated waste of working time was doubled in open-plan offices compared to private offices, and the tasks requiring complex verbal process were more likely to be disturbed than relatively simple or routine tasks (Haapakangas, Helenius, Keekinen,

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http://dx.doi.org/10.1016/j.jenvp.2013.06.007

CONCLUSIÓN

"In general, satisfaction level with workspace environment was the highest for those in enclosed private offices. Significant discrepancy existed between occupant groups in private office and open-plan office on their perception of privacy, acoustics and proxemics. Distraction by noise and loss of privacy were identified as the major causes of workspace dissatisfaction in open-plan office layouts. Multiple regression analysis indicated that relative importance of different IEQ factors affecting occupants' overall assessment of their work environment was different for occupants of different office layouts. While the amount of individual space available was identified as the most important predictor of overall workspace satisfaction across all five office layouts, some other IEQ factors also showed noticeable differences in their implicit importance. 'Visual privacy' and 'noise level' received higher priorities by open-plan office occupants, whereas 'amount of light', 'ease of interaction' and 'comfort of furnishing' were more important to private office occupants.

Finally, our results categorically contradict the industry-accepted wisdom that open-plan layout enhances communication between colleagues and improves occupants' overall work environmental satisfaction.

This study showed that occupants' satisfaction on the interaction issue was actually higher for occupants of private offices with very low dissatisfaction rate (APD < 5%). Moreover, the increment of overall workspace satisfaction due to the positive impact of ease of interaction in open-plan office layouts failed to offset the decrements by negative impacts of noise and privacy. This implies that even though occupants are satisfied with interactions in open-plan layout, their overall workspace satisfaction will eventually decreased unless a certain level of privacy and acoustical quality are provided."

Link al paper

INVESTIGACIÓN Asociación entre la exposición al ruido ambiental y el rendimiento escolar de los niños que viven en un área urbana: un estudio poblacional transversal

Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 91, No. 2
doi:10.1007/s11524-013-9843-6

Association between Ambient Noise Exposure and School Performance of Children Living in An Urban Area: A Cross-Sectional Population-Based Study

Sophie Pujol, Jean-Pierre Levain, Hélène Houot, Rémy Petit, Marc Berthillier, Jérôme Defrance, Joseph Lardies, Cyril Masselot, and Frédéric Mauny

ABSTRACT *Most of the studies investigating the effects of the external noise on children's school performance have concerned pupils in schools exposed to high levels due to aircraft or freeway traffic noise. However, little is known about the consequences of the chronic ambient noise exposure at a level commonly encountered in residential urban areas. This study aimed to assess the relationship between the school performance of 8- to 9-year-old-children living in an urban environment and their chronic ambient noise exposure at home and at school. The children's school performances on the national standardized assessment test in French and mathematics were compared with the environmental noise levels. Children's exposure to ambient noise was calculated in front of their bedrooms (L_{den}) and schools ($L_{Aeq,day}$) using noise prediction modeling. Questionnaires were distributed to the families to collect potential confounding factors. Among the 746 respondent children, 586 were included in multilevel analyses. On average, the $L_{Aeq,day}$ at school was 51.5 dB (SD=4.5 dB; range=38–58 dB) and the outdoor L_{den} at home was 56.4 dB (SD=4.4 dB; range=44–69 dB). $L_{Aeq,day}$ at school was associated with impaired mathematics score (p=0.02) or impaired French score (p=0.01). For a+10 dB gap, the French and mathematics scores were on average lower by about 5.5 points. L_{den} at home was significantly associated with impaired French performance when considered alone ($p<10^{-3}$) and was borderline significant when the combined home-school exposure was considered (p=0.06). The magnitude of the observed effect on school performance may appear modest, but should be considered in light of the number of people who are potentially chronically exposed to similar environmental noise levels.*

KEYWORDS *Environmental noise exposure, Ambient noise, Children, School performance, Urban area*

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Professor Marc Berthillier died between the submission and the acceptance of this article.

RESUMEN

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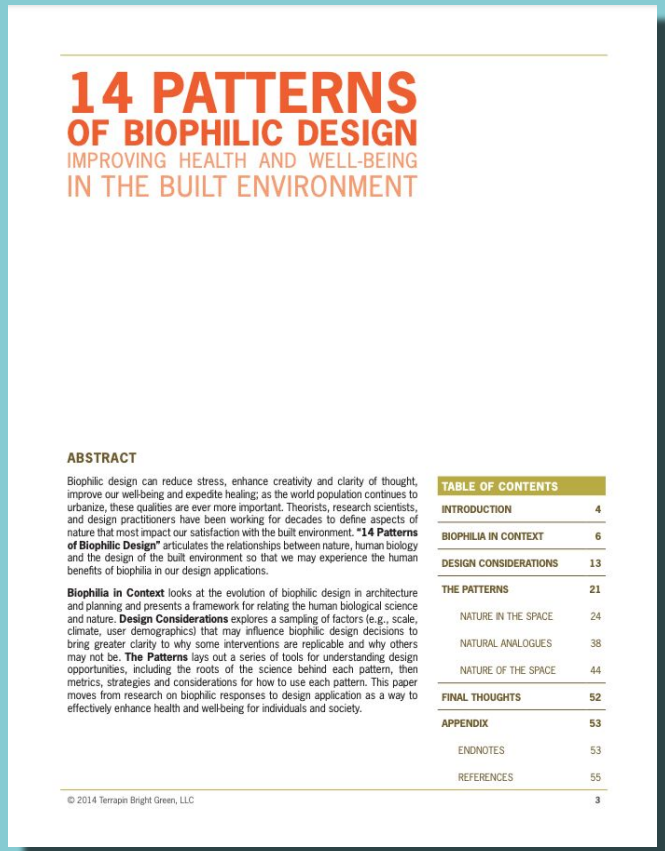
Link al paper

INVESTIGACIÓN 14 patrones de diseño biófilico: mejorando la salud y el bienestar en el entorno construido



14 PATTERNS
OF BIOPHILIC DESIGN
IMPROVING HEALTH AND WELL-BEING
IN THE BUILT ENVIRONMENT

ABSTRACT

Biophilic design can reduce stress, enhance creativity and clarity of thought, improve our well-being and expedite healing; as the world population continues to urbanize, these qualities are ever more important. Theorists, research scientists, and design practitioners have been working for decades to define aspects of nature that most impact our satisfaction with the built environment. **"14 Patterns of Biophilic Design"** articulates the relationships between nature, human biology and the design of the built environment so that we may experience the human benefits of biophilia in our design applications.

Biophilia in Context looks at the evolution of biophilic design in architecture and planning and presents a framework for relating the human biological science and nature. **Design Considerations** explores a sampling of factors (e.g., scale, climate, user demographics) that may influence biophilic design decisions to bring greater clarity to why some interventions are replicable and why others may not be. **The Patterns** lays out a series of tools for understanding design opportunities, including the roots of the science behind each pattern, then metrics, strategies and considerations for how to use each pattern. This paper moves from research on biophilic responses to design application as a way to effectively enhance health and well-being for individuals and society.

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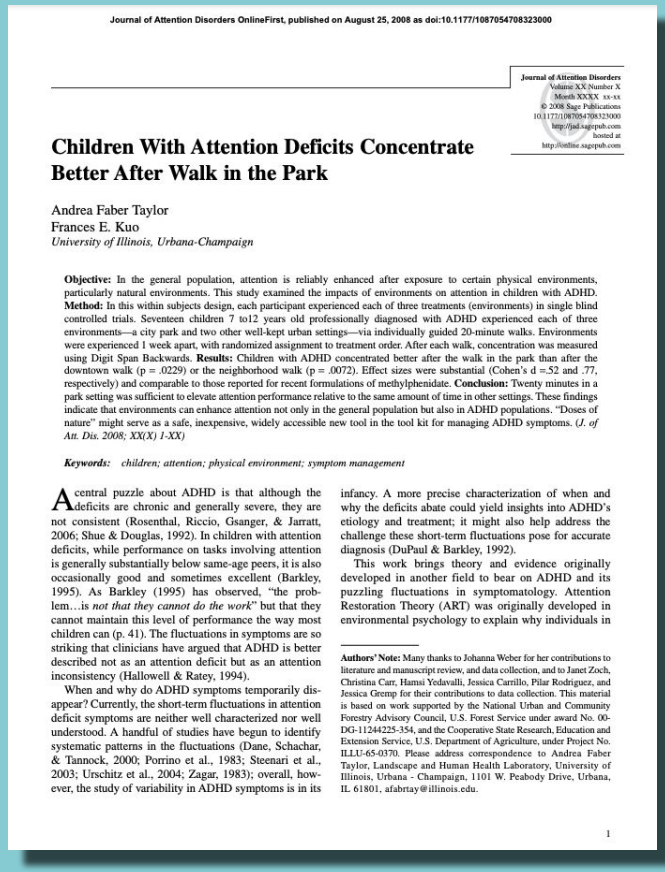
INVESTIGACIÓN Los niños con déficit de atención se concentran mejor después de dar un paseo en el parque



Journal of Attention Disorders OnlineFirst, published on August 25, 2008 as doi:10.1177/1087054708323000

Journal of Attention Disorders
Volume XX Number X
Month XXXX xx-xx

10.1177/1087054708323000
http://jad.sagepub.com
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Children With Attention Deficits Concentrate Better After Walk in the Park

Andrea Faber Taylor
Frances E. Kuo
University of Illinois, Urbana-Champaign

Objective: In the general population, attention is reliably enhanced after exposure to certain physical environments, particularly natural environments. This study examined the impacts of environments on attention in children with ADHD. **Method:** In this within subjects design, each participant experienced each of three treatments (environments) in single blind controlled trials. Seventeen children 7 to12 years old professionally diagnosed with ADHD experienced each of three environments—a city park and two other well-kept urban settings—via individually guided 20-minute walks. Environments were experienced 1 week apart, with randomized assignment to treatment order. After each walk, concentration was measured using Digit Span Backwards. **Results:** Children with ADHD concentrated better after the walk in the park than after the downtown walk ($p = .0229$) or the neighborhood walk ($p = .0072$). Effect sizes were substantial (Cohen's $d = .52$ and .77, respectively) and comparable to those reported for recent formulations of methylphenidate. **Conclusion:** Twenty minutes in a park setting was sufficient to elevate attention performance relative to the same amount of time in other settings. These findings indicate that environments can enhance attention not only in the general population but also in ADHD populations. "Doses of nature" might serve as a safe, inexpensive, widely accessible new tool in the tool kit for managing ADHD symptoms. (*J. of Att. Dis. 2008; XX(X) 1-XX)*

Keywords: *children; attention; physical environment; symptom management*

A central puzzle about ADHD is that although the deficits are chronic and generally severe, they are not consistent (Rosenthal, Riccio, Gsanger, & Jarratt, 2006; Shue & Douglas, 1992). In children with attention deficits, while performance on tasks involving attention is generally substantially below same-age peers, it is also occasionally good and sometimes excellent (Barkley, 1995). As Barkley (1995) has observed, "the problem…is *not that they cannot do the work*" but that they cannot maintain this level of performance the way most children can (p. 41). The fluctuations in symptoms are so striking that clinicians have argued that ADHD is better described not as an attention deficit but as an attention inconsistency (Hallowell & Ratey, 1994).

When and why do ADHD symptoms temporarily disappear? Currently, the short-term fluctuations in attention deficit symptoms are neither well characterized nor well understood. A handful of studies have begun to identify systematic patterns in the fluctuations (Dane, Schachar, & Tannock, 2000; Porrino et al., 1983; Steenari et al., 2003; Urschitz et al., 2004; Zagar, 1983); overall, however, the study of variability in ADHD symptoms is in its infancy. A more precise characterization of when and why the deficits abate could yield insights into ADHD's etiology and treatment; it might also help address the challenge these short-term fluctuations pose for accurate diagnosis (DuPaul & Barkley, 1992).

This work brings theory and evidence originally developed in another field to bear on ADHD and its puzzling fluctuations in symptomatology. Attention Restoration Theory (ART) was originally developed in environmental psychology to explain why individuals in

Authors' Note: Many thanks to Johanna Weber for her contributions to literature and manuscript review, and data collection, and to Janet Zoch, Christina Carr, Hamsi Yedavalli, Jessica Carrillo, Pilar Rodriguez, and Jessica Gremp for their contributions to data collection. This material is based on work supported by the National Urban and Community Forestry Advisory Council, U.S. Forest Service under award No. 00-DG-11244225-354, and the Cooperative State Research, Education and Extension Service, U.S. Department of Agriculture, under Project No. ILLU-65-0370. Please address correspondence to Andrea Faber Taylor, Landscape and Human Health Laboratory, University of Illinois, Urbana - Champaign, 1101 W. Peabody Drive, Urbana, IL 61801, afabrtay@illinois.edu.

RESUMEN

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Link al paper

INVESTIGACIÓN Efectos de los jardines escolares en estudiantes y escuelas: conceptualización y consideraciones para maximizar el desarrollo saludable

The Effects of School Gardens on Students and Schools: Conceptualization and Considerations for Maximizing Healthy Development

Emily J. Ozer, PhD

There are thousands of school gardens in the United States, and there is anecdotal evidence that school garden programs can enhance students' learning in academic, social, and health-related domains. There has been little rigorous research, however, on the effects of school gardens or on the factors that promote the sustainability of these programs. This review draws on ecological theory to conceptualize school gardens as systemic interventions with the potential for promoting the health and well-being of individual students in multiple interdependent domains and for strengthening the school environment as a setting for positive youth development. This review (a) summarizes the small literature regarding the impact of school garden curricula on student or school functioning, (b) provides a conceptual framework to guide future inquiry, (c) discusses implications of this conceptualization for practice, and (d) suggests further research needed to better inform practice.

Keywords: *school gardens; youth; health; youth development*

Historical and Policy Context

There is a growing U.S. movement for the "greening" of schoolyards through gardens at school sites, and much enthusiasm for the potential of garden-based learning in promoting healthy youth development. There are multiple rationales for the value of schools gardens, chiefly as outdoor "learning laboratories," as aesthetically pleasing spaces for children to play, and, most recently, as places to promote the consumption of fresh produce among a youth population with markedly elevated rates of obesity and type 2 diabetes (Hedley et al., 2004). In the late 1990s, Delaine Eastin, then California's Superintendent for Public Instruction, called for "a garden in every school." State legislation was passed that set aside small start-up funds for schools interested in planting instructional gardens that included teaching and practice of sustainable waste-management techniques such as composting and recycling. There are now estimated to be more than 2,000 school gardens in the state of California being used for academic

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The author gratefully acknowledges the helpful perspectives on school garden projects provided by many individuals including Arden Bucklin-Sporer, Eddy Jara, Karin Morris, Delaine Eastin, Katherine Ozer, Ann Evans, Beebo Turman, Rivka Mason, Beverly Koenig and Heidi Jenkins of the Rooftop Alternative School, Narda Harrington, Rebecca Bozzelli, Abby Rosenheck, Chelsea Chapman, and Kristin Bijur.

Health Education & Behavior, Vol. 34 (6): 846-863 (December 2007)
DOI: 10.1177/1090198106289002

RESUMEN

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INVESTIGACIÓN La influencia de la altura del techo: El efecto del priming en el tipo de procesamiento que las personas utilizan

The Influence of Ceiling Height: The Effect of Priming on the Type of Processing That People Use

JOAN MEYERS-LEVY
RUI (JULIET) ZHU*

This article demonstrates that variations in ceiling height can prime concepts that, in turn, affect how consumers process information. We theorized that when reasonably salient, a high versus low ceiling can prime the concepts of freedom versus confinement, respectively. These concepts, in turn, can prompt consumers' use of predominately relational versus item-specific processing. Three studies found support for this theorizing. On a variety of measures, ceiling height–induced relational or item-specific processing was indicated by people's reliance on integrated and abstract versus discrete and concrete ideation. Hence, this research sheds light on when and how ceiling height can affect consumers' responses.

There appears to be widespread belief that ceiling height can affect the quality of indoor consumption experiences. Fischl and Gärling (2004) found that ceiling height ranked among the top three architectural details that influenced consumers' psychological well-being. Much anecdotal evidence also supports this view. A home development company that uses design ideas inspired by the guru of transcendental meditation maintains that homes with higher ceilings induce clearer and improved thinking, more energy, and better health among residents (Bivins 1997). Airplane manufacturers seem to concur that higher ceilings can enhance consumers' consumption experience, even if the increased height is only illusory. Such manufacturers use numerous techniques to engender the illusion of increased vertical space or volume in plane interiors, including repositioning overhead baggage bins, installing gently arched illuminated ceiling panels, and affixing wavy mirrors on the bulkheads beneath overhead storage bins (Lunsford and Michaels 2002).

Despite such anecdotal evidence that ceiling height exerts a critical influence on consumers, we were unable to uncover any theory or research that explains how, when, and why ceiling height might exert an effect. This article seeks to address this issue by investigating the thesis that ceiling height may affect the very manner in which consumers process information and thus how they respond to products. To illustrate, suppose that you were shopping for a sleek new coffee-table and paused to evaluate how sleek one of the contenders truly appeared to be. We propose that different types of concepts might be activated or primed by the showroom ceiling if it were relatively high, as it tends to be in most contemporary mall stores, versus low, as it is in most strip mall shops and outlet centers. Relatively high ceilings may prime thoughts related to freedom, whereas lower ceilings may prompt those that pertain to confinement. We suggest that, in turn, these alternative concepts may affect the particular manner in which consumers process information, namely, whether they rely on relational or item-specific processing. Finally, the type of processing that is used could alter how consumers elaborate and ultimately evaluate the table's features.

The preceding notion that ceiling height might prime certain concepts or networks of associations that then affect how people process product information is quite novel. Clearly, it is well established that exposure to particular objects can prime concepts that are related to them (e.g., Aarts and Dijksterhuis 2003; Garcia et al. 2002) and that the heightened accessibility of such primed concepts can spill over and affect people's perceptions or even their overt behaviors (Bargh, Chen, and Burrows 1996; Mandel 2003). However, it is typically assumed that such effects occur

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John Deighton served as editor and Gavan Fitzsimons served as associate editor for this article.

Electronically published June 1, 2007

RESUMEN

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INVESTIGACIÓN Instalaciones educativas para el siglo XXI: Análisis de investigación y patrones de diseño

EDUCATIONAL FACILITIES FOR THE TWENTY-FIRST CENTURY: RESEARCH ANALYSIS AND DESIGN PATTERNS

Gary T. Moore and Jeffery A. Lackney

ABSTRACT

There is a crisis in education in the United States and in many other industrialized nations--*and* in the infrastructure of school buildings. This monograph examines in detail empirical studies of the building/performance issue and presents an ecological model to summarize the data and bring some clarity to the issues involved. The heart of the monograph is a process for developing design patterns and a presentation in detail of 27 design patterns developed to respond to the empirical literature and to the educational reform movement that suggest ways in which school buildings can better support educational performance. The monograph illustrates a prototypical design that grows out of the patterns, suggests needed new directions for empirical investigation, and offers a critique and reconceptualization of educational facility planning models. The research behind this monograph has been funded by the Johnson Foundation and Scholastic, Inc., with additional support from the Building Research Board of the National Academy of Sciences. Pp. viii + 90; illustrated.

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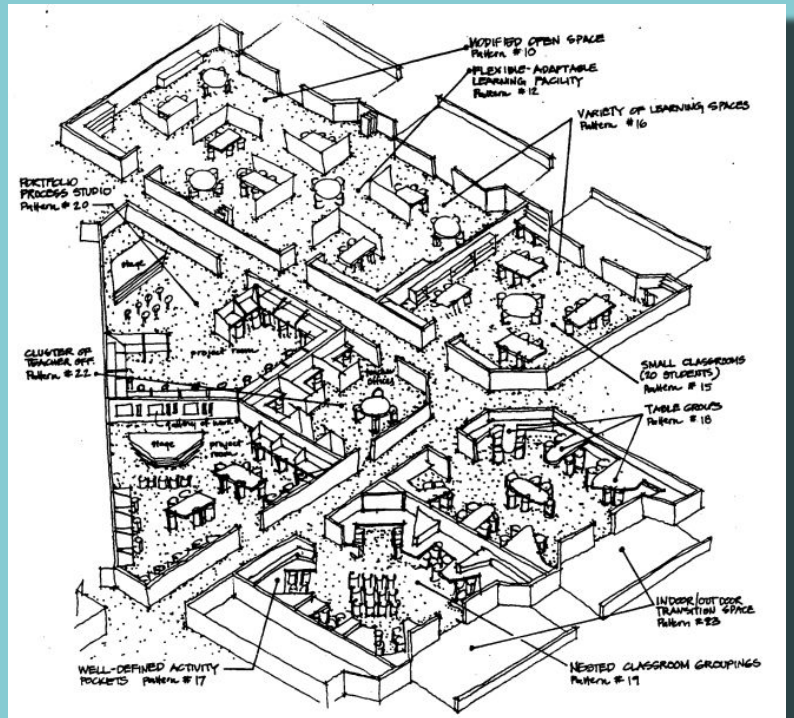

Figure 7.1. Prototype design for the new schoolhouse: Team suite / cluster of classrooms.

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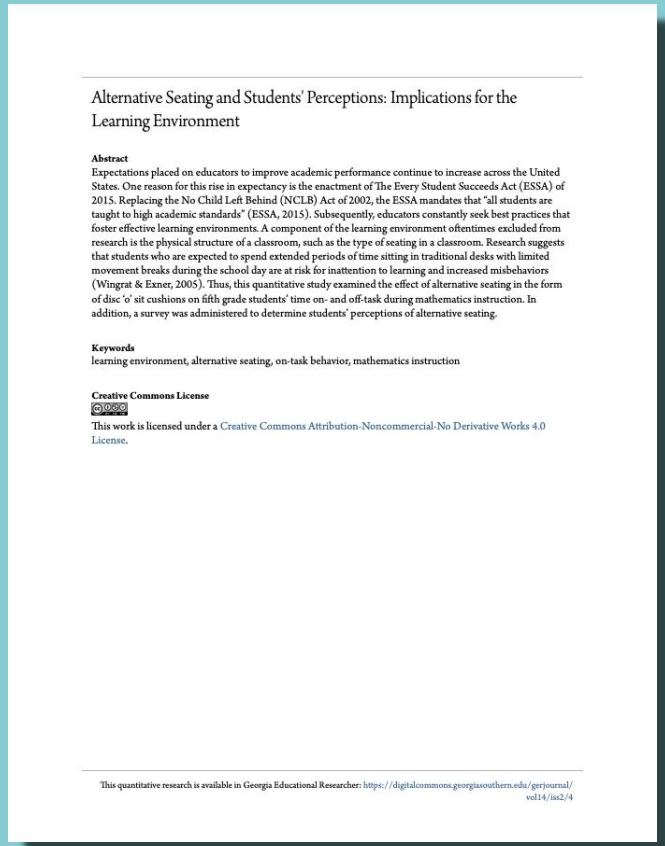
INVESTIGACIÓN Asientos alternativos y percepciones de los estudiantes: Implicaciones para el entorno de aprendizaje



Alternative Seating and Students' Perceptions: Implications for the Learning Environment

Abstract
Expectations placed on educators to improve academic performance continue to increase across the United States. One reason for this rise in expectancy is the enactment of The Every Student Succeeds Act (ESSA) of 2015. Replacing the No Child Left Behind (NCLB) Act of 2002, the ESSA mandates that "all students are taught to high academic standards" (ESSA, 2015). Subsequently, educators constantly seek best practices that foster effective learning environments. A component of the learning environment oftentimes excluded from research is the physical structure of a classroom, such as the type of seating in a classroom. Research suggests that students who are expected to spend extended periods of time sitting in traditional desks with limited movement breaks during the school day are at risk for inattention to learning and increased misbehaviors (Wingrat & Exner, 2005). Thus, this quantitative study examined the effect of alternative seating in the form of disc 'o' sit cushions on fifth grade students' time on- and off-task during mathematics instruction. In addition, a survey was administered to determine students' perceptions of alternative seating.

Keywords
learning environment, alternative seating, on-task behavior, mathematics instruction

This quantitative research is available in Georgia Educational Researcher: https://digitalcommons.georgiasouthern.edu/gerjournal/vol14/iss2/4

Conclusion

"In summary, this study adds to the limited, albeit growing body of knowledge that supports the benefits of alternative seating in the classroom. As one of the leading contributors to effective teaching and learning, time on- task is an imperative topic of research for educators.

Results of the present study indicated that physical factors of the learning environment, inclusive of alternative seating have a positive impact on time on-task. However, further research might examine disc 'o' sit cushions within different academic subjects and/or across different grade levels. Thus, there are further questions left to be answered that may reveal additional benefits of alternative seating for students in the academic classroom."

link al paper

INVESTIGACIÓN Asignación de atención en entornos de aula: Consecuencias para el aprendizaje

Allocation of Attention in Classroom Environments: Consequences for Learning

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Abstract

The current study investigates how young children allocate their attention in learning environments. Prior research has shown that elementary school students spend between 25% and 50% of instructional time off-task. However, the available research has not clearly identified the common sources of distraction, nor specified the relationship between the distraction source and learning outcomes. In this study we examined how visual features of the environment which are not relevant for on-going instruction (e.g., manipulatives, posters, artwork, maps, etc.) affect young children's ability to maintain focused attention to the content of a lesson. We addressed this question by experimentally manipulating our laboratory classroom environment (e.g., introducing or removing educational materials irrelevant to the current lesson). The effects of the manipulation on children's off-task behavior and learning were measured. Results suggested that children in the Low Visual Distraction condition spent less time off-task and obtained higher learning scores than children in the High Visual Distraction condition.

Keywords: Off-Task Behavior. Learning. Attention. Classroom Environment.

Introduction

Off-task behavior is a serious challenge that educational practitioners face on a daily basis. Indeed prior research has shown that elementary students spend between 25% and 50% of instructional time off-task (Karweit & Slavin, 1981). Off-task behavior is believed to be problematic as it potentially limits students' learning opportunities by reducing instructional time (Carroll 1963; Bloom, 1976). Although previous literature has documented that off-task behavior is common in educational settings, it remains unclear what children are doing while off-task as behavior is often coded as a binary variable (i.e., on-task vs. off-task). Thus, one of the goals of the present study was to identify common sources of distraction in kindergarten classroom environments and to evaluate consequences of off-task behavior for learning.

There is reason to believe that the ability to maintain focused attention during on-going instruction is more difficult for younger children than older children. In particular, research indicates that children's susceptibility to distracters decreases with age while focused attention improves (Ruff & Rothbart, 1996; Ruff & Capozzoli, 2003). Furthermore, children's ability to utilize selective attention strategies continues to develop throughout middle-childhood (DeMarie-Dreblow & Miller, 1988). Thus, with age children are increasingly able to efficiently and flexibly allocate their attentional resources.

Of particular interest for the present study was the role of the classroom visual environment in attention allocation and learning. There are two key reasons to examine this factor. First, the relationship between current practices in the design of classroom visual environments and student age is somewhat paradoxical. As stated above, it is well-documented that distractibility decreases markedly with age (Ruff & Rothbart, 1996). However, younger learners (e.g., kindergarten and elementary school students) are often presented with learning environments containing greater amounts of potential sources of visual distraction (e.g., art work, posters, alphabet charts, etc.; see Figure 1 for an example) than the learning environments of older students. Thus, it is an empirical question as to whether educational materials that are not directly relevant to the ongoing instruction present a distraction for young learners. And if so, does off-task behavior related to the classroom visual environment affect learning outcomes?

The second key reason to focus on the classroom visual environment is its malleability. If the classroom visual environment is found to influence allocation of attention and learning outcomes, then it may be possible to design classrooms that are optimally suited to promote focused attention and learning.

Off-Task Behavior

Prior research examining the frequency with which students engage in off-task behavior have estimated that children spend between 25% and 50% of their time off-task in regular education classrooms (Karweit & Slavin, 1981). Despite the significant amount of time spent off-task, there is limited research identifying which sources of distraction pose a heavy burden on young learners' ability to maintain focused attention during instruction.

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CONCLUSIÓN

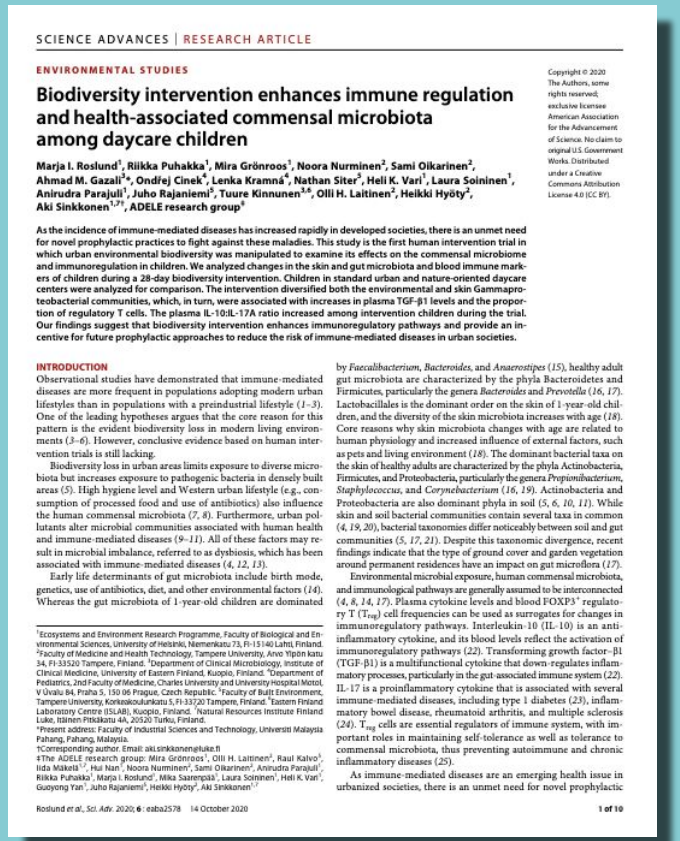
"A number of previous studies have established a relationship between time-on-task and learning outcomes; however, this study is the first (to our knowledge) to experimentally induce lower or higher levels of off-task behavior and observe corresponding changes in learning outcomes. At the same time, many important questions remain to be answered. Further research is needed to examine whether time-off-task mediates learning outcomes, whether children habituate to static visual environments, and whether the classroom visual environment in naturalistic settings pose a challenge to children's attention allocation and learning (although this is far from a comprehensive list of unanswered questions).

Nevertheless, the present study suggests that the classroom visual environment may in principle play a role in how children allocate their attention during instruction. The results from this study provide a foundation to explore more fully the practical implications of this line of work as our results point toward the possibility that some of children's attention can be redirected to the teacher by mitigating environmental distractions. The development of attention regulation in educational settings is an area of research which warrants further inquiry.

This research may lead to design of learning environments that reduce attentional burden and promote allocation of attentional resources toward learning."

link al paper

INVESTIGACIÓN La iantervención en la biodiversidad mejora la regulación inmunológica



SCIENCE ADVANCES | RESEARCH ARTICLE

ENVIRONMENTAL STUDIES

Biodiversity intervention enhances immune regulation and health-associated commensal microbiota among daycare children

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As the incidence of immune-mediated diseases has increased rapidly in developed societies, there is an unmet need for novel prophylactic practices to fight against these maladies. This study is the first human intervention trial in which urban environmental biodiversity was manipulated to examine its effects on the commensal microbiome and immunoregulation in children. We analyzed changes in the skin and gut microbiota and blood immune mark-ers of children during a 28-day biodiversity intervention. Children in standard urban and nature-oriented daycare centers were analyzed for comparison. The intervention diversified both the environmental and skin Gammapro-teobacterial communities, which, in turn, were associated with increases in plasma TGF-β1 levels and the propor-tion of regulatory T cells. The plasma IL-10:IL-17A ratio increased among intervention children during the trial. Our findings suggest that biodiversity intervention enhances immunoregulatory pathways and provide an in-centive for future prophylactic approaches to reduce the risk of immune-mediated diseases in urban societies.

INTRODUCTION

Observational studies have demonstrated that immune-mediated diseases are more frequent in populations adopting modern urban lifestyles than in populations with a preindustrial lifestyle (*1*–*3*). One of the leading hypotheses argues that the core reason for this pattern is the evident biodiversity loss in modern living environments (*3*–*6*). However, conclusive evidence based on human intervention trials is still lacking.

Biodiversity loss in urban areas limits exposure to diverse microbiota but increases exposure to pathogenic bacteria in densely built areas (*5*). High hygiene level and Western urban lifestyle (e.g., consumption of processed food and use of antibiotics) also influence the human commensal microbiota (*7*, *8*). Furthermore, urban pollutants alter microbial communities associated with human health and immune-mediated diseases (*9*–*11*). All of these factors may result in microbial imbalance, referred to as dysbiosis, which has been associated with immune-mediated diseases (*4*, *12*, *13*).

Early life determinants of gut microbiota include birth mode, genetics, use of antibiotics, diet, and other environmental factors (*14*). Whereas the gut microbiota of 1-year-old children are dominated by *Faecalibacterium*, *Bacteroides*, and *Anaerostipes* (*15*), healthy adult gut microbiota are characterized by the phyla Bacteroidetes and Firmicutes, particularly the genera *Bacteroides* and *Prevotella* (*16*, *17*). Lactobacillales is the dominant order on the skin of 1-year-old children, and the diversity of the skin microbiota increases with age (*18*). Core reasons why skin microbiota changes with age are related to human physiology and increased influence of external factors, such as pets and living environment (*18*). The dominant bacterial taxa on the skin of healthy adults are characterized by the phyla Actinobacteria, Firmicutes, and Proteobacteria, particularly the genera *Propionibacterium*, *Staphylococcus*, and *Corynebacterium* (*16*, *19*). Actinobacteria and Proteobacteria are also dominant phyla in soil (*5*, *6*, *10*, *11*). While skin and soil bacterial communities contain several taxa in common (*4*, *19*, *20*), bacterial taxonomies differ noticeably between soil and gut communities (*5*, *17*, *21*). Despite this taxonomic divergence, recent findings indicate that the type of ground cover and garden vegetation around permanent residences have an impact on gut microflora (*17*).

Environmental microbial exposure, human commensal microbiota, and immunological pathways are generally assumed to be interconnected (*4*, *8*, *14*, *17*). Plasma cytokine levels and blood FOXP3$^+$ regulatory T (T_{reg}) cell frequencies can be used as surrogates for changes in immunoregulatory pathways. Interleukin-10 (IL-10) is an anti-inflammatory cytokine, and its blood levels reflect the activation of immunoregulatory pathways (*22*). Transforming growth factor–β1 (TGF-β1) is a multifunctional cytokine that down-regulates inflammatory processes, particularly in the gut-associated immune system (*22*). IL-17 is a proinflammatory cytokine that is associated with several immune-mediated diseases, including type 1 diabetes (*23*), inflammatory bowel disease, rheumatoid arthritis, and multiple sclerosis (*24*). T_{reg} cells are essential regulators of immune system, with important roles in maintaining self-tolerance as well as tolerance to commensal microbiota, thus preventing autoimmune and chronic inflammatory diseases (*25*).

As immune-mediated diseases are an emerging health issue in urbanized societies, there is an unmet need for novel prophylactic

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RESUMEN

"As the incidence of immune-mediated diseases has increased rapidly in developed societies, there is an unmet need for novel prophylactic practices to fight against these maladies. This study is the first human intervention trial in which urban environmental biodiversity was manipulated to examine its effects on the commensal microbiome and immunoregulation in children. We analyzed changes in the skin and gut microbiota and blood immune mark-ers of children during a 28-day biodiversity intervention. Children in standard urban and nature-oriented daycare centers were analyzed for comparison. The intervention diversified both the environmental and skin Gammapro-teobacterial communities, which, in turn, were associated with increases in plasma TGF-1 levels and the propor-tion of regulatory T cells. The plasma IL-10:IL-17A ratio increased among intervention children during the trial. Our findings suggest that biodiversity intervention enhances immunoregulatory pathways and provide an in-centive for future prophylactic approaches to reduce the risk of immune-mediated diseases in urban societies."

link al paper

INTEDU

Anexo I

Retos

R1. Que los espacios co–evolucionen con las metodologías

R2. Que docentes, estudiantes y familias abracen la transformación de espacios como un paso hacia delante en la mejora del sistema educativo

R3. Que INTEDU no sea un caso aislado, sino que sea la palanca de cambio para transformar espacios de secundaria en otras regiones de España

R4. Que estudiantes y profesores del centro transformado lleven el mensaje a otros agentes de la comunidad educativa

R5. Que la transformación del espacio esté acompañada por una toma de conciencia del impacto que el espacio construido tiene en la salud de sus habitantes

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Anexo II

Oportunidades

O1. Creación de un catálogo de estrategias de diseño para escenarios de aprendizaje enfocados a adolescentes del SXXI

O2. Desarrollo de una rama del interiorismo específica para el diseño de espacios de aprendizaje

O3. Entrevista en RRSS para conocer las necesidades “reales” del usuario (docentes y estudiantes) en España

O4. Llevar la metodología INTEDU a otros espacios del centro

O5. Trasladar la metodología INTEDU a otros registros de aprendizaje (Bachillerato / Universidad e incluso espacio de trabajo)

O6. Dar a conocer este proyecto de acción-investigación a diferentes organismos a nivel nacional e internacional, por su carácter innovador y humano.

O7. Recuperar la confianza en el sistema educativo como ente que acompaña y evoluciona, por nuestros adultos del futuro

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Anexo III

Aprendiendo de los docentes con vocación

Docentes de todo el mundo transforman sus aulas con sus propios medios

Se cierra este informe de tendencias con una reflexión

Hay docentes de todo el mundo que han transformado la forma de dar clase, formándose y adquiriendo nuevos materiales pedagógicos. El cambio metodológico es una realidad global. La transformación de los espacios no está siguiendo este avance y los docentes están ya transformando las aulas con sus medios. Aprendamos también de los profesionales de la educación, que viven el día a día de sus aulas, y facilitemos el avance hacia espacios educativos más conectados con estudiantes y docentes.

La clase de Nichole Murray

La clase de Emily Polak

Un proyecto de

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