DesignShare
DESIGNING FOR THE FUTURE OF LEARNING

Search

go

news

The 2007 Awards jury w
projects from June 1 thr
July. Find out more abou
Winners will be announc

"Skulls and School Boxes: Student Brains That Want Out"

"School environments should be designed to enhance the development of student brains – and student brains are about movement, not motionless stagnation." — Bob Sylwester

*****

"Skulls and School Boxes: Student Brains That Want Out"

by Robert Sylwester, Emeritus Professor of Education, University of Oregon

> Note: This article was adapted from his forthcoming book, *The Adolescent Brain: Reaching for Autonomy* (Corwin Press, February 2007)

*****

The planning, regulation, and prediction of movements are the principal reasons for a brain. Plants are as biologically successful as animals, but they don't have a brain. An organism that's not going anywhere of its own volition doesn't need a brain. It doesn't even need to know where it is. What's the point? Being an immobile plant does have its advantages however. Plants don't have to get up every day and go to work because they're already there.

On the other hand, if an organism has legs, wings, or fins, it needs a sensory system that will inform it about here and there, a make-up-its-mind system to determine whether here is better than there or there is better than here, and a motor system to get it to there if that's the better choice – as it is, alas, when we have to go to work.

Human movement isn't limited to the physical movement of our leg/foot/toe system. We can also use our arm/hand/finger system to grasp and throw, and our neck/face/mouth system to rhythmically activate the stream of air molecules that will move thoughts from our brain into the ears and brains of others. So speech and song are also forms of human movement – and computers

WANT TO PUBLISH?

SEARCH PUBLICATI

- MOST RECENT
- MOST RECENT
- MOST POPULA
- By AUTHORS/I
- By TOPIC
- By TYPE
- Key Blog Entrie
- "Letters to a Y Designer" * ***Co***
- "Kids' Point of ***Soon*** *
- ALL of the ABC

DesignShare publicatio
by designers, universit
architects, planning co
educators, technologis
ecologists. Publications
detailed case studies,
proceedings, interview
research, editorials, th
practical design guideli

WANT TO PUBLISH?

User Tools

Register
Login

have further increased our communicative possibilities. The arts add aesthetic qualities to mobility by encouraging us to move with style and grace: to dance and prance, to sculpt and strum, to play a trumpet and trumpet a play.

We also move psychologically, such as when we leave childhood and reach for adult autonomy, move from being single into bonded relationships, and move from being unemployed to employed. We've also added and improved on many technological extensions to supplement the limitations of biological movement – from wagons to automobiles, ladders to escalators, mail to email, and spears to guns.

So to be human is to move in many different ways – from the ritual movements associated with conception at the beginning of life to those associated with burial at the end.

Further, individual and mass movements are central to the history of most religious and cultural groups. The Biblical departure from the Garden of Eden and the Jewish Exodus from Egypt, Mohammed's journey from Mecca to Medina, and the Mormon trek to Utah are notable examples — but so are the Odyssey, Moby Dick, the Columbus and Lewis and Clark expeditions, and every journey through life.

Movement occurs internally as well as externally. Our heart beats and our lungs expand and contract. Blood and nutrients flow through our circulatory system. Food moves through our 30-foot long digestive tube. Neurotransmitters move across the synaptic gap. Viral and bacterial invaders move throughout our body. Hair and nails extend. What's amazing is that our brain regulates all such internal and external movements, and predicts and responds to the movements of others and objects. When movement stops, we die.

Teachers who continually require students to sit still and stop talking apparently prefer to teach a grove of trees rather than a classroom full of students.

Mirror Neurons

But how do we initially activate and then master specific conscious movements? The recent dramatic discovery of the mirror neuron system explains key elements of the process. Mirror neurons in our brain's motor regulation regions prime nearby motor neurons to activate sequentially when we carry out a conscious movement (such as a smile or a handshake) — but they also activate when we observe another person carry out that action. In effect, they create a mental template within our brain of the related neural activity that's occurring within the brain of the person we're observing.

The development of a smoothly controlled motor system is a major childhood priority, and it must begin to develop in infancy without much formal instruction. If you thus stick out your tongue at an observant infant shortly after birth, the probability is high that she will reciprocate the behavior, because her mirror neurons will sequentially activate the motor neurons that then project her tongue. If we adults see someone yawning, we similarly experience the impetus to yawn. We may stifle the yawn, but infants who have to master many movements typically mimic anything they observe. Baby see; baby do.

Mirror neurons won't respond to the mere observation of a leg, hand, or mouth – only when it's carrying out a goal directed action. Further, they will respond to a hand but not to a tool that's grasping or moving an object (since body movement systems and not tools are represented in our motor areas).

Mirror neurons thus facilitate the preliminary simulation, priming, programming, and rehearsing of motor neurons that occurs throughout life, and this process obviously enhances our eventual mastery of complex motor behaviors, and (as suggested above) our ability to read the minds of others – to predict movements. For example, inferring the potential movements of others is essential in avoiding approaching pedestrians, in the complementary movements of dance partners, and in faking out opponents in many games. Mirror neuron stimulation may also explain why so many people enjoy observing virtuoso athletes, dancers, and musicians. It allows us to mentally represent masterful movements that we can’t physically mimic. Note the body language of former athletes observing a game as they mimic the actions of the athletes.

Scientists are also exploring the relationship between mirror neuron activity and our ability to imagine our own planned actions, be empathetic, and develop articulate speech by merely hearing it. A preliterate child’s mirror neuron system seemingly activates the same speech mechanisms that the speaker activates. Speech involves very complex movements, and so infants can only babble initially within a verbal environment, but they eventually develop articulate speech.

When we observe someone in the initial stages of a movement sequence, such as when a diner picks up a knife and fork, we can usually infer the subsequent actions because our brain is mirroring the movement sequence and so knows what will occur next. When a speaker stops mid-sentence, we can often complete the sentence.

Mirror neurons will probably help to explain many childhood teaching and learning mysteries in which modeling provides young people with an effective behavioral pattern to follow – and to help explain disabilities (such as autism) in which children can’t read the minds of others or speak effectively.

Adolescents spend much of their time observing and mimicking the movements of others, so it’s like starting anew. In infancy, they mirrored the movements of their parents who introduced them to human life, and now in adolescence they mirror the movements of the peers who will accompany them into adult life.

Our search for the meaning and nurturing of childhood and adolescence must thus begin with the organization and extended development of the maturing brain that regulates our long, sometimes-awkward, but always-fascinating journey into an autonomous adulthood. When children and adolescents aren’t asleep, they’re typically on the go – even when they’re not sure of their destination.

Students Within a School Box

School environments should be designed to enhance the development of student brains – and student brains are about movement, not motionless stagnation. But as suggested above, 21st century movement involves more than physical movement, since it now encompasses cyberspace movement and status shifts, and it’s integral to the arts and humanities – and probably to a lot of other exciting things that are awaiting discovery.

It’s kind of weird. A traditional school building is like a tree, rooted in place – but its function is to develop brains that are committed to movement.

It's something that's biologically important for building committees and architects to ponder.

*****

Bio:

Robert Sylwester is an Emeritus Professor of Education at the University of Oregon who focuses on educationally significant developments in the cognitive neurosciences. His most recent books are How to Explain a Brain: An Educator's Handbook of Brain Terms and Cognitive Processes (Corwin Press, 2005), and A Biological Brain in a Cultural Classroom: Enhancing Cognitive and Social Development Through Collaborative Classroom Management (Corwin Press, 2003, second edition). He writes a monthly column for Brain Connection (www.brainconnection.com).

This article was adapted from his forthcoming book, *The Adolescent Brain: Reaching for Autonomy* (Corwin Press, February 2007)

Reader remarks:

- "Excellent advice on dealing with young people. I wish I'd had this book when my own children were adolescents!"
  —Patricia Wolfe, International Educational Consultant, Mind Matters, Inc.
- "Written in a reader-friendly manner, the book thoughtfully examines the transition period from childhood to adulthood and combines scholarship from psychology, education, and neuroscience. Loved the graphics!"
  —Sheryl Feinstein, Associate Professor, Augustana College
- "Readers will leave this book with a sense of calmness about living or working with adolescents."
  —Bob Patterson, Training Manager, Discovery Education

Contact:

He can be reached at bobsyl@uoregon.edu

PRINT

Permalink