

Everyone who uses an iPhone is part of an adaptive learning system. The addition of fingerprint and face recognition features are two examples of the way technologies are evolving. This two-way learning process is called adaptive learning and people are not the only ones with a capacity to do it. Today,

Adaptive Learning Systems in Sensory Processing

Janice Ryan, OT, HSDP

we have technologies that are capable of adaptive learning. An iPhone and its user, together make one adaptive learning system.

A Sensory-Friendly Network of Practitioners is now using adaptive learning systems to help people overcome sensory processing challenges. We are using technologies that are designed to set the emotional stage for more self-regulated, situational decision-making and better learning. We are using adaptive learning systems to make lives better for people of all ages and with many diagnoses who are suffering from anxiety, depression, or challenging behaviors due to sensory sensitivities. Now let me introduce you to the real-world benefits of using technology to help people overcome sensory processing challenges.



Photo used with permission by Attunement Solutions. Therapeutic Multi-sensory Environment designed and approved by AAMSE Founder and past-trainer, Linda Messbauer, OT. Multi-Sensory Environment Equipment provided by Southpaw, Inc. Photo provided by Janice Ryan OT, HSDP

A Little Bit of Science

Inner sense perception, or interoception, contributes heavily to the feelings we now call emotional regulation, or its opposite, called emotional dysregulation. Inner sense perception is important for setting the emotional stage for adaptive learning. Inner sense perception tells each of us how to behave at school or work. It helps us know how to behave differently at a formal than a casual event. Inner sense perception gives us that self-assured voice of experience. It also gives us that fear-based feeling when we hear someone rapidly approach us from behind while walking alone on a dark street.

Research now shows that unwanted emotional triggers can develop whenever we have a negative experience. In the past, researchers



Photo used with permission by RoboKind. Photo taken in Arrington Nelson County, VA. Photo provided by Janice Ryan OT, HSDP

believed it took a lot to develop a trauma response, but now we know it happens to all of us. Negative daily experiences create fear-based behavior patterns and those can be enhanced in people with sensory

processing challenges. Since we know it happens to all of us, we now realize that fast, reactive thinking is a natural outcome of chronic stress. This is one reason humans need technology to help us overcome the negative behavior patterns that can develop in classrooms, healthcare, and dentistry practices when sensory differences are unrecognized.

Adaptive Learning Systems for Sensory-Friendly Classrooms

Although not the only special needs population to benefit from stress-reduction strategies that consider sensory sensitivities, people on the autism spectrum have been shown through research to benefit from adaptive learning systems that turn robots into teachers. Robot teachers seem to increase adaptive learning in people on the

autism spectrum who feel stress when they work with humans. By calming elevated inner sense perceptions, students with autism can learn better in their challenging areas such as con-

important when students are working with knowledge that they experience as difficult to understand. Sometimes these students have a learning disability, but often, they are just



versational skills or face reading and mirroring of emotions. After mastering social skills with robots, new adaptive learning can be practiced with other people.

Adaptive learning systems that personalize lessons based on student interests and familiar life contexts have been shown to improve classroom efficiency. This is especially

perfectionists and experience inner stress because they view themselves as underperforming. Intelligent Tutoring Systems (ITS) can be used with these students to put difficult concepts into real life experiences and personally meaningful processes. Research has shown for example, that personal interest increases student attention to reading math word problems, leading



“
An appropriate adaptive learning system might include the practitioner avoiding light touch and using a Story Board to help the patient anticipate what’s next.”

to greater problem-solving persistence and better learning.

Adaptive Learning Systems for Sensory-Friendly Healthcare & Dentistry

Four sensory processing patterns have been identified as contributors to behavior challenges when people are in contexts that they perceive as threatening. The four patterns are sensory seeking, sensory avoiding, sensory sensitivity, and sensory registration. Each pattern can be measured using Winnie Dunn’s Sensory Profile assessments, and multi-sensory environment technology can be used to help those previously threatening experiences be perceived as safe.

People with a high level of touch sensitivity may become stiff and resistant to healthcare or dentistry interventions due to inner stress. They may have body position sensitivity that causes a strong reaction when

they are reclined in a dental chair. An appropriate adaptive learning system might include the practitioner avoiding light touch and using a Story Board to help the patient anticipate what’s next. It may also include the use of a weighted x-ray vest as an adaptive learning technology that provides calming deep pressure. All these interventions are designed to calm the patient’s inner sense so that a dental visit doesn’t lead to stress-based emotional triggers that can compromise a lifetime of oral health.

Vision, sound, taste, and smell are other sensory sensitivities that can negatively affect healthcare and dentistry services. Sunglasses and headphones with calming sounds or music can be useful while in the dental chair. Relaxing visuals such as fiber optic ceiling panels and vibro-acoustic examination tables, can be

useful during a medical examination. In sensory-friendly health care and dentistry, practitioners, the patient, and the multi-sensory environment become part of the adaptive learning system.

Conclusions

Sensory processing challenges have no direct relationship with IQ and are sometimes seen in people with gifted intelligence. Challenges are often more obvious in people who have significant intellectual and developmental disabilities. Communication and physical limitations may add to the emotional stress of treating people with severe special needs. The unfortunate stress-response reality of this is that practitioners may decide that

serving special needs populations are not for them.

Our Sensory-Friendly Network of Practitioners knows that we are promoting a culture change because everyone in a human adaptive learning system is interconnected in creating good service outcomes. More sensory-friendly classrooms, medical examination rooms and dental offices are the way of the future. We welcome others to join us and learn more about how our Sensory-Friendly Network of Practitioners is making life easier for people with special needs, their families, and the very special practitioners who serve them.

Janice Ryan, OT, HSDP is Founder and Director of Attunement Solutions, a private occupational therapy practice located in Orange Grove Center, 615 Derby Street, Chattanooga, TN, 37404. She is the current trainer for American Association of Multi-Sensory Environments (AAMSE) and is working with Sensory Health, RoboKind, and Orange Grove Center to create more sensory-friendly environments for everyone. Email: janice@attunementsolutions.com

RESOURCES

1. Dunn, W. (2014). Sensory profile 2: Strengths-based approach to assessment and planning. Bloomington, MN: NCS Pearson, Inc.
2. Richardson, K. (2018). Challenging sociality: An anthropology of robots, autism, and attachment (1st ed.). From Social and Cultural Studies of Robots and AI. United Kingdom: Palgrave Macmillan.
3. Walkington, C. (November 2013). Using adaptive learning technologies to personalize instruction to student interests: The impact of relevant contexts on performance and learning outcomes. Journal of Educational Psychology. DOI: 10.1037/a0031882

A Passion for Supporting the IDD Community and Proud Supporter of HELEN: The Journal of Human Exceptionality



Almost 30 years ago, Eunice Kennedy Shriver asked **Dr. Steve Perlman** to create a health program for the Special Olympics. “Healthy Athletes” is now the largest public health program in the world for children and adults with Intellectual/Developmental Disabilities. HELEN: The Journal of Human Exceptionality is the next step to helping provide healthcare professionals, caregivers, families, and advocates with resources and education to better support this under-served, marginalized and invisible population.



Steve Perlman, DDS, MScD, DHL (Hon.) has extensive experience through his private practice and his role as Clinical Professor, Boston University School of Dental Medicine; has an Academic Appointment at the University of Pennsylvania School of Dental Medicine; is Co-founder and Past President of the AADMD.