# The Brain's Quest for Novelty in a Technology-Rich Environment: How Educators Can Help

Jaime Sawler, EdD candidate

New England College

For comments or questions for the author, contact Jaime Sawler at jsawler_gps@nec.edu

## Abstract

The brain's quest for novelty has been essential for human survival and development for the entirety of our existence. Novelty refers to unfamiliar situations or stimuli that lack a known or predetermined response or solution. In prehistoric eras, encountering the new—such as a potential threat like a saber tooth tiger—could mean life or death. Today, while such threats are no longer common, the drive for novelty continues to influence brain development and function. In the classroom, this innate pursuit of new experiences contributes to the ongoing competition for students' attention, especially in today's technology-rich environment where numerous extraneous distractions compete with instructional content. Understanding the neuroscience behind the brain's response to novelty—including the physiological benefits that extend beyond the classroom—can help educators identify high-impact strategies for capturing and maintaining student engagement. By leveraging insights into how the brain reacts to novel stimuli, teachers can create learning environments that not only attract attention but also foster deeper learning and resilience.

*Keywords*: novelty, valence, arousal, technology-rich environment

This article explores the importance of novelty in the learning process. Today's student faces the daunting task of navigating a technology-rich environment full of distractions, and, in the contemporary classroom, educators compete for attention against that technology—a

formidable opponent. Combatting the ever-present source of novel content that exists all around our students, in particular the personal cell phone within their grasp, requires a bifurcated approach consisting of controlling for outside stimuli that can be distracting and creating dynamic and varied instructional strategies that meet the standard to appease the novelty-seeking brain (Sousa, 2022). Educators regularly review and revise instructional strategies based on data from their students in the form of formative assessment. Educators should stay current on research related to brain science in a technology-rich environment and incorporate it into practice.

## Literature Review

Connecting our ancestors' experiences with saber tooth tigers to the challenges our students face today begins with an exploration of the physiology of teaching and learning. There are many instructional strategies that support the movement of information from short-term, working memory to long-term storage. Instructional strategies such as think-pair-share, concept mapping, and problem-based learning are examples of innovative teaching that support the acquisition of knowledge and skills and commit them to memory (Owens & Tanner, 2017). However, as Owens and Tanner (2017) described, at the most fundamental level, this process is a "neurological phenomena arising from physical changes in the brain cells" (p. 1). Though different models of information processing exist, it is widely agreed upon that the brain receives information from the outside world through the five senses (sight, hearing, touch, smell, and taste), associates sense and meaning either from contextual clues or past experiences and learning, and either moves the information from immediate memory to working memory, to long-term storage, or dismisses it somewhere along the way (Sousa, 2022, 2024). Whether the

stimulus is a jungle cat with oversized bicuspids or the steps of solving an algebraic equation, the basic process remains the same.

**Valence, Arousal, and Novelty**

Obviously, not all stimuli are created equal. Based on prior learning, past experiences, or the intensity or severity of the stimuli, certain experiences or knowledge pass to long-term storage more seamlessly (Sousa, 2022). As Weierich et al. (2010) conceptualized, "affect" is the capacity of a stimulus to modulate neural physiology within the context of a mental state, essentially attaching emotions to the stimuli (p. 2871). In the brain, that is the function of the amygdala. According to Weierich et al., (2010) the influences of this emotional attachment can be categorized by two properties: valence and arousal (p. 2871). Valence refers to the positive or negative attachment to the stimuli. Arousal refers to the intensity of the activation of the affective state. Experiences that are either positive or negative and highly arousing are more likely to be committed to long-term storage. The appearance of a saber tooth tiger would likely evoke a negative, highly arousing experience for the observer. Solving an algebraic equation for some students certainly evokes a neutral (maybe negative) and minimally arousing experience. Occurring in a vacuum, the experience with the saber tooth tiger would more likely be remembered for a longer period of time than solving the algebraic equation.

The amygdala, seated at the control of learning in the affective state, responds to positively and negatively valanced stimuli and experiences of high arousal with increased activity (Weierich et al., 2010). Weierich et al. (2010) explored the relationship among valence, arousal, and novelty by examining functional magnetic resonance imaging (fMRI) images of brain activity as participants viewed images that were categorized in various combinations of valence and arousal. The experiment included two conditions: one to explore familiarity, and

another to explore novelty. Findings revealed that novelty, like valence and arousal, plays a role in learning in the affective state. In fact, participants reported more elevated feelings of arousal by novel stimuli compared to familiar stimuli (Weierich et al., p. 2877). Novelty impacts other biological functions, as well. For example, in a study on the physiological response to social interactions, Mendes et al. (2007) examined how people reacted upon discovery of whether others either adhered to or violated expectations of physical characteristics. They found that when expectations were violated (an indication of novelty), participants exhibited a cardiovascular response similar to that of experiencing a threat (p. 714). A stimulus impacting the brain and body in this manner is more likely to catch the attention of the amygdala, facilitating the attachment of an emotion and further supporting passage to long-term storage (Mendes et al., 2007). By understanding how novelty, valence, and arousal influence learning—and applying this insight practically—educators can design and implement instructional methods that most effectively meet their students' needs.

**Competition for Attention**

In today's technology-rich environment, the volume of novel information causes greater demand for attention. According to Sousa (2024), the brain's primary function is survival and to that end, it constantly surveys the environment for potential threats. With particular sensitivity to novel stimuli, for the purpose of assessing whether it poses a threat, the brain experiences a constant pull in various directions. In today's classroom setting, where most students possess a cell phone, this has become a common source of novel content. In two separate studies, Thornton et al. (2014) examined how the mere presence of a cell phone affects attention and performance, finding that the cell phone acted as a distractor and led to deficits in both attention and performance, in particular as the complexity of the task increases (p. 485). It is important for

educators to understand and acknowledge that while delivering instruction they face a constant competition for students' attention.

**Benefits of Novelty**

Novel stimuli do not just create distractibility in the classroom; they can aid knowledge and skill acquisition, as well. In a study of insightful learning, Zhang et al. (2025) explored the impact of novel stimuli on memory. Associative novelty, or forming new connections or relationships between information or experiences, promotes long-term memory and slows forgetting over time (Zhang et al., 2025). When introducing curriculum, educators can rely on this understanding and create instructional strategies that take advantage of the positive impact of novel stimuli on memory.

The positive impact of novel stimuli on the brain goes above and beyond promoting long-term memory in the learning process. Velàzquez-Delgado et al. (2024) studied the impact of exposure to novel stimuli on cognitive resilience against the accumulation of the protein beta-amyloid peptide, which has been associated with cognitive dysfunction and neurodegeneration found in individuals diagnosed with Alzheimer's disease. The participants of the study were mice that were exposed to elevated levels of beta-amyloid peptide and were subjected to varying conditions, including a group involved in a novelty protocol. The data showed those exposed to novel stimuli demonstrated "remarkable resilience" against an infusion of the protein beta-amyloid peptide (Velàzquez-Delgado et al., 2024). The results of this study highlighted the physiological importance of exposure to novelty and allowed researchers to explore new and different therapeutic strategies for those diagnosed with conditions such as Alzheimer's disease (Velàzquez-Delgado et al., 2024). As educators introduce instructional strategies infused with

novel stimuli, they not only engage the contemporary learner's brain, but also contribute to its health and functionality over the lifespan.

## Conclusion

Novelty refers to stimuli, either information or an experience, such as a noise, a visual stimulus, or a novel experience that is unfamiliar and absent a known or predetermined response. The brain seeks novelty and that quest serves its owner well in terms of survival (Sousa, 2022) and also has benefits in the classroom (Zhang et al., 2025), and in the overall functionality of the brain (Velȧzquez-Delgado et al., 2024). In a classroom setting, educators face the challenge of competing with a technology-rich environment for the attention of their students (Sousa, 2024). Meeting that challenge by introducing instructional strategies that leverage the benefits of novelty supports knowledge and skill acquisition—transferring that information to long-term storage—and the overall health and functionality of the brain (Zhang et al., 2025).

## Discussion

The influence of novelty on the brain can be addressed in two specific ways—managing the educational environment and creating and delivering instructional strategies emphasizing novelty. The brain continuously seeks out novelty (Sousa, 2024). In classrooms today, sources of novel stimuli appear in a variety of formats. The external stimuli that can cause distractions can be managed through a safe and secure classroom environment and established routines and procedures (Sousa, 2022). Furthermore, educators can plan and deliver instructional strategies that pique the interest of the novelty-seeking brain (Sousa, 2022, 2024). Armed with this information, educators can create a superhighway of information, allowing the curriculum to be the source of content satiating the brain's desire for novelty.

**Mitigating Novel Stimuli**

In today's classroom environment, novel stimuli are ever-present—from what is actually seen and heard to what is perceived and practiced. A technology-rich environment contributes to distraction both physically, due to the proximity of devices, and virtually, through the potential for distractions that exist at the other end of the device (Thornton et al., 2014). The conflicting roles of technology in education—as both a tool for engagement and a source of distraction—create an ongoing debate. Technology can be used to capture the intrigue of the 21st century student (Sousa, 2022) and it also can cause attention to be drawn away from the lesson (Thornton et al., 2014). In my experience, even the presence of approved classroom technology, such as iPads or Chromebooks pursuant to 1-to-1 initiatives, provides abundant distractions for students—despite being issued and monitored by educators in the school. Technology also provides one of the largest sources of distraction that exists in the classroom—the student's personal cell phone (Thornton, et al., 2014). The mitigation of cell phone use in schools has been a topic of discussion at the school, district, and state levels over the past couple of years. School districts and municipalities have responded by introducing policies and laws governing the use of cell phones in schools (State of New Hampshire, 2025). As a building administrator, I have implemented a school-wide classroom-based cell phone ban and found the most success when all educators are implementing it in a consistent manner. Ensuring effective classroom routines and procedures has been a staple of teacher education programs and, as the environment that requires control extends beyond the physical space, it is the responsibility of educators to adapt their practices and include specific routines to address the use of technology in the classroom. As Sousa (2022) stated, "an environment that contains mainly predictable or repeated stimuli (like some classrooms) lowers the brain's interest in the outside world and tempts it to turn within for novel experiences" (p. 27). An expansion of the boundaries of where the stimuli exist results in

an increase in that which must be managed in the classroom to facilitate learning. An educator must be aware of that which distracts their students and establish routines and procedures to mitigate the impact.

**Instructional Strategies Leveraging Novelty**

To compete with the technology-rich environment for attention, educators should consider implementing instructional strategies that appeal to the novelty-seeking brain, varying them to address unique student dispositions and needs (Sousa, 2022, 2024). By enhancing the lesson with strategies that appeal to the brain's quest for novelty, educators can best position the curriculum to become the source of novel content that the brain seeks (Sousa, 2024). Understanding the association between novelty and the functionality of the brain informs instructional practices, including the development of instructional strategies that can support the acquisition of skills and knowledge in a technology-rich environment.

In two separate texts, Sousa (2022, 2024) articulated six different characteristics of instructional strategies that emphasize novelty as a mechanism for learning: humor, music, movement, quiz games, choice, and multi-sensory instruction. The following are descriptions and suggestions related to these strategies:

- Sousa (2024) described the specific benefits of infusing humor into the lesson, such as an endorphin surge during laughter and the creation of a positive classroom culture (p. 58). The internet can be a great resource for humorous content for all subjects.
- Incorporating music into the lesson has been shown to increase student focus and productivity (Sousa, 2022, p. 230). However, educators must be cautious when it comes to the selection and use of music to ensure it does not become a distraction or source of consternation. Consider playing music during independent work time or inviting students to connect the content to the lyrics of a familiar song.

- Movement increases blood flow to the brain—within a minute of moving around, there is about 15% more blood in the brain (Sousa, 2024, p. 34). A countdown timer set at regular intervals can be used as a reminder to take a movement break. Vote-with-your-feet or station-rotation are opportunities to move during the lesson, too.
- Quiz games can introduce more than friendly competition into the lesson. Asking students to create and rehearse the quiz game creates additional opportunities to interact and practice the skill or knowledge that is being taught. Incorporating choice into the lesson plan increases engagement by fostering autonomy (Sousa, 2024, p. 45).
- By introducing multisensory instructional activities into the lesson, the classroom content mirrors the characteristics of the technology-rich environment found in the personal cell phone. Introducing technology into the lesson, or adding visually stimulating content, appeals to what today's students are used to.

These strategies can equip the educator with suggestions to enhance the lessons used in the classroom in the battle for attention. Generative Artificial Intelligence (AI) such as ChatGPT or Gemini are great tools for suggestions on how to augment an existing lesson to be more engaging, incorporating these strategies. A resource such as *The artificial intelligence playbook*: *Time-Saving tools for teachers that make learning more engaging* (Hargrave et al., 2025) guides an educator through the process of exploring the power of AI and how it can be helpful to educators.

With all the above strategies at the ready, it may seem as if today's educator must be a comedian, musician, quiz-game host, or an expert at bedazzling classroom materials. The pursuit for the attention of our students is a constant struggle. As a building administrator, while working with teachers, I ask them to reflect on their practices, respond to student data, and allow

the data to inform instructional practices. When considering the research on novelty and the brain, it would be beneficial for educators to incorporate the above strategies into their lessons. Obviously, it is the classroom teacher who knows their students and the curriculum the best. Therefore, when implementing strategies that emphasize novelty, it is important to consider the diverse and individual needs of students, as well as the context and curriculum. It is important to consider how novelty influences brain functionality and use it to our advantage.

**The Novel and the Routine**

In the acquisition of knowledge and skill, as previously discussed, the information travels from immediate memory to long-term storage—that process can be facilitated by specific learning activities tailored to meet this need (Sousa, 2022). Each time a piece of information makes the journey through the brain, a neural pathway is formed; it is strengthened through processes such as rehearsal and practice (Sousa, 2022). The strengthening of the neural pathway allows the new skill or knowledge to transfer to long-term storage. The juxtaposition between the focus on novelty and the importance of routine mirrors the connection between instructional strategies that pique the attention of our students and the control of novel stimuli for the purpose of enhancing classroom activities. Goldberg (2018) discussed the connection between the novel and the routine and the interconnectedness between the two hemispheres of the brain. The process of transferring information from temporary to long-term storage begins with it being novel and gradually evolves into a routine, well-established memory. As Goldberg (2018) described, the right hemisphere of the brain is predominantly involved in processing novel information, while the left hemisphere becomes more engaged as the information becomes more routine. The connection between the novelty-seeking brain and the acquisition of skills and knowledge, moving the information to long-term storage, highlights the interconnectedness

between the two hemispheres and how they work together to process both new and old information.

## Conclusions

In my experiences working in education, as a classroom teacher and now an administrator who supervises teachers, the cycle of evaluating the efficacy of instructional practices should rely on multiple data points. With new research on brain science and the influence of an ever-changing technological landscape on students, it is the responsibility of educators to review and update our instructional strategies to best meet students' evolving needs. Harnessing the power of the brain's quest for novelty by focusing on the specific strategies that emphasize this quest allows educators to compete for attention in a technology-rich environment. As educators, we can no longer accept the status quo—the students we are teaching now are not the same as those we taught even five years ago (Sousa, 2024). Educators must review and revise our instructional practices, incorporating strategies that appeal to the novelty-seeking brain in a technology-rich environment, to meet the unique and varied needs of our students.

## References

Goldberg, E. (2018). *Creativity: The human brain in the age of innovation.* Oxford University Press.

Hargrave, M., Fisher, D., & Frey, N. (2025). *The artificial intelligence playbook*: *Time-saving tools for teachers that make learning more engaging* (2nd ed.). Corwin.

Mendes, W. B., Blascovich, J., Hunter, S. B., Lickel, B., & Jost, J. T. (2007). Threatened by the unexpected: Physiological responses during social interaction with expectancy-violating partners. *Journal of Personality and Social Psychology*, *92*(4), 698–716. https://doi.org/10.1037/0022-3514.92.4.698

Owens, M. T., & Tanner, K. D. (2017, October 13). Teaching as brain changing: Exploring connections between neuroscience and innovative teaching. *CBE—Life Sciences Education*, *16*(2). https://doi.org/10.1187/cbe.17-01-0005

Sousa, D. A. (2022). *How the brain learns* (6th ed.). Corwin.

Sousa, D. A. (2024). *Engaging the rewired brain* (2nd ed.). Corwin.

State of New Hampshire. (2025, June 26). *Bell-to-bell ban on cell phones in schools a win for New Hampshire students.* [Press release]. Office of the Governor Kelly Ayotte. https://www.governor.nh.gov/news/bell-bell-ban-cell-phones-schools-win-new-hampshire-students

Thornton, B., Faires, A., Robbins, M., & Rollins, E. (2014). The mere presence of a cell phone may be distracting: Implications for attention and task performance. *Social Psychology*, *45*(6), 479–488. https://doi.org/10.1027/1864-9335/a000216

Velázquez-Delgado, C., Hernández-Ortiz, E., Landa-Navarro, L., Tapia-Rodríguez, M., Moreno-Castilla, P., & Bermúdez-Rattoni, F. (2025). Repeated exposure to novelty promotes resilience against the amyloid-beta effect through dopaminergic stimulation. *Psychopharmacology*, *242*(1), 85–100. https://doi-org.nec.idm.oclc.org/10.1007/s00213-024-06650-5

Weierich, M. R., Wright, C. I., Negreira, A., Dickerson, B. C., & Barrett, L. F. (2010, February 1). Novelty as a dimension in the affective brain. *NeuroImage*, *49*(1), 2871–2878. https://doi.org/10.1016/j.neuroimage.2009.09.047

Zhang, Z., Si, Y., Wang, L., & He, K. (2025). The superior memory effect of insightful learning: The role of associative novelty. *Acta Psychologica*, 255. https://doi.org/10.1016/j.actpsy.2025.104901