THE NEUROSCIENCE OF LEARNING

Currently, information is more than doubling every year. Today the brain of the average worker has to process 30 times more information than 20 years ago. A single weekly edition of the New York Times contains more information than a person would have been exposed to in a lifetime during the 17th century! On the downside of this amazing expansion of available information is the real threat of being overwhelmed by the sheer volume. Eighty percent of all illnesses have it's their origin in chronic stress, and information overload is quickly becoming one of the greatest sources of this stress. People are feeling that they are losing control over themselves, their jobs and the world in which they live.

Big changes are coming to the world of work, according to a recent report published by the World Economic Forum entitled: The Future of Jobs. The report states that the forth industrial revolution is on its way. It will cause widespread disruption to business models and labour markets over the next five years. An enormous change in the most desirable skills to thrive in the job market is predicted. The table below illustrates the top 10 most wanted skills in 2015 and most needed skills in 2020:

In 2020	In 2015
1.Complex problem solving	1.Complex problem solving
2.Critical thinking	2.Co-ordinating with others
3.Creativity	3.People management
4.People management	4.Critical thinking
5.Co-ordinating with others	5.Negotiation
6.Emotional intelligence	6.Quality control
7.Judgement and decision making	7.Service orientation
8.Service orientation	8.Judgment and decision making
9.Negotiation	9.Active listening
10.Cognitive flexibility	10.Creativity

The scenario for 2020 changes: complex problem solving skills still occupies the top slot, but critical thinking skills and creativity takes the second and third position, with cognitive flexibility coming in new at number 10.

The only way that people and business will be capable of maintaining their competitive advantage in this rapidly changing, information soaked, and turbulent world is to out-think, out-learn and out-create their competition. At the core learning is change. By gaining deep insight into how the brain functions in support of learning, creating, and problem-solving, we can better prepare people to adapt to a continually changing market place, thus allowing companies to maintain a competitive advantage in highly dynamic business environments.

Progressive companies realize that if they want to prosper, they must build learning into their organization as a core competency and remain committed to learning. A learning organization is an enterprise whose workforce has the mental flexibility to continuously adapt and adjust to new systems, new technology, and new strategies. It means their workforce must have the ability to apply what they have learned in diverse and continuously changing circumstances.

Successful global companies like Toyota know that their workforces' ability to learn is requisite to progress in a highly competitive market. That is why they have adopted a philosophy called "Kaizen" (which means ongoing learning and improvement) to continuously invest in reskilling, multiskilling and rotating jobs to change behaviour conducive to out-performing their competition.

Neuroscience of Learning

The neuroscience of learning is a specialized field that consist of interdisciplinary research focusing on understanding how the brain learns, thinks and functions and provides scientific solutions to optimize cognitive functions and the most essential part of human capital – the ability to learn.

"Neuroscience proves that the brain has unlimited learning potential. Therefore, there is no limit to what people can become. Companies are the sum total of the collective brain power of their people, so there is also no limit to what and who companies can be if they continuously invest into the learning potential and competence of their workforce" says Dr. Andre Vermeulen, CEO of Neuro-Link, a company that specializes in the neuroscience of learning"

Neuroscience offers a new way to think about learning. It offers a biological approach to cut through the clutter of potentially conflicting learning theories. Neuroscience helps us to move beyond theory to empirically-based facts.

Why neuroscience?

- It brings to bear findings from hard sciences such as physiology, chemistry etc.
- It is inclusive of all cultures, races, genders and generations.
- It complements behavioural sciences and integrates easily with different learning technologies.
- It offers new ways of understanding and developing learning interventions.

Until now, the science of learning principally was rooted in education and psychology. While these areas of research have greatly advanced our understanding of how knowledge is transferred, new skills are developed, and behaviour is changed to adapt in dynamic environments, the methods employed in behavioural sciences such as these have relied

extensively on hypothetical constructs and have been able to measure relevant variables only indirectly. Scientific research focusing specifically on the brain, such as physiology, neuro-physiology, chemistry, psychoneuroimmunology, and immunology, provide methodology that support more direct observations of relevant variables, which serves to validate findings from the behavioural sciences like never before. This reciprocal and synergistic relationship between the sciences provides the promise of making tremendous gains in our understanding of how humans learn and will continue to provide direction in leveraging the reciprocal relationship between brain and environment to significantly improve the functioning of organizations.

The volume and depth of research in recent years has provided a wealth of evidence that there is a significant reciprocal relationship between brain functioning and the environments in which humans behave. Therefore, it is becoming quite clear that organizations will do well by aligning offerings, as well as their full enterprise with natural brain functioning. Doing so will ultimately drive more sales, enhance wellness, and increase productivity.

Recent research has significantly enhanced our understanding of brain processes, and the function of its underlying neural systems (how the brain stores and processes information, how neural plasticity impacts learning and observable behaviour, etc.). This has led to stronger understanding in such areas as biological processes involved in learning, the relationship between brain hemisphere and sensory dominance, the impact on cognitive control, dynamics of mental flexibility, personal motivation and social and emotional learning. The science of learning is an interdisciplinary field of study that examines how people learn and how the learning and development field can improve talent management, performance improvement, organizational learning, training, instruction and instructional design.

Neuroscience of learning fundamentals:

There are certain fundamental premises of the neuroscience of learning that are essential for talent development professionals and learning facilitators to understand its implications and applications to organizational learning. Learners, facilitators and practitioners engaged in the field of learning, who are responsible to prepare children, students and workers for developing the skills necessary to prosper in the new landscape predicted for 2020, will be well-served to have a clearer understanding of issues such as:

- The bio-chemistry of learning and thinking
- The neuroscience of the learning cycle
- Neuroplasticity, cognitive flexibility and how it is at the core of learning and behaviour change
- How the brain works and processes information
- Learning implications of different brain areas
- How to identify and improve drivers that optimize brain performance
- The concept of neurological dominance, it’s relationship between brain hemisphere and sensory dominance and its impact on performance and safety
- How to determine people’s unique neuro-design and learning potential
- Aligning workers’ neuro-design and learning preferences with their job functions to increase their joy, energy, sense of purpose, engagement, performance and flow
- How to prepare and activate the brain for learning, thinking and creativity

- Brain fitness skills and exercises to flex mental muscle
- Accommodating social and emotional learning in the workplace
- Advanced visual skills for 21st century workers who processes volumes of information
- How to develop complex problem solving, critical thinking, creativity and emotional intelligence skills for future workers
- Aligning workplace learning practices with memory and attention spans
- Creating brain friendly working and learning environments

Therefore, anyone responsible for the learning and development of another should strengthen their understanding of the neuroscience of learning and apply this evidence-based knowledge to their practice of human capital development. The goal would be for them to incorporate these fundamental principles into their learning design and test it through the applications of their new neuro-aligned learning interventions and determine its impact on behaviour change, performance improvement, wellness, productivity and safety.

Neuroscience have many implications and suggest many organizational learning changes as illustrated below:

Current	**Future**
• Present-Demo-Practice-Feedback	• Gather-Reflect-Create-Test
• Evaluative testing	• Active testing
• Cookie-cutter chunks	• Right-sized chunks
• Information	• Meaning
• What	• How
• Content-centric	• Learner-centric
• Training & Instruction	• Learning
• Explanation & telling	• Discovery
• Expert-driven	• Learner-driven
• Teachers & instructors	• Learning networks
• Set content	• Dynamic content
• Receiving meaning	• Creating meaning
• Information silos	• Connected information
• Start with what we know	• Start with what they know

Neuro-Link has followed a neuroscientific approach towards developing emotionally intelligent supervisors at Sishen Iron Ore Mine, part of the Anglo American Mine House in South Africa for more than 15 years. All participants went through a 9 module course over a 9 month period. Every course module had a neuroscience point of departure and grounding, aligned with the participant's neurological design. OD management evaluated the results of this learning intervention by doing an Organizational Climate Assessment (OCA). The purpose of the assessment was to determine if the Neuro-Link intervention had a positive impact on behaviour change that will influence productivity and bottom line. If a result of 3% was achieved it would be regarded as positively impacting the organization and its bottom line. A result of 8% was achieved – an almost three times better result than the minimum requirement. Amongst other results, reduced absenteeism, better workplace relationships and change in attitude was reported. Also because of increased productivity a 14th performance bonus salary pay check of four times their monthly salary was paid to all workers.

The neuroscience of learning is a promising field that provides sufficient evidence that can be put in practice in order to validate learning as one of the essential ingredients, if not the most sustainable ingredient for improving the performance of the workforce, improving productivity and impacting the bottom line in profound ways.

Dr. André Vermeulen is a thought leader in the Neuroscience of Learning. He is the CEO of Neuro-Link, a consultancy specializing in the neuroscience of performance optimization and talent development. As a business innovator, André has developed a neuro-agility framework and solutions for organizations to optimize neuro-agility and overall brain fitness of the workforce.