ELEARNINGNEWS ARTICLE

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How does eLearning affect our brain?

How does our brain work during traditional training and during eLearning and how do these differences affect our learning process?

Education has always been central to human development, and the way we acquire knowledge has continually evolved over time. Traditional instruction, with its traditional classroom setting and face-to-face interaction, has been the dominant approach for centuries. However, with the advancement of technology, eLearning has emerged as a transformative alternative, which has changed the educational landscape and brought new opportunities to students. The difference in how our brains work in traditional education versus eLearning is profound and has significant implications for cognition, attention and memory. In this article we will explore these differences and understand how each educational approach affects the way our brains process information.

What does the psychology world think of eLearning?

Psychology agrees on the many benefits eLearning offers to student well-being. The flexibility and convenience of eLearning allows people to expand their horizons regardless of busy schedules or the inability to attend in-person classes due to geographic limitations. Furthermore, eLearning helps to retain knowledge through the use of interactive media. However, to delve into the psychological aspects of these forms of learning, we need to understand how our brain works during the learning process.

Learning process

Our brain has about **85 billion neurons** that send information to each other. When we learn, our brain makes new connections between its neurons. The more we practice, the more connections our brain creates. Thus, we can say that when we are good at something, it is usually because our brain has made stronger connections with this information. More precisely, the learning process begins with **perception**, during which the brain receives information from the environment. Next comes **attention**, where the brain retains only vital information. The third step is memory, or the brain's ability to store information. There are different types of **memory**, such as sensory, short-term, and long-term. Finally, there's **recovery**, where you can apply everything you know to different situations.

Motivation is one of the main factors influencing learning, as it pushes people to engage more and more in the learning process. Motivation can come from external factors, such as encouragement, rewards, or punishments, and from internal factors, such as an interest in knowledge. **Feedback** also affects learning by providing people with information about their performance so they can make necessary changes to their learning strategy. Likewise, **practice** helps people apply their knowledge and skills, whether they do it over a period of time or in a single session. However, prior knowledge is also essential, but not necessary. They provide a basis for students to learn new things, allowing them to apply their learning patterns.

Psychology in traditional training and eLearning

Our brain works in different ways in traditional training and eLearning. In this section we explore the main psychological differences between these two approaches to training.

Cognitive processing

- **In mainstream education:**

In traditional education, cognitive processing is greatly influenced by **personal interactions**, both with teachers and peers. Classroom discussions, lectures, and group activities engage various parts of the brain, promoting active learning. The physical presence of teachers allows for immediate feedback, which helps students strengthen understanding of concepts and correct

misconceptions. The combination of auditory, visual and kinesthetic stimuli facilitates multimodal learning, favoring different learning styles.

- **In eLearning:**

eLearning moves cognitive processing to a **digital environment**. In this context, students rely mainly on visual and auditory stimuli, presented through digital media such as video, interactive presentations and virtual simulations. While eLearning platforms can provide immediate feedback through automated assessments, the absence of face-to-face interaction with instructors may require learners to adapt to different feedback mechanisms. Furthermore, the self-managed nature of eLearning allows individuals to take control of their own learning experience, engaging executive functions to manage time and set learning goals.

Attention and concentration

- **In traditional teaching:**

In traditional classrooms, students are exposed to a **structured and controlled environment**, which can help maintain attention and concentration. The physical presence of teachers and dynamic teaching styles, together with the social atmosphere of the classroom, contribute to student engagement. However, distractions from classmates or external factors can also affect students' ability to concentrate.

- **In eLearning:**

eLearning gives **students more control over their learning environment**. They can access course materials whenever and wherever they want, which can be beneficial for those who prefer a more personalized, distraction-free environment. However, this independence also presents the challenge of self-discipline. Staying focused in an online environment requires strong self-discipline and the ability to resist distractions, both internal and external.

Memory and retention of information

- **In mainstream education:**

In traditional education, face-to-face interactions combined with hands-on learning experiences can **enhance memory consolidation**. The human connection, emotional engagement, and physicality of engaging with learning materials create stronger memory traces in the brain. Students often recall information by associating it with specific events, discussions, or experiences that occurred during the learning process.

- **In eLearning:**

eLearning relies on the delivery of digital content that can pose a **memory retention challenge** compared to traditional education. It may be more difficult for students to retain information when they are primarily exposed to learning experiences that come from a screen. However, well-designed eLearning modules that incorporate effective multimedia elements, periodic quizzes, and spaced repetition techniques can optimize memory retention.

The potentially negative impact of eLearning on the brain

Our memory is temporary and therefore has limited capacity. Sweller's cognitive load theory suggests that when we overload our memory, we are unable to acquire and process new information**. eLearning can increase the load on our memory because we are exposed to multiple media at the same time** and have to switch between platforms or learning materials. For example, we can start watching a video and then move on to reading the corresponding article. Then there is the **matter of multitasking**. According to a study by the American Psychological Association, multitasking isn't as convenient as it sounds, because switching between tasks can cost up to 40 percent of a person's productive time. Furthermore, multitasking prevents us from focusing on a specific activity, with the result of weakening the connections between our neurons.

How to face challenges

- **Reduce cognitive load**

As already mentioned, the way we learn is strongly influenced by our mental effort. Therefore, **online courses should be designed in a way that reduces mental effort to a minimum**, allowing us to learn more effectively. To begin with, when designing eLearning material you should use plain language and avoid presenting long chunks of text. Instead, using bulleted lists, titles and categories is advisable. Also, when using multimedia content in a presentation or lecture, select relevant videos, infographics, animations, etc. and insert them in a way that does not distract learners. Above all, be attentive and offer constructive guidance and feedback when needed.

- **Encourage active learning**

Students who actively participate in online classes are more likely to retain knowledge and achieve goals. To help them in this regard, offer them **problem-solving exercises** through realistic scenarios or case studies. You can also ask them to turn in essays in which they will reflect on what they have learned and help them remember it. Discussions and collaborative work can also thrive

- **Take notes**

The brain often benefits from **physically writing** in a notebook because it aids in the recall of information. Handwriting notes and seeing your own handwriting can help students assimilate learning material and retain knowledge. Also, writing activates many parts of the brain. For this reason, students can also try taking notes while taking online courses, to speed up this process. You can also encourage them to keep an online journal to track their progress and outline key points.

- **Immediate feedback**

In a typical classroom, teachers and instructors can immediately point out mistakes or areas for improvement. They can do this as soon as they notice something and are available for further on-the-spot instruction and guidance. In online courses, however, instructors can only form full hypotheses after they receive data analysis of student performance and can make suggestions and comments afterward. That said, there are ways to provide instant feedback through simulations, scenarios, and learning apps that offer the ability to create your own quizzes.

Understanding the psychological differences between eLearning and traditional training

Both traditional education and eLearning have different impacts on the way our brains process information, attention and memory. Traditional instruction takes advantage of face-to-face interactions, instant feedback, and diverse sensory stimuli, fostering social engagement and memory consolidation. eLearning, on the other hand, leverages digital technology to offer flexibility, accessibility and personalization, allowing students to take control of their own learning journey. To maximize the benefits of each educational approach, educators must strike a balance between the two, integrating interactive and multimedia elements into both traditional and digital classrooms. By understanding the psychological differences, we can create comprehensive and effective educational experiences that meet the diverse needs of students in the modern world.