

# **BUSINESS ANALYSIS & INSIGHTS OF EdTech INDUSTRY USING NEURO-TECH**



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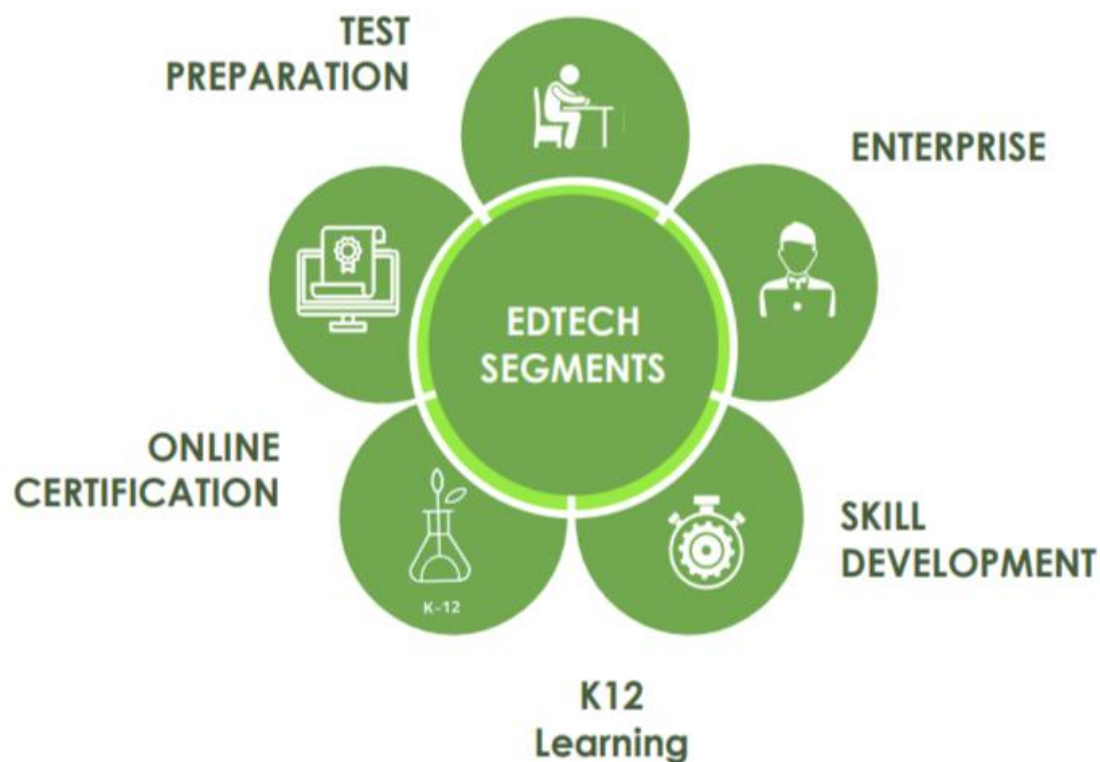
# Background

The field of neuroscience has long been interested in understanding how the brain processes and retains information, and the application of education technology (edtech) in neuroscience is a natural fit.

The intersection of education technology (edtech) and neurotechnology has the potential to revolutionize the way we learn and understand the brain.

Personalized learning has become a buzzword in the education industry, and the integration of neurotech has the potential to take personalization to the next level. By providing immersive educational experiences, real-time feedback, and personalized interventions, edtech can help individuals improve their cognitive function and enhance their learning experiences.

EdTech market is expected to reach \$3.5bn by 2022 and \$10bn by 2025 and 39% CAGR of market size (2020 – 2025).



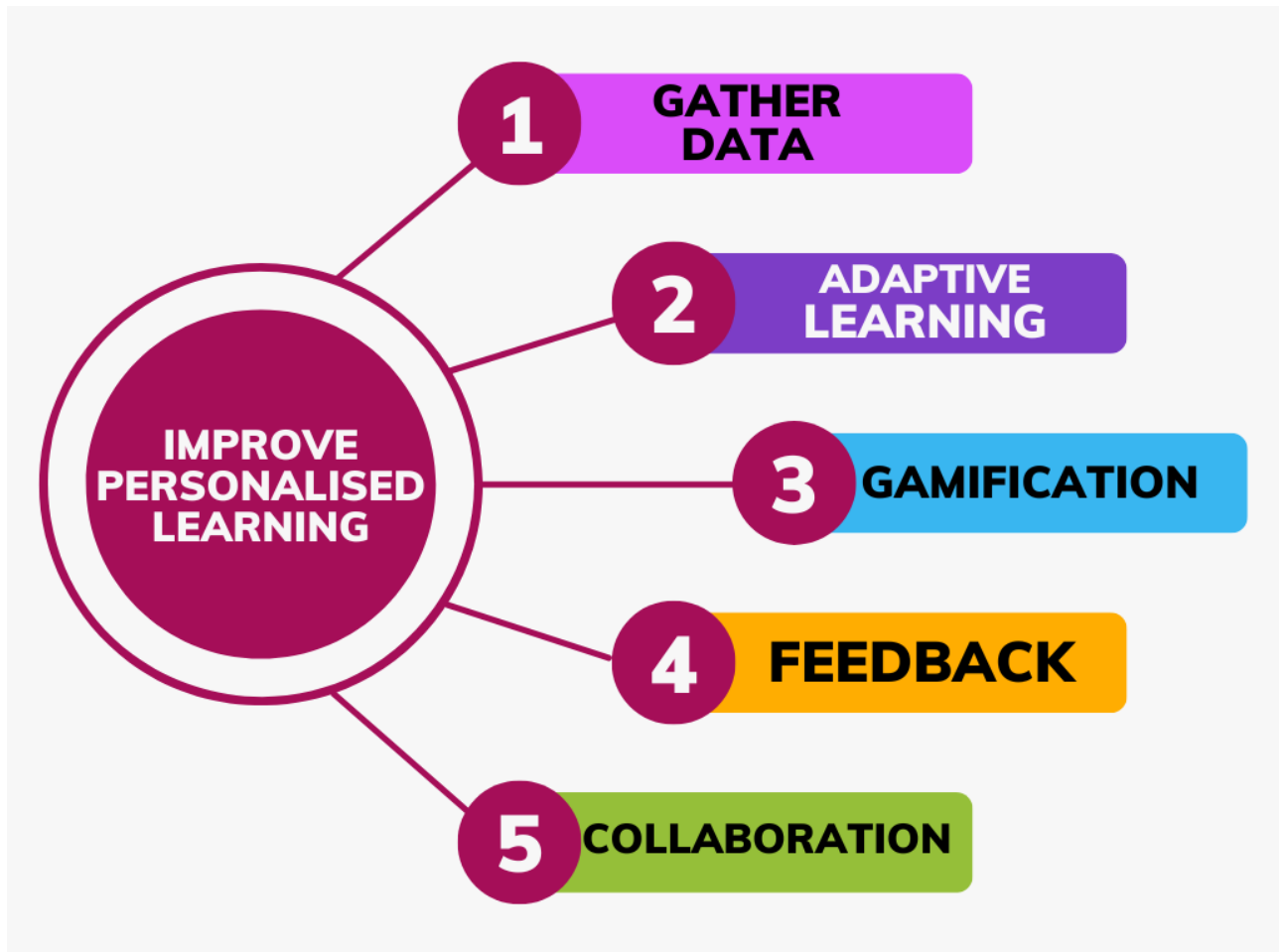
# How Ed-tech Using Various Neuroscience Tools

**Here are a few ways in which EdTech is using various neuroscience tools:**

1. **Eye-tracking technology:** Eye-tracking technology can be used to measure a student's attention and focus while they are learning. This information can be used by educators to determine which parts of a lesson are most engaging and to make adjustments to the curriculum accordingly.
2. **Electroencephalography (EEG):** EEG can be used to measure brain activity and determine how students process information. By analysing EEG data, educators can better understand how students learn and retain information, and design more effective teaching methods.
3. **Functional magnetic resonance imaging (fMRI):** fMRI can be used to measure changes in blood flow in the brain, which indicates which parts of the brain are activated during learning.
4. **Virtual reality (VR):** VR can be used to create immersive learning environments that stimulate multiple senses and engage students more fully in the learning process.
5. **fMRI (Functional Magnetic Resonance Imaging):** Edtech platforms can use fMRI to understand how students process information and which areas of the brain are involved in different learning tasks. This information can be used to optimize teaching methods and improve learning outcomes.
6. **Neurofeedback:** EdTech platforms can use neurofeedback to help students improve their focus and attention. By providing feedback on brain activity, students can learn to self-regulate their attention and improve their learning outcomes.
7. **Brain-computer interfaces (BCIs):** BCIs are tools that allow individuals to control digital devices with their thoughts. Edtech platforms can use BCIs to help students with disabilities, such as those with paralysis or motor impairments, to interact with digital content.

# Improve Personalised learning

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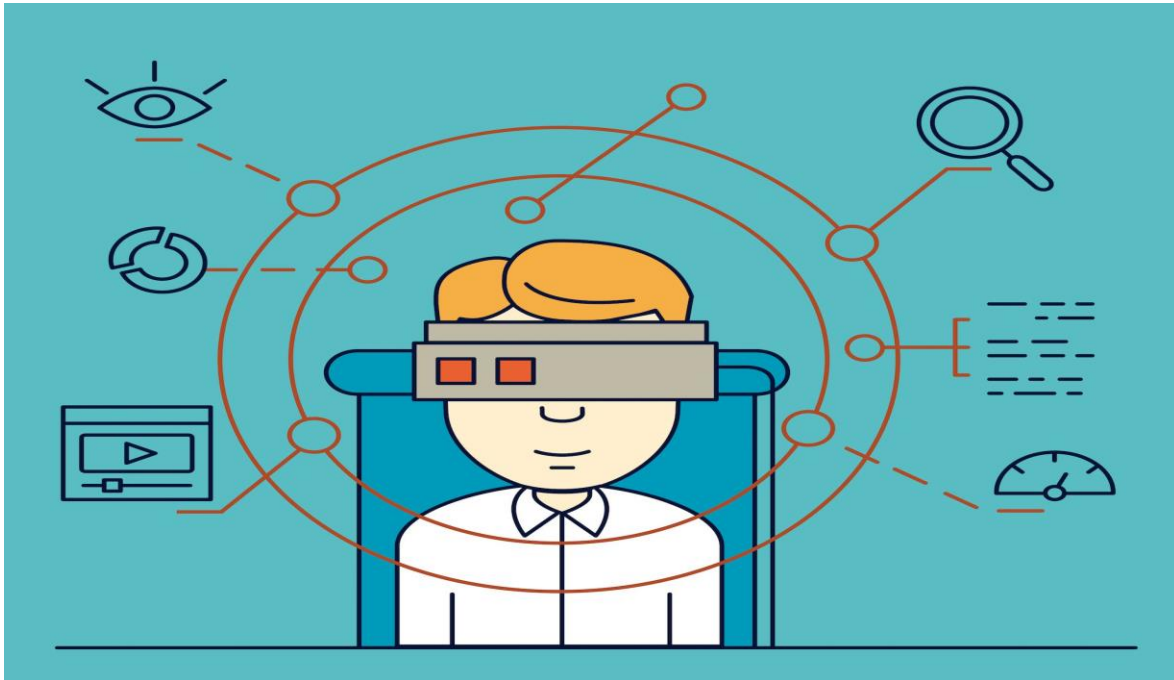


## 3 Principles of Modern Personalised Learning:

- It Treats Learning as A Continuum, Rather Than a One-Off Event
- It Increases Relevance
- It puts The Learner in Control

## 1. Using Eye tracking technology

Eye-tracking technology and neurotech can be used to improve personalized learning by providing more accurate and real-time feedback on how a student is engaging with the material.

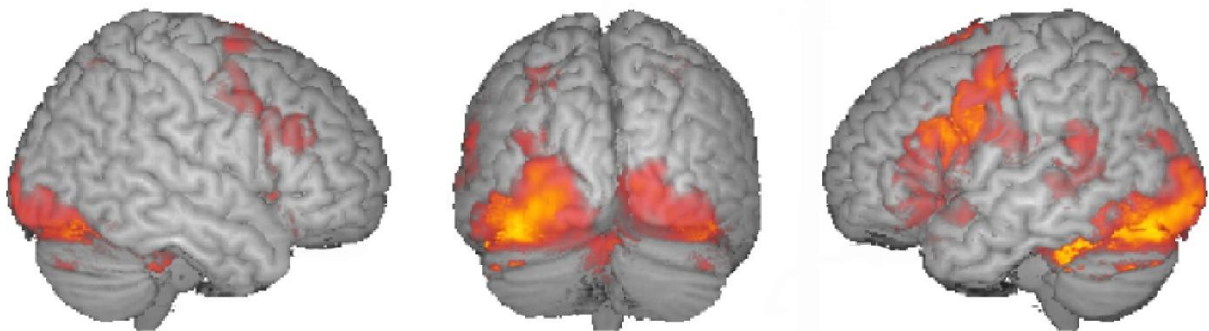


Here are some ways eye-tracking technology and neurotech can be used to improve personalized learning:

1. **Real-time feedback:** Eye-tracking technology can provide real-time feedback on how a student is engaging with the material. For example, if a student is having difficulty focusing on a particular part of the text, the system can adjust the presentation of the material or provide additional resources to help the student understand the content.
2. **Personalized recommendations:** Neurotech can be used to analyze a student's learning style and preferences, and provide personalized recommendations on the type of material they are most likely to engage with. For example, if a student is a visual learner, the system can recommend more videos and images to help them understand the content.

3. **Tracking cognitive load:** Eye-tracking technology can also be used to track a student's cognitive load, which refers to the mental effort required to complete a task. By monitoring cognitive load, the system can identify when a student is becoming overwhelmed and adjust the material or pace of the learning accordingly.
4. **Identifying learning difficulties:** Neurotech can be used to identify specific learning difficulties or disabilities that a student may be facing, such as dyslexia or attention-deficit/hyperactivity disorder (ADHD). The system can then provide targeted interventions and support to help the student overcome these challenges.

## 2. Using Functional Magnetic Resonance Imaging

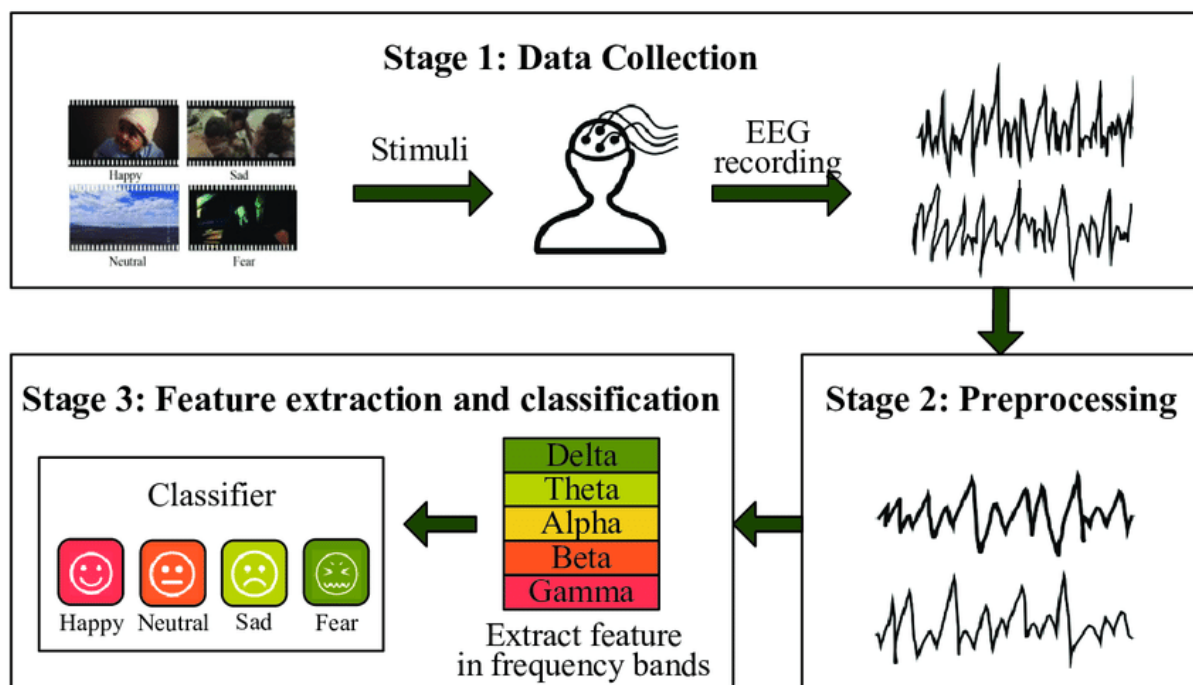


Here are some ways fMRI technology can be used to enhance personalized learning:

1. **Identifying learning preferences:** fMRI can be used to identify the neural networks involved in different learning modalities such as visual, auditory, and kinaesthetic. This information can be used to personalize learning based on a student's preferred learning style.
2. **Optimizing learning strategies:** fMRI can be used to measure the effectiveness of different learning strategies on brain activation. This information can be used to optimize the learning strategies used for each individual student.

3. **Identifying learning difficulties:** fMRI can be used to identify neural differences in students who struggle with learning compared to those who do not. This information can help to identify students who may need additional support or intervention.
4. **Monitoring engagement:** fMRI can be used to measure changes in brain activation that indicate changes in attention and engagement during learning activities. This information can help to identify when a student is losing focus and needs additional support.
5. **Personalized feedback:** fMRI can be used to provide personalized feedback to students based on their brain activity during learning activities. This information can help students understand their strengths and weaknesses and make adjustments to their learning strategies accordingly.

### 3. Using Electroencephalography



Electroencephalography (EEG) technology is a type of neurotech that can be used to improve personalized learning by providing insights into brain activity during learning activities. Here are some ways EEG technology can be used to enhance personalized learning:

1. **Monitoring attention:** EEG can be used to measure changes in brainwave patterns that indicate changes in attention during learning activities. This information can help to identify when a student is losing focus and needs additional support.
2. **Adaptive learning:** EEG can be used to provide real-time feedback during learning activities and adjust the difficulty level of the material accordingly. For example, if a student is experiencing high levels of mental workload, the system can adjust the difficulty of the material to reduce cognitive overload.
3. **Developing brain-computer interfaces (BCIs):** EEG can be used to develop brain-computer interfaces that allow students to interact with learning materials using their thoughts. This technology can be particularly useful for students with disabilities that limit their ability to use traditional input devices such as a mouse or keyboard.
4. **Brain-based assessments:** EEG can be used to assess cognitive abilities such as attention, memory, and problem-solving. This information can be used to tailor learning activities to each student's unique strengths and weaknesses.



## 4.Using Virtual Reality



**Virtual reality (VR) technology is a type of neurotech that can be used to improve personalized learning by providing immersive, interactive, and engaging learning experiences. Here are some ways VR technology can be used to enhance personalized learning:**

1. **Simulations and scenarios:** VR can be used to create simulations and scenarios that allow students to experience real-life situations in a safe and controlled environment. This can be particularly useful in fields such as healthcare, where students can practice clinical procedures without putting real patients at risk.
2. **Multi-sensory learning:** VR can be used to provide multi-sensory learning experiences that engage multiple senses and enhance learning retention. For example, a student learning about a historical event can be

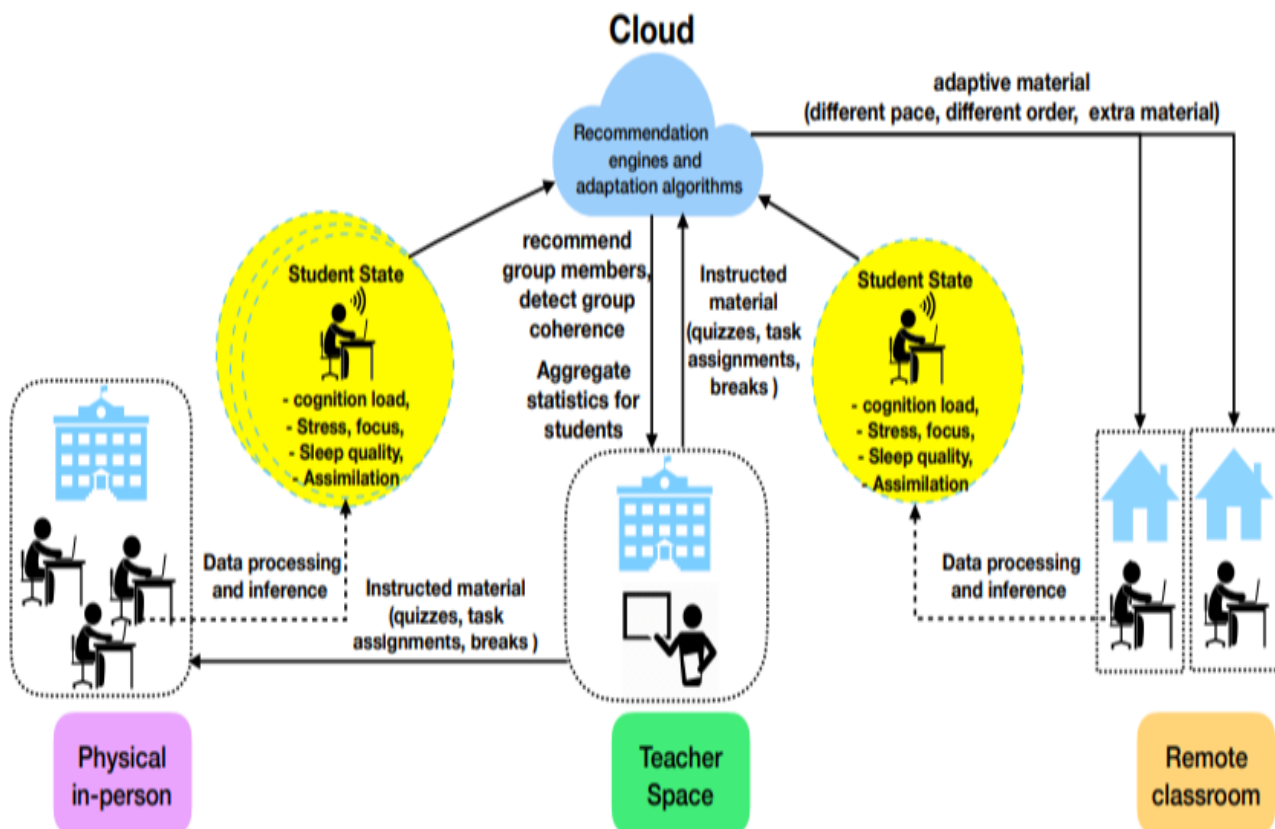
immersed in a VR environment that includes sights, sounds, and even smells from that time period.

3. **Personalized feedback:** VR can be used to provide personalized feedback to students based on their actions within the VR environment. This can help students understand their strengths and weaknesses and make adjustments to their learning strategies accordingly.
4. **Adaptive learning:** VR can be used to provide adaptive learning experiences that adjust the difficulty level of tasks based on a student's performance. This can help students stay engaged and motivated, while also ensuring that they are challenged appropriately.
5. **Virtual field trips:** VR can be used to take students on virtual field trips to locations that may be difficult or impossible to visit in person. For example, a student studying marine biology can explore a virtual underwater environment and interact with marine life in ways that would not be possible in a traditional classroom setting.

## **Future smart classroom in the era of wearable Neurotechnology**

Fundamental challenge to achieve the aforementioned vision is to measure the student's mental state, in real-time. Indeed, recent advances in neuroscience have opened the gate to unveil fundamental processes in the human brain, such as the ability to generate emotions, memories, and actions.

Optimal cognitive processing is central to all aspects of human activities, and recent advances in neuroscience have provided critical insights on how the brain accomplishes cognitive processing, spanning single neuron to neural population level resolution accomplishes cognitive processing, spanning single neuron to neural population level resolution.



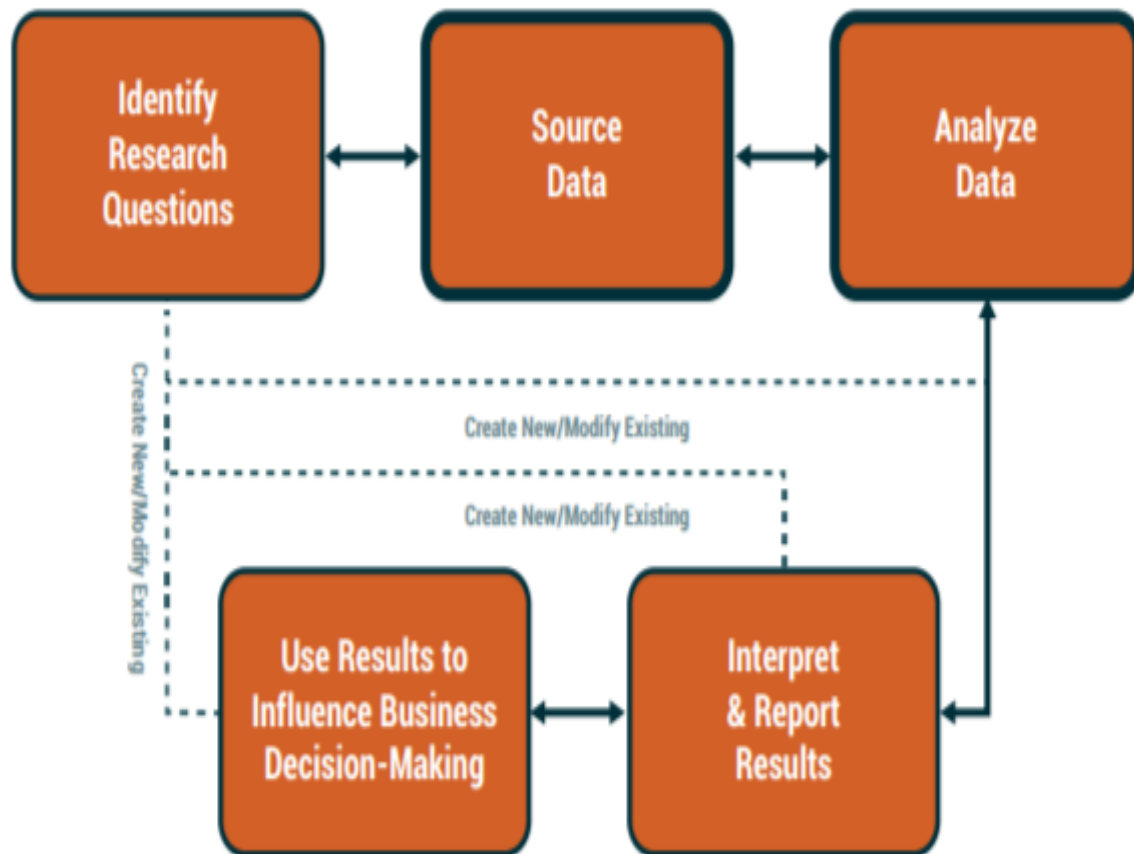
While these studies gave us the fundamentals to measure the ability to memorize visual content, and the specific parts in the brain that are responsible for cognitive processing, the form factor of the utilized machinery prevent the widespread use of this technology in classroom settings.

**Challenge 1:** Decision making in the face of system variability

**Challenge 2:** Restructuring the pedagogical materials

**Challenge 3:** Internet-of-Things (IoT) design and robustness to errors

## Business data analytics activities



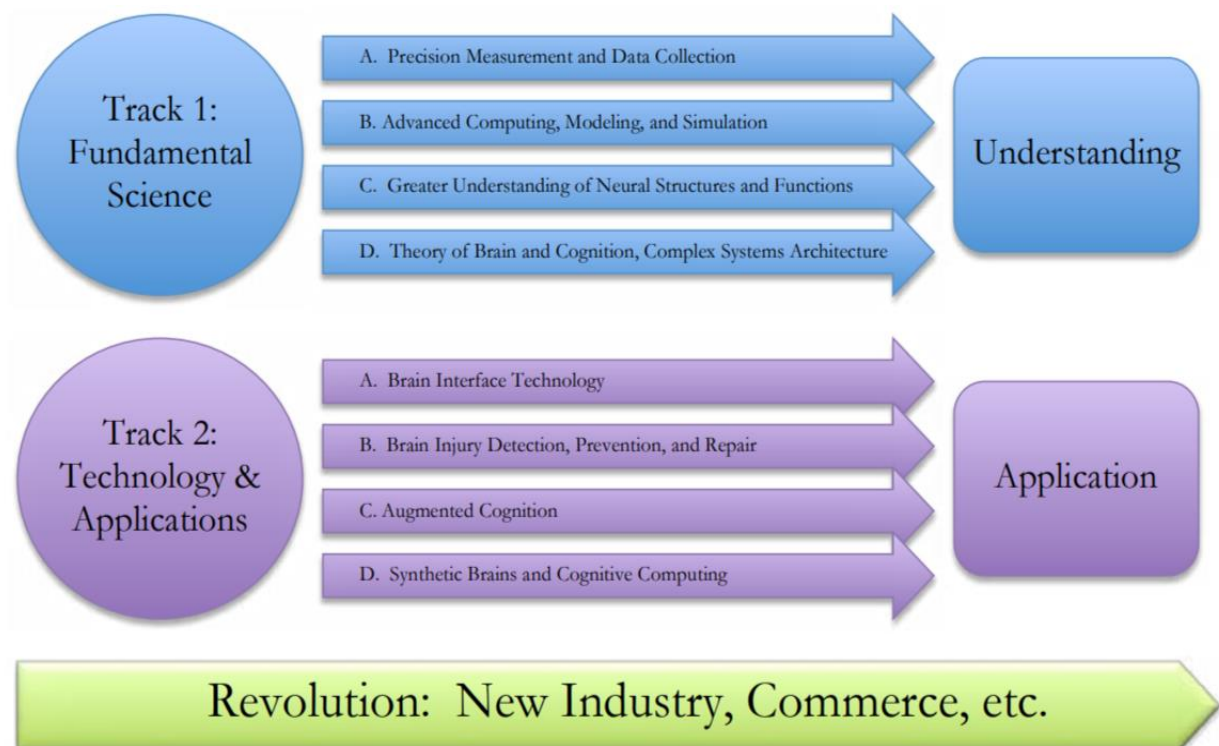
## 1. Defining the business problem or opportunity

One potential business opportunity in Neuro-Edtech (neuroscience + education + technology) is the development of personalized learning solutions that incorporate insights from cognitive and neuroscience research to optimize learning outcomes. Some Business opportunity for edtech using neuroscience:

- 1. Businesses could capitalize on this opportunity by developing software platforms or tools that incorporate cognitive and**

neuroscience research to provide personalized learning experiences for students.

2. Another approach could involve the use of brain-computer interfaces (BCIs) to track and analyse students' brain activity during learning activities, which could provide insights into their cognitive processes and inform personalized learning recommendations.



## 2. Assessing the current state

The market for personalized learning is growing rapidly, with many companies offering products and services aimed at supporting this approach to education.

There are also several companies developing neurotech-based products for personalized learning, such as brain-training apps that use games and other activities to improve cognitive function and memory.

1. **Market size and growth potential:** The edtech industry is growing rapidly, with an estimated market size of \$250 billion by 2020. Meanwhile, the neurotech industry is also expanding, with a projected market size of \$12.6 billion by 2024.
2. **Technology advancements:** The development of neurotechnology's such as brain-computer interfaces (BCIs), neurofeedback, and virtual reality (VR) has opened up new avenues for edtech companies.
3. **Opportunities for collaboration:** The edtech industry has already seen collaborations between traditional education companies and tech giants, such as Google and Apple. Startups in both industries could also benefit from collaboration, as they seek to create innovative solutions for brain-based learning.
4. **Ethical concerns:** As with any technology that interacts with the brain, there are ethical concerns around privacy and security.

### 3. Defining the future state

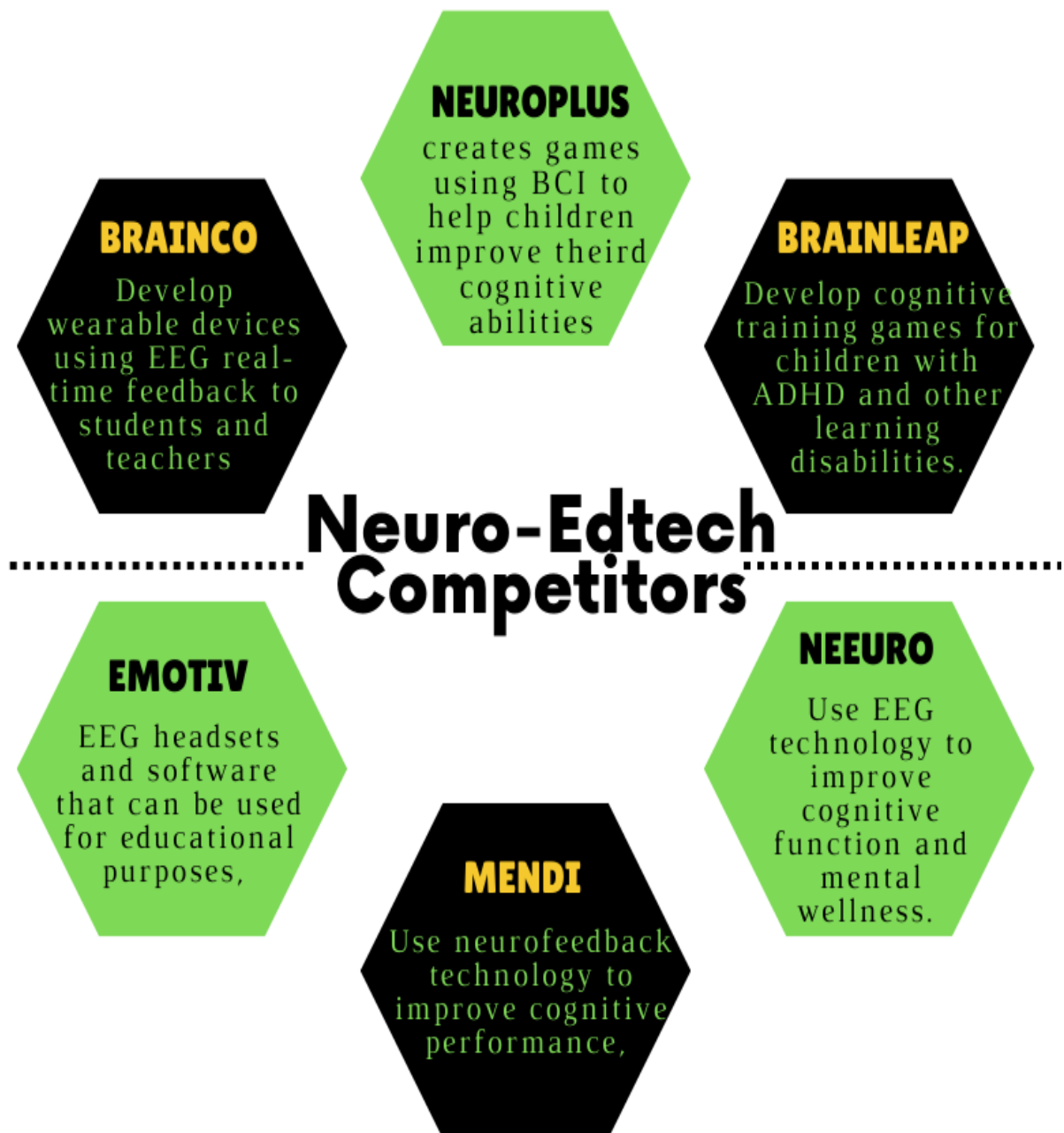
The future of edtech in neuroscience is very promising, with many new and exciting developments on the horizon that could revolutionize education. As neuroscience and technology continue to advance, they are increasingly converging, leading to new and innovative applications in education. EdTech market is expected to reach \$3.5bn by 2022 and \$10bn by 2025 and 39% CAGR of market size (2020 – 2025)

Several exciting and promising future aspects of neuroscience in edtech that have the potential to revolutionize education. Here are a few examples:

1. **Adaptive Learning Software:** Adaptive learning software uses machine learning algorithms to adjust instruction in real time based on the student's performance and learning preferences.
2. **Neuroscience-Driven Teaching Strategies:** As we learn more about the neural processes involved in learning, educators will be able to develop more effective teaching strategies that are tailored to the individual needs and learning styles of each student.
3. **Cognitive Skills Training:** Cognitive skills training programs, such as working memory training or attention training, are designed to improve specific cognitive processes. In the future, these programs could be personalized to target the specific cognitive processes that each student needs to improve.
4. **Virtual Reality:** Virtual reality (VR) technology can be used to create immersive and engaging learning experiences that are tailored to the student's needs and preferences. In the future, VR technology could be used in conjunction with neuroscience to create learning experiences that are even more effective at engaging students and promoting learning.
5. **Brain-Computer Interfaces (BCIs):** BCIs use electrodes implanted in the brain or placed on the scalp to detect brain activity and translate it into commands that can be used to control devices or interact with software. In the future, BCIs could be used to help students with physical disabilities or who struggle with traditional methods of input to interact with learning materials using their thoughts.

## Top Neuro-EdTech Competitors

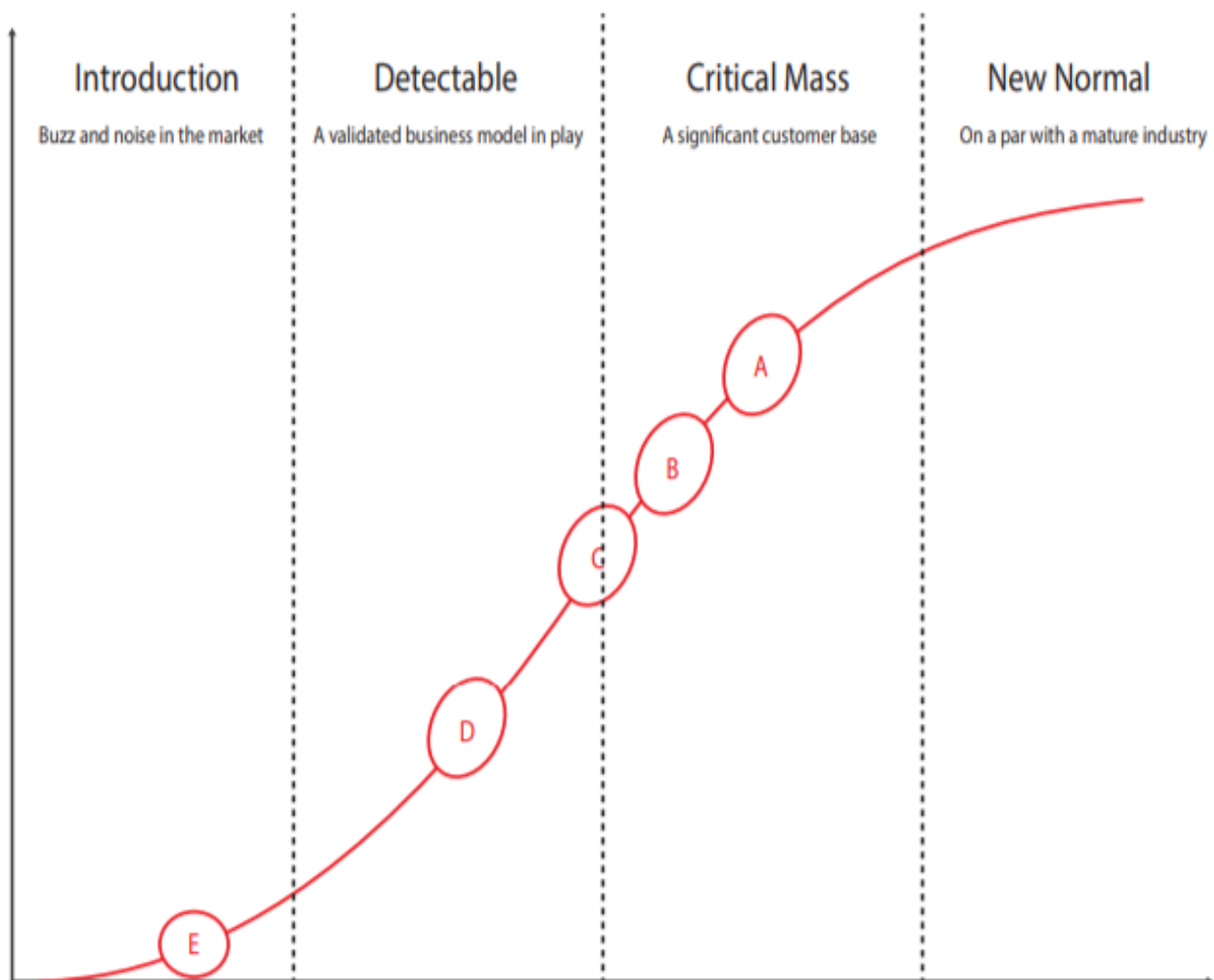
The field of Neuro-Edtech is still emerging, but there are already several companies and organizations that are competing in this space. Here are a few examples:





Overall, the competition in the Neuro-Edtech space is still growing, and we can expect to see more companies and organizations entering the market in the future. As the field continues to evolve, we can also expect to see new products and services that combine neurotech with other technologies, such as virtual and augmented reality, to create more immersive and engaging learning experiences.

## Maturity Cycle of EdTech Startup



## Competition Edge in market

The competition edge in Neuro-Edtech can come from several different areas, depending on the specific product or service being offered. Here are a few examples:

1. **Technology innovation:** One of the main advantages in Neuro-Edtech is the use of cutting-edge technology such as brain-computer interface (BCI) technology, wearable EEG devices, neuroimaging tools, and neurostimulation devices
2. **Scientific validation:** Scientific validation is important in the field of Neuro-Edtech because it provides evidence that the product or service actually works.
3. **User experience:** The user experience is critical in the success of any product or service, and this is especially true in Neuro-Edtech where the user's engagement and motivation are key factors in achieving results.
4. **Customization:** Every individual is unique, and Neuro-Edtech products and services that can be customized to meet the specific needs of each user can provide a competitive edge in the market
5. **Partnerships:** Partnerships with other companies, organizations, or academic institutions can provide a competitive edge in the market by enabling access to new technology, expertise, and resources.

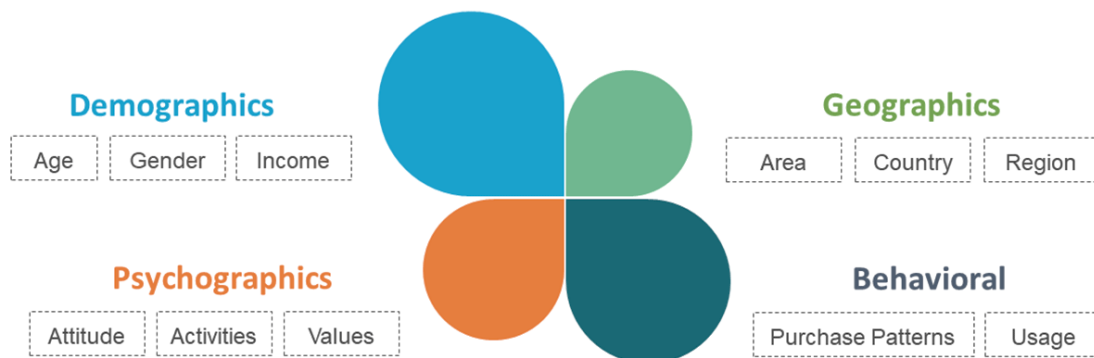
## Quantitative analysis

Quantitative analysis can be an important tool for Neuro-Edtech startups to evaluate their performance and make data-driven decisions.

1. **User engagement metrics:** Startups can track user engagement metrics such as number of active users, session length, and retention rate to understand how users are interacting with their products and services. These metrics can help startups identify areas for improvement and optimize user experience.
2. **Conversion rates:** Startups can measure conversion rates, or the percentage of users who take a desired action (such as purchasing a subscription or upgrading to a premium plan), to understand the effectiveness of their marketing and sales strategies.
3. **Revenue analysis:** Startups can analyse revenue data to understand which products are driving revenue growth, identify pricing strategies that are working well, and assess the overall financial health of the company.
4. **Customer satisfaction metrics:** Startups can measure customer satisfaction through surveys or other feedback mechanisms to understand how well their products and services are meeting the needs of their target customers. This information can help startups improve their offerings and build customer loyalty.
5. **A/B testing:** Startups can use A/B testing to evaluate the impact of different design or messaging elements on user behavior. For example, a startup could test two different versions of a landing page to see which one leads to more signups or conversions.
6. **Cohort analysis:** Startups can perform cohort analysis to understand how different groups of users are behaving over time. This can help startups identify trends and patterns in user behaviour, and assess the effectiveness of different product or marketing strategies.

# Market Segmentation

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To conduct a customer analysis for Neuro-Edtech, we need to identify the target customer segments and their characteristics.

## Target Customer Segments:

1. **Educational Institutions** - Schools, colleges, and universities looking to improve the effectiveness of their teaching methods and enhance student learning outcomes.
2. **Corporate Training** - Companies looking to enhance the skills and knowledge of their employees through effective training programs.
3. **Individuals** - Learners of all ages who are looking for personalized, efficient, and engaging ways to learn new things.
  - ✓ **Parents:** Parents who are interested in using technology to support their child's learning and development may be interested in Neuro-Edtech products that use neurotech to improve cognitive abilities such as attention, memory, and problem-solving skills.
  - ✓ **Students:** Students of all ages can benefit from Neuro-Edtech products and services, including those with learning disabilities, attention deficit hyperactivity disorder (ADHD), and other cognitive or neurological conditions.

- ✓ **Educators:** Educators who are interested in using technology to support their teaching and enhance student learning outcomes may use Neuro-Edtech products to measure and improve student cognitive performance.

## Characteristics of Target Customer Segments:

1. **Educational Institutions** - These customers are looking for solutions that can improve the quality of education, increase student engagement, and improve student outcomes. They may be looking for ways to integrate technology into their classrooms and curricula, and they may require solutions that are easy to use and implement.
2. **Corporate Training** - These customers are looking for solutions that can help them train their employees more effectively, reduce training costs, and improve employee retention. They may be looking for solutions that are customizable to their specific needs, and they may require solutions that can be integrated with their existing training programs.
3. **Individuals** - These customers are looking for solutions that can provide them with personalized learning experiences, improve their retention and recall of information, and make learning more engaging and fun. They may be looking for solutions that are accessible on their mobile devices, and they may require solutions that can adapt to their learning style and pace.

## Key Customer Needs:

1. **Effective Learning** - Customers want solutions that can help them learn faster, better, and with higher retention rates.
2. **Engagement** - Customers want solutions that are engaging, interactive, and fun to use.
3. **Customization** - Customers want solutions that can be tailored to their specific needs and preferences.
4. **Convenience** - Customers want solutions that are easy to use and can be accessed from anywhere, at any time.
5. **Cost-effectiveness** - Customers want solutions that provide value for money and are cost-effective in the long run.

# Efficient Business Revenue models for Neuro-EdTech Startup

Neuro-Edtech startups can generate revenue in several ways, depending on the specific product or service being offered. Here are some examples:

1. **Product sales:** One way for Neuro-Edtech startups to generate revenue is through the sale of their products. This could include the sale of brain-training apps, neurostimulation devices, neuroimaging tools, and other hardware or software products.
2. **Subscription-based models:** Many Neuro-Edtech startups offer subscription-based models that allow users to access their products or services for a set period of time. This could include access to a brain-training app, cognitive assessment tools, or a neurofeedback service.
3. **Licensing and partnerships:** Neuro-Edtech startups can also generate revenue by licensing their technology or partnering with other companies or organizations. For example, a startup that has developed a new brain-computer interface technology could license the technology to a medical device company or partner with a research institution.
4. **Consulting services:** Some Neuro-Edtech startups offer consulting services to companies or organizations that are interested in implementing neurotechnology into their operations. This could include providing guidance on the use of neuroimaging tools or the development of neurofeedback programs.
5. **Research collaborations:** Neuro-Edtech startups can collaborate with academic institutions and researchers to conduct studies and clinical trials on their products or services. This can generate revenue through grants, research contracts, and partnerships with pharmaceutical companies.

# Requirement for Neuro-Edtech Startups

There is a significant need for neurotech startups in the industry as they can bring innovation, creativity, and agility to the development of new neurotech products and solutions. Here are some reasons why:

1. **Address Unmet Needs:** Neurological disorders and conditions can be highly complex, and existing solutions may not be effective or accessible for all patients. Neurotech startups can identify unmet needs and develop novel solutions that can address these challenges.
2. **Flexibility and Agility:** Startups are more agile and can adapt more quickly to market changes and technological advancements, allowing them to stay ahead of the competition and provide better solutions.
3. **Attracting Investment:** Neurotech startups often attract significant investment from venture capital firms, angel investors, and strategic partners, providing them with the necessary resources to develop their solutions and bring them to market.
4. **Collaboration and Partnerships:** Startups can collaborate with other companies, research institutions, and medical centres to develop and test their products and solutions, which can lead to more significant breakthroughs and advancements.
5. **Disrupting Existing Markets:** Neurotech startups can disrupt existing markets by offering more affordable, accessible, and effective solutions for neurological disorders and conditions.
6. **Advancing Research:** Neurotech startups can play a significant role in advancing research in the field by developing new technologies, collecting and analyzing data, and collaborating with researchers and clinicians to better understand neurological disorders and conditions.

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