



EBRAINS

Landscape Survey on Needs in Neuroscience Education

Analysis and Report

Landscape Survey on Needs in Neuroscience Education: Analysis & Report

Executive Summary

The EBRAINS Education Task Force conducted a survey to better understand the needs and opportunities in digital neuroscience education from educators, trainees, and tool developers. Insights from 315 respondents will help guide new educational initiatives and inform policy to improve neuroscience education through digital technologies.

Results demonstrated that, while there is a universal demand for advanced digital neuroscience education, systemic barriers in resource allocation, institutional flexibility, and tool accessibility are currently impeding the development of a digitally fluent research workforce. Increased awareness and time availability among academics alongside funding for tool developers are needed to support the increased use of digital tools in neuroscience education.

Programming, computational/data analysis, and hands-on practical training are specific areas of need for trainees, while accreditation requirements are specifically important for European trainees. Trainees express that they lack interdisciplinary training and practical/experimental training while educators find these types of teaching to be the most difficult to organise.

Despite the likely bias towards prior EBRAINS engagement in respondents, knowledge of EBRAINS and experience with EBRAINS tools was lower than expected. EBRAINS should take every opportunity to extend its reach and increase awareness of tools and training, both within and beyond Europe.

Background

The use of digital technologies in neuroscience education is growing as their benefits gain increasing recognition. Digital tools improve the efficacy of students' learning of neuroscience¹ and advance their practical skills in line with career

¹ Schleisman KB, Selcen Guzey S, Lie R, Michlin M, Desjardins C, Shackleton HS, et al. Learning Neuroscience with Technology: a Scaffolded, Active Learning Approach. *J Sci Educ Technol* 2018 August 24;27:566–580.

development objectives². However, with no current consensus on how best to engage educators in implementing digital tools³, their implementation is likely to be inconsistent across institutions and countries. Understanding how to effectively utilise digital technologies in neuroscience education is crucial for equipping the next generation of neuroscientists with the skills they need to advance brain research and health.

The EBRAINS Education Task Force sought to fill this gap in understanding with the Landscape Survey on Needs in Neuroscience Education. Its goal was to gain insights from educators, trainees and tool developers into the current needs and opportunities in digital neuroscience education; these insights can then inform new educational initiatives and support policy-making, improving neuroscience educational outcomes through digital technology implementation across and beyond Europe.

Demographics

315 respondents completed the survey which involved up to 15 role-specific questions: 148 educators (47%), 147 trainees (47%), and 20 tool developers (6%).

Individuals responded from 32 countries across Europe, North America, Africa, Asia, and Oceania. There was a roughly even gender split between responses from men (46%) and women (50%), with the majority of individuals having 10 or more years of experience in academia and/or industry (62%).

Findings/Results

The Digital Skills Gap

Most educators use digital tools or training in their teaching (75%), most commonly brain atlases (46%), datasets (41%), and programming applications (38%).

Meanwhile trainees experience hugely varying levels of digitalisation during their

² de Wit B, Badcock NA, Grootswagers T, Hardwick K, Teichmann L, Wehrman J, et al. Neurogaming Technology Meets Neuroscience Education: A Cost-Effective, Scalable, and Highly Portable Undergraduate Teaching Laboratory for Neuroscience. *J Undergrad Neurosci Educ* 2017 Jun 15;15(2):A104–A109.

³ Gerostathi M, Vrahatis A G, Tikva C, Doukakis S, editors. Vlamos P, editor. Exploring the Role of Strategies and Tools in Teacher Professional Development in Neuroscience Education: A Review. *GeNeDIS 2024*; Cham: Springer Nature Switzerland; 2026.

neuroscience education (from 0 – 100%); those that receive digital training are highly appreciative of it, with more than 84% welcoming the incorporation of more digitally engaging content into their classes, such as a virtual brain atlas. Digital training was popular across neuroscience disciplines, with data management being the most popular (53%) (see Figure 1).

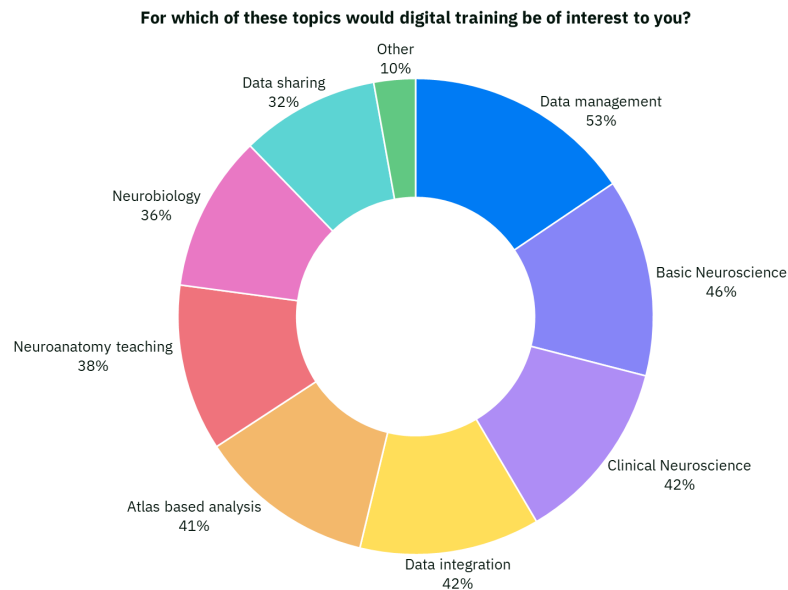


Figure 1. Responses from trainees to the question “For which of these topics would digital training be of interest to you? (Please select all that apply)” (n=125).

Educators' insights revealed critical skills deficits among early-career researchers: a 53% gap in programming, a 52% gap in data analysis/statistics and a 50% gap in interdisciplinary knowledge indicate that current curricula are failing to keep pace with the computational demands of modern neuroscience (see Figure 2). This aligns with the experience that computational/data analysis training (52%) is the most difficult to organise, alongside experimental/lab-based (50%) and interdisciplinary training (43%).

What skills or knowledge gaps do you observe in incoming graduate students or early-career researchers?

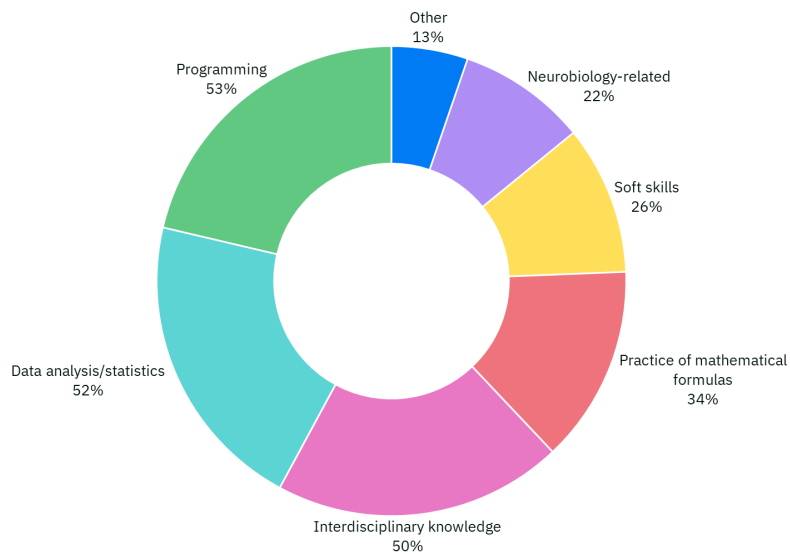


Figure 2. Responses from educators to the question “What skills or knowledge gaps do you observe in incoming graduates or early-career researchers?” (n=145).

Trainees are acutely aware of these gaps: when asked which essential disciplines are underrepresented in their training, most selected statistics/data science (50%) and programming/coding (48%). Trainees agree that their teaching content is interesting (75%), delivered by field experts (75%) and is up to date (74%). However, only 36% agree that their training includes sufficient hands-on practice, and less than half (46%) feel that their training provides practical skills that support their career development goals. Notably, the percentage of real scientific data usage in current training varies greatly, ranging from 0% to 100%.

The European Landscape

Educators outside of Europe (the majority of whom live in the USA) find it much easier to organise interdisciplinary training than those within Europe. In Europe, 48% of respondents stated that their curricula are inflexible in allowing students to attend courses from other departments or institutions, while 55% of international respondents stated that their curricula were flexible.

ECTS or other formal certification is a specific need for training programmes in Europe, according to trainees: in Europe, 30% of trainees rated certification as important, while 55% of international trainees rated it as unimportant.

The Barriers to Digital and Interdisciplinary Neuroscience Education

The main barriers to offering interdisciplinary training are staffing (53%) and funding (45%), with funding being a common theme among barriers to greater integration of digital technologies in education. While 80% of tool developers have created educational materials, 76% require targeted financial support to achieve formal integration into academic programs. Further barriers for tool developers are a lack of time (65%), lack of awareness about tools/courses, and time constraints for training or implementation (both 60%). Educators' preferences for support to use digital tools in their teaching reflect these barriers: self-directed learning materials, such as step-by-step user guides/manuals (62%), pre-recorded modules/tutorials (47%) and case studies/reports (43%), were selected as the most popular formats for support.

Many tools currently have a low capacity for concurrent users, with a maximum of 100, minimum of 1 and median of 70. The adaptability of tools for educational purposes is mixed, with 20% reporting full adaptability, 5% reporting no adaptability and 30% reporting moderate adaptability (see Figure 3).

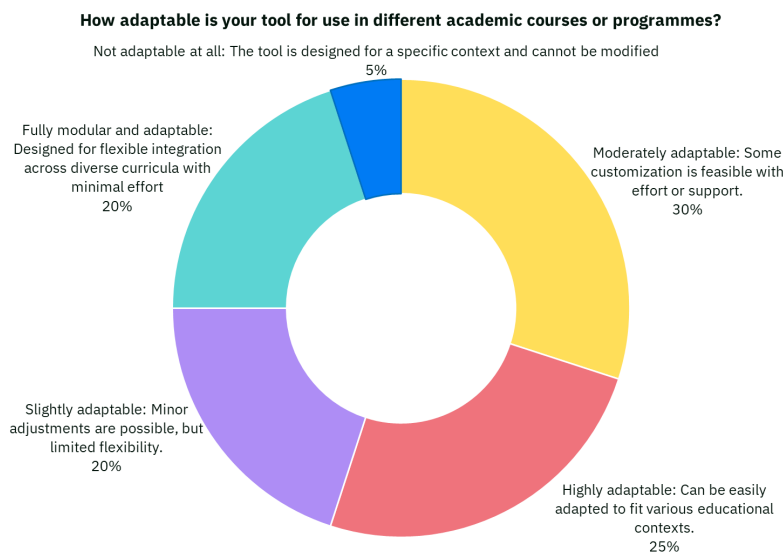


Figure 3. Responses from tool developers to the question “How adaptable is your tool for use in different academic courses or programmes?” (n=20).

The Strategic Solution

There is a significant expansion opportunity for EBRAINS as 50% of trainees have never heard of EBRAINS before while only 5% use EBRAINS tools or services

regularly and less than 1% consider themselves an expert user of EBRAINS. When asked if they know where to find EBRAINS Education offers, 35% of respondents said no, 29% had a general idea but did not know the exact details, while only 14% knew exactly where to find them. 21% also reported that they did not know what EBRAINS is. These results were surprising given the likely bias towards prior EBRAINS knowledge and engagement in respondents, as much of the survey dissemination took place through EBRAINS channels.

The majority of respondents wish to stay in touch with the EBRAINS community via email (71%), with 29% preferring a newsletter and 27% wanting to use social media. The EBRAINS community space (15%), forum (14%), GitLab (13%) and chat (12%) all had similar levels of popularity. Trainees specifically feel that announcements through university channels or mailing lists (53%) would be the best way to make EBRAINS educational and training opportunities more visible or accessible to them (see Figure 4).

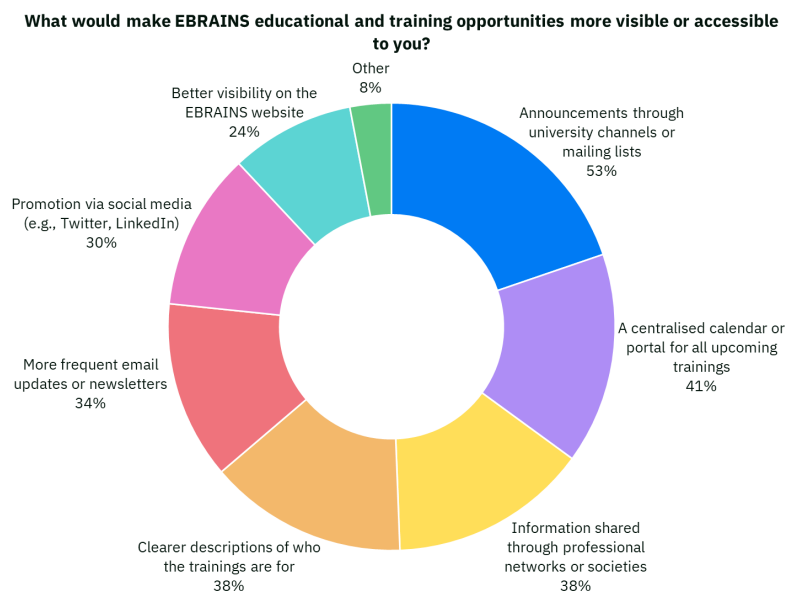


Figure 4. Responses from trainees to the question “What would make EBRAINS educational and training opportunities more visible or accessible to you? (Please select all that apply)”.

Conclusion

Educators, trainees and tool developers all want more digital training but face barriers in organising, accessing and producing educational material. Programming, computational/data analysis and hands-on practical training are specific areas of need. Awareness, time and money are needed to increase the use of tools in formal education. Current and future EBRAINS users can be engaged through email lists and university channels.

EBRAINS' position as a central node for digital excellence provides the international network, scientific knowledge and educational support needed to overcome these barriers to digital and interdisciplinary neuroscience training. The resulting deeper integration of digital tools into neuroscience education will ensure the next generation of neuroscientists graduate with the skills they need to pursue neuroscientific innovation in today's computational era of neuroscience.

Recommendations

1. Future neuroscience educational activities should focus on practical skills and career development, with an increase in digital training delivery, particularly regarding programming and data science skills.
2. An interdisciplinary approach should be taken in all future educational activities with institutional-level policies supporting an increase in interdisciplinary working and teaching.
3. Targeted support for educators to integrate digital tools into their teaching should be prioritised through supporting the creation of self-directed learning materials by tool developers.
4. Tool developers should be further supported to improve the educational readiness of their tools to increase tool integration in education.
5. EBRAINS should take every opportunity to extend its reach, increasing awareness of and familiarity with EBRAINS tools and educational offers.

Contact

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