2024 Technology Fee Grant Proposal

Title: Enhancing Academic Achievement through Brain Mapping and Neurofeedback Training

Proposer: Carlos Hernandez, Counseling and Wellness Center, Geoff Lee, Counseling and Wellness Center, Brian Shaw, Counseling and Wellness Center, Collier Shepard, Counseling and Wellness Center, Kelsea Visalli-Bettag, Counseling and Wellness Center:

Contact: Collier Shepard, jcshepard@ufl.edu, 3190 Radio Road, Gainesville, FL 32611, 352-392-1575

Purpose: The Counseling and Wellness Center (CWC) provides quality mental health counseling services that support University of Florida students in successfully finishing their educational programs while achieving personal mental health and wellness goals. The CWC provides evidence-based counseling services and strives to be a leader among University Counseling Centers (UCCs) by offering innovative and cutting-edge technologies that can improve mental health outcomes and academic achievement. The CWC is requesting funding for a BrainMaster Freedom 20R headset that would allow the center to implement research quality QEEG brain mapping and provide personalized QEEG-informed neurofeedback training. These pioneering services would equip the CWC with technology that can better personalize the experience of students receiving counseling and, in doing so, improve assessment and remediation of psychological and cognitive factors that are adversely affecting their well-being and academic performance.

Since the beginning of the COVID pandemic, mental health disorders among college students and the utilization of campus mental health services have been at all-time highs (Healthy Minds Survey, 2023). Mental health disorders can significantly impact academic performance and productivity, and several studies have demonstrated that anxiety, stress, depression, and ADHD can have profound impairment on attention, memory, information processing, decision-making, goal setting, and planning, all of which are vital to academic success (Adamis & Olatunji, 2024; Ajilchi & Nejati, 2017; Warren, Heller, & Miller, 2022). Additionally, mental health concerns can have a significant impact on student retention. A recent Gallup and Lumina Foundation poll (2023) found that 40% of students surveyed had recently considered withdrawing from college with the top two reasons being “emotional stress” and “personal mental health reasons.” Drop-out rates are significantly higher among college students with symptoms of mental health disorders (25%) compared to those without any symptoms (9%; Hrala, 2022).

Personalized medicine is a rapidly growing approach to healthcare that uses an individual’s unique genetic makeup, technology, and big data to develop a tailored healthcare plan that can provide better prevention, more accurate diagnosis, and more effective treatment than traditional “one-size-fits all” approaches (Landeck, 2016; U.S. Department of Health and Human Services, 2024). Biomarkers are an essential element for selecting appropriate treatments in personalized medicine yet are seldomly used in diagnosing mental health disorders (Keizer, 2021). Instead, structured interviews and questionnaires are the primary tools for diagnosis. Steps are being taken to identify biomarkers for mental health disorders, and growing research is investigating such biomarkers through a variety of brain imaging techniques including electroencephalography (EEG), a measurement of the brain’s electrical activity. Several studies have demonstrated statistically significant and clinically relevant differences in EEG activity among individuals with mental health disorders such as ADHD, depression, anxiety, autism, and insomnia (Kearson, 2023; Keizer, 2021; Monstra, 1999). Snyder et al. (2015) even demonstrated that using EEG in addition to standard diagnostic procedures can increase diagnostic accuracy from 61% to 88%.

Recent developments in the scientific literature show great promise in the use of quantitative EEG (QEEG) assessments, which use a normative database to assess deviations in EEG activity, in clinical practice as both a diagnostic and prognostic tool (Keizer, 2021). QEEG assessments can also be used to detect connectivity issues between neural networks in the brain, which are prevalent in most mental health disorders (Kearson, 2023). Another use of these assessments is to customize neurofeedback training plans that target an individual’s clinically relevant EEG deviations. Neurofeedback training uses operant conditioning to train the client to learn how to use

behavioral and coping strategies to produce more optimal EEG activity that moves toward normative values. Neurofeedback training can lead to significant long-term improvement of mental health symptoms with multiple studies demonstrating that it is as effective as methylphenidate for improving ADHD (Moreno-Garcia, Cano-Crespo, & Rivera, 2022).

By acquiring a Freedom 20R headset, the CWC would be able to utilize cutting-edge technology to provide comprehensive brain functioning assessments and personalized neurofeedback training plans to improve the academic achievement and well-being of many UF students seeking services at the CWC whose academic performance is significantly impacted by their mental health concerns. These services would also provide an invaluable resource to the CWC's assessment and testing services, which have increasing demands but, unfortunately, lack the resources to meet the growing needs of UF students.

Impact/Benefit: The ability to offer QEEG brain mapping and QEEG-informed neurofeedback training will have an immediate impact on assessment and remediation of mental health concerns that are significantly impacting the academic achievement of many UF students. Traditional psychoeducational testing for ADHD and personality testing for anxiety and mood disorders can take up to seven hours over three separate appointments to complete at the CWC. Additionally, there is often a waitlist that presents a barrier for many students to participate in these services in a timely manner and, sometimes, even at all. The ability to offer QEEG would not only increase the accuracy of diagnosis, it would also enhance the efficiency of testing services. A QEEG assessment with the Freedom 20R headset can be completed in under 20 minutes, including setup and removal of the headset, and within two hours of uploading the assessment through a secure online portal to an FDA-registered EEG reporting service, a comprehensive neuropsychological profile report is automatically generated that compares the EEG assessment to a normative database to identify EEG biomarkers and possible symptoms experienced by the client. The report also includes a personalized neurofeedback training plan to improve EEG deviations and the client's symptoms.

QEEG assessments would be a complementary service to traditional testing and assessment offered at the CWC. Having the capability to complete a QEEG in about 20 minutes allows for far more students to participate in testing services, acts as a screener to determine if further assessment through traditional testing is clinically necessary, and, most importantly, provides a personalized neurofeedback treatment plan that students can begin in the next 1-2 weeks. This would be particularly beneficial for students whose testing is delayed for several weeks due to a waitlist and are unable to receive appropriate counseling, medication management, and/or Disability and Resource Center (DRC) accommodations to improve mental health concerns that are most significantly impacting their academic performance until they receive results from testing. The ability to begin a personalized behavioral intervention prior to testing could make a marked difference in these students' academic performances and could potentially decrease the frequency that some of these students seek medical withdrawals due to mental health reasons.

Currently, the CWC is able to accommodate around 150 students a year for testing and assessment services. Testing is confined to two dedicated offices and most appointments require three hours of clinical time to be scheduled. The Freedom 20R is a portable device, which allows for QEEG assessments to be conducted in any office at the CWC, and because the assessments can be completed in around 20 minutes, this would allow the opportunity for clinicians to conduct multiple QEEGs in one day as opposed to being limited to seeing one student per day for testing and assessment services. We anticipate that four clinical staff members will be trained to conduct QEEG assessments by the anticipated launch of these services in January 2025 and plan to limit capacity to five QEEG assessments per week during the first semester, which would be around 80 QEEG assessments. Following a meeting to determine usage, efficacy, and impact in May 2025, we would aim to increase the daily capacity of QEEG assessments to 2 for the summer and fall semesters, which would allow for roughly 120 assessments in the summer and 160 in the fall. We would then determine the feasibility of increasing the number

of daily assessments to 3 beginning in the spring 2026 semester, which would bring the capacity to around 240 assessment slots that semester.

Based on the comprehensiveness of the generated neuropsychological report and accuracy of QEEG in determining ADHD (sensitivity rating of 86%; Monastra, 1999), the Freedom 20R would allow the testing and assessment team to better determine the appropriateness of the students who engage in psychoeducational and personality testing, thus increasing the efficiency of these services and improving the utilization of these resources for the most appropriate students. The ability to personalize neurofeedback training plans to target each student's deviations in EEG activity would also mean that students who have significant problems with academic performance but do not receive a diagnosis from testing and assessment that would warrant certain medications or accommodations would be able to participate in neurofeedback training, which could lead to symptom relief and increased attention, memory, information processing, decision-making, goal setting, and planning. This progress could result in improved academic achievement, well-being, and overall functioning for these students.

We envision that the success of this 2-year project will lead to an expansion of QEEG assessments at the CWC to reach a far greater number of UF students. We also plan to enhance the learning outcomes of practicum students and interns by offering supervised training for QEEG assessments in the near future. This would be a unique training opportunity that is not available at most, if any, UCCs. In time, we hope this program bolsters UF's reputation as a model for innovative counseling approaches to UCCs around the nation through research, publication, presentations, and training.

Sustainability: The CWC supports this proposal and is committed to providing ongoing resources for maintenance of equipment and the operating costs of software and reporting services after the period of funding provided by the grant.

Timeline:

Timeline	Action
Summer 2024	Funds Awarded
August 2024	UF IT for UF Risk Assessment review of equipment and software
August 2024	Purchase equipment and software
Fall 2024	Staff training and equipment testing
Fall 2024	Services advertised and promoted
January 2025	Services launched
May 2025	Assessment of usage, efficacy, and impact

Budget: BrainMaster Technologies offers an "Emerald Package" for the Freedom 20R headset that includes all of the necessary equipment and software to run QEEG assessments and QEEG-informed neurofeedback training, including a 1-year "gold" level subscription to qEEG-Pro Report Service. Here is a breakdown of this package:

Item	#	Item	#	Item	#
Freedom 20R Headset	1	Battery Chargers	2	Echo Module	1
Replaceable Li Ion Batteries	4	Leadwire Earclips	2	FlexSensor 10 Pack	2
USB Bluetooth dongle	1	Disposable Cleaning Wipes	1	Drypad Sensor 10 Pack	2
Carrying Case	1	BrainAvatar 4.0 Acquisition Software	1	HydroFlex Sensor 10 Pack	2
MultiMedia Player Package	1	BrainAvatar 4.0 up to 19 Channels	1	HydroFlex Accessory Pack	2
qEEGPro Surface Z-Score Training	1	BrainAvatar 4.0 Live sLORETA Projector	1	Measuring Tape for head	1
qEEG-Pro Report Service-Gold	1	qEEGPro Live sLORETA Z-	1	One Year Affiliate	

		Score Training		Membership	
Three Year Limited Parts and Labor Warranty	1				

The cost of this package is $31,025.00. Additionally, we are requesting $2000 in funding for a dedicated laptop with the necessary specifications to run the software. The only funding needed for Year 2 of this project is the annual subscription to qEEG-Pro Report Service, which is $1495.00. A breakdown by year and the total is included below:

Year 1	Item:	Price:
	Freedom 20R Emerald Package	$31,025.00
	Laptop	$2000.00
	Year 1 Total:	$33,025.00
Year 2	qEEG-Pro Report Service – Gold annual subscription	$1495.00
	Total Project:	$34,520.00

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Technology Fee Full Proposal Template Sponsor Signature Form

Title: Enhancing Academic Achievement through Brain Mapping and Neurofeedback Training
Proposer's Name: Collier Shepard, Carlos Hernandez, Geoff Lee, Brian Shaw, Kelsea Visalli-Bettag

Note: By signing this form the sponsor is making a commitment to support the project. This may include providing startup, recurring or equipment replacement resources as presented in the attached budget.

Signature of sponsor: College Dean, or Unit Director, or VP for Student Affairs.

Ernesto Escoto, Interim Associate Vice President, Division of Student Life — 3/19/2024 | 3:03 PM EDT

Name and Title **Date**

Note: By signing this form the UF IT unit is making a commitment to manage the project if selected for submission of a full proposal. This may include providing startup, recurring or equipment replacement resources as presented in the attached budget.

Signature of unit UFIT Director of a core unit:

Mark McCallister — 3/19/2024 | 4:51 PM EDT

Name and Title **Date**