ARTICLE
The FUN Exchange: A Community-Driven Repository of Resources for Neuroscience Educators

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Even prior to the COVID-19 pandemic, higher education was facing pressure both to modify traditional instruction practices to more learner-centered instruction and to meet the increased demand for flexible instruction (including hybrid and online). These pressures have increased the need for high quality, engaging content for instruction across all modalities (including in-person, hybrid, and online). To address this need of neuroscience educators, we developed the FUN Exchange, an online repository that is accessible to educators without a paid membership and that is endorsed by the Faculty of Undergraduate Neuroscience organization. Furthermore, the resource is community-driven, allowing educators to contribute and vet submissions to the Exchange. Hosted on AirTable, there are currently more than 475 resources available that are organized by resource type ranging from Class Activities to Simulation Exercises and that can be searched by subject area as well as key words. We believe the FUN Exchange can be a one-stop shop for educators interested in high-quality neuroscience teaching resources useful for all teaching modalities—in-person, hybrid, and online.

Key words: teaching, repository, undergraduate teaching, biopsychology, neuroscience, engaging library

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Higher education has been facing pressure to modify traditional instruction practices to more learner-centered instruction and to meet the increased demand for hybrid and online instruction. It is noteworthy to state that the COVID-19 pandemic forced a rapid conversion to hybrid and online teaching during the Spring 2020 semester. It is estimated that nearly 91% of faculty transitioned to remote teaching (Marsicano et al., 2020). This trend continued into the 2020-2021 academic year, with nearly 2/3 of faculty teaching completely remotely, and another 1/4 who taught some portion of their courses online (Tyton Partners, 2021). Ultimately, higher education might have been permanently altered by the COVID-19 pandemic—substantiating the need for high quality engaging content for instruction across all modalities to meet the demand for learner-centered instruction even online. Therefore, neuroscience teaching resources that are high quality, engaging, and can be implemented across all modalities (including in-person, hybrid, and online) have never been more important than now (Cameron-Standeford, et. al. 2020). This naturally raises two questions:

1) Where can I find high-quality neuroscience teaching resources, and
2) How do I vet those resources, and/or contact the creator of the resource?

Although a google search will easily pull up many potential neuroscience teaching resources, at present there is not a collection of effective neuroscience teaching resources available. Previously, ERIN, a neuroscience repository, offered a multitude of high-quality resources (Olivo, et. al., 2015), but this collection is no longer accessible. Furthermore, other online collections, such as the Science Education Resource Center (SERC), Quantitative Undergraduate Biology Education Synthesis (QUBES), or the Case Study Database at SUNY Buffalo, are great collections, but require memberships, are not specific to neuroscience (e.g., National Center for Education Statistics), and are limited in their searchability.

During the most recent FUN virtual workshop (2020), the presentation of neuroscience resources for remote teaching led to a discussion of where to find high quality teaching resources. To address this need for teaching across all modalities, we have designed an online repository, named the FUN Exchange, that we believe can serve as a nexus for teaching resources for Neuroscience and Biological Psychology faculty teaching in K-12, undergraduate, and even graduate level courses.

The FUN exchange currently has more than 475 resources, distributed across 12 broad categories. It is hosted on the AirTable platform, which is free. Sign-up and contributions are easy and straightforward; a link to the forms for sign up and contributions are included at the end of this report. Items within a category can be searched easily.

DESIGN OF THE FUN EXCHANGE
We designed the FUN Exchange to address several common barriers to using online sources, such as:

Locating high quality resources: Web searches can be very time consuming, and they do not always result in finding high-quality content. Other times, a high-quality resource might only be located by word of mouth (e.g., during a symposium or workshop).

Accessibility of the resource: While many resources are hosted on a faculty member's webpage or their GitHub Repository, some online collections require membership to access. Only until membership has been granted can you then search through the resources.

Beyond Exams (non-exam assessments)
Case Studies
Class Activities (activities that do not require mathematical simulations)
Lab Equipment/Supplies (vendors for low-cost tools and resources)
Lab Exercises (wet, human, etc.)
Media (neuro-centric books and movies)
Open Education Resources (Brain Maps, Data Repositories, etc.)
Podcasts (neuro-centric podcasts)
Simulation Activities (exercises involving mathematical models/simulations)
Software for neural simulations
Videos (neuro-centric TED, YouTube, etc.)
Web-based Tools (neural simulations, etc.)

Table 1. Categories currently available on the FUN Exchange.

Types of available resources: Some resources, such as OpenNeuro (https://openneuro.org/), only carry one type of resource (e.g., EEG data, MRI images).

Finally, the required knowledge that is needed to make the resource work: For example, if a simulation requires specialized software (such as Matlab), are there tutorials available so that interested faculty could use the resource right away. That may be especially important when working with students who are not familiar with the software.

ACCESSING THE EXCHANGE
The FUN Exchange is hosted on AirTable—an online collaboration site in which information is stored in a hybrid database/spreadsheet format. This allows for searching within a database as one would a spreadsheet. Accounts on AirTable are free and there are no limitations to access the FUN Exchange, making it easily accessible to faculty interested in the posted resources.

Access to the FUN Exchange simply requires the completion of a google form selecting the Viewer (person can view and download content) or the Contributor (person can submit to the Exchange as well as view and download content) option.

COMMUNITY-DRIVEN
Another goal was to make the FUN Exchange community-driven. This will be accomplished in two ways. First, new FUN Exchange resources will be submitted by Contributors, not just the authors of the exchange. Any Contributor is asked to provide an accessible email so that they may be contacted for questions. For any submission, the Contributor acknowledges that the work is their own and that they have the appropriate rights to post their work. For each submission, the Contributor completes a form that is tied to the fields in the AirTable Database for the type of submission they are contributing. For certain submissions, a readme file is required, along with all Content (lesson plans, etc.) such

that someone unfamiliar with the activity can complete it or be able to contact the Contributor. The content will be uploaded as a .zip file containing all of the relevant documents, or it can be linked from any typical cloud service, including Dropbox or GitHub. Contributors may choose to attach a Creative Commons License (4.0) to their work as well.

The second component of the community-driven FUN Exchange is providing a mechanism for vetting submissions. There will be two levels of vetting. During the first level, submissions will be vetted for completeness. This is currently managed by the authors; in the future, we hope to engage the community to assist in vetting new submissions. The second level of vetting will be completed by the community; we plan to allow a rating system in which submissions can be rated using a 5-star rating scale. In this way, FUN Exchange users can see what resources have been identified as being of exceptional quality or that a particular submission may need updating.

INTERACTING WITH THE EXCHANGE
We designed the AirTable around a specific search paradigm:

1. Someone needs a resource (resource, e.g., a case study), about topic x
2. Usually they complete a web search for such a resource
3. Then they need to vet the results

Our goal with the FUN Exchange is to simplify this process:

1. Someone needs a resource (case study) about topic x
2. Go to the FUN Exchange
3. Search for case studies related to topic x

Currently, there are more than 475 resources available across 12 categories (see Table 1)—organized around pedagogical needs. We chose this organization of resources to allow an instructor to search based on a type of pedagogical practice (e.g., lab exercise).

Each resource category has an AirTable sheet dedicated to it. Within each category, the search can be narrowed by subject area (see *Table 2*), level of student, length of activity, keywords, and even the contributor or author (see Figure 1). It should be noted that the consistent layout across sheets allows to easily search the FUN Exchange for subject area, level of student, etc. across all categories. Furthermore, the keyboard short-cut Crtl+F opens a search bar by which any

Development
Electrophysiology
Neurophysiology
Neuroanatomy
Psychopharmacology
History & Education
Techniques
Sensory Systems
Motor Systems

Table 2. Subject areas currently available on the FUN Exchange.

Figure 1. Screenshot of the FUN Exchange, showing the different types of resources available. The active tab shows Class Activities. Note that hovering over the tab displays information relevant to that tab.

AirTable sheet can be searched for a specific word or phrase. The flexibility of the FUN Exchange is further enhanced by the fact that identifiers of an entry can easily be added or changed as the FUN Exchange evolves and grows. Any individual record can be expanded in order to get a snapshot of the submission as a whole (see Figure 2). This snapshot allows easy viewing of the entry containing a brief description of the resource as well as a field with the attachments necessary to implement the submission. Furthermore, each entry includes the name and contact information of the contributor—allowing the user to contact the contributor for any follow-up questions or clarifications. This approach fits with our community-driven ethos: if a link to a resource is disrupted, the contributor can be contacted directly by a user for the author to fix it. Taken together, we believe the FUN Exchange can be a one-stop shop for neuroscience teaching resources.

DISCUSSION

As the pandemic stretches into its second year, undergraduate education is facing an interesting future balancing the demands of continued remote teaching options with adjusting in-person teaching strategies in a post-pandemic world. Needless to say, the need for effective high-quality neuroscience resources that can engage all students, whether in-person or remote, will only continue to grow. We recognize that these resources exist, but are spread across numerous online resources, individual faculty pages, etc. We believe that the FUN Exchange provides an opportunity to address this need by involving the community to both curate and maintain a repository of teaching resources that can be accessed by faculty teaching Neuroscience and Biopsychology courses. Furthermore, the vetting of these resources has the potential to impact undergraduate neuroscience education by improving engagement, persistence, and achievement in our courses.

PLAN FOR GROWTH/SUSTAINABILITY

We chose to host the repository on Airtable, and are currently using their base plan, which is free and can accommodate an unlimited number of Viewers. As the Exchange grows (via the number of contributors), Airtable offers discounted pricing for educational and/or non-profit

organizations. Therefore, the FUN Exchange can be easily scaled to fit demand for nominal cost. Furthermore, the authors have partnered with FUN, who have created an ad-hoc Committee on Teaching Resources so that we can collaborate on advertising and financial support for the growth of the Exchange.

In addition to infrastructure, the authors have already begun to present the initial work of the FUN Exchange—further increasing its visibility. We have presented the FUN Exchange at the most recent Neuroscience Teaching Conference (July 2021) and the Society for Neuroscience (October 2021) meeting. We plan to present again at this year's Neuroscience Teaching Conference (July 2022) and will continue to look for opportunities to present the FUN Exchange at other conferences as well.

Currently, we have 10 contributors and more than 115 Viewers who can access the content. Our goal is to grow our
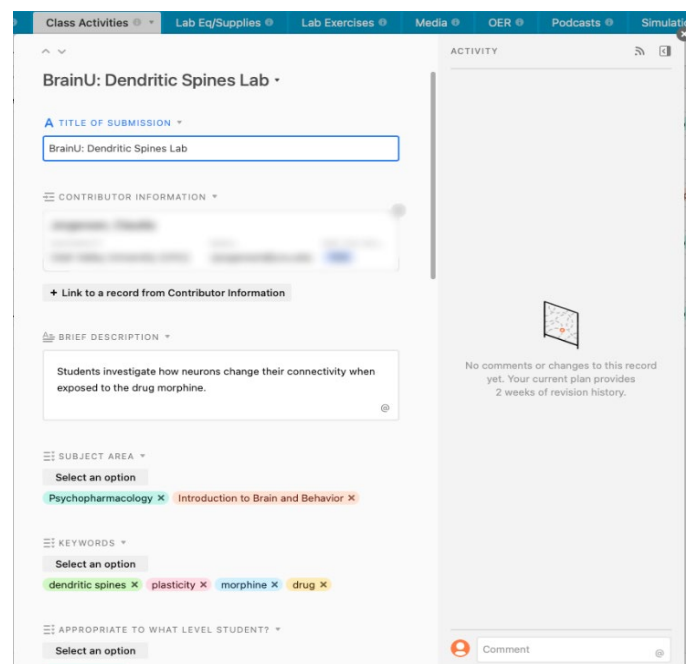

Figure 2. Screenshot showing an individual record of the BrainU submission on the Class Activity tab. Note that the subject area or keywords can be used as search terms with the database.

pool of contributors to add breadth and depth to the Exchange. We are especially happy to receive submissions of Case Studies and/or Lab Exercises, as many courses employ Case Studies and/or have labs associated with their courses. One way we hope to do this will be to monitor the Table of Contents of future editions of JUNE and to reach out to authors directly. Another way would be to query attendees at teaching conferences such as the Neuroscience Teaching Conference to upload their contributions to the Exchange. This will help keep content on the Exchange new and relevant. We have also reached out to content creators such as Crescent Loom to provide contributions as well.

Our plan for growth also includes reaching out to educators from BIPOC and LGBTQ+ groups. We will reach out to existing communities such as BRAINS (Broadening Representation of Academic Investigators in NeuroSciences), Black in Neuroscience, Black in Physiology, and Queer in Neuro on Twitter. Collectively, these groups have ~30,000 followers on twitter, and thus a large audience for recruiting contributors from diverse groups.

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