

Our Growing Brain

The GTCS Professional Standards outline our responsibility to support Scotland’s young people to “develop skills for learning, life and work”. At SSERC, our three strands of activity (professional learning, the advisory service and wider STEM engagement) can link together to create learning opportunities that celebrates this vision for education.

In celebration of British Science Week (BSW) 2022, the professional learning and STEM Ambassadors in Scotland (SAiS) teams worked together to create an online event called “Our Growing Brain”, embracing this year’s theme of “growth”. Teachers representing many local authority areas across Scotland engaged with the event, which boasted a panel of STEM Ambassadors who shared their experiences working within their respective sectors.

Online SSERC Meet

Erin Cowley (University of Dundee) shared classroom resources she developed on Motor Neuron Disease (MND), supported by the University of Dundee and MND Scotland. Michael Stringer, from the Centre for Clinical Brain Sciences at the University of Edinburgh, explored the development of magnetic resonance imaging (MRI) for the diagnosis and treatment of disease and for understanding the impact of ageing

on brain structure and function. Finally, John Morgan, a PhD student from the University of Strathclyde, supported aspects of the Higher Human Biology curriculum by sharing new research into cholesterol-targeted drug treatments for brain tumours. The event was recorded and presenter resources are available for download [1]. These fabulous STEM Ambassadors form part of a growing community of professionals who love to support classroom activities. Visit the SAiS website [2] for more information.

Our Growing Brain resource pack

A resource pack [3] was developed by SSERC featuring six curriculum-linked activities, suitable to support CfE Third and Fourth Level Science Experiences and Outcomes (e.g. *SCN 3-12a*), and National 5 and Higher Human Biology in their respective key areas on the nervous system.



Figure 1 - Merge Cube and Micro:bit.

Activity 1 & 2

Use of digital technology

In December 2021, Sarah Clark from Queen Anne High School in Dunfermline led a SSERC Meet on the use of digital technologies in the classroom. Inspired by her practice, SSERC developed two activities using Merge Cubes and Micro:bits (Figure 1) to support exploration of the human brain using digital technologies.

Using a Micro:bit, activity 2 offers a digital approach to the classic “ruler drop” reaction test. This 2-player activity is an entertaining and competitive alternative that involves block coding before game-play can commence. The resource includes a “how-to” video and text instructions for coding the Micro:bit and constructing the game boards. As shown in Figure 2, the coding instructs the Micro:bit to display a heart within a specified time frame; the first player to touch their left “button” in response to the heart display wins the point. In 2016, every S1 learner attending a Scottish secondary school was issued with a Micro:bit. Many schools have a supply of these so it is worth investigating if there is a rogue box lying dormant somewhere. Alternatively, Kitronik are a reputable supplier and the Digital Xtra Fund welcomes applications for funding of specific projects. >>



Figure 2 - Activity 2 involves block coding of the Micro:bit.

Activity 3

Can our brain make us do things we didn't mean to?

Education Scotland's Science benchmark document outlines our responsibility to support young people develop informed opinions on STEM issues. Here, learners consider the impact of brain injury or damage on an individual's behaviour and challenges the idea of responsibility and free will. The activity follows the story of Charles Whitman who, in 1966 murdered several people. The disturbing content of the story could make this more appropriate to senior classes and consideration of videos should be made prior to showing learners.

Activity 4

Explore the effect of sleep on our memory

Memory is a key area of the Higher Human Biology curriculum and activity 4 explores the link between sleep duration and short-term memory span – perhaps an interesting experiment to do from a health and wellbeing point of view with your teenage, sleep-deprived learners too. Ethical considerations central to a human study, as featured within the AH Biology curriculum, and appropriate sampling strategies are explored. Learners can make their own copy of a sample "Participation Form", covering themes of "informed consent", "confidentiality", and the "ability to withdraw", and a link to a suitable online memory test. Once learners have conducted their study, a Google Sheet is available to record their data and draw conclusions, while considering the principles of causality versus correlation (Figure 3).

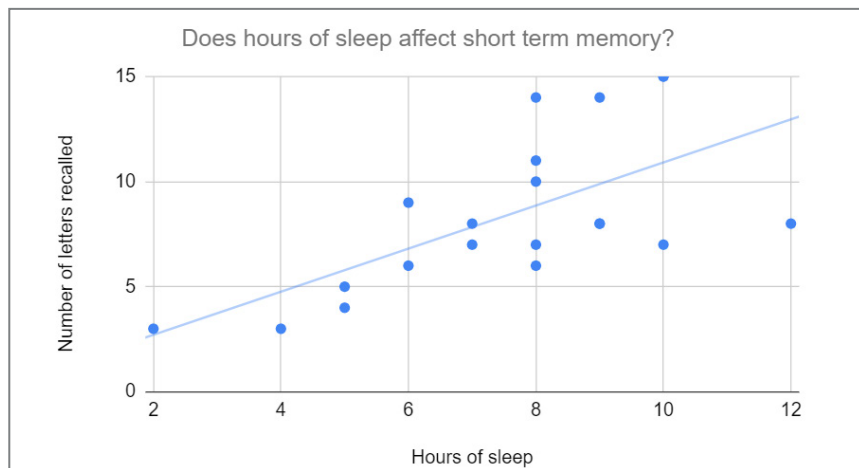


Figure 3 - Activity 4 investigates a possible link between sleep duration and short-term memory.

Activity 5

Are certain behaviours hard-wired in our growing brain

Working with organisms in the classroom can be a rare but exciting opportunity for learners. Prior to any investigative work, you should carry out a risk assessment using the SSERC Code of Practice, "Materials of Living Origin" [4]. This investigation explores the effect of light on maggot behavioural rules using choice choobs (see Figure 4), a simple and easy-to-produce piece of apparatus. Consideration of the "3Rs" in scientific ethics are reinforced and digital templates for presentation of data are provided.



Activity 6

Explore the role of our growing brain when we exercise

Adapted from the Wellcome Trust "In the Zone – I've got the power" resource pack [5], this activity involves learners using a respirometer containing an indicator responsive to carbon dioxide concentration. The respirometer can be used before and after exercise and the number of breaths required to change the colour of the indicator can be recorded. Health and safety precautions are explained, including the requirement to fit a 1-way valve in the respirometer.

The resource concludes with a suggested activity for incorporating the Young STEM Leader programme into the classroom under the broad theme of "our growing brain". <<

Figure 4 - A choice choob set up to support activity 5 (image courtesy of Association for the Study of Animal Behaviour).

References

- [1] SSERC (2022a), Our Growing Brain SSERC Meet resources, available at https://ssercltd-my.sharepoint.com/:g/personal/enquiries_sserc_scot/EtS_yZb0W3p0mv4sOZ2e6qYBLafmnMgvJDj5LJU4a1_4aw?e=dIzsrF.
- [2] STEM Ambassadors in Scotland, available at <https://www.stemambassadors.scot/>.
- [3] SSERC (2022b), Our Growing Brain website, available at <https://sites.google.com/view/our-growing-brain/home>.
- [4] SSERC (2018), Materials of Living Origin – Educational Uses, A Code of Practice for Scottish secondary schools and colleges, available at https://www.sserc.org.uk/wp-content/uploads/2018/06/SSERC-Materials_of_Living_Origin_Code_of_Practice.pdf.
- [5] Wellcome Trust (2012), In the Zone, Pearson Education Ltd and Guardian Professional.