Generative artificial intelligence in education: call for evidence
August 2023

The Royal Society of Biology responded to the Department for Education's call for evidence on Generative artificial intelligence in education. The use of AI in primary, secondary and tertiary education is of interest to our members and in supporting RSB's education policy priorities for 2023-2028: all young people should have an unbroken chain of experts teaching the disciplines and all young people should experience curricula and assessments which prepare them to be scientifically literate, able to make scientifically informed choices, and ready them for a diverse and evolving world of work.

To inform this submission, our education-focussed groups and committees: Education and Science Policy Committee, Accreditation Committee, Biology Education Research Group, Curriculum Committee and Heads of University Biosciences, were asked to provide broad views as part of a rapid survey collection in August 2023. Artificial intelligence and its use in education in a rapidly developing area of work in which RSB is building its evidence base and expertise. The survey results reported in this response to the Department for Education mark the beginning of developing RSB's policy positions. We anticipate further work in this area with each of the committees over the coming months.

We would like to acknowledge the support of our Full and Supporting Member Organisations, a group of approximately 80 organisations, working in diverse disciplines across the biosciences. RSB facilitates a number of policy groups, which meet to discuss and formulate responses to Government and other consultations. Member Organisations contribute their expertise to these groups and the responses, which are submitted on behalf of all RSB members. To find out more about organisational membership, and our current members, visit the RSB website.

Background
The public, including the education sector, has recently gained access to generative artificial intelligence (AI) tools. Generative AI technology uses foundation models trained on large volumes of data. It can be used to produce artificially generated content such as text, audio, code, images, and videos. Examples of generative AI tools include ChatGPT, Google Bard, Claude and Midjourney. This technology is also being integrated into other tools. Although generative AI is not new, recent advances and public access to the technology mean that the public can now use it more easily. This poses opportunities and challenges for the education sector.

DfE published a position on generative AI in education in March 2023 and sought evidence from a wider range of education professionals and organisations including education providers, local authorities technology companies, teachers, academics on the following five themes:

- Experience with generative AI
- Opportunities and benefits
- Concerns and risks
- Ethical and legal consideration
- Future predictions and suggestions.

Royal Society of Biology draft response to the Department for Education call for evidence: generative artificial intelligence in education

EXPERIENCE WITH GENERATIVE AI:

10) Have you or your institution used generative AI tools in an education setting? If so, could you briefly describe the ways it was used and the specific tools used.

The Royal Society of Biology does not conduct any teaching in an education setting, however we represent many members that do so. The Society is interested exploring the experiences school and higher education teaching members have had with artificial intelligence, and plans to host discussions through our education-focussed groups and committees over the coming months.

11) What were the main challenges you faced in using generative AI and how did you address these?

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12) What was the result of your use of these tools, including any impacts?

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OPPORTUNITIES AND BENEFITS OF AI:

13) How do you think generative AI could be used to improve education?

The Royal Society of Biology agrees with the department's statement that "when used appropriately technology has the potential to reduce workload and free up teachers' time". The Society supports exploring any opportunities to reduce teacher workload with a view to improving teacher retention. However, technologies that aid the user's understanding of topics in which they are not an expert may increase pressure on teachers to teach outside of their subject expertise.

To inform this response, the Royal Society of Biology conducted a rapid survey of our education-focussed groups and committees made up of members of the education and bioscience community across the UK including those with expertise in primary, secondary, further, tertiary education and initial teacher training. In answer to these questions we present a first look at the data collected from our members. Over summer many education professionals are out of office, and as a result the sample size is small. The number of respondents [n] is included for each statement. We aim to further explore this area in the coming months and would welcome further discussion with the department on the use of artificial intelligence in teaching and learning at all levels of education.

Most respondents (83.87%) believed that generative AI could be used as a tool for both teachers and students within education, with only one respondent believing that it would not be useful for either teachers or students. [n=31]

Over three quarters of respondents believed that generative AI could help with teacher workload [n = 40]. Comments in the extended response included that they believed that it could help with teacher marking, routine administration tasks, repetitive tasks that teachers have to undertake, and comprehension tasks that could have extended answer responses. It was also noted that at the moment, AI is adding to workloads with the need for checking assessments for plagiarism, and that good education needs academic insight and involvement.

14) What subjects or areas of education do you believe could benefit most from generative AI tools?

The Royal Society of Biology advocates for preparing young people to make scientifically informed choices. This should include an informed understanding of generative AI and the ability to critically assess its uses.

Respondents to RSB's rapid survey noted that they believe generative AI will have a role in all subject areas, but that guidance will be required for it to be used to avoid cheating or unethical use.

Assessment: AI could generate example questions, which is something that students are always looking for in secondary/higher education, although this would need to be more managed within secondary due to the exam boards. It could be used to provide a writing framework for extended answer questions and for lesson plans for teachers to reduce potential workload. It could also be

used to show students examples of ways to structure their writing for essay based/longer answer questions as there may not always be the time to write a sample answer or be able to find one. Teachers could use it to create feedback for assessments that would be personalised based on student performance.

Teaching: There is the potential to use machine learning for already well established topics to give summaries and overviews of subjects for students who are struggling, which could improve the quality of learning. It could also model research ideas and help students with presentation skills, or help students produce their first drafts of coursework or essays.

CONCERNS AND RISKS OF AI:

15) What are your main concerns about using generative AI in educational settings?

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The biggest concerns for respondents in regards to the use of generative AI were students accessing inaccurate or biased information from AI (83.87%), the use of AI to 'cheat' (70.97%), and loss of motivation to do their own work (51.61%) [n=31]. In the written responses, respondents noted that there will be a significant amount of upskilling needed for staff to be able to implement the technology, the worry that there will be the impression that AI can do the job of teachers, which could lead to an increase in the expectations of the workload of teachers, and that the speed of the movement of the AI technology could move faster than educational reforms to include the technology.

16) If at all, have these concerns impacted your use of generative AI? Please explain how.

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17) Are there specific subjects or areas of education where you believe generative AI should not be used? Why?

Respondents to RSB's rapid survey focussed on the following areas in which to avoid use of AI:

Assessments: No assessment should be written in a way that allows AI or machine learning to answer the question fully, and there is increasing concern about the use of AI to answer long format text questions such as essays and dissertations, which impacts both secondary and higher education.

Other: Coding and production of syntax for statistical analysis, scenarios in which there is risk or controversy

ETHICAL AND LEGAL CONSIDERATIONS:

18) If any, what are your views regarding ethics, data privacy and security when using generative AI in education?

The Royal Society of Biology intends to explore ethical considerations with schools, HE, our members and committees. The Society supports an emphasis on ethical considerations when developing any such tools, including acknowledgement that many artificial intelligence tools may have been trained on biased data sources.

Ethics: Acknowledgement should be given when AI has been used, and the limitations of the software need to be understood when employing it for particular uses. AI currently has an inherent bias to western and white content, and only functions based on the source material it has been fed. The use of AI as a personal tutor could be problematic as a teacher may not be in the position to verify any recommendations given.

FUTURE PREDICTIONS AND ENABLING USE:

19) How do you see the role of generative AI in education evolving in the future?

The Royal Society of Biology seeks to support policy and frameworks that contribute to excellent biology teaching and learning in the UK, informed by evidence and best practice. AI in education is a rapidly developing field, and we expect to see an increase in its use across all levels of education. The question of workload is critical – reducing teacher workload is key to improving the retention crisis in UK education, however, many teachers believe the introduction of AI tools to reduce workload will be counterbalanced by the time required to check AI outputs, or filled with other activities.

20) What support do education staff, pupils, parents or other stakeholders need to be able to benefit from this technology?

To inform this response, the Royal Society of Biology conducted a rapid survey of our education-focussed groups and committees made up of members of the education and bioscience community across the UK including those with expertise in primary, secondary, further, tertiary education and initial teacher training. In answer to these questions we present a first look at the data collected from our members. Over summer many education professionals are out of office, and as a result the sample size is small. The number of respondents [n] is included for each statement. We aim to further explore this area in the coming months and would welcome further discussion with the department on the use of artificial intelligence in teaching and learning at all levels of education.

Respondents to RSB's survey noted that the areas of support that would be most needed were in training for teachers to use generative AI effectively (I.e. write good prompts) and covering AI risks, misuse and misinformation in science class (at 90.32%). The next area was teaching pupils how to use generative AI as a useful tool (83.87%) and information for parents on AI risks and combatting misinformation (74.19%) [n = 40]. Respondents also noted that resources would need to be produced to reflect the specification of technology in use in schools which is freely accessible and that professional bodies should produce exemplars of good practice.

21) What activities would you like to see the Department for Education undertaking to support generative AI tools being used safely and effectively in education?

The Royal Society of Biology would recommend DfE develop training and guidance for teachers on the use of artificial intelligence in teaching, learning and assessment, including ethical considerations, limitations of artificial intelligence and exemplars of good practice

22) Is there anything else you would like to add on the topic of generative AI in education?

Respondents to RSB's rapid survey had a range of both positive and negatives views on the use of generative artificial intelligence in education, and we note that the use of AI in teaching and learning would vary greatly in primary, secondary and tertiary education.

Positives: Whilst this is a rapidly changing area of innovation, it would be best to have DfE, funded training for all staff to ensure they understand the implications of the current technology. Case studies and 'how to' guides would be useful to target conflicting information. Educational institutions, including exam boards and regulatory bodies, should make sure they aren't blind to opportunities that AI could bring by trying to over-regulate its use as there are more positives than negatives to its use at the current time.

Negatives: Teachers will need to have up to date training to make sure that they are aware of the risks and benefits, which could be costly to educational institutions. Privacy, accuracy of

source materials and ethical issues are raised in many comments, noting that the use of it should be limited until the true risks are known and there are sufficient regulations and guidelines in place