

Reflections on the Teaching Symposium at the Microbiology Society Annual Conference 2023

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Abstract

The Microbiology Society Education and Outreach Network (EON) recently hosted the Teaching Symposium at the Microbiology Society Annual Conference, sponsored by *Access Microbiology*. The presence of the Symposium as an established parallel session within the wider Annual Conference reflects the importance of high-quality, contemporary microbiology education and outreach delivered in an enthusiastic and inclusive manner. At the 2023 Symposium, a variety of pedagogical research projects in higher education learning, teaching and assessment, as well as public engagement projects, were showcased through invited talks, offered talks, flash talks and posters. The event was attended by up to 70 delegates. Several themes were noted throughout the day: engaging with Gen Z (Generation Z, those born between 1996 and 2010), active learning, art in science and engaging with non-higher education (HE) audiences. Inclusivity was a key driver in the organization of the Symposium; the room was set up to encourage discussion and participants could ask questions using an online platform as well as speaking in the room. We now encourage all speakers to consider publishing their work as a peer-reviewed article for further dissemination and impact.

DATA SUMMARY

No data were generated during this research or are required for the work to be reproduced.

INTRODUCTION

The Education and Outreach Network (EON) is made up of national and international Microbiology Society members interested in educating students at all stages, as well as members of the public, about microbiology. It supports all Society members to share ideas and best practice and to connect with other educators. The Network has expanded recently to around 12 members and two co-Chairs who represent a range of career stages from PhD students to established academic colleagues with interests and experience in education and public engagement research [1–5].

EON was proud to host the Teaching Symposium at the Microbiology Society Annual Conference, sponsored by *Access Microbiology*. The Teaching Symposium started in 2018 as a pre-conference satellite session and has since become embedded as a parallel session within the main conference, reflecting the importance of high-quality, contemporary microbiology education and outreach.

The 2023 Symposium included a mix of invited talks, offered talks, flash talks and posters [6], with up to 70 delegates attending, some staying for the whole day and some dropping in for specific talks. Attendance remained consistent throughout the day. We have a strong drive to ensure the Teaching Symposium is welcoming and inclusive, a core strand running from

Received 18 July 2023; Accepted 05 September 2023; Published 22 September 2023

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Keywords: active learning; education; inclusive practice; outreach; pedagogy; public engagement.

Abbreviations: EON, Education and Outreach Network; HE, higher education.

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planning to execution. This article will provide a snapshot of the overarching themes and highlights of the Symposium, as well as reflections by those who organized and chaired the sessions.

OVERARCHING THEMES OF THE SYMPOSIUM

Engaging with Gen Z

Gen Z (Generation Z, those born between 1996 and 2010) are accustomed to high-quality, bite-sized content, both in education and on social media. Tina Joshi [7] opened the Symposium by stressing the importance of talking to students and engaging in a way that feels authentic to them (which, for Tina, included bringing *Love Island* into discussions on potential disease transmission!). This ethos of making content relevant to the audience to retain their engagement continued into the public engagement and science communication talks of the afternoon. Alison Cottell discussed her epidemiology teaching practices, which allowed students to critically engage in the topic after living through a pandemic, despite the ‘epidemiology fatigue’ that could bring. She advocated the use of authentic assessments, such as debunking fake news in Instagram posts.

Mel Lacey gave a glimpse into how Gen Z students are using social media for discussions around their teaching and assessment. The vast majority of the students who responded to their questionnaire use one of the top three platforms (Snapchat, WhatsApp and Facebook) to discuss their studies at least once per week. Bridget Kelly described how she encourages students to collaborate on difficult topics by embedding problem-based learning [8] in undergraduate immunology teaching.

Active learning

Many of the speakers in the morning session embedded active learning [9] in their practice. Nicholas Harmer, building on previous work [10], demonstrated how a range of different approaches can be used to provide students with individual datasets to create authentic and robust assessments, and, crucially, how automated marking can be designed in parallel. Relatively common programmes such as Excel and R can be used to create these individual data sets for exams and coursework. In contrast, Gemma Wattret showcased more specialized employability software, Shortlist Me, to capture digital interviews to increase awareness of commercial and career skills amongst students. Jerry Reen emphasized the benefits of repetition and multiple modalities by initially teaching students how to construct representations of plasmids with physical jigsaws before moving on to using virtual reality.

Game-based learning [11], a theme in last year’s Symposium, came through strongly again this year. David Negus won an *Access Microbiology* award for the poster that supported his talk about a board game to illustrate the antibiotic development pipeline. Students designed elements of their boards to represent the challenges in developing new antibiotics and demonstrate how money is so easily spent during antibiotic development. A public engagement escape room presented by Maitreyi Shivkumar, showing antiviral drug discovery, was not only a great example of science outreach but would also make a fantastic teaching laboratory session.

Art in science

The powerful nature of partnerships and collaborations outside microbiology to create impactful public engagement was seen across the afternoon session. Joanna Verran shared a collaborative, citizen science project centred around kombucha. This project brought together colleagues from the worlds of film, fashion, food and fermentation. Chloe James further exemplified the power of multidisciplinary collaboration when sharing her experiences of working with artists to create an immersive installation of video, sound and sculpture. Briony Thomas and Morgan Herod brought together designers and scientists who worked with students to co-create physical and virtual virus models (Fig. 1). These presentations showed how exploring science through art can result in both beautiful and effective public engagement [12].

Engaging with non-higher education (HE) audiences

Linda Oyama shared her remarkable experiences in reaching over 2600 primary school children in Northern Ireland, largely during the pandemic, to bring them authentic outreach activities. This is highly commendable even without considering the additional steps that were needed to comply with the restrictions in place at the time. Diane Ashiru-Oredope shared a range of public engagement resources that spanned primary school children to healthcare workers (Fig. 2). Two particular highlights were e-Bug, an online repository of free activities to engage children and young people with antibiotic resistance [13], and the Antibiotic Guardian scheme [14], which invites members of the public and professionals to pledge an action to make better use of antibiotics. The importance of including students as presenters to increase audience diversity at a blended art and science event was demonstrated by Kelly Capper-Parkin [15], whose supporting poster won an *Access Microbiology* award.

REFLECTIONS ON THE SYMPOSIUM

This article, and the following reflections, are written by those who organized and chaired sessions at the Teaching Symposium. A core aim of the Teaching Symposium was to create a friendly, inclusive and interdisciplinary space. We hoped that delegates



Fig. 1. Briony Thomas presenting her collaborative research on art in science with tactile models in the foreground.



Fig. 2. Diane Ashiru-Oredope sharing a range of methods to engage both HE and non-HE audiences.

would be inspired by the presentations and posters, see themselves as part of a community of practice, and have the opportunity to network and ‘find their people’.

Inclusivity was a key driver for many decisions taken regarding the Symposium (just as it would be for an effective teaching session [16]). We were conscious that participants can sometimes find asking questions in front of a large group daunting. To ease the pressure of public speaking, we implemented an anonymous online platform <https://padlet.com/> (Padlet) [17] for collating questions that were read out by the Session Chair, as well as taking questions in the room. To further encourage interaction and discussion, the room was set up with cabaret-style seating, which is based on a horseshoe-style seating arrangement (Fig. 3) [18].



Fig. 3. Cabaret-style seating throughout the Symposium facilitated discussion.

The programme of the Symposium was designed to cover a range of contributions, from small-scale classroom interventions to large multi-person collaborative outreach ventures. Presentations ranged from 30 min presentations from invited speakers to 5 min flash talks that allowed a number of contributors to showcase their good practice. Some speakers gave slide-based presentations, whereas others chose more demonstration-based formats. On reflection, the variety of timings and formats helped to keep engagement high throughout the day. In particular, including flash talks allowed a wider range of speakers to contribute than would otherwise have been possible. Although each talk was short, delegates were seen to follow up with speakers at break times and we saw contact details being noted to follow up after the Symposium. Delegates were asked to feed back at the end of the day and the variety of activities covered was mentioned as a highlight by several participants.

Many participants remarked on the friendliness of the Symposium, which had created a relaxed environment. Speakers were enthusiastic and passionate, not just about their topics, but also in the way they communicated. This enthusiasm transferred to the audience, with many thought-provoking questions being asked both in-person and online. The final session asked delegates to record their biggest inspiration of the day. Many were impressed by how science and arts can come together to achieve high impact. Delegates also reported that they would appreciate help in implementing new ideas in their teaching and outreach. EON is actively working with the Microbiology Society to curate existing teaching and outreach resources on their website to make these more accessible.

A secondary aim of the Symposium was to increase the visibility and accessibility of pedagogy and outreach research within the microbiology community. The Symposium was sponsored by *Access Microbiology* and the session organizers felt this sponsorship gave an implied pathway to publication. Throughout the poster sessions, Society journals highlighted research that aligned with their scope. *Access Microbiology* tagged appropriate and relevant posters with a 'We like your work – submit to *Access Microbiology*' sticker. As well as this tangible intervention, all speakers at the Symposium were invited by the Pedagogy Editor to consider submitting their research as a peer-reviewed publication to *Access Microbiology*. We felt that encouraging presenters to publish their work was well received. This was reflected in the range of responses to a discussion around publication, with some presenters already having submitted work, some aiming to prepare manuscripts and others having not yet considered the impact of their work past their presentation or poster.

Overall, there was a clear message from delegates that they would like to see the Symposium retained as a parallel session next year. We are pleased that what started as a satellite to the main conference has become thoroughly embedded alongside the scientific sessions. The authors feel this is important because it allows delegates whose primary focus is not education to dip in and out of the Symposium whilst also providing a community of practice for those who are more education- and outreach- focused. It is our hope that the Teaching Symposium will go from strength to strength, providing a supportive, practice-based forum for education and outreach in a microbiology setting.

Funding information

This work received no specific grant from any funding agency.

Acknowledgements

The authors would like to thank all speakers and participants and the Microbiology Society's staff for their support in the organization and delivery of the Teaching Symposium and the Education and Outreach Network, especially Curtis Asante, Dalia Nikadon and Charlotte Holtum.

Author contributions

M.M.L.: conceptualization, writing – original draft, writing – review and editing. K.L.J.: writing – original draft, writing – review and editing. M.G.: writing – original draft, writing – review and editing. V.E.: writing – review and editing. G.E.: writing – original draft. B.G.K.: writing – original draft, writing – review and editing. A.I.G.: visualization, writing – original draft, writing – review and editing.

Conflicts of interest

Georgios Efthimiou is Pedagogy Editor of *Access Microbiology*.

Consent to publish

Photographs are owned by the Microbiology Society and were taken during the Teaching Symposium at the Microbiology Society Annual Conference 2023. Permission for the photographs to be used has been granted from the individuals depicted.

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Peer review history

VERSION 2

Editor recommendation and comments

<https://doi.org/10.1099/acmi.0.000676.v2.3>

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Seána Duggan; University of Exeter, MRC Centre for Medical Mycology, UNITED KINGDOM

Date report received: 05 September 2023

Recommendation: Accept

Comments: I am pleased to accept your manuscript. Thank you for addressing the reviewers' comments so thoroughly and implementing their suggestions into future practice.

SciScore report

<https://doi.org/10.1099/acmi.0.000676.v2.1>

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iThenticate report

<https://doi.org/10.1099/acmi.0.000676.v2.2>

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Author response to reviewers to Version 1

Dear Reviewers and Editor,

We would like to thank you for your time in reviewing our manuscript ACMI-D-23-00145. We have responded to your comments below. Line numbers used refer to the version with tracked changes.

Best wishes

Alison Graham

Reviewer 1

Comment 1: The review of the teaching symposium is an accurate reflection of the session. I attended as a participant, and very much enjoyed the breadth of talks and posters, as well as the diversity of speakers involved. The session ran smoothly, to time, and covered current topics in microbiology teaching and outreach practices.

Response: We are pleased the reviewer considers the submission to be an accurate reflection of the Symposium.

Comment 2: No data was collected, which could be something for future reviews/publications to measure the anticipated impact of the session in the self-assured shorter and longer-term, and for qualitative approaches of what specific aspects attendees took from the sessions.

Response: The Education and Outreach Group have discussed approaches to gathering feedback and we would like to have a strategy in place for the 2024 symposium.

Reviewer 2

Comment 1: Overall this symposium sounds like an amazing event- providing inclusive opportunities for discussing the importance of pedagogical tools (particularly interdisciplinary ones) in science is really crucial and exciting. These tools can serve both to promote the science and improve the inclusivity to wider audiences. The good practice included in this

manuscript is excellent and very worthwhile to share, making it a valuable and interesting contribution both to scientific and pedagogical research.

Response: We thank the reviewer for these positive comments.

Comment 2: This manuscript is not one based around a data-driven question, so a concrete methodological approach may not be applicable here. Given the reflective focus, there is an appropriate inclusion of good practice examples and links with pedagogical concepts in the literature.

Response: We thank the reviewer for these positive comments.

Comment 3:

2. Very few results were presented, as this was a reflective account of the symposium. Any questionnaire data or participant quotes would be helpful to have included, provided ethical approval was in place.

Response: The Education and Outreach Group have discussed approaches to gathering feedback and we would like to have a strategy in place for the 2024 symposium.

Comment 4: I would like to see more reflective content about the session- not just a descriptive account of the talks/presentations that were given as it currently is. Restructuring this (or refocusing the final sections in particular) would really improve it, starting with the key drivers and purpose of creating the session and then concluding with what was learned from it. What decisions were made in advance of the session to promote your aims, and what would you change for the future? Did everything that you set out to achieve happen? Are there particular resources that someone could take away from the session & apply to their own practice?

Response: We have addressed this by removing the “Focus for the Next Year” section from the manuscript and reworking the “Inclusivity and Audience Engagement” and “Extending the Reach of the Symposium” into a new “Reflections on the Symposium” section (lines 140-193) which focuses on the reflections of those who organised and chaired the sessions. In this new section, we have addressed the questions posed in Reviewer 2’s comment 4.

Comment 5: There are links to the literature that are helpful, however these could be strengthened with a restructuring of the overall manuscript- (i.e. more clearly laid out aims, achievements and then action to take forward in the future).

Response: see response to Reviewer 2’s comment 4 above.

Comment 6: On more minor notes, it would be interesting to see how likely folks that were encouraged to submit manuscripts on their conference presentations actually do (so monitor the results of this initiative).

Response: Delegates were encouraged to submit manuscripts at the conference and this fed into part of the wider efforts by the Education and Outreach Group and the Microbiology Society to promote and support pedagogy and public engagement-based research publication. It is worth noting that, although delegates were encouraged to consider submitting their work to *Access Microbiology*, they may choose to publish it elsewhere, thus making tracking the impact of these initiatives difficult. EON will consider capturing the impact of the Symposium and other ongoing efforts within the Microbiology Society within the wider context.

Comment 7: Also, having rough numbers of participants for the different sections of the symposium might be nice, but not essential.

Response: This has been added to the Introduction, Line 64.

Comment 8: Can any of the content that connects with potential evaluation activities be supported by data? I’m assuming this has been left out because ethical approval for human participants was not in place. However, even the reflections from the contributing authors (i.e. session organisers) might be helpful. Things like, what was the response from participants in the main conference? was this accepted as a legitimate/equal session to the scientific ones?

Response: These comments have been addressed in the new section “Reflections on the Symposium” (lines 140-193). In addition, the Education and Outreach Group have discussed approaches to gathering feedback and we would like to have a strategy in place for the 2024 symposium.

Reviewer 3

Comment 1: The reflections on the symposium were well presented, but could have been supported with demographic data and feedback collected from the participants to provide evidence that the perceptions of the authors on the ‘friendly, inclusive and interdisciplinary’ aims of the symposium had been met and were appreciated by all participants. This would then have also given greater direction to the considerations for planning the next year’s symposium, especially regarding the engagement with key groups and what the challenges and interests of the participants are. **Response:** The Education and Outreach Group have discussed approaches to gathering feedback and we would like to have a strategy in place for the 2024 symposium.

Comment 2: A clearly presented reflection of the Teaching Symposium and the Microbiology Society Annual Conference, but could have been more balanced in the discussion of whether the aims of the symposium had been met through the use of participant feedback.

Response: This has been addressed in the new section “Reflections on the Symposium” (lines 140-193).

VERSION 1

Editor recommendation and comments

<https://doi.org/10.1099/acmi.0.000676.v1.6>

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Seána Duggan; University of Exeter, MRC Centre for Medical Mycology, UNITED KINGDOM

Date report received: 14 August 2023

Recommendation: Minor Amendment

Comments: Three reviewers have shared opinions and comments on how this article might be improved prior to publication. Please consider each point. I look forward to receiving the resubmission.

Reviewer 3 recommendation and comments

<https://doi.org/10.1099/acmi.0.000676.v1.5>

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Katie Solomon; University of Exeter, Biosciences, Geoffrey Pope Building, University Park Road, Streatham Campus, Exeter, UNITED KINGDOM

<https://orcid.org/0000-0002-5736-082X>

Date report received: 14 August 2023

Recommendation: Accept

Comments: 1. Methodological rigour, reproducibility and availability of underlying data No data was generated during the research or was required. 2. Presentation of results Reflections were presented in clearly headed sections, that reflected the different themes of the symposium and short overviews. Sections were brief, but discussed the aim, delivery and success of each part of the symposium. 3. How the style and organization of the paper communicates and represents key findings The reflections on the symposium were well presented, but could have been supported with demographic data and feedback collected from the participants to provide evidence that the perceptions of the authors on the 'friendly, inclusive and interdisciplinary' aims of the symposium had been met and were appreciated by all participants. This would then have also given greater direction to the considerations for planning the next year's symposium, especially regarding the engagement with key groups and what the challenges and interests of the participants are. 4. Literature analysis or discussion Literature cited was mainly used to support the content presented at the symposia. 5. Any other relevant comments A clearly presented reflection of the Teaching Symposium and the Microbiology Society Annual Conference, but could have been more balanced in the discussion of whether the aims of the symposium had been met through the use of participant feedback.

Please rate the manuscript for methodological rigour

Very good

Please rate the quality of the presentation and structure of the manuscript

Very good

To what extent are the conclusions supported by the data?

Partially support

Do you have any concerns of possible image manipulation, plagiarism or any other unethical practices?

No

Is there a potential financial or other conflict of interest between yourself and the author(s)?

No

If this manuscript involves human and/or animal work, have the subjects been treated in an ethical manner and the authors complied with the appropriate guidelines?

Yes

Reviewer 2 recommendation and comments

<https://doi.org/10.1099/acmi.0.000676.v1.3>

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Anna McGregor; University of Glasgow, School of Life Sciences, Glasgow, UNITED KINGDOM

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Date report received: 08 August 2023

Recommendation: Minor Amendment

Comments: Overall this symposium sounds like an amazing event- providing inclusive opportunities for discussing the importance of pedagogical tools (particularly interdisciplinary ones) in science is really crucial and exciting. These tools can serve both to promote the science and improve the inclusivity to wider audiences. The good practice included in this manuscript is excellent and very worthwhile to share, making it a valuable and interesting contribution both to scientific and pedagogical research. 1. Methodological rigour, reproducibility and availability of underlying data This manuscript is not one based around a data-driven question, so a concrete methodological approach may not be applicable here. Given the reflective focus, there is appropriate inclusion of good practice examples and links with pedagogical concepts in the literature. 2. Presentation of results Very few results were presented, as this was a reflective account of the symposium. Any questionnaire data or participant quotes would be helpful to have included, provided ethical approval was in place. 3. How the style and organization of the paper communicates and represents key findings Overall, this is the area of the work that needs the most improvement. The key elements and most exciting content about this symposium were less obvious because of the somewhat 'play-by-play' account of the session. Also, there are neither evaluation data or author reflections included- there is a little bit in the final paragraph about inclusivity, but the majority of this manuscript is a descriptive account of what happened, which obscures its real strengths- the aims of encouraging inclusive practice and highlighting best practice in pedagogy and outreach. In order to improve this, I would like to see more reflective content about the session- not just a descriptive account of the talks/presentations that were given as it currently is. Restructuring this (or refocusing the final sections in particular) would really improve it, starting with the key drivers and purpose of creating the session and then concluding with what was learned from it. What decisions were made in advance of the session to promote your aims, and what would you change for the future? Did everything that you set out to achieve happen? Are there particular resources that someone could take away from the session & apply to their own practice? In particular, I think the last two sections ('Extending the Reach of the Symposium' and 'Focus for Next Year') are admirable, but they are very vague and speak to the wider context of the society & journal rather than the symposium. These sections lose the focus of the symposium & pedagogy event, instead commenting on the wider aims of the EON & Society (which are fine, very admirable and useful objectives, just not well connected with the manuscript's focus). If the word count is limiting, perhaps those two sections could be refocused to include reflections on what happened or suggestions for future improvements. Also, if more space is needed, some of the list of presentations could be condensed into a table, with those most transferable elaborated on in the main text. 4. Literature analysis or discussion There are links to the literature that are helpful, however these could be strengthened with a restructuring of the overall manuscript- (i.e. more clearly laid out aims, achievements and then action to take forward in the future). 5. Any other relevant comments On more minor notes, it would be interesting to see how likely folks that were encouraged to submit manuscripts on their conference presentations actually do (so monitor the results of this initiative). Also, having rough numbers of participants for the different sections of the symposium might be nice, but not essential. Can any of the content that connects with potential evaluation activities be supported by data? I'm assuming this has been left out because ethical approval for human participants was not in place. However, even the reflections from the contributing authors (i.e. session organisers) might be helpful. Things like, what was the response from participants in the main conference? was this accepted as a legitimate/equal session to the scientific ones?

Please rate the manuscript for methodological rigour

Good

Please rate the quality of the presentation and structure of the manuscript

Good

To what extent are the conclusions supported by the data?

Partially support

Do you have any concerns of possible image manipulation, plagiarism or any other unethical practices?

No

Is there a potential financial or other conflict of interest between yourself and the author(s)?

No

If this manuscript involves human and/or animal work, have the subjects been treated in an ethical manner and the authors complied with the appropriate guidelines?

Yes

Reviewer 1 recommendation and comments

<https://doi.org/10.1099/acmi.0.000676.v1.4>

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Date report received: 02 August 2023

Recommendation: Accept

Comments: The review of the teaching symposium is an accurate reflection of the session. I attended as a participant, and very much enjoyed the breadth of talks and posters, as well as the diversity of speakers involved. The session ran smoothly, to time, and covered current topics in microbiology teaching and outreach practices. No data was collected, which could be something for future reviews/publications to measure the anticipated impact of the session in the self-assured shorter and longer-term, and for qualitative approaches of what specific aspects attendees took from the sessions.

Please rate the manuscript for methodological rigour

Very good

Please rate the quality of the presentation and structure of the manuscript

Very good

To what extent are the conclusions supported by the data?

Strongly support

Do you have any concerns of possible image manipulation, plagiarism or any other unethical practices?

No

Is there a potential financial or other conflict of interest between yourself and the author(s)?

No

If this manuscript involves human and/or animal work, have the subjects been treated in an ethical manner and the authors complied with the appropriate guidelines?

Yes

SciScore report

<https://doi.org/10.1099/acmi.0.000676.v1.1>

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