

Rethinking poster presentations at large-scale scientific meetings – is it time for the format to evolve?

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Introduction

Conferences have been recorded since the mid-1600s [1], and form a key professional practice in scientific and other academic/professional domains. Conference events range in scale from small local affairs to vast international gatherings, but their underlying objectives are the same: to allow like-minded people to gather and exchange knowledge and views, and to promote networking within the field. The motivations for attending conferences are both intrinsic and extrinsic. As individuals, we like to learn more about our fields of study, meet our peers, and also revitalize ourselves away from our daily routines. Additionally, as a presenter, you may formally contribute your knowledge to the community, which has both altruistic and personal motivations. As individuals, the benefits of conference attendance are clear (although seldom measurable), but how effective are these meetings and presentations in disseminating information and facilitating professional interaction?

Multiple presentation streams at conferences give delegates choice over what conference content they engage with, as well as offering more opportunities to present information to a gathered audience. As podium space is limited, poster sessions evolved to create interactive opportunities whereby delegates could share their work [2]. In large group settings, lecture-type presentations create a greater sense of educational value among delegates than more interactive approaches; however, no significant difference has been noted in the actual degree of knowledge retention and transfer that these two approaches facilitate [3]. Nowadays, posters are numerically by far the most prevalent means of disseminating information at conferences, and it is not uncommon to see hundreds, if not thousands, of posters displayed in a single session. This is clearly evident in the number of abstracts published in academic/scientific journals (e.g. *FEBS Journal* volume 279, supplement S1, provides abstracts for 1663 posters presented at the 22nd IUBMB & 37th FEBS Congress in 2012 [4]), and has also been noted in other fields [5].

As an example of the growth of poster presentation and its accommodation, the 1969 FEBS meeting [6] was the first recorded example of an international scientific poster-type display session. It hosted 105 posters over 4 days, with 12 h dedicated to the sessions (averaging 1.5 h per display period and 13 posters on display per session). In contrast, the 2014 FEBS/EMBO conference [7] hosted 2098 posters over 4 days, but only 6 h were dedicated to the sessions. Whilst the latter meeting also allocated 1.5 h per scheduled display period, an average of 525 posters were on display at each session – more than 40 times the number presented in 1969 (Fig. 1).

On the surface, this appears to be a positive indication that members of the scientific community are actively engaging in the conference process and are keen to share their work with fellow delegates. However, on a practical level, this mass of information has the potential to hinder delegate interaction, in that not only is it impossible to devote meaningful attention to so many 'exhibits' in the time available, but it is also difficult to select particular items of interest from the many on offer in conference proceedings. An editorial in *Nature Chemistry* [8] observed: 'your potential audience has only a limited time resource to spend on a wide choice', and, as a poster presenter, it is not uncommon to feel that you have failed to attract the attention of a significant number of conference delegates (Fig. 2).

If 15 posters are displayed in a room for 1.5 h, it is very easy for delegates to circulate, see what each one was about, determine whether they want to know more, approach the poster and look it at their leisure, and perhaps spend some time talking to the presenter. Increasing this number to 500 posters renders this an impossible and uninviting task (you would have only 10.8 s to view each poster), but this is a common occurrence at large-scale conferences in many fields. Delegates are thought to pre-select items of interest from the published conference programme, but even previewing the abstract titles for these 500 posters

words is submitted for consideration by the organizers. The processes for evaluating submissions vary, but, from a practical perspective, even if only 5 min are spent on each submission, reviewing the abstracts of 500 posters requires over 40 h of work. Hence, the prestige or acknowledgement awarded to poster presentations is often tempered by speculation as to the amount of scrutiny that has been involved in their acceptance and review. Furthermore, the selection of posters for awards and prizes is also subject to scepticism, given the time needed to comparatively evaluate such a large volume of submissions. To whittle down such a large body of work and select a single ‘winner’ is an unappealing and unrealistic task, yet poster competitions and prizes are common features at large conference events.

A study by Goodhand *et al.* [9] showed ‘that only a minority of delegates visit an individual poster, and often only for social reasons’, and this has also been reported elsewhere [10,11]. Despite these practical limitations, delegates continue to present posters at conferences in vast numbers, so other motivations are likely to be involved. In 2007, MacIntosh-Murray [12] described posters in terms of ‘situated practice’ and ‘social action’, and this is supported by two observations. First, delegates value making an active contribution to the events that they participate in. Offering their knowledge is seen as a chance to be recognized within their peer community (see Fig. 1), and is often a prerequisite for obtaining funding to support their attendance at conference events. This is reflected in the policies of many academic/scientific institutions, and has also been raised by FEBS conference delegates; in the small survey performed at FEBS/EMBO 2014, and described in detail below, 64% of 37 respondents felt that presentation was either a fairly or very important consideration when obtaining funding to attend conferences.

Second, the concept of presenting a poster is often represented as an opportunity for more junior researchers to engage in dialogue with their peers, in a less formal manner than a podium presentation. However, there is no empirical evidence showing that poster presentation is less demanding than other forms of knowledge sharing. The survey responses also failed to support this view, and showed an even split between student and more experienced presenters (51%/49%). As a result, the fact that posters attract little individual attention and rely on casual interaction may be the reason why they are felt to be placed lower on the hierarchy of professional practices, not because they are an easier medium of professional practice to accomplish.

Brief overview of a study on poster presentation at FEBS/EMBO 2014

A survey on poster presentation was performed at the FEBS/EMBO 2014 conference held in Paris from 30 August to 4 September 2014. All of the conference attendees were asked to participate, and 2000 survey questionnaires were distributed in the delegate packs. However, despite only 37 surveys being returned, this very limited response still serves to support the issues raised in this commentary. Whilst the returned data in no way present a robust picture of how poster presentation is viewed across the scientific community, they offer an interesting perspective of how poster presentation was viewed and utilized by the responding delegates who attended this scientific meeting. Notably, the survey gives insights as to how poster presentation fits into the hierarchy of scientific professional practices, and, when considered alongside the literature that surrounds the topic, offers suggestions as to how the medium may be further developed to meet the needs of poster users – both presenters and viewers. Whilst the individual study did not yield a sufficient amount of generalizable data, the results were interesting and offer a good motivation for an expanded study to be undertaken.

Survey results and observations

Thirty-seven delegates responded to the questionnaire. Of these, 91% were poster presenters, 67% were female, and their ages ranged between 30 and 50. Nineteen respondents were ‘students’, 17 were ‘scientists’ (*post doc*), and one was classed as a ‘professional’. In this scientific setting, it was good to see that posters were not just used by ‘juniors’, which is often implied in poster meme and literature. On average, respondents had previously presented 5–10 posters and 1–3 oral presentations, and had published approximately three peer reviewed papers. They had also attended 5–10 international conferences. Most respondents were fairly experienced, and, although the number of respondents is too small to generalize to the wider scientific community, there is no reason to suspect that the attendants of this FEBS conference were any different in composition to the delegate bodies of other similar-scale scientific events. Also, the concept of ‘junior’ is ill-defined. Other than the fairly equal division between student and post doc qualified poster presenters who responded to the survey, there is an inconsistent hierarchy amongst professional groups. For example, whilst a researcher may not be tenured, they may be well-qualified and experienced in their

role and the community in which they practice. The survey responses illustrate this, and at other events there may also be situations where poster presenters do not fit neatly into the 'junior' category. An example may be medicine (which is the major contributory field with regard to poster presentation), where a doctor has long graduated from their studentship, but occupies an experienced role (such as a senior registrar), but one that is below the rank of consultant. The act of poster preparation itself is a valuable learning experience for junior presenters in terms of organizing their data for presentation, relaying information to others, and preparing figures and text in a format that is not dissimilar to what is required when preparing a formal paper for submission. However, it should be noted that the poster presenters at the FEBS 2014 conference were quite experienced and already had a number of papers and presentations under their belts. In terms of publishing and participating in professional conference activities, they were not particularly 'junior'. Designation of posters as merely a formative activity needs to take this into account.

Respondents mainly rated poster presentations as 'slightly important', whilst oral presentations were rated as 'very important'. This ties in with the sense of 'educational value' of learning strategies as reported by Haidet *et al.* [3], and also is a reflection of the understandable prominence given to podium presentations. However, given that most of the survey respondents were presenting posters themselves, it is interesting that posters were still only evaluated as 'slightly important'. Conference attendance was viewed as 'fairly/very important', and 51% felt it was important that delegates be given the opportunity to 'present'. This in itself is interesting, because 84% of the 2014 FEBS conference delegates also presented at the event. No comparative information is available to allow us to accurately measure the correlation of the general increase in conference attendance numbers with the increase in presentations at events, but conferences have expanded to allow greater numbers of delegates to present. This is reflected in the multiple streams of oral presentations, as well as mass poster exhibitions.

Whilst increase ratios cannot be established, there is no doubt that large numbers of conference delegates are taking up the opportunity to present their work. A recent paper by Zarnetske and Zarnetske [5] reported that, in the field of geosciences, there has been a consistent use of poster presentation (as a percentage of overall conference presentations), but the total numbers of presentations have grown significantly. In the period 2000–2014, the Geological Society of America

has hosted somewhere in the region of 2000 posters at each of its annual meetings (approximately 37% of its presentations). The American Geophysical Union (AGU) and the European Geosciences Union (EGU) are both cited as hosting approximately 66% of their presentations in poster form, but overall poster numbers have grown rapidly. From 2006 to 2014, the number of posters at AGU and EGU meetings has increased from approximately 7000 posters to approximately 10 000 (EGU) and 14 000 (AGU). This means that thousands of poster presentations are being displayed each day; and for the 2014 AGU meeting, this entailed posters being displayed throughout the day on each of the 5 days of the meeting, in two halls and under 26 groupings [13].

Almost all (97%) of the FEBS respondents felt that it is very important to publish formal papers. Most were fairly ambivalent regarding the benefit that conference presentations have with regard to their work/study appraisal (43% felt it was fairly important, whilst 35% were neutral or negative). However, 97% felt that conference presentations were a very important addition to their CV, suggesting a need for further examination of the intrinsic/extrinsic motivations that exist to attend and present at conferences.

Mean value scores

Presentation was seen as an important factor in attracting funding for conference attendance (3.8 on a scale of 5, where 1 is 'not at all important' and 5 is 'very important'), although there appeared to be no certain requirement for them to demonstrate any value for money or benefit arising from this investment (3.2/5). If reasonable figures are attributed for factors involved in presentation (such as the wage of the presenter and the hours spent preparing the poster, printing, conference fees and expenses), and the number of presentations estimated to be undertaken globally each year, then poster presentation amounts to a billion dollar practice. As such, the cost of supporting conference activities cannot be ignored. Funders want a reason to justify and support conference attendance, and 'presenting' seems to provide this. However, the literature suggests that approximately 30% of poster research (range 24–78%) is never converted to a full paper [14–17], and that abstracts/posters are often submitted with no intention other than to obtain funding for conference attendance. If posters are considered a product of funding, there is a need to investigate the value of such activities in terms of their efficacy/utility.

Posters were not seen as a good medium for presenting information without the presence of the author

(3.7 on a scale of 1–7, where 1 represents ‘strongly disagree’ and 7 represents ‘strongly agree’), but, when the author was present, this rose to 6.2/7. They are also seen as not ‘providing enough information’ as a stand-alone entity (also 3.7/7), which reinforces how they are seen from a viewer perspective. However, they were seen as a very good medium for networking (6.3/7), even though the literature reports that individual poster presentations are visited by only a handful of delegates (e.g. 9). At the FEBS/EMBO conference, most presenters spoken to (additional to the printed survey) reported only 5–10 visitors to their poster, i.e. < 1% of the 2014 FEBS conference delegate population. The free comments also reflected this, as did my own personal experience (with approximately 30 visitors to my poster over the four poster sessions).

The free comments in the survey also indicated that it was difficult to gain access to presenters as (a) there are understandably only short periods when they are present at their poster, (b) being present at their own poster prevents them engaging with other posters at the same time, and (c) high volumes of posters are on display at the same time. Given these limitations, the issues of access and exposure pose a significant barrier to reaching and engaging with conference delegates, and possible solutions to these problems are discussed below.

‘Networking’ is stated as a key aim of conference participation. However, the issues raised above indicate that it is the overall conference experience that achieves this, and that poster presentation may only help indirectly with facilitating it. The role of the actual poster presentation itself is therefore questionable in this regard. If meaningful exposure of posters is limited within the conference setting, then more efficacy may be achieved by increasing the exposure of both authors and their presented information beyond the conference event. This is reflected in respondents’ views on how poster presentation practice may be improved, as discussed below.

It was not generally felt that posters disseminate information beyond the conference event (3.7/7). At the meeting, some delegates gave the opinion that presenters often withhold key data from their oral presentations, posters and abstracts so as not to be ‘scooped’, and save their full data for formal publication. This was seen as a habit of more ‘experienced’ scientists, and various examples were given where this had taken place. As such, it was expected that respondents would not favour any proposed development that made their presented (non-published) data more accessible. However, this was contradicted by the responses given to possible development proposals

provided in the questionnaire: 40.5% of respondents favoured increased post-conference exposure of presentations, 32.4% favoured web hosting of presented posters and materials, and 67.6% favoured formal publication of the poster image and short paper in an online repository/journal (although any differentiation of this from web hosting was not clear). In other disciplines, the concept of being ‘scooped’ is not prevalent, and many presenters are happy for their work to reach as wide an audience as possible. Therefore, ideas that increase the visibility and depth of poster-presented information may possibly be of greater interest in other fields.

Posters were seen as providing a slight benefit (4.6/7) to their authors beyond the conference event, but it is unclear what this is. Respondents were unsure as to whether poster presentations constituted a valid form of publication (4.4/7), but said that conference presentations were very important to their CV (97%). This indicates that they consider their conference presentations (non-peer reviewed) to be of equal value to their peer-reviewed publications on a CV, although these are conceptualized differently in terms of personal and professional value. Posters were viewed as being only slightly valued by the peer community (4.1/7), highlighting a difference between internal and external value attribution. On a wider scale, posters were attributed as being of only slight value to society (4.5/7), which may reflect the view that if the ‘evidence’ is not available to those who do not directly engage with poster presentations, then little appreciation or benefit is achieved.

Options for poster presentation development

The percentage of respondents in favour of the innovation is shown in parentheses.

Wider exposure to conference delegates (45.9%)

Exposure is a key aspect raised in both the survey and the literature. As previously discussed, the interaction that delegates have with individual posters at larger conferences is poor, so increased exposure is a desirable element to be considered in developing the poster medium.

Better organization of poster sessions (56.7%)

Many delegates are overwhelmed by the current volume of posters at large events. This was reflected in all of the free comments that were made by respondents,

with terms such as: 'impossible to go through', 'too large', 'too many posters/too little time'. In the words of one respondent: 'At a very large conference, there are simply so many that it is not possible to give each one the attention it deserves'. Whilst delegates appreciate the opportunity for presenting and viewing work, the high numbers on view reduce the efficiency of the process. Solutions should therefore seek to enhance and support sessions, as opposed to changing the current format in which individual posters are compiled.

Most of the literature surrounding poster presentation is centred upon poster compilation [5,10,11,18], and this has led to a fairly consistent standard of conference posters. Additionally, there are a wide range of resources available on the internet, and most conferences and institutions have their own guidance regarding the appropriate structure and requirements for academic/scientific posters.

Presenters themselves take steps to promote their posters at conferences, and this may include a certain degree of self-promotion [5]; however, when there are hundreds of competing posters, engagement of other delegates often still relies on chance encounters, rather than any strategy to attract attention. This links back to the ideas of increased exposure.

Options to give short presentations (48.6%)

Presenters want to give detail and attract attention, but the practical limitations of anything but small-scale events do not make this possible. Solutions may therefore focus on other ways that this may be achieved, either before, during or after the conference. An example may be the online hosting of an accompanying podcast that offers viewers further details of the presented work. Not only would an innovation of this type add variation to the usual experience of simply 'reading' the displayed poster, but it would also increase the depth of subject information available, so addressing the constraints posed by the concept of an 'abstract writ large' [12].

IT/computer presentation (13.5%)

IT enhances the capacity for multi-media presentation, dataset linkage etc., but current practices often replace one 'wall' of posters with a 'bank' of computers. Although unreliable, the personal contact in poster sessions is valued, and smaller sessions are more effective in meeting the needs of poster presenters and viewers. Large-screen 'e-posters' are often used, but these may be very expensive to host and are also passive in terms of knowledge transfer; viewers tend to 'read' the information available, as opposed to engaging with the author.

It is possible that this perception contributed to the low selection of IT development as a development opportunity. Links to data and presenters (internet, social media, Skype etc.) are often difficult to maintain during events, so solutions before and after conferences should be considered to enhance and supplement current practices, as opposed to replacing them with more modern alternatives. Some degree of pre-conference viewing and social media apps that help delegates locate items of interest are available, but these are often only accessible by conference delegates and often only during the real-time schedule of the conference, thus maintaining the situation where a select number of people are faced with a vast amount of information, but for only a limited time. Traditionally, conferences are closed, time-limited affairs, so introducing an 'open access' approach that extends access and engagement beyond the realms of scheduled conference sessions and paying delegates may be difficult for conference organizers and users to conceive. However, use of readily available technologies may extend the barriers of time and location, and such technologies may offer options to develop poster presentation (and conferences in general) into events that offer better opportunities for knowledge dissemination and networking. Whilst organizers would still benefit from the 'live' event, which offers first-hand participation and interaction, by utilizing the virtual dimensions of the internet, not only could they offer added value to paid delegates, they may also make the presented information more widely available to a global audience.

Web hosting of posters and materials (32.4%)

Websites are commonplace repositories for material that has been presented at conferences, but few exist that meet the needs of an ongoing conference. Virtual conferences take place, but again lack the direct interaction that is favoured by delegates and peer groups. Options before, during and after the conference should be considered to enhance current practices. Diverse web pages host materials that have been presented at previous conferences, but these are scattered and of varying quality. As well as repository-type sites that host materials, thought may perhaps be given to developing a central service that helps to host and collate materials, and improves access and interaction across specialities and disciplines.

Increased exposure post-conference (40.5%)

Conferences are traditionally gatherings of peers who have normally paid for an exclusive, quality service. However, changes in communication and scholarly

practice have widened our peer community, so conference organizers should also consider the role they play in the global peer group. This follows along the lines of the open access movement, and may increase the longevity of the conference experience and any subsequent utility of the presented information.

Increased employer recognition (8.1%)

Employers appear to give fair recognition to activities such as conference attendance, but there is a differentiation between outputs that are visible (e.g. high-impact-factor journal publications that attract funding), and less visibly productive activities such as conferences. Increasing the visibility of conference presentations may increase the value they are attributed, and importantly help differentiate them in terms of the valued contribution they make to professional practice. Whilst the individual benefits of conference attendance and presentation are generally acknowledged, their extrinsic value is less clear. Rightly or wrongly, the popular measurement of outputs focuses on high-impact-factor peer-reviewed journal articles. However, as professional engagement and learning form an integral part of professional practice, it is reasonable that an individual's engagement (and achievement) also be recognized in some meaningful way.

Formal publication of poster image and short paper in an online repository/journal (67.6%)

Managing high volumes of posters is difficult. The revenue they bring is significant, but their efficacy in terms of disseminating information is questionable. Meta-journals or a dedicated web platform may enable the hosting of images, text and data, and offer more room for this type of contribution than is currently feasible in a traditional journal. Abstract publication is the predominant record of poster presentations. However, by nature of being an abstract, it is not only impossible to provide any depth of information, but also the visuality and interaction of the actual poster presentation is lost. Web hosting has the capacity to accommodate greater volumes of text and imagery. It also offers a means by which to increase the visibility and accessibility of authors, so such developments may offer possible benefits to poster users (presenters and viewers), institutions and conference organizers.

Concluding observations

Poster sessions are an area that demands further thought and development. They are an established

practice in the scientific community, and at the FEBS/EMBO conference, approximately 84% of delegates presented work in poster format. However, their value is undermined by their limited ability to effectively disseminate information and facilitate networking. Additionally, the way in which poster-presented work is evaluated must also be re-examined if a true sense of professional value is to be established. It is by no means suggested that poster sessions are not of value, but rather that they have out-grown their traditional format, in terms of enabling conference delegates (and the wider peer community) to meaningfully select and interact with specific works of others.

In developing the poster medium, possible changes are the ways that posters are displayed and also the way in which they are made available to the peer community. The time-bound constraints of a scheduled poster session are fairly inflexible, and nobody would like to decrease the opportunities delegates have to share their work. However, larger conference events may wish to give more consideration as to how posters may be made available on their websites before the conference, so providing delegates with a longer opportunity to view the material on offer, then target specific posters to visit at the actual event. Posters are commonly created using computer-generated formats that enable both the poster and its abstract to be displayed online. Indeed, it may be considered whether the depth of an online poster abstract should be extended to allow inclusion of more descriptive detail. Such a development may also increase the levels of interaction during the actual session, as delegates have had a greater opportunity to select presentations to visit and engage with. The poster may then regain its place as a visual tool that facilitates discussion around a given subject.

Finally, organizers may consider extending the exposure of poster submissions, by making them openly available to view after the conference event. Published abstracts (which have a limited capacity to transfer information) are often the only visible output of such presentations, and, as previously mentioned, only a relatively small proportion of posters are developed into full publications. By increasing the exposure of poster images, abstract texts, recorded narrations etc., not only would presenters have a more long-lasting record of their efforts, but others who did not attend the conference may still benefit from their work after the physical event has concluded. In so doing, conference organizers would enhance the efficacy of poster (and other) presentations, and also promote the expressed conference aims of knowledge dissemination and networking within what is now a more globally connected peer community.

Author contributions

NR planned, performed and analysed the survey, wrote the paper and created the illustrations. DI wrote and reviewed the paper.

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