Creating a place for learning – bridging physical and virtual learning spaces at conferences

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Abstract. This paper presents a reflective case study of the introduction of Learning Toolbox as an ePoster solution for conferences. The Learning Toolbox ePoster platform is designed to overcome practical knowledge sharing and communication problems encountered in both the traditional paper poster and standard, screen-based ePoster approaches. Additionally it draws on the trialogic learning theory, by offering ePoster authors and viewers support for discussion and knowledge development focused on an object (the ePoster). As such it aims to support greater engagement, community building and knowledge creation within and beyond an academic conference. In this paper we describe the educational aims behind Learning Toolbox, the technological solution, the practical approach used to introduce it as the ePoster platform at a large international conference, a review of its use at the conference and then reflect on what contributed to its successful adoption. Finally open challenges and further work are identified (including evaluating the impact on learning and engagement beyond the conference and scaling up the numbers of ePosters whilst still allowing authors to present to and discuss their work directly with an audience) to which we propose possible solutions.

Keywords: case study, ePosters, informal learning, knowledge building, community building, impact

1 Background

Learning Toolbox was originally designed and developed, within the Learning Layers research project, to support informal learning in a vocational education setting [1] and it continues to be used within that context. This paper reports on the adoption of the tool within a new informal learning context, academic conferences. The potential to transfer the tool to this new context was identified by the authors near the end of the Learning Layers project and this further development then took place after the end of the project.

1.1 Conferences as a place for informal learning and knowledge creation

It is widely recognised that conferences are places where informal learning can occur; that they provide "*crucial hubs for scientific communication <…> an essential platform that facilitates collaboration and disseminates information*" p.153 [2]. They offer opportunities to share knowledge and discuss current research topics, questions and work in progress. These social and informal learning activities can also foster community building through networking of people who share common interests in a particular field of knowledge. However, formal paper presentations alone often do not provide the best environment in which such exchange can occur and "*poster sessions evolved to create interactive opportunities whereby delegates could share their work*" p.3661 [3]. These poster sessions have been growing in popularity and many of the large international conferences, particularly in the areas of medicine and healthcare, now have thousands of posters presented at each conference [3]. They are considered to be particularly valuable for presenting, discussing and helping to develop work that has an "*intermediate status*": early research and work in progress [2, 4].

As is clear from the discussion above the main educational objective of conferences is often knowledge creation, not knowledge transfer. Indeed the activities in a conference can be usefully viewed through the lens of the trialogic learning model [5]. Monologic learning is occurring where individual conference participants assimilate and (individually) make sense of the presentations they attend. Dialogic learning occurs where conference participants engage in discussions: asking questions, making suggestions and making sense (collaboratively) of the presentation. Trialogic learning would be most likely to happen within interactive workshop sessions where participants work together on a particular material artefact. The learning processes that we are particularly interested in supporting are those involved in dialogic and trialogic learning, which we consider to be important aspects of informal learning at conferences.

1.2 The problems with posters and ePosters

However, traditional paper posters have limitations, particularly in terms of space/location and time [4], which hinder the opportunities for social knowledge construction. With so many posters being presented it can be difficult for participants to find those that are of most interest to them. Additionally participants report that traditional posters do not contain enough information to allow them to explore or evaluate them properly unless the author is present to fill in the gaps [2, 3]. This therefore limits the potential for poster authors to get meaningful feedback on their work (impending both dialogical and trialogical learning), as they cannot spend the whole conference at their poster. Beamish et. al. [6] recognise that therefore learning opportunities (which would be triggered through discussion) are sometimes missed in conferences and they advise poster authors to take their poster home and display it in their own institution in order to increase its use and exposure. This advice is particularly apposite given that poster information recall has been shown to be low [7] and library studies research [8] has identified that most posters are 'grey literature' – unfindable after the conference or only in the form of an abstract. A final limitation is that a flat, static presentation of the work

is increasingly limiting in a time when research methodologies, data analytics and presentation methods can be much more dynamic, multi-modal and potentially interactive [9].

Due to these limitations, there is a growing desire from conference organisers and participants to change conference formats and presentations, particularly poster sessions, and to make effective use of technology to increase their interactivity, richness and exposure at conferences [3, 6, 9, 10]. ePosters [9] and fully online social media formats [11, 12] are being increasingly explored. ePosters involve moving from the poster being displayed on a physical medium (paper) to being presented and displayed on a screen. ePosters can potentially overcome some of the limitations identified above. They can include much richer, multimedia material. They can include links to the background material that makes the work more understandable to participants and therefore supports more constructive discussion and feedback. However, many existing ePoster platforms start from the premise of an ePoster being an enhanced paper poster – a PDF file onscreen with some interactive links or embedded videos. This approach leads many authors (most familiar with the traditional format) to produce what Masters, Gibbs & Sandars [9] call "*pre-printed paper posters*" p2; ePosters that are really just a *not yet printed paper poster* and therefore do not fully utilise the possibilities of this new format. In terms of communication, ePosters can make it easier for participants to contact the author (by embedded email links) with questions or comments. However, this communication is normally one-to-one, not captured or shared with others interested in a particular ePoster or with the wider academic audience. In some case this may be appropriate, but in others it is a lost opportunity to open up the discussion and support knowledge and community building around particular research topics. Concerns have also been raised around the level of technical competence required in order to create an ePoster and that additional training or support may be required [9]. Another drawback of ePosters is that, with no physical presence, their visibility and exposure within the conference is extremely limited – they are not found serendipitously (as one might happen to walk past a paper poster and it catches your eye) and the potential for direct interaction and discussion is felt to be limited to the very short time in which they are presented [3]. An alternative to this is to also give the ePosters a physical presence in the conference by introducing "*a bank of computers*", however, as Rowe & Ilic [3] comment this is extremely costly and still does not allow for the display of all the ePosters.

In the following section we will present the digital solution we have designed to overcome the limitations listed above and take advantage of the potential for technology to more effectively support informal learning around ePosters.

2 Learning Toolbox – A transformative ePoster solution

Learning Toolbox (LTB) was originally designed and piloted to support informal learning within a vocational training setting [13]. The authors identified that the tool also had the potential to support informal learning at conferences, both by addressing known practical issues around poster sessions and also be enhancing the support for dialogic

and trialogic learning processes. The tool needed some adaptations to fit this context. The re-design was undertaken by a small interdisciplinary team, who together covered development, design, education and commercial perspectives. Crucially the team also included the user perspective since all were active conference participants with experience of presenting posters and ePosters. An agile design and development approach was undertaken, starting in January 2017, with the goal of piloting the developed tool at AMEE (a large international conference) in August 2017. Design iterations were tested & refined by the core team and key stakeholders from AMEE. Specifically, the ePoster solution was designed with five pedagogical goals:

1. Moving beyond PDFs to rich, multimedia and interactive ePosters
LTB ePosters can contain many different rich elements such as videos, images, audio, apps, presentations, twitter and RSS feeds and links to online resources including content from social media platforms such as YouTube, Vimeo and SlideShare. The intention is to provide the authors with the flexibility to choose the form that suits their work best.

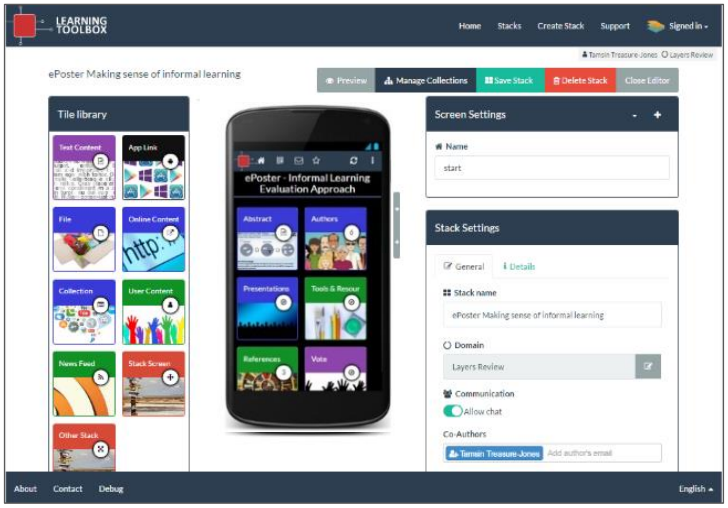


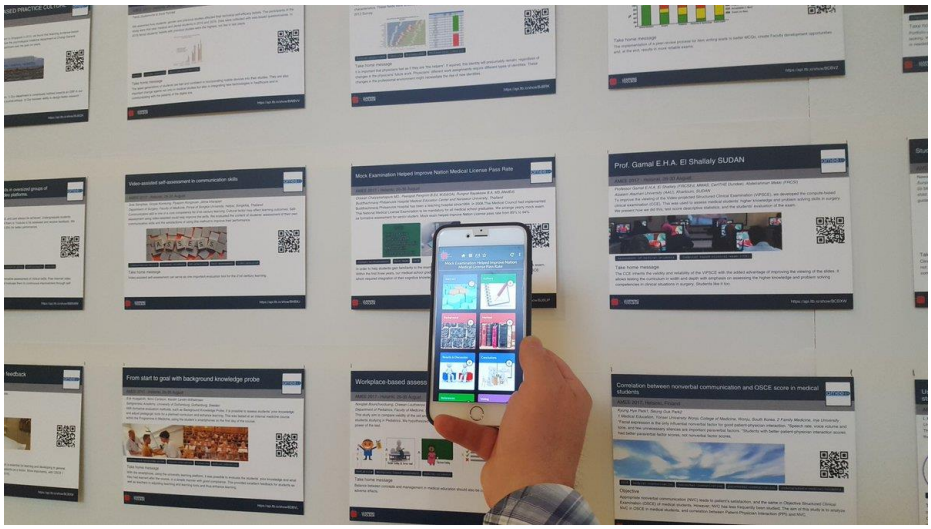
Figure 1 LTB ePoster Editor

2. Putting the creation of rich ePosters within reach of all – easy to build
LTB has an easy to use web-based editor, allowing the author to add content and resources by simply dragging and dropping it onto their ePoster.

3. Bridging between the physical and virtual learning spaces in conferences
LTB generates a mini-poster that shows a brief summary of the ePoster and a unique QR code. These mini-posters can be prominently displayed at the conference, allowing participants to browse them, scan the QR code and then explore the ePoster on their own phone or tablet[1]. We therefore adopt a "bring your own device" approach, which

[1] The ePoster opens in the LTB app. It can also be viewed in a web browser on any device.

does not rely on costly screens and PCs, and also allows participants to take ePosters with them to explore away from the conference and share more widely with colleagues. Participants can also find and search for ePosters on the conference's ePoster showcase website (created and hosted on the Learning Toolbox platform).



Figures 2 Exploring ePosters at the mini-poster wall

4. Supporting engagement with and discussion around the ePosters

From within the LTB app, participants can post questions and comments directly onto the ePoster that are viewable by everyone who accesses the ePoster. This increases the opportunities (in space/location & time) to initiate and continue discussions with the author and others interested in the same topic. Participants can subscribe to their favourite ePosters in order to receive notifications from the author and follow ongoing discussions. These functionalities are included to support dialogic learning.

5. Dynamic ePosters - increasing the exposure and life of ePosters

LTB ePosters are a living learning resource. They can be accessed before, during and after the conference either through the app or the showcase website. This allows people to return to the ePoster, explore it more fully, reference it and share it with others. The author can also update the ePoster for instance following up on discussions started at the conference, and the subscribers to the ePoster can therefore see and contribute to the development of knowledge beyond the conference. These functionalities open up the potential for the ePoster to be a meaningful object within a trialogic learning process. The author and viewers can jointly discuss and propose changes to the ePoster itself, knowing that these can actually be made and shared.

3 LTB ePoster Pilot at AMEE 2017

The piloting of Learning Toolbox at AMEE 2017 was as a feasibility study. Within the timescales and with the resources available, our main aim was to check if the solution would be accepted by conference participants (authors and viewers) and stakeholders (conference organisers). Future studies are now planned to look in more detail at the impact on learning processes.

3.1 Context

AMEE[2] is a large, international medical education conference attracting 4,000 delegates & with approximately 1,000 poster presentations. Between 2011-2015 AMEE had adopted an ePoster platform for some of their poster presentations, but this solution had not be judged to be fully satisfactory (due to some of the limitations mentioned in section 1) and, as a result, had been dropped in 2016. The authors had attended previous AMEE conferences as presenters and were aware of the issues.

3.2 Stakeholder engagement – getting senior management buy-in

In 2016 the authors approached the AMEE Board to propose that they pilot the use of LTB as an ePoster platform in 2017. Following a pitch to the Board, the authors were asked to work with members of the AMEE TEL committee, who would try out the platform and advise the Board on its suitability. Skype calls were held with one member of the committee, who explored the platform and made some suggestions for changes. Following the changes, it was agreed to pilot the platform for 80 ePosters at AMEE 2017.

3.3 Stakeholder engagement – working with ePoster authors

The 80 ePoster authors did not actively chose to join the pilot, but had indicated on their poster submission that they would be willing to consider an ePoster. It is important to note that at this stage they had no information at all about the LTB platform and so many may have assumed this would be a simple PDF projection approach which would not require changes to their practice. We therefore wanted to ensure that the ePoster authors had good training and support in order to understand and make the most of this new platform. Given that we were working with authors spread across the globe then this had to be done online. We made short videos that explained the LTB ePoster vision, an example ePoster and the steps involved in creating your own ePoster. Additionally we ran two webinars in June and July. We regularly monitored the ePoster production and sent timely advice and reminders to the authors by email. Authors could also email to a support address. We provided an onsite helpdesk at the conference, located in a prominent position close to the mini-poster wall and registration desk, and from here we were able to provide authors with last minute help, support authors in practising their presentations and support participants at the mini-poster wall.

[2] https://amee.org/conferences

3.4 Implementation onsite

At the conference venue we had a helpdesk, the mini-poster wall and a room set aside for the scheduled ePoster presentations.

Physical learning space – mini-poster wall. The mini-poster wall was in fact constructed as a 1.5m by 1.5m column with mini-posters displayed on all 4 sides, allowing participants to walk around it. It was located in a prominent central location, close to the registration desks and in an area that participants passed regularly on their way between sessions. This central location was something that we requested as we believed that creating a physical place for the ePosters within the conference would be important. It did not need to be a large space, unlike the hall devoted to the paper posters, but it was important that it was prominent and visible.

Physical learning space – presentation room. Each ePoster had a scheduled 5 minute presentation slot in the designated room, and the presenters could present directly from a tablet, with their ePoster projected onto the wall. Copies of the mini-posters for the ePosters being presented in the current session were available in the room so that participants could easily access the ePosters that were being presented and discussed. Sessions were streamlined so that ePoster presenters with similar topics and interests were presenting in the same session.

Virtual learning spaces. In order to ensure that the ePosters had a strong virtual presence and place at the conference as well, we also contributed to the AMEE twitter stream. This involved posting photos from the mini-poster wall, sharing ePosters, signposting participants to the ePoster showcase website and posting links to the videos explaining how the ePosters would work at AMEE. We also promoted the ePoster public vote. We had added a vote tile to each ePoster so that participants could vote for their favourite ePoster.

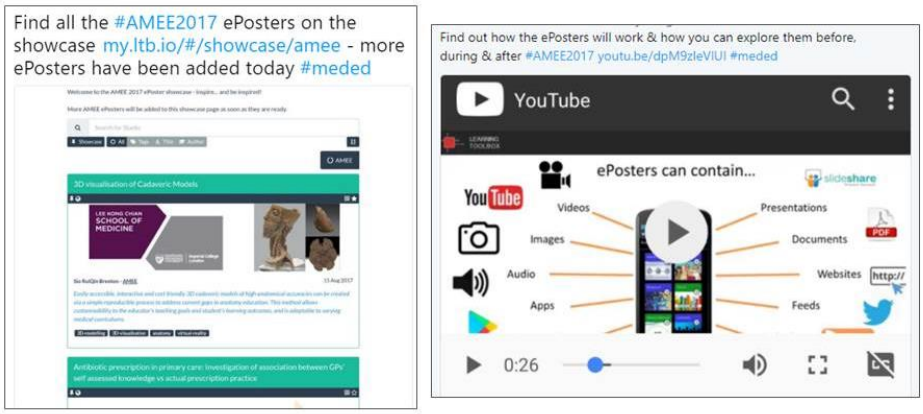


Figure 3 ePosters – promoting a virtual learning place on Twitter

4 Reflections and Lessons Learned

Whilst we did not undertake a formal evaluation ourselves, AMEE evaluated the pilot and, based on the highly positive responses from ePoster authors and participants, they have adopted Learning Toolbox as their commercial ePoster platform for AMEE 2018. Participants, who used Learning Toolbox at AMEE, have also gone on to become customers and Learning Toolbox is now providing the ePoster platform for several international and national conferences[3], as well as being used within individual organisations to support informal learning or to help students learn how to make ePosters [14]. In this respect, the implementation is seen as a success in terms of adoption. Below we reflect on what indicators we have of changes of practice or issues related to each of our five pedagogical objectives before discussing what factors may have contributed to the successful adoption.

1. Moving beyond PDFs to rich, multimedia and interactive ePosters
There were many ePosters which successfully achieved this. Most included videos, websites and relevant background material. The most sophisticated included interactive 3D models, interactive displays of the research data, surveys and creative presentations including music and poetry. However, there was a small minority who relied on text and limited images. Some of those authors came to the helpdesk for support in enhancing their ePoster at the conference itself, which was possible for them to do given the live nature of ePosters in LTB.

2. Putting the creation of rich ePosters within reach of all – easy to build
The vast majority of ePoster authors were able to create their ePosters using the support videos and there were few who emailed the support helpdesk. Anecdotally ePoster authors told us how creative they had found the process and how they valued the resource they had made, although as a new process, it had taken them longer to make than a traditional poster.

3. Bridging between the physical and virtual learning spaces in conferences
The ePoster profile in the conference appeared much higher than in previous conferences and the prominent role of the mini-poster wall appeared to have helped with this. ePoster authors posed for photos at the wall as they do with traditional posters, and the wall was busy and buzzing throughout the conference. The central location meant that people were already visiting it during its construction and set-up. It became a focal point, with participants arranging to meet up with colleagues at the "ePoster cube".

[3] CEN 2018, SESAM 2018, ADEE 2018, AMEE 2018, EC-TEL 2018, ECER 2018

Figure 4 The busy mini-poster wall (cube)

The ePosters were also prominent online, with the ePosters at times being a trending topic on the conference twitter stream. Our analysis of the log data shows that each ePoster was opened and viewed on average 209 times during the conference. 189 participants attended the ePoster presentations, but many more viewed the ePosters in their phone or online. 1,206 people created LTB accounts, which allowed greater interaction with the ePoster (posting questions and comments, voting). However, there were thousands more anonymous viewers since we did not require accounts to be created in order to view the ePosters. The approach taken was one of Open Access and Open Educational Resources (OER) since the aim was to encourage and facilitate the easy sharing of the ePosters at and beyond the conference.

4. Supporting engagement with and discussion around the ePosters

There were some comments and questions posted on the ePosters. However, this communication channel was not as well-used as we had hoped. This result is a challenge for us, given that the pedagogical approach underpinning our work emphasises the importance and value of discussion and collaborative knowledge development within conferences and around the research presented in ePosters. We are therefore keen to explore the reasons for this low engagement with the discussion functionality in future work. There are many possible reasons for this including participants taking time to familiarise themselves with the format before using advanced features, not being aware of the function, using other communication channels (email, twitter), not wanting to

post public comments, not needing/valuing this functionality or simply a reticence to be the first to post. Another possibility is that the engagement in poster presentation and discussion serves more of a professional identify building and community of practice engagement function, rather than actually knowledge development. This could explain why the need to record and document discussions on the work itself did not appear to have such a high priority. It will be interesting to return to this in future studies and new settings in order to get a better understanding of the issues involved.

5. Dynamic ePosters - increasing the exposure and life of ePosters
Reviewing the logs we were also able to see that the ePosters were being shared and viewed far beyond the conference, with access from Asia, Europe and South America during the conference itself. The AMEE 2017 ePosters are all still available online and being shared and accessed. 229 updates were made to ePosters during and after the conference, indicating that ePoster authors were able to respond to feedback and improve or add to their ePoster.

5 Open challenges and further work

5.1 Identifying the factors that actually contributed to adoption.

Overall the LTB solution was widely welcomed and its adoption is already spreading beyond the AMEE community. Factors that we believe *may* have contributed to this success include:

The solution addresses widely recognised problems. As set out earlier in this paper, the design of Learning Toolbox was based on an understanding of the limitations of existing paper and ePoster approaches. So this was a real-world problem, not an IT solution in search of a problem.

The usability of the platform itself. The ePoster authors at AMEE had no special technical skills and yet were able to create rich ePosters with no face-to-face instruction and with fewer than anticipated requests for online support. This, and results from a subsequent pilot involving students [14], suggests that the platform is easy to use.

The creative freedom it gave to authors. ePoster authors reported to us their feelings of joy and delight in being able to create such rich and flexible presentations of their work – "*loved this format*", "*Great fun to create too!*" Of course, not everyone welcomed this flexibility and some people were happiest sticking to the templates. So structure (templates) and guidance (support videos) are certainly still required in such tools.

Bridging between physical and virtual learning spaces. The inclusion of and easy bridging between both physical (mini-poster wall, presentation room) and virtual learning spaces (ePosters, showcase website, social media) seems to have been important. Both the physical and virtual places were busy throughout the conference and there did

appear to be cross-over between them. People browsing the mini-poster wall were scanning and exploring the ePosters, people in the presentation room did scan the mini-posters in order to download and access the relevant ePosters before or after the session. On twitter the conversation referred both to the ePosters themselves, but also to the physical places in which people were congregating (mini-poster wall in particular) to explore and potentially discuss the ePoster work. So we observed signs that this bridging was happening and that it was helping to promote both learning spaces. However, a more detailed tracking of activity and conversations across the physical and virtual spaces would be required in order to assess the impact that this bridging had. We will look at this as part of the planned future work – a formal evaluation of ePosters and their impact on informal learning processes at AMEE 2018.

The support approach used. We had deliberately framed the support in terms of us (the ePoster support team and the ePoster authors) working together and being pioneers – part of a team exploring the possibilities of ePosters. We adopted a very open and friendly approach, appearing in the support videos ourselves, talking about our own use of ePosters and signing the support emails with our own names. This appeared to lead to a real feeling of community and collegiality for many ePoster authors. When they arrived on site many ePoster authors recognised us from the videos and were effusive in their welcome and thanks, offering to help us set-up and asking for photos with us. From a personal perspective this was very gratifying, but from a scaling perspective this could be a concern since sustained adoption would need to go beyond this pioneering spirit, reaching out to much wider groups and eventually become the standard rather than the innovative practice. The tool was offered to poster authors at EC-TEL 2017, as an optional extra and without this strong support package. About 1/3 of the authors did create an ePoster (without any requests for help), but the ePosters did not appear to have the same impact/profile at the conference as they did at AMEE. This was probably connected both to the level of support and the fact that they were only an optional extra, not the core way of presenting the work.

Stakeholder culture and engagement. We also recognise that the solution could have fallen at the first step if it had not been for the culture of the AMEE Board (interested in exploring innovations and prepared to take risks) and the enthusiasm and positive attitude of the member of the TEL committee with whom we first worked.

Designers who are also part of the user community. It may also be worth noting that the solution designers (ourselves) came from the community we were supporting – we have been, and continue to be, researchers and ePoster authors ourselves. We had first-hand experience of the problem we were solving. Therefore, although we did not adopt a co-design approach in the development, the team already had the characteristics of a co-design team with the user perspective being very well represented.

However, whilst this has been a very successful activity in terms of technology adoption, and we do have hypotheses for what contributed to that success, we recognise that

we are not able to verify any of these yet. At this stage we can only make recommendations to other developers and researchers that, when planning their own large-scale TEL interventions, they at least consider some of the possible contributing factors that we have identified above. A structured evaluation in one or more other settings would be required in order to attempt to identify which of these factors were actually most important. This may form part of our future work.

5.2 Evaluating the impact on (informal learning) practices within and beyond the conference.

Although the pilot was a success in terms of adoption and spread, we have not undertaken a detailed analysis of *how* the ePosters were used. This would involve looking at how they were used by authors, conference participants and viewers from outside the conference. It would explore how they were used before, during and after the conference. Such an analysis would need a mixed approach including an analysis of the log data to look at frequency and patterns of use, but also surveys and interviews to get a better understanding of the nature of that use. For example, is it for dissemination, knowledge development or for teaching? Having a better understanding of the actual usage made of the ePosters would help us to better understand informal learning practices at conferences, identify factors that contribute to successful TEL adoption and identify further opportunities for technology support. Such a detailed evaluaton is now planned for the use of the ePoster at AMEE 2018.

5.3 Scaling up and opening out

A limiting factor on scaling up the ePosters is the process of presentation. In AMEE 2017 all the ePosters were presented in scheduled presentation slots in presentation rooms. However, this approach requires the allocation of a separate presentation space and, moreover, is not conducive to open and extended discussion or exploration of links between related pieces of work. We have recently successfully piloted, in a Leeds-based conference, an alternative model of presentation which combines BarCamps [15] with ePosters. This approach puts even greater emphasis on the dialogic and trialogic learning processes, fore-fronting the collaboration and discussion and getting participants to add their new knowledge to the ePosters during the session itself. This model could be adapted for larger conferences and could use currently underutilised communal spaces for ePoster BarCamps, bringing together presenters with shared interest to discuss their work with others. Another option we are exploring is a *silent disco* approach - multiple ePosters presented at the mini-poster wall and the participants able to tune-in to the presentation that interests them.

5.4 Supporting conference organisers to manage and support the ePosters

The support we provided to AMEE ePoster authors was highly valued, but is also time consuming and difficult to scale, in particular the onsite support. A challenge therefore is to provide conference teams with the tools they need to manage and support the

ePosters themselves. We have already started this work and will be piloting this approach where support is provided by a local team at a conference later this year. This pilot may also help us to better assess to what extent our own support package and approach contributed to the success at AMEE.

6 Conclusions

Learning Toolbox was piloted as an ePoster platform at AMEE 2017, a large, international conference for medical education. This paper explains how the digital solution was designed to overcome recognised limitations to knowledge sharing and communication inherent in traditional paper posters and existing ePoster solutions, and to enhance dialogic and trialogic learning processes. The high use of the platform at the conference, the positive feedback and the subsequent adoption by both AMEE and other conference organisers indicates that the design is perceived to be an improvement. Further work is planned to understand in more detail the longer-term impact of the platform and how it changes informal learning practices at conferences.

7 Acknowledgements

We would like to thank AMEE and in particular Ken Masters, Ron Harden, Pat Lilley, Tracey Thompson and Trudie Roberts for their trust and belief in us, and for taking the risk to try out this new platform at such a large scale. We would also like to thank all the AMEE ePoster authors, who took the time to use the tool to its full potential. We also thank our Learning Layers colleagues, particularly those at ITB and Bau-ABC, who helped shape the original Learning Toolbox tool.

8 Conflict of interest

The authors are researchers but also co-founders of Kubify BV, the start-up commercial company set up to further develop and provide the LTB for ePosters solution. As such they want to be clear and ethical in reporting that they have a financial and business interest in the work reported in this paper.

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