# Development of three Higher Education professional learning networks in response to COVID-19: a case study

CRAMMAN, Helen <http://orcid.org/0000-0002-8684-4882>, BURNHAM, Jennifer AJ <http://orcid.org/0000-0001-7448-7470>, CAMPBELL, Craig D <http://orcid.org/0000-0002-1082-3508>, FRANCIS, Nigel J <http://orcid.org/0000-0002-4706-4795>, SMITH, David <http://orcid.org/0000-0001-5177-8574>, SPAGNOLI, Dino <http://orcid.org/0000-0001-6367-4748>, STEWART, Malcolm I <http://orcid.org/0000-0002-5724-9160> and TURNER, Ian J <http://orcid.org/0000-0002-5070-6621>

International Journal for Academic Development

ISSN: 1360-144X (Print) 1470-1324 (Online) Journal homepage: www.tandfonline.com/journals/rija20

# Development of three Higher Education professional learning networks in response to COVID-19: a case study

Helen Cramman, Jennifer A. J. Burnham, Craig D. Campbell, Nigel J. Francis, David P. Smith, Dino Spagnoli, Malcolm I. Stewart & Ian J. Turner

**To cite this article:** Helen Cramman, Jennifer A. J. Burnham, Craig D. Campbell, Nigel J. Francis, David P. Smith, Dino Spagnoli, Malcolm I. Stewart & Ian J. Turner (24 Nov 2025): Development of three Higher Education professional learning networks in response to COVID-19: a case study, International Journal for Academic Development, DOI: 10.1080/1360144X.2025.2580277

**To link to this article:** https://doi.org/10.1080/1360144X.2025.2580277

INTERNATIONAL JOURNAL FOR ACADEMIC DEVELOPMENT
https://doi.org/10.1080/1360144X.2025.2580277



# Development of three Higher Education professional learning networks in response to COVID-19: a case study

Helen Cramman [a], Jennifer A. J. Burnham [b], Craig D. Campbell [c], Nigel J. Francis [d], David P. Smith [e], Dino Spagnoli [f], Malcolm I. Stewart [c] and Ian J. Turner [g]

[a]School of Education, Durham University, Durham, UK; [b]School of Mathematical and Physical Sciences, University of Sheffield, Sheffield, UK; [c]Chemistry Teaching Laboratory, Department of Chemistry, University of Oxford, Oxford, UK; [d]School of Biosciences, Cardiff University, Cardiff, UK; [e]Department of Biosciences and Chemistry, Sheffield Hallam University, Sheffield, UK; [f]School of Molecular Sciences, The University of Western Australia, Perth, Australia; [g]College of Science and Engineering, University of Derby, Derby, UK

**ABSTRACT**

The COVID-19 (SARS-CoV-2) pandemic brought in-person teaching to an abrupt halt in March 2020 posing the problem of how to continue to deliver undergraduate courses remotely. This paper presents a detailed case study of three international online Higher Education (HE) teaching networks, formed to address the critical need to support laboratory teaching in the UK and Australia. The study employed a sequential mixed methods design using an online survey followed by structured discussions with network leads. The findings show these networks provided a space that was previously missing for knowledge development, building confidence, supporting collaboration, and reduced isolation of members. COVID-19 created a common purpose triggering the formation of these communities, but multiple factors contributed to their continued success: individuals prioritised engagement; both participants and their contributions were welcomed, and they subsequently felt able to lead change. The research found that the three networks fit the framework for Professional Learning Networks (PLN) providing a useful template for Higher Education PLNs operating anywhere in the world.

**ARTICLE HISTORY**
Received 31 October 2024
Accepted 13 July 2025

**KEYWORDS**
Biosciences; chemistry; laboratory teaching; professional learning network

## Introduction

By the end of March 2020, the COVID-19 (SARS-CoV-2) pandemic lockdowns had brought in-person teaching in Higher Education (HE) to an abrupt halt in more than 100 countries (Hale et al., 2021). This left educators with the significant challenge of how to adapt undergraduate courses for Emergency Remote Teaching (ERT), the rapid transition to teaching online in response to a crisis or disaster (Hodges et al., 2020). This forced change was fundamentally different to the traditional approaches to Higher Education (Koris & McKinnon, 2022) and was

**CONTACT** Helen Cramman Helen.cramman@durham.ac.uk
Supplemental data for this article can be accessed online at https://doi.org/10.1080/1360144X.2025.2580277

especially challenging for subjects in which hands-on practical experience forms a core part of the curriculum (Hofstein & Lunetta, 1982, 2004) or is required by governing and oversight bodies (Pyke et al., 2014; QAA, 2019). Traditional in person teaching had to pivot to online whilst still meeting the same learning outcomes. HE staff had little experience at this, so a collective approach was required.

This paper will show how one such approach was impactful and led to the creation of three successful discipline-specific PLNs. By employing a sequential mixed methods design and discussion with the network leads, an examination of the implementation and participant experience provides a case study of how PLNs can work. The findings are significant for the insights they provide into PLNs in HE and the framework for supporting and empowering teaching focussed HE staff to engage with opportunities for professional growth and improving wellbeing.

## Theoretical framework for professional learning networks

Communities of practice (COP) are groups of people that share a common interest in a topic, or common concerns, and who come together to fulfil their individual or group goals. Research has highlighted the effectiveness of workplace COPs for professional development as a teacher (Viskovic, 2006), effective delivery of teaching (Pharo et al., 2014), enhancing teaching quality (Bolander Laksov et al., 2008) and as a source of support and academic identity (Ryan, 2015; Viskovic, 2006). Professional Learning Networks (PLNs) extend the COP concept beyond the workplace, facilitating larger groups to engage in '*collaborative learning with others* [. . .] *in order to improve teaching and learning*' (Brown & Poortman, 2018). PLNs are a form of community focussed Academic Community Development that combine group cohesion with intentionality towards a goal (Parkinson et al., 2024), similar to Communities of Interest, Personal Learning Networks and Peer Learning Networks, which have varying levels of group cohesion and intentionality towards a goal (Henri & Pudelko, 2003; Oddone et al., 2019; Trust et al., 2016). The combined benefits of PLNs over these other formats are greater potential for support; increased opportunities for collaboration and discussion; reduced isolation; greater space for professional growth; and a heightened sense of collegiality (Macià & García, 2016; Trust, 2012). PLNs support developments in education through sharing of resources; curation of new ideas; reflection on teaching practice and increase innovation potential; and, consequently, improve teaching practice and student outcomes (Brown & Flood, 2020; Macià & García, 2016).

To function, PLNs require a space for educators to connect and learn. In-person meetings create a shared community (Brown & Flood, 2020); however, engagement is restricted by geographical considerations, especially where expertise is widely dispersed (Trust et al., 2017). Meeting online (via the internet and social media) lessens these constraints (Trust et al., 2017), widening the scope of knowledge exchange with peers (Jenkins et al., 2009; Trust, 2012), and in the context of COVID-19, enabling continued operation of networks (Leontyev et al., 2020; Nataro & Johnson, 2020).

Successful implementation of PLNs is contingent on multiple factors summarised in Table 1 (further detail in Supplementary Information Table A).

**Table 1.** Factors required for PLNs in education to be successful (Brown, 2020; Brown & Flood, 2020).

| Success factor |
|---|
| Collaborative and collegial exchanges |
| **Behaviour of members** |
| Trust |
| **Support from employers** |
| Lack of fear of competition |
| **Effective leadership of the PLN** |
| Common focus |
| Long-term commitment |
| Senior leadership support for engagement |
| Formalisation |
| Prioritisation |
| Effective leadership |

The majority of research into PLNs in education has focused on the school system, with only a few studies considering PLNs in HE (Trust et al., 2017). This article will clearly demonstrate this approach is also applicable to HE.

### *Context of the study*

The COVID-19 pandemic forced science educators to pivot laboratory teaching for an online environment. An existing Chemistry network moved onto Zoom to bring people together (Drylabs20) (Campbell et al., 2020), rapidly followed by the formation of similar networks. We present a case study of three international drylabs networks (Drylabs20-DL20; #DryLabsRealScience-#DLRS; #DryLabsDownUnder-#DLDU) with more than 350 attendees from across the UK, Ireland, Australia, New Zealand and the USA.

The study undertook to explore the research question: what was the perceived impact of the drylabs networks for participants? It additionally sought to identify factors contributing to the successful implementation of the networks. We describe the three networks and demonstrate a fit with the theoretical framework of a PLN and lessons that can be learned.

## Research design

### *Description of the networks*

A summary of key features of the drylabs networks (Table 2) shows three broadly comparable networks differing only slightly in the detail. Each network had a small organising team, varied presenters, an education-focussed audience, and broadly comparable attendance. The networks had common aims of sharing practice and ideas but adopted different balances of session content to do this (Table 3).

### *Methodology*

The study utilised a sequential mixed methods approach (Creswell et al., 2003), commencing with a comprehensive online survey (containing quantitative and qualitative

**Table 2.** Key features of each network.

| | DL20 | #DLDU | #DLRS |
|---|---|---|---|
| Network leaders (organisers) | 2 staff<br>Single institution | Single person | 3 staff<br>Multi-institutional |
| Presenters | Network hosts, volunteers from attendees, invited contributors. | Volunteers. | Volunteers from attendees. |
| Target audience | Educators in practical chemistry teaching. | First time creators of online learning environment in chemistry. | Bioscience teaching lecturers & academics. |
| Attendees | 80 (av), 35 (min), 120 (max) | 50 (av), 38 (min), 84(max) | 60 (av), 25 (min), 150 (max) |
| Motivation | To establish how other institutions in the UK were going to adapt their practical chemistry courses to an online-only environment.<br>To discover and share any 'dry' practical materials. | Forum for discussion and sharing ideas.<br>Sharing resources.<br>Creation of online resources page accessible by community. | To share best practice, experiences, and ideas when supporting remote learning in the life sciences. |
| Content suggestions | Suggestions by email, from meetings, and other requests. | Proposed by presenters. | Suggestions from attendees, by email, requested by organisers. |
| Meeting platform | Zoom | Zoom | Zoom |
| Other network content | Shared drive for resources, webhosting platform. | ChemNet website. | Resources hosted on LectuREmotely.<br>YouTube videos. |
| Other activities | Resource sharing. | YouTube recordings. | Video resources.<br>How to guides. |
| Frequency of meetings | Fortnightly, moving to monthly. | Every 3 or 4 weeks. | Fortnightly moving to monthly. |
| Advertising | Email & Twitter. | ChemNet (academic staff teaching chemistry at Australian universities), Twitter. | Email & Twitter. |
| Meeting format | 2 or 3 20 min talks and 1-hour open discussion in break-out rooms. | 2 or 4 20 min talks each with 10 mins discussion. | 3 or 4 20 min talks with Q&A. |

**Table 3.** Nature and frequency of session content for each network.

| | DL20 | #DLDU | #DLRS |
|---|---|---|---|
| Presentations on teaching (logistics) | Majority | Minority | None |
| Presentation on teaching (content) | Minority | Majority | Majority |
| Presentations on policy | Minority | None | Majority |
| Q&A after presentation | Majority | Majority | Minority |
| Discussion on presentation theme | Minority | Majority | Majority |
| Break-out rooms (theme-based discussion) | Majority | None | None |

responses), followed by structured reflective discussions with network organisers giving a detailed case study of the three networks. The online survey enabled a breadth of information to be gathered from network participants to identify whether the networks were achieving their original aims and to understand participants' experiences. The sequential design enabled the findings from the survey to be used to inform focussed questions in a structured reflective discussion with the network leads. The questions for the network leads had a particular focus on any unexpected impact that the networks had achieved and reflection on the alignment to the PLN theoretical framework (Table 1).

The surveys contained a mix of open (free-text) and closed (Likert-scale) response questions with minor variations for the different networks to accommodate terminology differences related to discipline and location (e.g. relevant networks, institutional structures). See Supplementary Information for DryLabs survey questions. The survey questions and information about the purpose of the survey were designed to minimise response bias within the self-report surveys (using neutral wording of questions, ensuring non-leading questions, and the option to complete the survey anonymously if desired). During development, feedback was gathered on the survey from three academic colleagues with similar experience to those attending the networks. The colleagues completed the survey and then participated in a discussion around their understanding of the meaning of the questions. Any misconceptions were then addressed through refinement of wording to the relevant questions

Participants were required to have attended at least one network meeting. Recruitment was by announcements at the network meetings and email to the network mailing lists. Surveys were opened for responses between 16 July to 14 September 2020 (DL20 and #DLRS) and 30 July to 14 September 2020 (#DLDU). Survey respondents were self-selecting voluntary participants, there was no incentive for participating in the study. A breakdown of respondents to the survey is provided in the next section.

Ethical approval for the study was granted by the School of Education Ethics Committee at Durham University on 14 July 2020 (*EDU-2020–07-13T15:17:52)*. Participants were provided with an information sheet, privacy notice, and agreed to a series of participation agreement statements before taking part in the study.

Quantitative survey data were analysed using descriptive statistics using the Jamovi statistical package and Microsoft Excel. Qualitative data from open text responses were analysed using inductive thematic analysis following the six-phase process (Braun and Clarke (2006). Coding and generation of initial themes was carried out by a single researcher followed by discussion and iterative review of codes and themes in collaboration with a second researcher. The themes identified from the inductive thematic analysis were then triangulated with the findings from the quantitative survey at the data interpretation stage (Creswell et al., 2003) and mapped to the theoretical framework for PLNs (Table 1). Findings were presented to the network organisers as the starting point for the structured reflective discussions.

The structured reflective discussions took place over two sessions (A group discussion and individual interview) and were framed around Kolb's (1984) reflective learning cycle. Discussion at the sessions was captured in observation notes. The notes were then deductively thematically analysed against the themes within the theoretical framework for PLNs (Braun & Clarke, 2006). Findings from the structured reflective discussion were then combined with those from the surveys during the interpretation of the overall analysis for the case study (Creswell et al., 2003).

### *Respondents to the surveys*

Survey responses were gathered from 76 individuals in 44 unique institutions (Table 4) from the UK, Ireland, Australia, New Zealand, and the USA. The majority (> 94%) were primarily based in the country in which their network was hosted.

**Table 4.** Summary of respondents to the surveys.

| | DL20 | #DLDU | #DLRS | All networks |
|---|---|---|---|---|
| Survey responses | 34 | 19 | 23 | 76 |
| Institutions represented | 16 | 14 | 16 | 44 |
| No institution identified | 9 | 2 | 1 | 12 |

Respondents were experienced teachers or teaching-support professionals. Seventy-two percent of respondents had five or more years teaching experience, with 41% having more than 10 years' experience. The majority of respondents across all three networks were on permanent or non-fixed term contracts (88% DL20, 72% #DLDU, 91% #DLRS) and 41% of all respondents had worked at their current institution for more than 10 years. Table 5 shows the number of meetings attended by respondents, only five respondents had only attended one meeting.

The remainder of this paper presents the findings addressing the research question: what was the perceived impact of the drylabs networks for participants? The findings are then synthesised and interpreted in the discussion section, before the findings of this case study are summarised in the conclusion along with recommendations for future implementation and research.

## Results

To investigate the perceived impact of the drylabs networks for participants we first present motivation for initial and continued attendance, followed by an exploration of how participants felt engagement assisted their roles.

### *Reasons for attending*

Respondents rated the importance of a range of sixteen factors as to why they initially chose to attend meetings and continued to attend (full list in Supplementary Information). The desire 'To learn from the ideas and experiences of colleagues at other institutions' and 'The need to develop knowledge of different teaching methods (due to the impact of COVID-19)' ranked in the top three 'important' or 'very important' reasons for respondents from all three networks and remained top reasons why participants continued to attend (Table 6). 'The practitioner focus of the meetings' was considered the *least* important reason for initially attending by respondents. However, this changed dramatically for all three networks, even moving into the top three 'important' or 'very important' reasons for continued attendance at DL20 meetings. Qualitative data from open text responses gave insight into this change with respondents' views on the value of the networks morphing from sourcing practical ideas for alternative delivery approaches and resources, to recognising the impact

**Table 5.** Numbers of meetings attended by respondents.

| | Respondents | Mean | Median | Min | Max |
|---|---|---|---|---|---|
| DL20 | 34 | 4.82 | 5 | 2 | 7 |
| #DLDU | 19 | 2.47 | 3 | 1 | 3 |
| #DLRS | 23 | 3.00 | 3 | 1 | 6 |

**Table 6.** Percentage of respondents selecting 'important' or 'very important' as to why they initially (i) chose to take part, and continued (c) to take part, in the networks on a five-point likert scale of 'very important' to 'very unimportant'.

| | DL20 | | #DLDU | | #DLRS | |
|---|---|---|---|---|---|---|
| | *N*=34 (I) | *N*=33 (C) | *N*=19 (I) | *N*=19 (C) | *N*=23 (I) | *N*=23 (C) |
| To learn from the ideas and experiences of colleagues at other institutions | 100% | 100% | 100% | 100% | 100% | 100% |
| The need to develop knowledge of different teaching methods (due to the impact of COVID-19) | 91% | 88% | 95% | 95% | 96% | 96% |
| The practitioner focus of the meetings | 42% | 88% | 32% | 68% | 43% | 91% |

on them personally through increased confidence in their own practice, understanding of the national picture and tools to leverage change within their institutions.

The survey also more broadly explored the elements of respondents' roles they considered attending the drylabs networks had assisted with. Findings are presented under three broad themes that emerged from inductive thematic analysis of open text responses: knowledge exchange and sharing ideas; professional development and ups-killing; and increased confidence. Barriers to participation were also highlighted directly and indirectly within the survey responses.

## *Knowledge exchange and sharing ideas*

The survey data showed that the networks facilitated exchange of ideas: Respondents from each network had given presentations (29% DL20, 42% #DLDU, 14% #DLRS) and the majority had shared thoughts, ideas, or experiences (91% DL20, 84% #DLDU, 65% #DLRS). Responses also gave insight into the exchange of ideas, for example, the usefulness of the networks as platforms for information sharing by the HE degree accreditation professional bodies (the Royal Society of Chemistry, RSC, and Royal Society of Biology, RSB) and for participants carrying knowledge back and using it as a lever for change within their home department:

> It has been really useful to know what the RSC think of remote labs when feeding back to my department.
>
> DL20 network

> The first meeting with the RSB also in attendance was excellent - it gave reassurance of what was expected . . . I then went back to my institution to disseminate the ideas for dry lab/ alternative projects.
>
> #DLRS network

> Gaining a broader knowledge of what is being done in other institutions. This aids my own discussions and proposals within my institution.
>
> #DLDU network

### Professional development and upskilling

Respondents reflected on the impact of attendance at their network on specific areas of knowledge, and what would be the impact of that knowledge gain. For all three networks, the highest percentage of respondents reporting a 'small' or 'large increase in knowledge' was in relation to 'Online/virtual/remote lab teaching options' (97% DL20, 95% #DryLabDownUnder, 100% #DLRS). Also within the top three areas reported by the highest percentage of respondents was an increase in knowledge of 'who is working in a similar area to you and what their interests/areas of expertise are' (91% DL20, 94% #DLDU) networks, and 'Technology to enhance/support lab teaching' (83% #DLDU, 95% #DLRS).

Analysis of open text responses showed that knowledge gained had helped with the development of teaching plans and was expected to assist with planning for lab delivery.

> I am starting to develop a new course and this network has really increased my scope because I have only worked at one institution for a short time.
>
> #DLRS network

Improved consistency, quality, and standards for undergraduate labs were also anticipated to be an important benefit of the networks along with providing an improved student experience.

> Through networking and discussions (and potential collaborations) we are ensuring a consistency in quality and output across the UK for UG teaching labs. Having this network to discuss possible benefits and pitfalls for our proposals and ideas is invaluable.
>
> DL20 network

### Increased confidence

Respondents had not initially anticipated that boosts to self-confidence would be a benefit of attending drylabs meetings; however, open text responses describing areas where the network had already assisted with their role or responsibility, showed that this had occurred. Likert scale survey responses supported these findings.

> . . . confirmed that my approach to supporting pedagogy in the lab environment was well grounded and well-founded so provided me with much more confidence.
>
> DL20 network

> . . . confidence in the quality and equivalency of my current practice.
>
> #DLRS network

> Confirming that our choice of how to present lab work to our students was a sound one.
>
> #DLDU network

### Barriers to participation

Respondents identified any barriers or challenges which affected their ability to participate in the drylabs networks. Key themes were clashes with other work commitments, time commitment due to the meeting duration, internet connection problems, and conflict with caring responsibilities. Barriers linked to the online environment were reduced concentration and attention span, difficulty engaging in ad-hoc discussions and a lower depth of interaction in the networking outside of the discussion compared to an in-person conference.

## Discussion

The results presented above show perceived benefits for respondents of all three networks, through enabling knowledge exchange and sharing ideas, providing the opportunity for professional development and upskilling, increasing social interaction, developing a sense of community, and increasing confidence. These were achieved outside of the workplace, extending the community beyond a workplace CoP into a PLN (Brown & Poortman, 2018). Below, we outline how the networks fit within a theoretical framework of a PLN, noting barriers to engagement and implementation, followed by consideration of the limitations of the study.

### Mapping to the theoretical framework for successful PLNs

The evidence presented within this paper shows that the delivery model of the drylabs networks fits that of a PLN. Moreover, the evidence maps directly onto the criteria for success (Table 1). However, findings from the discussion with the network leads showed that this had not been a conscious design decision, the networks had implemented '*what [they] thought would work well*' based on their professional experience.

### Common focus and prioritisation

Primarily, and crucially, there was a shared sense of purpose within the network prompted by the pandemic (Brown, 2020; Brown & Flood, 2020). COVID-19 acted as both initiator and common focus for the drylabs networks with participants engaging to share ideas and discuss the common challenges COVID-19 posed. Prioritisation of engagement was assisted by the immediacy and necessity created by COVID-19. Participants described '*prioritis[ing] attending . . . meetings even though [their] workload [had] increased*', how COVID-19 conditions had '*catalysed*' their involvement, and that the exceptional circumstances had '*added a great NEED to the situation on top of the normal CPD*'. Successful engagement relies on the individual also prioritising acting on their learning from the network (Biddolph & Curwood, 2016; Brown & Flood, 2020; Tour, 2017; Trust et al., 2016). Alignment between the focus of the networks and the critical components of staff's roles (i.e. redeveloping laboratory courses for socially distanced, remote, or online delivery) made that possible. It could be argued despite adopting hashtags and maintaining an online presence, these networks appear to concentrate predominantly on synchronous online meetings rather than leveraging the broader, more participatory affordances of social media platforms. As a result, the

dynamic possibilities of networked learning such as asynchronous collaboration, informal knowledge sharing, and community-driven inquiry were limited

### *Collaborative and collegial exchanges*

The networks offered much-appreciated support beyond the immediate workplace with the flexibility of the online platform bringing together geographically dispersed peers. Each network supported developments through sharing of resources and discussion of ideas, prompting '*critical re-thinking of our approaches*', and increasing innovation potential to solve the challenges of remote practical education with participants "*inspired to imagine new ways of doing things*" (Francis et al., 2023; Campbell et al., 2020). The networks enabled professional growth and facilitated development of teachers' social capital and professional identity, offering space for participants to '*learn from experienced colleagues*', '*seek reassurance from others facing similar practical situations*', and to provide '*confidence in the quality and equivalency of [their] current practice*'. The networks collaborative approach has led to sharing of expertise and similar PLN formed in a range of subjects such as Engineering (Keulen & Sielmann, 2021) and Forensic Science (Bolton-King et al., 2022). The importance of collegiality to participants was demonstrated by the increase in importance of the practitioner focus of meetings (Macià & García, 2016; Trust, 2012). The opportunity to make connections beyond their normal network, in particular, multiple meetings enabling participants to meet more people, made these networks different to previous experiences. The networks contributed to wellbeing by reducing isolation, physical as well as role-related, and provided emotional support during the lockdown periods between March and August 2020 with one respondent commenting that attending once a fortnight was '*really important for maintaining [their] own happiness*' (Lantz-Andersson et al., 2018). The structured reflective discussion with the network leads highlighted that designing in support of wellbeing, fulfilling a need for social contact and prioritisation of attendance had not been a conscious aim. Leads had simply sought to provide a forum for sharing ideas and resources (Table 2). The findings also fit within Parkinson et al. (2024) framework for Academic Community Development, as a community-focussed and needs-based network operating beyond a single institution with common purposes evolving over time, from alleviating the impact of the constraining conditions of COVID-19 to supporting members to think more transformatively to leverage change.

### *Trust and absence of fear of competition*

Trust in the competence, benevolence and integrity of members can be inferred by the percentages presenting their work and sharing ideas. The majority of respondents felt welcome at the networks, and many felt very comfortable taking part in discussions with most sharing thoughts, ideas, or experiences strongly indicating they felt 'safe' (Brown & Flood, 2020; Scott, 2015) to do so in the network environment. *Senior leadership support for engagement Formalisation* – The data gives little direct evidence of formal support for engagement in the drylabs networks by the employer. Survey respondents appeared not to perceive value in encouragement from colleagues to attend or in a requirement to attend as part of their role and awareness of attendance by line managers was also reported to be low (9% DL20, 39% #DLDU, 26% #DLRS). We make sense of this by inferring that respondents are treated as academics who are not subject to close-

management by line managers and thus are able to access development activities autonomously. The challenge of this is shown in respondents reporting limited access to funds for professional development/networking/conference attendance (50% of respondents reported having no access to funds via their department or university).

Research evidence (Brown & Flood, 2020) shows that if participation in PLNs is not formalised by leadership, there is a risk that it becomes a 'bolt-on' on top of existing work, rather than embedded within the role. Therefore, although staff may not require encouragement from leadership to attend network meetings, buy-in for participation from leadership should be considered important in empowering staff to lead change with sufficient resources.

### *Effective PLN leadership*

All three networks reported that leadership had been carried out as an addition to their existing roles. Moving forward, this may be a role which the network leads may wish to formalise with senior leadership within their own organisations to ensure sufficient recognition, resourcing, and support for the valuable role they have been undertaking (Brown, 2020).

### *Long-term commitment*

Measurement of the results of long-term commitment in the PLN was out of scope for this study due to timescales and could be investigated within future studies. The findings from this study did indicate that participants in the PLN had experienced important short-term 'wins' (such as acquisition of knowledge and resources for the development of online learning and 'kitchen chemistry' activities) that the literature indicates are essential to assist the longer-term commitment. All three networks were continuing to meet for more than three years after forming in July 2023.

## *Enabling engagement by addressing barriers to attendance*

The drylabs networks provided a new type of online, international, practitioner-focused, free, 'public' network for HE Chemistry and Biosciences laboratory teaching-focussed staff, overcoming existing barriers to engagement. Participants shared how they had previously '*found it difficult to integrate into teaching networks, mostly because of travel and cost restrictions, and not having any reason for regular contact with people outside [their] institution*'. Participants shared how they considered that the arrangements of the drylabs networks had been beneficial, including the smaller time commitment to participate (no additional travel time required), cost (no travel costs or registration fees), no geographical restrictions (facilitating multi-institutional national and international representation at meetings),

In addition, some features of the online Zoom platform helped make the drylabs meetings more accessible. The chat function was noted by some participants to have '*broken down barriers to interaction*' and '*democratise[d] conversations*', some participants felt more able to contribute in the online forum and commented that discussion following talks included a broader group of participants than may have occurred at an in-person meeting. However, we note not all barriers could be addressed equally. For example, although the online format was easy to access it was '*not necessarily easier to*

*speak*'. The chat function often moved very quickly, making it difficult to contribute and follow.

### *Limitations of the current study and suggestions for further research*

The current study was conducted during a highly exceptional period of teaching for many HE institutions globally. The study gathered data from a voluntary subset of network participants. It is therefore likely to present the views of those who were most engaged and felt most strongly about networks, presenting a primarily positive view of the impacts. Nevertheless, the responses provide a valuable insight into the views of a wide range of laboratory-focused HE teaching staff from a broad range of institutions internationally.

Outside the scope of this work was an investigation of the impact of the drylabs networks on the effectiveness of developments in education, and to what extent they led to improved teaching practice and student outcomes. Further research is required to robustly study these and to understand to what extent prolonged-engagement with the networks facilitates the development of social capital and professional identity for those that continue engagement (Lantz-Andersson et al., 2018). Research, including robust evaluation of PLNs against specific long-term aims, will be vital to understand the complexity of how engagement with networks impacts learning and teaching within the specific context of HE.

## Conclusions and practical implications

This detailed case study has examined three international drylabs networks showing comparable benefits for participants of each network in the areas of enabling knowledge exchange and sharing of ideas, providing the opportunity for professional development and upskilling, increasing social interaction, supporting wellbeing, developing a sense of community, and increasing confidence to change their own practice. It is known that a supportive community of peers outside of the home institution can be hugely important (Scott, 2015). The format adopted by the drylabs networks has enabled cooperation, collegiality, and collaboration, demonstrating many factors linked to the successful implementation of Professional Learning Networks (PLNs) and showing that the drylabs model makes a useful template for a Higher Education PLN operating anywhere in the world.

Whilst the drylabs networks played a crucial role during the COVID-19 pandemic, it is crucial to remain circumspect about the broader adoption of the drylabs model. The findings from this study were gathered under circumstances that created a sense of urgency, driving a collective shift towards reimaging practical delivery. The HE landscape is diverse and dynamic so a more nuanced and adaptable approach may be required to move the networks forwards. These PLNs would emphasise participant-driven collaboration, encourage cross-disciplinary knowledge sharing and be supported by flexible digital tools inc. GenAI and peer mentoring,

This study underscores the potential advantages of PLNs for individuals and the broader Higher Education sector. However, it is equally important to address the potential challenges to widespread implementation. We advocate for more robust

encouragement from senior leaders and policymakers towards PLN engagement. Nevertheless, we must also recognise the potential cost implications for ensuring adequate resources and facilitating active participation in PLNs.

The authors also caution against attributing the success of these networks solely to the circumstances under which they were formed. The sustained engagement of members will ultimately determine the fate of these networks and further post-pandemic investigation into the longer-term benefits for members and potential changes to educational policy will be required as these become apparent. We acknowledge the need to critically explore the drylabs model, its scalability, and long-term viability, even as we affirm its immediate short-term value and potential to inform future educational practice.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Funding

This work did not receive funding for the research to be undertaken.

## Notes on contributors

*Helen Cramman*, Helen is an Associate Professor in the School of Education at Durham University and the Durham Centre for Academic Development. Her research interests lie in evaluation of education interventions and understanding of skills development in science, with a particular focus on practical work. Through her work she is passionate about facilitating development pathways for education-focussed academic staff in HE.

*Jennifer A. J. Burnham*, Jenny is a Senior University Teacher in chemistry at the University of Sheffield. Her pedagogic scholarship interests span laboratory teaching, professional skills development, the student experience, and the career experiences of education specialists in a research-focussed environment. She is an AdvanceHE Principal Fellow, she leads the RSC HE Chemistry Teaching network and chairs the RSC Higher Education special interest Group.

*Craig D. Campbell*, Craig is a Lecturer in Chemistry at the University of Oxford. His chemical education research focuses on the redesign of the undergraduate chemistry practical course particularly skills development. Craig was jointly responsible for initiating the DryLabs professional learning network, to address the challenges of the pivot to online teaching during the global COVID-19 pandemic.

*Nigel J. Francis*, Nigel is a Senior Lecturer in immunology at Cardiff University. His research focuses on using digital tools to enhance immunology education. He won the British Society for Immunology's Teaching Excellence Award (2020), the Royal Society of Biology's Higher Education Teacher of the Year (2021) and has received a National Teaching Fellowship (2022) and Principal Fellowship (2024) from Advance HE.

*David P. Smith*, David is a National Teaching Fellow and a Principal Fellow of the Higher Education Academy. His innovative practice has been awarded the Royal Society of Biology HE educator of the year award 2019. His biological research interests bring together protein chemistry, cell culture and mass spectrometry to investigate the molecular basis of Parkinson's disease and cancer spheroid models.

*Dino Spagnoli*, Dino is an Associate Professor at the University of Western Australia. Dino's main research interests are in the field of Chemistry Education Research. The first is the use of technology to enhance student learning focused mainly on learning in the laboratory. The second area is in employability and the link that students make between assessments and their employability. Dino is also a Senior Fellow of the Higher Education Academy (Advance HE).

*Malcolm I. Stewart*, Malcolm is the Director of the Undergraduate Teaching Laboratories. Malcolm's research is to maximise the effect practical chemistry can have on a student's learning, by removing discipline-imposed boundaries. This work received the inaugural University of Oxford Vice-Chancellor for Education Award in 2020. Malcolm is a Senior Fellow of the Higher Education Academy.

*Ian J. Turner*, Ian is a Professor of Learning and Teaching in Higher Education at the University of Derby. He was named a National Teaching Fellow in 2014, The Royal Society of Biology HE lecturer of the year in 2017 and a Principal Fellow of the HEA in 2021. Ian is passionate about game-based learning and playful pedagogies.

## ORCID

*Helen Cramman* http://orcid.org/0000-0002-8684-4882
*Jennifer A. J. Burnham* http://orcid.org/0000-0001-7448-7470
*Craig D. Campbell* http://orcid.org/0000-0002-1082-3508
*Nigel J. Francis* http://orcid.org/0000-0002-4706-4795
*David P. Smith* http://orcid.org/0000-0001-5177-8574
*Dino Spagnoli* http://orcid.org/0000-0001-6367-4748
*Malcolm I. Stewart* http://orcid.org/0000-0002-5724-9160
*Ian J. Turner* http://orcid.org/0000-0002-5070-6621

## References

Biddolph, C., & Curwood, J. (2016). Understanding twitter as a networked field site: Implications for research on teacher professional learning. In M. Knobel & J. Kalman (Eds.), *New literacies in teacher learning: Professional development and the digital turn* (Vol. 74, pp. 195–218). Peter Lang.

Bolander Laksov, K., Mann, S., & Dahlgren, L. O. (2008). Developing a community of practice around teaching: A case study. *Higher Education Research & Development*, *27*(2), 121–132. https://doi.org/10.1080/07294360701805259

Bolton-King, R. S., Nichols-Drew, L. J., & Turner, I. J. (2022). RemoteForensicCSI: Enriching teaching, training and learning through networking and timely CPD. *Science & Justice*, *62*(6), 768–777. https://doi.org/10.1016/j.scijus.2022.01.004

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brown, C. (2020). *Networks in Germany: Examining the use and value of networked learning*. Emerald Publishing Limited. https://doi.org/10.1108/978-1-83867-719-020201010

Brown, C., & Flood, J. (2020). The three roles of school leaders in maximizing the impact of professional learning networks: A case study from England. *International Journal of Educational Research*, *99*, 101516. https://doi.org/10.1016/j.ijer.2019.101516

Brown, C., & Poortman, C. (2018). Introduction. In C. Brown & C. Poortman (Eds.), *Networks for learning: Effective collaboration for teacher, school and system improvement* (pp. 3). Routledge.

Campbell, C. D., Challen, B., Turner, K. L., & Stewart, M. I. (2020). #DryLabs20: A new global collaborative network to consider and address the challenges of laboratory teaching with the challenges of COVID-19. *Journal of Chemical Education*, *97*(9), 3023–3027. https://doi.org/10.1021/acs.jchemed.0c00884

Creswell, J. W., Plano Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209–240). Sage.

Francis, N., Smith, D., & Turner, I. (2023). #DryLabsRealScience: Redefining practical pedagogy post-pandemic. In P. Blikstein, J. Van Aalst, R. Kizito, & K. Brennan (Eds.), *Proceedings of the 17th International Conference of the Learning Sciences-ICLS 2023* (pp. 2219–2222). International Society of the Learning Sciences.

Hale, T., Angrist, N., Goldszmidt, R., Kira, B., Petherick, A., Phillips, T., Webster, S., Cameron-Blake, E., Hallas, L., Majumdar, S., & Tatlow, H. (2021). A global panel database of pandemic policies (Oxford COVID-19 Government Response Tracker). *Nature Human Behaviour*, *5*(4), 529–538. https://doi.org/10.1038/s41562-021-01079-8

Henri, F., & Pudelko, B. (2003). Understanding and analysing activity and learning in virtual communities. *Journal of Computer Assisted Learning*, *19*(4), 474–487. https://doi.org/10.1046/j.0266-4909.2003.00051.x

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hofstein, A., & Lunetta, V. N. (1982). The role of the laboratory in science teaching: Neglected aspects of research. *Review of Educational Research*, *52*(2), 201–217. https://doi.org/10.3102/00346543052002201

Hofstein, A., & Lunetta, V. N. (2004). The laboratory in science education: Foundations for the twenty-first century. *Science Education*, *88*(1), 28–54. https://doi.org/10.1002/sce.10106

Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robinson, A. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. The MIT press.

Keulen, C., & Sielmann, C. (2021). Experiences with remote teaching of manufacturing engineering laboratory and project courses. In *Proceedings of the Canadian Engineering Education Association (CEEA)*. https://doi.org/10.24908/pceea.vi0.14906

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Koris, R., & McKinnon, S. (2022). No time to wait in a crisis: Developing an informal approach to academic development through international online conversations. *International Journal for Academic Development*, *27*(2), 121–134. https://doi.org/10.1080/1360144X.2022.2082440

Lantz-Andersson, A., Lundin, M., & Selwyn, N. (2018). Twenty years of online teacher communities: A systematic review of formally-organized and informally-developed professional learning groups. *Teaching & Teacher Education*, *75*, 302–315. https://doi.org/10.1016/j.tate.2018.07.008

Leontyev, A., Houseknecht, J. B., Maloney, V., Muzyka, J. L., Rossi, R., Welder, C. O., & Winfield, L. (2020). OrganicERs: Building a community of practice for organic chemistry instructors through workshops and web-based resources. *Journal of Chemical Education*, *97*(1), 106–111. https://doi.org/10.1021/acs.jchemed.9b00104

Macià, M., & García, I. (2016). Informal online communities and networks as a source of teacher professional development: A review. *Teaching & Teacher Education*, *55*, 291–307. https://doi.org/10.1016/j.tate.2016.01.021

Nataro, C., & Johnson, A. R. (2020). A community springs to action to enable virtual laboratory instruction. *Journal of Chemical Education*, *97*(9), 3033–3037. https://doi.org/10.1021/acs.jchemed.0c00526

Oddone, K., Hughes, H., & Lupton, M. (2019). Teachers as connected professionals: A model to support professional learning through personal learning networks. *International Review of Research in Open & Distributed Learning*, *20*(3). https://doi.org/10.19173/irrodl.v20i4.4082

Parkinson, T., M, Q. K., & Bolander Laksov, K. (2024). Beyond academic development as institutional practice: Advancing community-led approaches. *International Journal for Academic Development*, *29*(2), 155–168. https://doi.org/10.1080/1360144X.2024.2362331

Pharo, E., Davison, A., McGregor, H., Warr, K., & Brown, P. (2014). Using communities of practice to enhance interdisciplinary teaching: Lessons from four Australian institutions.

*Higher Education Research & Development*, *33*(2), 341–354. https://doi.org/10.1080/07294360.2013.832168

Pyke, S., O'Brien, G., Yates, B., & Buntine, M. (2014). *Chemistry academic standards statement*. http://chemnet.edu.au/sites/default/files/files/CHEMISTRY_Academic_Standards_CONSULTATION_DRAFT_Final.pdf

QAA. (2019). *Subject benchmark statement, biosciences* (4th ed). The Quality Assurance Agency for Higher Education.

Ryan, J. (2015). It ain't just what you do and the way that you do it: Why discourse matters in higher education communities of practice. *Higher Education Research & Development*, *34*(5), 1001–1013. https://doi.org/10.1080/07294360.2015.1011087

Scott, G. (2015). Why do we bother? Exploring biologists' motivations to share the details of their teaching practice. *F1000Research*, *4*, 46. https://doi.org/10.12688/f1000research.6129.1

Tour, E. (2017). Teachers' personal learning networks (PLNs): Exploring the nature of self-initiated professional learning online. *Literacy*, *51*(1), 11–18. https://doi.org/10.1111/lit.12101

Trust, T. (2012). Professional learning networks designed for teacher learning. *Journal of Digital Learning in Teacher Education*, *28*(4), 133–138. https://doi.org/10.1080/21532974.2012.10784693

Trust, T., Carpenter, J. P., & Krutka, D. G. (2017). Moving beyond silos: Professional learning networks in higher education. *Internet and Higher Education*, *35*, 1–11. https://doi.org/10.1016/j.iheduc.2017.06.001

Trust, T., Krutka, D. G., & Carpenter, J. P. (2016). "Together we are better": Professional learning networks for teachers. *Computers and Education*, *102*, 15–34. https://doi.org/10.1016/j.compedu.2016.06.007

Viskovic, A. (2006). Becoming a tertiary teacher: Learning in communities of practice. *Higher Education Research & Development*, *25*(4), 323–339. https://doi.org/10.1080/07294360600947285