# Co-Constructing a Community of Practice for Early-Career Computer Science Academics in the UK

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## ABSTRACT

Early-career academics across all disciplines in the UK face significant challenges, and computer science is no exception. There are challenges in terms of developing an independent research career, delivering high quality learning and teaching, maintaining their own professional development, as well as wider academic service commitments. Tertiary education institutions in the UK often provide support through some combination of mentoring, coaching, and training. Early-career faculty often have to work towards professional recognition of their teaching, either by direct application or via successful completion of an accredited institutional taught postgraduate course. This paper reports on progress towards supplementing institutional-level support through an evolving UK-wide initiative, co-constructed with early-career academics, to build diverse and resilient communities of practice in computer science. Insights are provided as to how the initiative supplements current institutional approach and is underpinned by national-level academic practice developmental events, professional body engagement, alongside cross-institutional mentoring and buddying schemes.

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## CCS CONCEPTS

• **Social and professional topics → Computing education**.

## KEYWORDS

Early-career academics, community of practice, professional development, co-construction

## 1 WHAT IS IT?

This paper reports on the progress to date of an emerging initiative to support the development needs of early career academics in the United Kingdom. The background analysis undertaken to initiate this scheme and the outcomes of a related workshop at the ACM UK & Ireland Computing Education Research Conference 2020 (UKICER'20) to formulate a pilot course are discussed in a previous paper [3]. The initiative has three key activities: (*i*) Developmental/training sessions; (*ii*) Cross-university mentoring; and (*iii*) Cross-university buddying. Initially, the steering group set out with the goal of having two key activities, namely (*i*) and (*ii*) above, but as part of the co-construction process with participants, buddying was added as a third goal. Universities from across the four nations of the UK have been involved and to date 59 early career colleagues from 16 different institutions have participated in the scheme.

The scheme was formally initiated in December 2020. To date three developmental/networking events have been delivered online, primarily due to the impacts of the ongoing COVID-19 pandemic, which has presented considerable challenges for the discipline of computer science [5, 23, 25] and for higher education in general [32, 33]. Alternative approaches would have been considered in other circumstances. However many of the participants at the workshops highlighted that due to competing work-pressures and expense issues they preferred the adopted virtual format. Following each event, feedback was sought by a post-event survey; the outcomes of these surveys are explored in Section 4.

The *first event* took place in December 2020 attracting 22 attendees from seven different universities representing all four nations of the UK. Four main activities were provided: (*a*) Challenges and tools for teaching programming exploring tools for automated testing and plagiarism detection and provided good practice examples for discussion; (*b*) An interactive session related to the challenges and opportunities of supervising CS project students; (*c*) Prior to the event, attendees were asked to pose questions to a panel of five experienced CS professors; and (*d*) A workshop that explored how the scheme could help/support the participants, how could a diverse, resilient and sustainable community be developed for the participants, and did the format work and what could be improved? The *second event* took place in March 2021 and was designed to be more interactive; again there were 22 attendees from across all four nations of the UK. The main activities were: (*a*) Networking opportunities with breakout rooms being used for the attendees to discuss the challenges and successes they have been experiencing and how this initiative could best support them; (*b*) Professional bodies and accreditation related to computer science were explored; (*c*) 'Would you like us to set up a mentoring scheme?' was explored; and (*d*) the existing information sharing opportunities were discussed i.e. the related conferences, journal club, available training, etc. The *third event* took place in May 2021 attracting 15 colleagues. Given the timing in the UK academic year, the focus of this event was delivering effective HE assessment and feedback processes. This session was led by a former Advanced HE employee.

As part of these events, there has been an ongoing discussion regarding a mentoring scheme and how it would operate. The agreed expectations for mentoring have been agreed: the mentoring is external i.e. the mentor/mentee do not work at the same institution; the time commitment is initially 60 minutes, four times per year; a specific focus is agreed; there is a process for matching mentors/mentees, with an initial meeting to confirm suitability. The first batch of mentor/mentees was assigned in October 2021. Alongside the discussion regarding mentoring, at the second and third event there was a discussion regarding buddying. The preference from the participants was that buddying should not be one-on-one, but that small groups of buddies be established. As more participants join, thematic groups can be formed. Over the course of the initiative, the steering group has also expanded from 12 to 24 academics representing 20 universities (England: 16, Wales: 4, Scotland: 3 and NI: 1).

## 2 WHY ARE YOU DOING IT?

Starting out in your academic career can be challenging [29] and potentially lonely [9]. Many new academics have moved on from either funded PhD studentships or postdoctoral research positions in which they have the luxury of placing a primacy in their research. Others join universities from industrial careers and hence find themselves in the challenging position of establishing a research portfolio alongside their learning and teaching activities. All face the challenge of balancing all aspects of the role: delivering education, research profile and professional service commitments. For many, this could be on a short-term contract. Additionally, workloads in UK HE has become a highly contested issue [30]. Making this transition requires learning. The quality of learning support provided will be promoted in part by the strength of the community of practice operating within the department [18] and the communities of practice that exist at a national and international level [29]. Furthermore, this can and should be co-constructed with early-career academics; we refer to co-construction as the joint creation of an action, activity, identity, institution, or other culturally meaningful reality, including this paper [15].

In computing education, there are a number of discipline-specific challenges that have been discussed in the literature, especially at university-level [8, 21, 26]. For example, the effective teaching of introductory programming has persistent issues: (*i*) Attrition and failure rates can be high, with a range of issues impacting barriers to progression [7, 34]; (*ii*) Student satisfaction is often reported as below that of other disciplines [27], with more challenges in subdisciplines [17]; (*iii*) Discipline-related challenges linked to facilitating teamwork [11, 22]; (*iv*) Computing graduates' employment prospects are reported to be inferior to other STEM graduates [4, 24]; (*iv*) The appropriate handling of gender inclusion [36] and neurodiversity [28]. Addressing these challenges requires the development of specialised educational competencies alongside technical skills and outputs [31].

Together these pressures highlight that early career academics could potentially benefit from further support from the wider community. Offering developmental events and mentoring are tangible ways of providing assistance. Mentoring is commonly used in HE, this can help to diversify the staff base [10]. However, restricting guidance and support to within one university rather than a wider community has its limitations [10], so a wider community mentoring scheme would be beneficial. Use of buddying schemes for learners in higher education is commonly reported to be beneficial, for example [12, 20]. Use of buddying between academic colleagues is less well reported. Buddying has been reported as a mechanism to help support the onboarding of expatriate academics to a particular university [35]. Attempting to establish a nationwide, cross university scheme presents a new departure. The genesis for such a scheme came from the early-career colleagues themselves and it has been configured entirely around their suggestions.

## 3 WHERE DOES IT FIT?

To date, there have principally been three key participant groups: *Early-career lecturers* who have recently been appointed to an academic post. These may have teaching and research or alternatively more teaching focused responsibilities. Some have joined from industry, others from a research background; *Aspiring academics* who are typically PhD students or post-docs and are aspiring towards a full academic role; and *more established/senior colleagues* who are

new to UK HE and hence are seeking help to acclimatise. There is some variety too in the colleagues who are supporting the initiative. All have had a degree of seniority either via their presence in the computing education community or the responsibilities they adopt within their own university and/or nationally. There has been significant representation from members of the professoriate but not exclusively so.

## 4 DOES IT WORK?

The scheme has been run as a trial/prototype for a number of UK universities. This was deliberate in order to establish the feasibility of the approach, and facilitate the co-construction, to allow the scheme to evolve and develop in response to the voice of the participants. Of note is that there are a number of participants who have actively engaged with all the events to date. There is also a growing number of requests, commonly from peers at the university of attendees to join the scheme.

Anonymous post-event surveys have also been used for evaluation. 11 participants completing the post event survey. When asked "*Overall, was the workshop useful*", four attendees strongly agreed and seven agreed. One item of constructive feedback received was the session could be even more interactive which was taken on board for the second event. The second event was again well received; of particular note was the strength of positive feeling related to the networking opportunities. Another outcome was the suggestion that buddying should be considered as a possibility alongside mentoring. In terms of post-event feedback, there were eight respondents, six of whom strongly agreed that "*Overall, the workshop was useful*" and a further two agreed. For the third event, only two responses to the survey were received; again, these were positive. Other feedback referred to workload pressures. It is also noted the session was less computer science specific than the previous events. The session was scheduled when many colleagues would be engaged in marking, which was deliberate so the activity could be discussed. On reflection, attendance may have been higher at another time of year.

Over summer 2021, volunteer mentors and expressions of interest for mentoring were sought. This resulted in 12 expressions of interest in having a mentor. Many colleagues seek mentoring in more than one area: 92% are seeking support with research, 75% with career and career planning, 58% in education, 57% in their subdiscipline area and 50% in professional membership and registration. Initial mentoring relationships were established in September 2021. The First meetings in October 2021 are being closely monitored to observe the emerging practice, and to understand support, promotion and scalability needs.

The buddying scheme pilot began in July 2021; an initial group of six buddies has been meeting regularly since then to discuss items of common interest. In October 2021, a second group of five buddies was formed and is progressing similarly. Both groups are being closely monitored in the same way as the mentor meetings.

## 5 WHO ELSE HAS DONE THIS?

As discussed in Section 2, in addition to wider educational challenges (including the ongoing impact of COVID-19 [2, 6]), many disciplines including computing exhibit a range of specific challenges.

The limitations of generic institutional schemes to address the educational challenges of physics has been reported [19]. Mathematics is one such discipline and one professional body (the Institute of Mathematics and its Applications) has previously run courses for early-career colleagues to help establish them in the discipline [14]. Peer-to-peer conversations have been reported to be a commonly used mechanism for professional development [16] and a number of national and international communities exist to help promote such conversations. Internationally, groups such as ACM SIGCSE or the IEEE Education Society promote this dialogue via conferences and other activities. In the UK and Ireland, a SIGCSE Chapter further promotes these discussions by running two annual conferences, one focusing on practice (CEP) and the other on educational research (UKICER). Training programmes are run by individual higher education providers. Additionally, in the UK, Advance HE delivers training programmes for academics at different stages of their career [13]. However this training is not discipline specific. The UK Council of Professors and Heads of Computing (CPHC) run occasional workshops in a variety of issues, for example the "Chair in 10 Years" workshop which is aimed at facilitating career planning and "New Heads of Department" workshop. Whilst these are well received contributions, it is clear that developmental needs are broader than those supported by these workshops.

## 6 WHAT WILL YOU DO NEXT?

Firstly, to be sustainable and to scale up the programme *a)* so it is available to a much wider population and *b)* has repeating components there is a need to move to a product which has the capacity to manage larger cohorts and a greater volume of material. This will require sustainable funding. Secondly, the aspiration is to provide a searchable repository (developmental sessions, shared resources, and examples of good practice) from the workshops. Thirdly, the team has partnered with the UK's chartered/professional body for the computing/IT industry (BCS, The Chartered Institute for IT), who can host the repository and facilitate mentoring and buddying schemes the project is trying to establish. We have recently established a new Special Interest Group (SIG) within the BCS to further develop this work. Fourthly, the initiative aims to help address equality, diversity and inclusivity (EDI) issues in computer science. There are specific related challenges in computing; for example, accessibility of systems and digital poverty. Supporting early career colleagues to identify and address EDI challenges and embedding good practice is a critical aspect of the project. Fifthly, it is recognised that there is a virtuous circle between computing education research and sustained improvement in computing education. It has also been argued that "the rapidly evolving nature of computing together with changing educational technologies encourages continuous review of the pedagogy for computing courses" [1]. Progress in establishing computer science educational research has been slow and whilst there have been notable examples of excellence in this space, universal adoption and universal acceptance has not happened. This programme will promote educational research to early career colleagues and thereby help to establish it as a mainstream thread in computer science research. Finally, the project wishes to examine if the programme framework is transferable to other disciplines; one of the aspirations is to use the work we are doing in

computer science to create a generic framework which will allow other STEM, near-STEM and potentially non-STEM subjects to contextualise subject specific programmes for their new academics.

## 7 WHY ARE YOU TELLING US THIS?

In the UK, the communities of practice related to computing education have rapidly evolved in recent years. The initiative discussed in this paper further develops this work by: (*i*) creating networking and developmental events aimed specifically at introducing early career colleagues to one another and the wider community of computing education practice; (*ii*) establishing co-constructed national mentoring programmes, running across universities providing support for early career colleagues development in research and education; and (*iii*) providing scaffolding for nascent professional networks across universities by the establishment of a nationwide buddying scheme. The initiative presents significant opportunities for those at differing stages of their career, co-constructed with a diverse groups of academics. For those at an early career stage, the initiative presents a further source of beneficial professional development. For those with more experience, it gives an opportunity to better understand challenges early career colleagues face as well as to grow their professional networks and foster the emerging community of computing education practice in the UK.

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