Learning Digital Humanities in a Community of Practice: the DEAR model of Postgraduate Research Training

Francesca Benatti <francesca_dot_benatti_at_open_dot_ac_dot_uk>, The Open University
Paul Gooding <paul_dot_gooding_at_glasgow_dot_ac_dot_uk>, University of Glasgow
Matthew Sillence <m_dot_sillence_at_uea_dot_ac_dot_uk>, University of East Anglia

Abstract

To date, there has been relatively little discussion of how the UK doctoral funding landscape shapes digital humanities pedagogy for postgraduate research students. This article sets out to address this relative lack, by introducing the inter- and multi-disciplinary context in which many students in the UK work. We examine the phenomenon of students who are not necessarily interested in becoming DH practitioners, but have identified DH as a knowledge gap in their own disciplinary practice. Such a realisation changes the nature of the learner within DH communities of practice, requiring a different form of learning.

This study therefore explores learning within a community of practice, the inter- and multi-disciplinary space in which digital humanities practitioners operate. First, drawing on the diverse disciplinary landscape, it highlights an individual's learning journey through self-determined learning (heutagogy). Second, it outlines an idea of digital humanities pedagogy for postgraduate research based on current frameworks of digital literacies and broader researcher development in the UK, framing research activity as learning. Third, it presents the DEAR model for learning and teaching design, which is based on four principles: Diversity; Employability; Application; and Reflection. Finally, it provides an evaluation of the DEAR model in the context of one UK Doctoral Training Partnership (DTP). It contributes to understanding of pedagogical practices for doctoral-level DH training and provides a set of recommendations for instructors to adopt and adapt these pedagogical principles in their own programmes.

Introduction

Despite the growth of digital humanities (DH) centres and programmes during the last twenty years, the provision of digital humanities training in the United Kingdom is still unevenly distributed across universities and varies in format from dedicated Masters and Doctoral programmes to more informal seminars and research groups. For smaller or less research-intensive institutions, the establishment of a digital humanities programme usually begins with the recruitment of a single specialist lecturer [Cordell 2016], who may however struggle to cover the breadth of expertise required to provide suitably wide-spectrum teaching. While a number of doctoral students may want to undertake a specific digital humanities PhD supervised by a specialist, many may desire to acquire digital humanities skills without wanting to specialise in the field and make it the centre of their research career. UK Arts and Humanities PhD programmes are not as structured as their US counterparts, though students are required to do a certain amount of training [Nerad 2007] [Powell and Green 2007]. The direction of the training is left largely to the students' own choice; a form of "hidden curriculum" [Elliot et al. 2020, 20–1] [Thouaille 2017].

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The provision of DH training at PhD level in the UK is shaped by the cyclical nature of the funding context. Since the early 2000s, the funding of doctoral training in the UK has moved away from single institutions or individual studentships towards building multi-institution clusters. Initially focused on a regional basis, the approach later moved to more multi-layered geographical models, with research-intensive universities securing a prominent role in the new structures [Harrison et al. 2016]. The eleven Doctoral Training Partnerships (DTPs) funded by the UK Arts and Humanities Research Council (AHRC) offer participating universities the possibility of pooling the expertise of individual specialists to provide more extensive coverage, especially in emerging areas such as DH (see Figure 1).
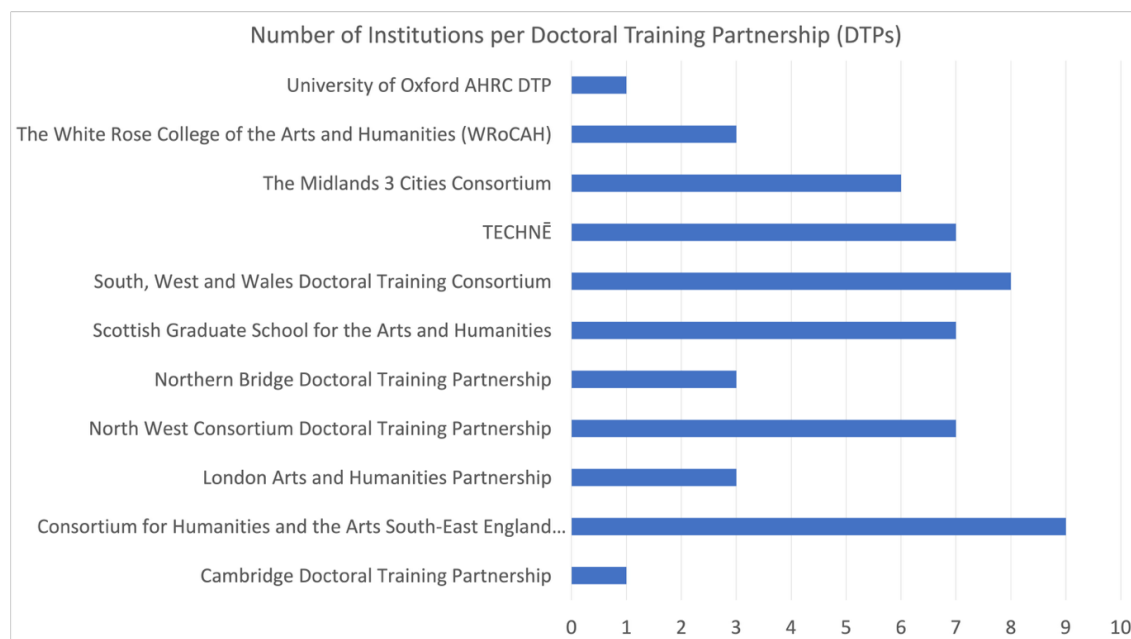
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Figure 1. Number of institutions which are members of UK Doctoral Training Partnerships (DTPs) in 2019.

One of the DTPs included in our survey is the Consortium of Humanities and Arts South-East England (CHASE) DTP [CHASE DTP 2020]. Founded in 2014 as part of the DTP1 funding round, it initially comprised seven institutions: the universities of East Anglia; Essex; Kent; Sussex; Goldsmiths, University of London; the Courtauld Institute; The Open University. Two more joined in 2016: Birkbeck College and the School of Oriental and African Studies. CHASE is now proceeding with a revised membership for its DTP2 second phase, during 2019-2024. This research is concerned with CHASE phase 1, the period 2014-2019, during which CHASE offered seventy-five doctoral studentships per annum, enrolling a total of 373 students over five years.[1] This article will discuss the implementation of a DH training programme in the CHASE DTP.

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The provision of training is a central element of doctoral funding in the UK, in keeping with the findings of the 2001 Roberts Review [Roberts 2002] and the 2010 Hodge Review [Hodge 2010], which both recommended the inclusion of skills training within doctoral education, with a particular emphasis on transferable skills. From 2014 to 2019 CHASE employed its Cohort Development Fund[2] to initiate training programmes in three broad areas: Advanced Research Craft, Future Humanities and Public Humanities. Each year, a competitive bidding process allocated funding to both staff- and student-led training programmes, leading to the development of a number of initiatives. Once funding had been allocated and a programme established, students were invited to apply for training places. During Phase 1 of the DTP, priority was given to students in receipt of a CHASE studentship, while other PhD students at CHASE institutions were usually allowed to apply if sufficient places were available.

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Digital humanities was immediately identified as a priority area and regarded as an essential element in the training opportunities offered to CHASE students. During this period, the CHASE institutions displayed varying degrees of involvement with digital humanities, ranging from the foundation of a multimillion-pound centre (the Sussex Humanities Lab, launched in 2015), to the appointment of individual digital humanities staff (Open University, East Anglia, Essex, Kent), to research and teaching events on specific sections of DH or adjacent areas (such as Digital Media at Goldsmiths, Digital Literary Studies at Birkbeck, Digital Art History at the Courtauld). In none was digital humanities an established part of formal undergraduate or postgraduate curriculum, though more informal training opportunities were developed during the life of the consortium. While making it difficult for any single institution to sustain a digital humanities training programme on its own, the diversity of approaches and expertise present within CHASE had the potential to provide a rich and diverse corpus of teachers.

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This article introduces a new model of DH pedagogy (the DEAR model) and uses the example of the CHASE Arts and Humanities in the Digital Age (AHDA) programme in the context of the UK DTP framework. The AHDA programme was launched in 2015 by an interdisciplinary team led by The Open University and the University of East Anglia. It was allocated £15,000-£20,000 per annum by the CHASE Training and Development fund to cover staff and student travel, seminar organisation and a certain amount of staff time, with additional staff time provided as an in-kind contribution. It concluded with the end of the first phase of CHASE in Summer 2019, after having trained over one hundred students.

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There have been previous approaches to training provision in digital humanities for research students. The Arts and Humanities Research Council (AHRC) funded an initiative for doctoral students in the UK called Collaborative Digital Research in the Humanities (CEDAR) (2008-2010). It had three main aims:

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1. to further the understanding and expertise of doctoral students in the humanities in the use of hypermedia and other digital

humanities research tools;

2. to bring together humanities doctoral students in a way that will ensure current and future peer-led development in this area;

3. to offer examples of good practice and innovation in the use of new technologies in the humanities [Ensslin and Slocombe 2012].

CEDAR was a bold first step in the UK at creating inter-institutional training for doctoral students on the eve of the creation of the Doctoral Training Partnerships. However, the focus at that time was largely around how digital technology was changing the ways that academics worked by sharing and modifying content. The depth of understanding around the nature of data in the humanities, and the value of quantitative and qualitative research methods, was at the time very limited. Similarly, the Praxis Network project provides a snapshot from 2017 of eight postgraduate-level programmes in digital humanities at institutions in the UK, US, and New Zealand. The project aims to "emphasize new models of methodological training and collaborative research" [Praxis Network n.d.] in the digital humanities. However, digital humanities programmes are still relatively uncommon in the UK, and none has explicitly addressed how the various motivations and expectations of participants shape the extent of their desired participation in digital humanities as a community of practice.

We will therefore consider how DH training might be embedded within a student's broader learning journey with reference to the CHASE AHDA programme. First, we will analyse how self-determined learning and working within a community of practice combine in DH pedagogy to support heutagogical learning in DH. Second, we will define digital humanities pedagogy in the context of postgraduate researcher training. Third, we will introduce our model, the DEAR model, based on abstracted principles from the applied pedagogy that could be adapted to account for locally informed pedagogical practice. These principles are: Diversity; Employability; Application; and Reflection. Fourth, we will demonstrate and evaluate how we have instantiated the DEAR model into the CHASE Arts and Humanities in the Digital Age (AHDA) training programme. In doing so, this paper will make a significant contribution to our understanding of pedagogical practices for doctoral-level DH training by reflecting on how the DEAR model can be adapted to other contexts, and provide a set of recommendations for doing so.

Learning in a Community of Practice

The introduction of the DTP2 funding round (2019-2024) is changing the funding context, making this an opportune moment to reflect upon DTP1. We therefore aimed to provide a snapshot of the UK digital humanities provision at a time that coincided with the end of the DTP1 five-year funding cycle. In June 2019, we surveyed data from FindaMasters and FindaPhD, two of the most commonly used search websites for postgraduate programmes. The syllabi of these MAs/PhDs were not examined, meaning that this data refers only to programmes that explicitly mention DH. Of 350 advertised MA programmes, eleven could be identified as digital humanities. Of twenty PhD studentships, only one mentioned both "digital" and "humanities." It is worth noting that most PhD scholarships are advertised in the period October-December, so we conducted our survey during a time when fewer opportunities would be on offer. However, even this survey suggests that digital humanities are not explicitly mentioned in the majority of the programmes listed in the most widely used MA/PhD search websites. Our brief analysis also flagged up different terminologies, levels of self-identification and organisational alignment with digital humanities, coupled with conflicting definitions of the field.

Another significant result of our survey was the geographical distribution of these programmes. Of the eleven MAs advertised, eight were based in London, with the rest of the country, especially England, being severely underrepresented (one course was offered in Scotland and one in Wales). Only four of the eleven DTPs were included in the offer of MA and PhD programmes in DH. Overall, this suggests that DH is rarely the main focus of postgraduate learning in the United Kingdom. As a result, it is important to reflect upon the challenge of providing DH training in a multidisciplinary environment where students' primary focus is at the subject level. Whether English Language and Literature, History, or Art and Design, many students ground their training needs first and foremost within their own disciplinary context. It is therefore important to their development to understand how disciplinarity has been addressed within the digital humanities.

Inter/multidisciplinary

To take into account the broad disciplinary perspectives of our students, we have sought not to centre our pedagogical approach on a strict definition of the digital humanities. In this we take our lead from scholars such as Lisa Spiro, who describes the digital humanities as a "convergence of several sets of values, including those of the humanities; libraries, museums and cultural heritage organizations; and networked culture" [Spiro 2012]. All of these groups have been represented in the CHASE AHDA programme, and each faces the challenge of defining how their established practices relate to the inter- and multi-disciplinary communities that constitute DH. In 2011, Matthew Jockers and Glenn Worthey coined the highly influential concept of the "Big Tent" to express the diversity of DH practices, noting their "wonder and appreciation for the many-splendored field of DH" [Jockers and Worthey 2011] in a move that was designed to be highly inclusionary and participatory. Simultaneously joyful and pragmatic [Terras 2011], the big tent also had the unintended effect of erasing the multifarious disciplinary traditions – effectively grouping everybody into a single amorphous space which, by erasing the barriers between disciplines, in fact worked to ensure that traditionally powerful scholarly traditions dominated the conversation. Klein (1990) has noted that interdisciplinarity relies on some form of demarcation between the disciplines in question, and the push back against the unintended erasure of smaller disciplinary traditions via the big tent has been characterised by a similar logic.

Klein, while recognising the broad scope and significance of interdisciplinarity, notes that cutting across all the various theories is one recurring idea: that it "is a means of solving problems and answering questions that cannot be satisfactorily addressed using single methods

or approaches" [Klein 1990, 196]. The extent to which the digital humanities truly engage with various disciplines has been contested [Liu 2013], and indeed attention has fallen in recent years upon how it represents and exchanges knowledge with other meta-disciplines such as Library and Information Studies [Gooding 2020].

This view follows on from McCarty and Short's work to map the extent of humanities computing, the forerunner term to digital humanities. Their work resulted in the creation of a "methodological commons" which presented DH as a series of convergence points between the various disciplines, and focusing upon methods and tools that were considered essential to the DH community [Siemens 2016]. The nature of this collaboration, or this community of practice, in DH has been heavily discussed over the years. Several models have been introduced, which expand upon or provide alternatives to Melissa Terras' notation of the concept of communities of practice [Terras 2006]. Terras considered whether or not digital humanities (as we now understand it) was actually a discipline or a community of practice. The former has a more institutionalised presence as well as an international community; the latter, a group "which shares theories of meaning and power, collectivity and subjectivity... but is little more than a support network for academic scholars who use outlier methods in their own individual fields" [Terras 2006]. Terras' conclusion is that digital humanities seems to act like a discipline, but without the institutional acceptance of a subject: "...the community exists, and functions, and has found a way to continue disseminating its knowledge and encouraging others into the community without the institutionalization of the subject" [Terras 2006].

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This desire to encourage others to participate effectively in DH has led to a great deal of work in relation to the nature of these communities of practice. In his influential account, Ray Siemens ruminates on the careful balance that must be found between preserving an element of disciplinarity, on the one hand, and adopting a more revolutionary approach to DH:

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> When we do try to define in a way that can lead to action...there's a loss via disciplinarity's constraint in light of current and future growth, narrowing potential collaborative opportunities… Conversely, we can choose to ignore disciplinary and institutional structures, adopting the revolutionary approach we find reflected in the several excellent manifestos existing in the area… but, in ignoring those structures, we run the risk of losing access to their benefits. [Siemens 2016]

Siemens, however, focuses upon the collective nature of this relationship, arguing that this community contains people who have "identified" [Siemens 2016] with the community of practice. The notable and admirable focus on collectivism here, then, begins to build a definition for DH of those who are a self-selecting part of the recognised DH community. Within this context, Siemens' repeated discussion of the term "we" - "who we are via what it is we do, where we do what we do, and why we do it in the way that we do it" [Siemens 2016] becomes a carefully constrained collective that may even have limited relevance to those who do not want to identify with the DH community. Yet, as we have found through our training programme, the non-identifying DHer represents a significant proportion of those reaching out for relevant training. Thus it is essential for us to consider how other models – of DH, of pedagogy, and of learning – might support such learners to engage with critical digital humanities practices in a meaningful way, by which we mean in a way that can be successfully operationalised in the individual's own work.

Svensson borrows the notion of "trading zones" to describe "places where interdisciplinary work occurs and where different traditions are maintained at the same time as intersectional work is carried out" [Svensson 2012]. He argues that the digital humanities can become an intersectional meeting place where scholars can maximise points of interaction and facilitate deep praxis-led interactions. However, as Terras (2006) notes, we are still talking here primarily about a research environment rather than a learning environment. What we are often doing, then, is encouraging students to enter the DH space through meta-debates that are focused upon effective research rather than effective learning. Indeed, Claire Warwick has challenged the orthodoxy assuming that a single form of DH will emerge that encompasses all relevant parties, noting "the likelihood that different schools and methods of doing DH will emerge" [Warwick 2016]. What, however, is most relevant to the discussion of research training is that despite their importance to the field of DH, meta-debates are not obvious to newcomers, and are indeed not often relevant. Instead, we have found through the CHASE AHDA programme that the key sticking point for many participants is working out how to operationalise new forms of intellectual and technical practice into their existing humanistic modes of study. As such, the otherwise essential work on communities of practice emphasises characteristics of collectivism in DH research that are to some extent incompatible with the more self-directed individual learning journey that many new entrants to DH embark upon.

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Interdisciplinary learning, though, offers a degree of guidance in navigating this tension between the community and the individual learner. Indeed, we will argue that groupwork is essential within this individual learning journey in order to expose learners to other disciplinary perspectives, and is a key facet of learning in this context. Klein's notions of the pedagogy of interdisciplinarity, for instance, share an intellectual core with the structure of the CHASE AHDA program. For instance, she notes that both DH and interdisciplinary learning are "active and dynamic. Group work and projects are common and, echoing the constructivist theory of learning, students build new knowledge through exploration and the actual 'doing' of a subject" [Klein 2014]. Many existing training programmes emphasise and reinforce the idea that there is a core set of competencies and methods that are central to DH. This is a matter of necessity, but one great strength of the collaborative doctoral training system in the United Kingdom is that it encourages interdisciplinary and collective solutions from staff that support individual learning from learners.

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Digital Humanities and Self-Determined Learning

Many of our students on CHASE AHDA have been more focused on their individual learning journey. Indeed, the programme has welcomed the full spectrum of attendees from those who intend to pursue DH-related careers, to those with an interest in learning more about the field,

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through to those who are solely interested in how to operationalise and understand specific DH competencies in their own work. This means that individuals must learn about the methods and tools that are available to them, how they individually relate to DH, and how that influences their own learning. We turn here to the literature on self-determined learning to propose that it must sit alongside community-driven active learning in order to maximise the benefits to participants from diverse backgrounds. Our model for CHASE AHDA thus emphasises two key points: self-determined, reflective learning, and scaffolding of sessions via active learning and groupwork. As we will outline here, this allows learners to create their own learning communities, not as spaces for research practice, but as networks to facilitate and support their own individual learning approaches. To this end, the concept of heutagogical learning has been largely underexplored in relation to DH pedagogy.

The term heutagogy was introduced by Stewart Hase and Chris Kenyon (2000) to represent the study of self-determined learning. They draw upon Knowles' definition of self-directed learning as:

> The process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing learning strategies, and evaluating learning outcomes . [Knowles 1970, 7]

Importantly, though, they view heutagogy as a less linear, and more intuitive and unplanned process. Hase and Kenyon emphasise that heutagogical learning emphasizes flexibility, in that the teacher provides resources but the learner designs their own course and, if appropriate, the assessment [Hase and Kenyon 2013]. A heutagogically-centred approach for DH, then, relies upon the ability of learners to access resources with relevance to their own learning, and to develop their own journey through the material in a way that helps them to define and obtain their own desired outcomes. While structured workshops play a vital role in imparting often highly technical information to learners, and do so within the CHASE AHDA programme, it suddenly becomes hugely important to provide a highly reflective space that allows learners time to consider these aspects of their learning. The question of reflection has been under-investigated but not ignored in DH pedagogy. Mahony et al. provide a valuable account of the role of reflection in Masters' study, for example [Mahony 2014]. The focus and value here is around doctoral learning, which should address higher-order thinking, and ultimately support an original contribution to knowledge, a key tenet of research degree programmes in the UK, and arguably worldwide [Quality Assurance Agency 2020]. Heutagogy, within this context, represents a shift towards the learner that facilitates such a reflective turn.

In a subsequent article, Hase noted that heutagogy:

> suggests that learning is an extremely complex process that occurs within the learner, is unobserved and is not tied in some magical way to the curriculum. Learning is associated with making new linkages in the brain involving ideas, emotions, and experiences that lead to new understandings about self or the world. [Hase 2011]

While much of the heutagogical literature refers to online learning, it is characterised by several aspects that provide a useful framework for student-led learning in DH: self-determined learning, in which individuals take the initiative to diagnose their learning needs and engage with resources in a way that leads to new understandings [Hase 2011]; group collaboration, via active learning and creation [Blaschke 2013]; and a reflective approach to identifying and evaluating learners' own learning outcomes. These all provide a useful pivot point that aligns the approach of the CHASE AHDA programme more closely with those models of DH that emphasise not only communities of practice that have been discussed here, but the ways in which diverse individual and disciplinary backgrounds inform how participants approach their learning in DH.

As such, while DH emphases the collaborative, the interdisciplinary, and the community-driven aspects of its praxis, its training is often centred on a self-determined journey of discovery. Stories abound of the autodidact in DH, the individual who was forced to teach themselves due to a lack of external training. There is an element of necessity in this – while many aspects of method, approach, even theory, can transfer across the disciplines that represent the DH community of practice, a new entrant is faced with the challenging prospect of working out how to apply these myriad contexts to their own work. It is therefore essential for them to be given the space to reflect upon their own journey, to adopt a heutagogic approach to their learning that helps them to shape and decide their level of engagement with the research-focused community of practice that sits a step beyond the methodological commons of DH practice situated within various disciplines.

Yet, as DH training becomes an ever-more embedded, but sadly under-theorised, area of focus for the community, the question of how to balance the needs at the various points of the learner spectrum becomes a highly pressing concern. As the following section will indicate, the framework outlined here gives us a structure upon which we, as professionals with DH-related positions, might leverage our broader understanding of the field in a way that promotes the self-determined model of learning that is necessary to support a diverse body of learners.

Digital Humanities pedagogy in the context of postgraduate researcher training.

In addition to the tension between collectivism and individual direction in research practice, there is a further layer of complexity as this takes place within specific higher education structures. The increased formal presence of DH in universities and DTPs has an influence on who attends certain training programmes. Where there is a strong local presence of DH, students are likely to use that provision first, as opposed to a cross-institutional programme provided by the DTP.

A digital humanities pedagogy for research training therefore needs to be mindful of the quasi-disciplinary community it speaks to and the

ability of students to apply skills and behaviours locally within their own institution. This will depend on the degree to which DH has been embedded alongside the other fundamentals of their discipline. One of the dimensions that has been crucial in the DTP training context is employability. For example, the CHASE DTP currently provides students with the opportunity to undertake a three-month paid internship with a partner organisations in the GLAM (galleries, libraries, archives and museums) sector [CHASE DTP 2018]. As a result, students are coming to programmes such as the CHASE AHDA with objectives that include enhancing future employment prospects [Software Sustainability Institute 2020].

The primarily US-oriented literature has addressed such learner motivations. Leigh Bonds (2014), for instance, has written on the preparation and delivery of undergraduate courses that include both the employability dimension, which is also a feature of researcher development, and "project-based learning;" an approach relevant to our model of training. Margaret Konkol (2015), however, has highlighted some of the inherent assumptions around learning and research outputs around digital humanities in US institutions (and arguably those in the UK as well). The difference that Konkol identifies is the apparent distinction between the two terms: "digital humanities" and "digital pedagogy," in which the latter is "classified as the light and lively little sister whose ability to use digital tools in the classroom engages students in a variety of interactive learning formats" [Konkol 2015].

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Konkol's digital pedagogy resembles digital literacies in the UK (Figure 2); functional skills aimed at employability which can be readily embedded in undergraduate programmes, with defined learning outcomes. However, research activities that may receive more substantial funding tend to sit apart from learning and teaching conceptually. The "real" academic work is assumed to take place within such projects.

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In many ways, universities and digital humanities teachers can draw on a digital literacy framework in the UK to structure their approach, but the functional skills, such as learning Python syntax to extract textual data from different source files (ICT literacy), are not in isolation training in digital humanities.

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Digital literacies are defined by JISC as "those capabilities which fit an individual for living, learning and working in a digital society" [JISC 2014]. Although frequently considered in relation to undergraduate and Masters programmes, which are highly structured through taught programmes, they are clearly applicable to researchers, and particularly those whose work focuses on or utilises digital resources.
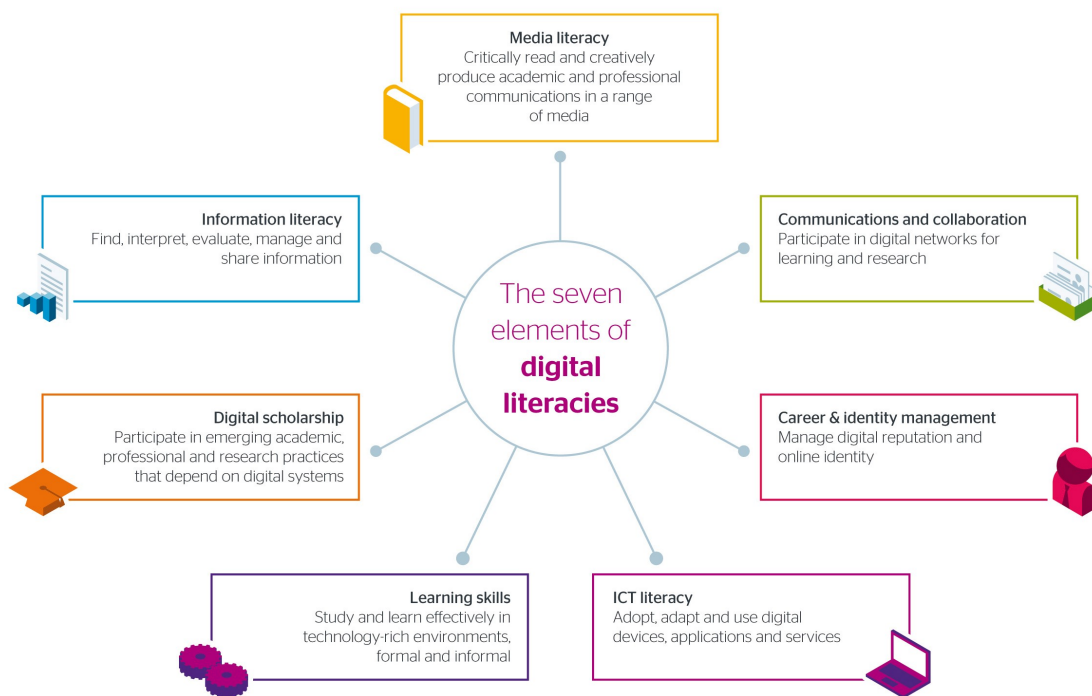
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Figure 2. The seven elements of digital literacies ©Jisc CC BY-NC-ND https://www.jisc.ac.uk/guides/developing-digital-literacies

These seven elements have a clear employability dimension, and are intentionally transferable from the formal learning environment of the university classroom, to other sectors and industries. They are also compatible with the recommendations of research training formulated since the 2002 reviews [Roberts 2002] [Hodge 2010], and they also map onto several subdomains of the Vitae Researcher Development Framework (RDF) (Figure 3), namely Knowledge Base (A1), which comprises information seeking, literacy and management, as well as Professional and Career Development (B3) and Working with Others (D1).
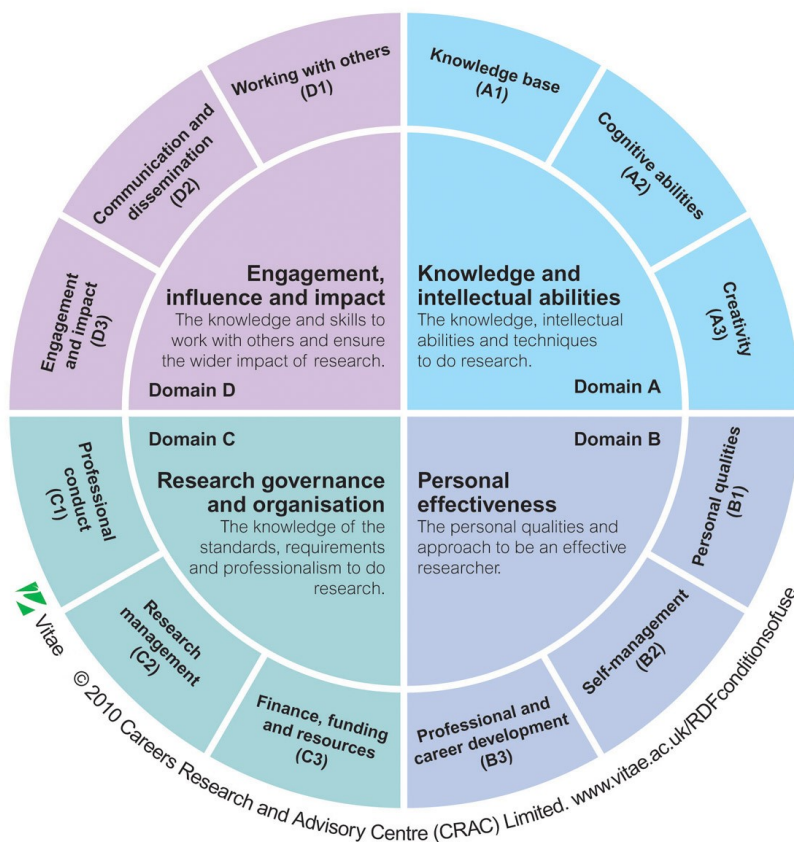
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Figure 3. The Vitae Researcher Development Framework, from https://www.vitae.ac.uk/researchers-professional-development/about-the-vitae-researcher-development-framework/developing-the-vitae-researcher-development-framework

The challenge for those in the UK who support doctoral researchers is to develop these digital literacies across a range of disciplines and fields at a research level, rather than embed them in undergraduate programmes.

One of the reasons that the pedagogy around digital literacies is so challenging is that it contains seven elements that work as part of a longer developmental process, and one which is seen as very much bound up with the student's own identity [JISC 2014]. Research training as a whole can be seen as remedial, with digital literacies becoming part of a deficit model in higher education [Hinrichsen and Coombs 2013], the aim being to embed functional skills to enable the student to complete their research in a timely fashion, and hence reduce risks around non-completion and low employability. This has been a particular concern in doctoral education in the US in recent years [Rogers 2020] [Cassuto and Weisbuch 2021].

Konkol's point here is that this distinction is false. Digital humanities work entails learning, (few researchers begin research fully-equipped to undertake it) and students can learn through involvement in and contribution to real-world projects: this is how a digital humanities pedagogy is applied. In short, and in the applied context of research training, we have taken digital humanities pedagogy to mean digital humanities combined with digital pedagogy.

Core Elements of a Digital Humanities Pedagogy

Reviewing the last decade of digital literacies and digital humanities pedagogy, it is clear that researcher developers need to look broadly at the context of the modern doctorate, the design of undergraduate teaching using project-based learning, digital literacies, employability, and the nature of digital humanities as a community of practice to inform the structure of formal programmes. The CEDAR programme mentioned earlier focused primarily on digital literacies, whereas there is a need for a model that encompasses the complexity of postgraduate researcher training. CEDAR encountered challenges around the diversity of backgrounds of students, which reflects Taylor, Kiley and Humphrey's [Taylor et al. 2018] observation about the present diversity of the doctoral candidate population worldwide.

In drawing together these phenomena at research degree level, we can discern several core principles:

1. Programme design should embrace diversity of candidates' a) disciplinary backgrounds and b) technical proficiencies
2. Learning outcomes should reflect candidates' priorities around employability, in terms of transferable ICT skills and disciplinary expertise
3. Learning should emphasise application and preferably involve the design, execution and evaluation of a project

4. Learning should emphasise reflection on a) individual abilities and b) attitudes and behaviours towards others in the digital humanities community

We can visualise these principles as core elements to underpin learning and teaching, which we present in Figure 4 as the "DEAR" model:
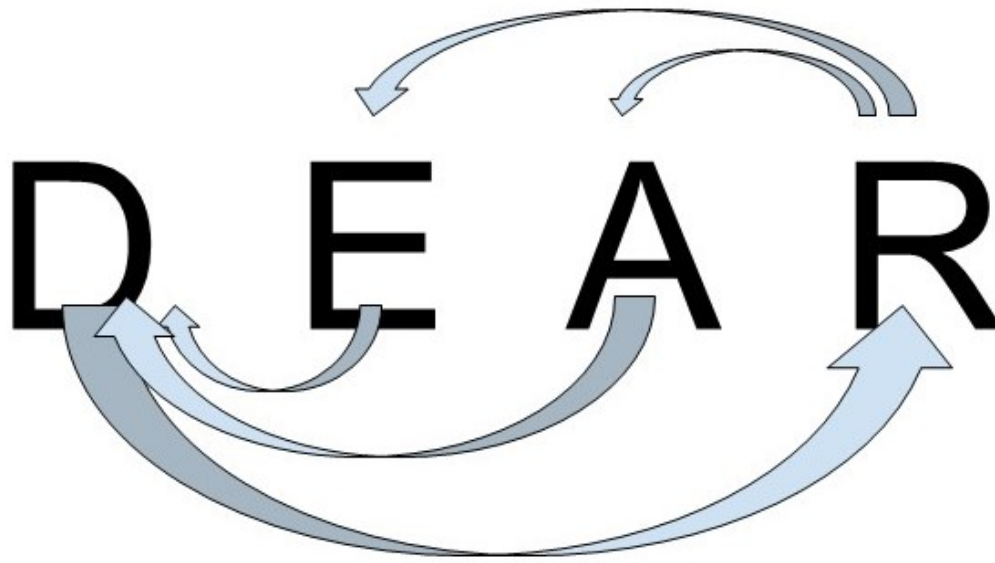
Figure 4. The DEAR model

Although there are clear challenges to embedding each of these elements, they should function and be taught interdependently. For example, significant differences in technical proficiencies (diversity) can be supported and improved through initial reflection by candidates on their current abilities and aspirations (employability), as well as the nature of the application; most projects do not rely on all team members having the same skill sets, nor do individual projects require an individual to have a high level of proficiency in all skills. *The skills and competencies need to match the aims of the project*. This is true of any doctoral research; digital humanities projects are no exception.

In the following section we will consider how this self-determined approach to learning and engagement with a community of practice supports a digital humanities pedagogy. We will do so with reference to the CHASE AHDA programme, which embodies many aspects of the pedagogical DEAR model proposed here.

The CHASE AHDA programme

This section demonstrates and evaluates how the principles of the DEAR model were instantiated in the CHASE AHDA programme. The programme was enabled by a yearly grant from the CHASE Training and Development Group, which was allocated each year during the period 2014-2019 through a competitive bidding process. The grant covered staff travel and subsistence while teaching on the programme, catering for staff and students and honoraria for a small number of external speakers. Staff time and room use were provided as an in-kind contribution from CHASE member institutions. No charge was levied for enrolling in the programme, but students were responsible for their own travel costs, except for overnight accommodation at residential workshops, which was covered by the yearly grant. Students who received their doctoral scholarship from CHASE had access to a £1,000 individual research allowance, which they could employ to travel to the course workshops.

The first iteration of AHDA in 2014/15 experimented with a multi-site approach based on independently-held seminars on a number of Digital Humanities subjects, which experienced quite variable levels of attendance. While each seminar provided in-depth training on a given area, the CHASE Training and Development Group remarked upon the lack of a unifying vision for the programme. In order to address these issues, the core AHDA team, led by Francesca Benatti (Open University), Matthew Sillence (University of East Anglia) and Paul Gooding (then University of East Anglia) decided from 2015/16 to provide a more directed programme delivered in one centralised and easily accessible location, The Open University in London regional office. After Paul Gooding's move to the University of Glasgow, David King (Open University) joined the core AHDA team for the 2018/19 academic year.

The emphasis of the revised programme was to provide a more coherent structure with clearly defined outcomes in terms of employability skills, allowing space for the application of DH research skills within a short project. At the same time, students would be invited to reflect upon their degree of participation in the digital humanities community, taking into account the diversity of their backgrounds and goals. The structure of the course was therefore revised and rebuilt around

- a three-day residential winter school (December or January)
- four one-day methods-based workshops (January - April)
- a two-day mid-project residential (March)
- a final plenary session (April or May)

Below we assess how the programme employed the DEAR pedagogical model to achieve its outcomes within the remit provided by the CHASE DTP.

Winter School

The 2014/15 iteration of the AHDA programme had shown the promise and challenges of digital humanities training. Following informal consultations in 2015 with Digital Humanities colleagues and with the CHASE Training and Development Group, it was decided to open all following presentations of AHDA with a three-day residential Winter School, which took place in December or January. The aim of this intensive residential opening was to enable the students to reflect upon their prior knowledge of Digital Humanities and their expectations for the course. In addition, a venue was provided for students to begin to consider their desired degree of participation in the digital humanities community. A public blog was maintained for each year, providing information on programme details, booking links, and access to learning materials[3]. Over its four iterations, the Winter School was attended by fifteen to twenty-five students each year, with numbers capped at twenty students per programme from 2017/18 onwards. The event consisted of

- a plenary lecture by leading CHASE Digital Humanities scholars
- a number of introductory 2-hour seminars from the AHDA core team and from the teachers of the subsequent workshops, including
  - Digitisation and metadata
  - Text analysis
  - Data visualisation
  - Image analysis
  - Threshold concepts as a critical learning framework
  - Project management
- a final student-led "unconference" focusing on the practical group project that would form the main application of their learning

The residential school format has widespread precedents in Digital Humanities pedagogy, such as for example the Digital Humanities Summer Institute (DHSI)[4] and the Digital Humanities at Oxford Summer School (DH@OxSS)[5]. For the AHDA programme, it was found to offer considerable benefits but also some significant disadvantages, due to the diversity of the student population. An intensive, face-to-face experience allowed the students to participate in a more in-depth introduction to the variety of Digital Humanities approaches. Additionally, it permitted students from different universities and departments to develop connections based on common or contiguous interests, building a sense of membership in a shared student cohort. Finally, it was central to the definition and allocation of group projects, which formed a central part of the application of the students' learning.

The four iterations of the Winter School confirmed the validity of this approach but also highlighted its exclusionary impact on certain categories of students, with the potential to negatively affect student diversity. Specifically, students with disabilities, caring duties or additional commitments (for example, those undertaking part-time study) were found to experience difficulties in attending the Winter School or in committing to its full duration. Mitigation strategies were gradually put in place and included the prior circulation of teaching materials and handouts, culminating finally in the video capture of the directed teaching component of the School from 2017/18 onwards. However, the seminar-style discussions and group-based exercises could not be captured for data protection reasons.

Contents were pitched at an introductory level, assuming no prior familiarity with Digital Humanities methodologies and debates. The diversity of the student cohorts was the main reason for this choice. While CHASE is a specialist Art and Humanities partnership, student backgrounds were nonetheless quite disparate, including a range of subjects such as digital humanities, musicology, practical digital arts, social sciences, literature, art history, history, visual arts/visual anthropology and media studies. Figure 5 groups them on the basis of the UK Research Excellence Framework (REF) Units of Assessment[6].

Figure 5. Disciplinary backgrounds of CHASE AHDA students grouped by UK REF Units of Assessment.

Though a growing number of students joined AHDA because of an interest in digital media and culture, over the five iterations students presented with variable levels of digital skills, ranging from programming to video editing to basic digital literacy skills. Rather than force the more novice students to catch up on their own, the Winter School was designed to develop a common basis through intensive training. Topics discussed included what were labelled "the building blocks of Digital Humanities:" digitisation and metadata, basic text analysis and web authoring. All topics were taught in two-hours sessions, which included both a lecture and a practical applied component through in-class exercises. The exercises, carried out in small groups, offered a first chance for students of different prior skill levels to enter into a dialogue and begin to collaborate.

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Transferable skills for employability were further developed with the introduction of a session on project management from 2017/2018 onwards. According to a recent report, unlike their colleagues in STEM, UK Arts and Humanities PhD students are less likely to be motivated to undertake doctoral study by the opportunity to develop transferable skills [Bennett 2020], despite the fact that roughly 75% of those who move into non-academic careers undertake non-research roles [Hancock 2020]. The CHASE AHDA team therefore viewed it as essential to introduce students to the skills that could be mapped to Domains C and D of the Vitae Researcher Development Framework, especially around Research Management (C2) and Working with Others (D1) (see Figure 3). A half-day project management workshop was delivered in collaboration with the British Library, one of the CHASE non-academic partner institutions, and by CHASE team members with project management expertise. In 2019, we also partnered with the Royal Society, the School of Advanced Studies, and digital consultancy company Digirati to provide a workshop to evaluate the Science in the Making platform, where students worked alongside cross-sectoral partners to support further development of the user interface and functionality of the resource.[7]

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A significant reflective element was provided by a session on threshold concepts, which asked the students to consider the motivations and modalities of their learning journey [Kiley and Wisker 2009]. Through threshold concepts, students were asked to examine the process of learning, focusing on their expectations of transformative and integrative enhancement to their education through their participation in AHDA [Berman 2013]. The decision to include this component was led by research showing the benefit of aiding students in the development of an explicit conceptual framework to support doctoral learning [Berman 2013]. At the Winter School, students were asked to define their research problems and to organise their research design for the upcoming group or individual project, with further assessments of their implementation and their conceptual conclusions in the middle and at the end of the entire AHDA programme. They were also asked to situate their participation in AHDA within their broader learning and career goals.

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The Winter School was designed to allow the students to combine an individual learning journey with taking the first steps into a digital humanities community of practice. After the 2016/17 academic year, teacher-led plenary sessions were replaced with presentations from AHDA alumni who evaluated the programme and its impact on their employability, for example by enabling them to join Digital Humanities projects as interns or team members. This heutagogical approach culminated in a one-day student-led "unconference," during which students were asked to propose a research project, usually focused on their own research interests, and to pitch it to their fellow students. Votes were then cast to choose which four projects would be developed during the remainder of the AHDA course, with students choosing which project group to join. AHDA team members then provided the students with advice on methodologies and resources for their projects.

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While this process enabled students with more developed plans for their learning journey to expand them through the help of their peers,

feedback collected over the first three iterations led to the introduction of individual projects. The latter were found to enable greater dialogue between the interdisciplinarity of Digital Humanities methods and the diversity of the students' disciplinary backgrounds and interests. This grounding in the students' own priorities helped them to remain motivated for the duration of the programme and to assess the relevance of their learning to their future employability. The initial presentation and the subsequent iterative refinement of the project ideas through peer and teacher feedback were retained even with the individual projects approach.

Follow-on workshops

After the Winter School, students had further opportunities to self-direct the course of their learning. Between 2015/16 and 2017/18, students were able to choose between two and four one-day workshops, held face-to-face over the course of three months (January to April). The syllabus as initially proposed aspired to provide an overview of the main areas of Digital Humanities research as as reflected in the expertise present within scholars from CHASE and the British Library, who delivered workshops on the following topics:

- Text Analysis for History and Literature
- Digital Images and Digital Art History
- Databases
- Information Visualisation

While the topics above were appreciated by the students, they were not equally relevant to all of the students' diverse disciplinary backgrounds and to all of their employability goals. This element of self-direction led to an excessive dispersion of a small student cohort, with certain seminars being poorly attended. More broadly, it reduced the development of a common grounding in digital humanities methods and perspectives.

The emphasis of the AHDA programme shifted gradually from teaching discrete topics into preparing the students for employability as digital researchers either as individuals or as part of a group. The 2018/19 programme focused therefore on guiding the students through the development of their own research project, providing workshops on the following interdisciplinary skills:

- Data cleaning and management
- Introduction to Python
- Network Analysis
- Information Visualisation

Each workshop included a taught element, presented by a subject specialist, and a practical afternoon session, where students applied what they had learnt to their individual projects and data. This hands-on session enabled students to ask and receive advice from the AHDA team, who were also available outside of the workshops through virtual office hours. The diversity of the student cohort resulted in all students being able to make contributions to the discussions and exercises on the basis of their disciplinary and personal background, such as having experience of working in cultural institutions, being skilled in a programming language, or being familiar with certain media types.

Mid-project residential

Another residential event was organised midway through the AHDA programme, usually in early March. Students and the AHDA team met for two days to

- report on project progress in 10-minute individual or group presentations
- receive feedback and "feed forward" advice from instructors and peers
- develop transferable skills in web authoring and dissemination

The mid-project residential allowed students from different institutions to meet face-to-face and to reflect on the progress of their group project, receiving further feedback from teachers and peers. After the shift to individual projects, the focus of this second residential moved to short presentations on ongoing progress and challenges, and on the provision of "feed forward" advice, helping the students to plan the next steps in their research [Hattie and Timperley 2007]. For both group and individual projects, the second residential had the aim of increasing the opportunities for cohort-building and collegiality among students and teachers. It also helped to reinforce important employability skills, such as communication (through presentations on the progress of their project), critical thinking (by providing "feed forward" on other students' work) and problem solving (by sharing suggestions for development with the other students). Finally, it provided additional opportunities for reflection and evaluation.

Final presentation

The concluding learning event took place in late April and consisted of presentations on the group (or individual) projects, discussions on the projects and an extended feedback session where students expressed their views on the entire AHDA programme. Sample group projects included mapping medieval miracles, visualising Early Modern printing networks and building a survey and database of favourite songs. Individual projects included performing text analysis on mailing lists and forums, classifying music reviews, visualising the social networks behind a museum collection, analysing the language of newspaper articles and of official reports, and building a language corpus.

In the student presentations and discussion, emphasis was placed on process and reflection, rather than on notions of "success" and "completion." Reconnecting to the threshold concepts session at the Winter School, students were asked to reflect on their research journey, highlighting both milestones and difficulties. The importance of careful project planning, of documenting each step of the research process, and of a clear division of tasks within a team were among the most frequent items to emerge from this reflection phase. Students were also encouraged to consider the applicability of what they had learned within their doctoral research and their envisaged future employment opportunities. Several students, for example, declared the intention to include their AHDA project as part of seminar presentations, articles and dissertations, or to further their participation in the digital humanities community through, for example, further involvement in DH initiatives such as summer schools or DH seminars and centres in their home institutions.

The AHDA feedback sessions provided the team with essential information to develop and adjust the programme over the years in order to better understand the training needs of the students and respond to them. For example, the shift from group to individual projects was motivated by consistent student feedback, which highlighted the shortcomings of the group approach. Collaboration is a central tenet of digital humanities, which is often manifested in multi-disciplinary project teams and programmes. However, the constraints of the AHDA programme made effective groupwork difficult. Students were based in different institutions, often separated by significant geographical distances. Moreover, they were often at different points in their doctoral student journeys, ranging from first year to thesis submission. Hence, the other demands on their time varied considerably. Finally, they had different levels of commitment to the projects, especially where the fit with their disciplinary background was poorer, and different degrees of participation in the digital humanities community.

In order to recognise this diversity within the student cohort, the AHDA team agreed therefore to move to individual projects, refocusing the group work objective through the "feed forward" and feedback sessions in the mid-project and final workshops. The team were impressed by the students' development of informal support networks, for example through a WhatsApp group, and their engagement in independent exchanges of expertise, resources and advice. The vast majority of the goals of the previous group projects were therefore fulfilled through a self-determined asynchronous contact strategy.

Conclusion: Evaluating the DEAR Model in AHDA

This article has used the CHASE AHDA programme as a case study to consider how DH training might be embedded within a student's broader learning journey. We have analysed the roles of self-determined learning within DH communities of practice, and defined digital humanities pedagogy in the context of postgraduate researcher training. Based on this critical framework, we have introduced the DEAR model for DH learning and teaching, based on four abstracted principles that can be adapted to account for locally informed pedagogical practice: Diversity; Employability; Application; and Reflection. Finally, we have evaluated how we have instantiated the DEAR model into the CHASE AHDA training programme. This conclusion provides a set of reflections upon the extent to which DEAR has been successfully implemented in our programme, and recommends key priorities for those looking to adopt it in their own pedagogical practices. In doing so, it demonstrates the potential for DEAR to act as an adaptable framework upon which to shape local multidisciplinary training in digital humanities.

Diversity

The AHDA programme has certainly embraced the diversity of its candidates, originally in attempting to address the disciplinary interests through historical and literary texts, social media, social and economic data and visual and aural media. Although this may reflect the disciplinary demographics of postgraduate research in DTPs such as CHASE, it proved difficult to anticipate each year, and therefore more challenging to cover with our teaching staff.

In terms of diversity in skills and competencies, AHDA has been able to establish an entry-level approach, which has clearly benefited the majority of postgraduate researchers in being accessible. This was, however, more problematic for students working on group projects. In these cases, students with pre-existing knowledge and higher proficiency in certain methods or techniques were more likely to adopt technical roles within their groups. This limited the opportunities for other members to develop comparable skills.

Diversity has much deeper historical, social and political implications. Digital Humanities as a community of practice may be inclusive in aims, but clearly can do more to decolonise its curriculum, as shown through the work of groups such as Postcolonial DH and Global Outlook::Digital Humanities.[8] Possible avenues include addressing the gaps in the digital archives, using digital methods to represent marginalised voices, embracing plurality and using the digital to question dominant narratives [Risam 2018]. The CHASE DTP overall is addressing diversity issues through, for example, the BAME Masterclass series[9], the Feminist Duration[10] lecture series, the CHASE Feminist Network[11] and public lectures such as Decolonising the Nuclear.[12] A specifically feminist approach to Digital Humanities was introduced with the 2020 FACT///.coding workshop series, which partnered with Women Who Code London and the Reanimating Data Project.[13]

Writing this in an ongoing pandemic, the question of remote attendance is at the forefront of everyone's mind, but virtual or mixed seminars are a possibility for widening participation regardless of wider issues. They offer the opportunity to support diverse student needs, such as those who have personal or professional commitments that prevent them from taking part in residential programmes. This approach would have to be combined with a reevaluation of the programme's goals and structure.

Employability

Many candidates on the AHDA programme were motivated by their own projects, i.e. the PhD itself. The initial focus on group projects was intended to reflect the collaborative nature of work in digital humanities, but this was not limited to preparedness for an academic career. The involvement of key partners from the UK GLAM sector was both a DTP strategic commitment, but also in recognition of the various career trajectories of doctoral candidates.

Where engagement with employability has been most successful is undoubtedly when representatives of the GLAM sector and project managers have been involved. These contributors have repeatedly highlighted the importance of institutional responsibilities, such as risk management, openness and scalability. Although candidates could use the AHDA experience as evidence of working with institutions beyond their immediate academic community, our programme did not focus on CV-building itself. We have also yet to measure the impact of AHDA on employability longer term. This would require a survey of the AHDA alumni to see if the training helped them in their careers, where opportunities in the academic community are still discipline-oriented. This in turn is heavily dependent on structural factors, such as the short-term funding provided by the DTP. Employability, therefore, is not the sole responsibility of this training, but needs to be part of broader initiatives in the UK addressing mentoring, skills and career diversity. One way forward may be the public scholarship model proposed by Cassuto and Weisbuch (2021), which involves academic knowledge and digital literacies, but also the professional attributes that are frequently deployed - but often implicit - in the GLAM sector [Rogers 2020]. The question of employability is an ongoing debate in DH [Romanova et al. 2020], for which programmes such as AHDA provide important context.

Application

The heutagogical ethos of the AHDA programme meant that students needed to take individual responsibility for the design, execution and evaluation of a project. In group projects, although the first process involved investment from most group members, the remaining processes depended heavily on a group's dynamic and its diversity.

Consistent motivation and evidencing of learning through design, execution and evaluation can be better defined and observed through individual projects. Their final stage is clearly complemented by an anonymous feed-forward approach, which allows for peer-learning in the absence of a team-based approach.

Application is therefore observed in two ways. The first is in furthering a student's PhD research, the second is in making a wider contribution to knowledge, for example through partnerships with cultural heritage organisations, such as the British Library, or broadcast media. This is broadly in line with DTP support for partnerships and placements with CHASE partner institutions.[14] Ultimately, this involves a movement from what both Nowviskie and Warwick describe as the unhelpful construct of "hack" versus "yack," and towards a praxis-based model of digital humanities in theory and practice [Nowviskie 2016] [Warwick 2016].

Reflection

A reflective approach to learning in the AHDA programme has been key to enabling the three other core elements of the DEAR model. A recognition of the challenges of the learning curve at the outset, and the need to effectively self-assess current skills and knowledge, has been crucial for addressing individual motivations and outcomes for both the project and for learning itself. In its most recent iteration, AHDA candidates' mid-project and final presentations clearly demonstrated the technical skills acquired and extended abstract thinking [Biggs and Collis 1982]. Specifically, the projects displayed the conceptual alignment of the ontological, methodological and epistemological dimensions of a research project; key characteristics of doctoral candidates [Berman and Smyth 2013].

Within the DEAR model, such reflection should take into account the other components of diversity, employability and application as encompassed within the students' own learning journey. For example, the AHDA programme's final reflective session is delivered as a group, which allows the diverse perspectives of attendees to feed in, while students are also tasked with addressing the development and learning outcomes of their project work, thus linking their reflection back to the application of digital humanities theory in practice. The iterative approach to reflection adopted in our programme (feed-forward and feedback) for students' presentations also addressed the ways in which individuals identify their next steps, both for development of their own skills set and realisation of their project(s). These are fundamental aspects of professional development and employability generally, relating back to the RDF sub-domains B3 and C2 (see Figure 3).

Recommendations for Practice

This article has conceptualised and applied the DEAR model within the context of the UK, demonstrating its success in developing a community of practice conducive to heutagogical learning within an advanced research training programme. However, the model has applicability for other contexts where a highly reflective, self-directed style of learning is suited locally to student needs, including doctoral training programmes internationally. The DEAR approach allows students the time and space to situate digital humanities within their own broader research skills development. As such, we see this as complementary to existing summer and winter schools, which are more focused upon skills development over a compressed time frame. Although we have cited examples of the projects that participants in AHDA have undertaken over the years, this study does not advocate adopting a predefined programme structure. It is the core elements of the DEAR model that are crucial to its success, such as providing time and space within the programme for the heutagogical aspects to be prioritised.

Programme design should build out from these core principles, rather than inserting them once a programme is confirmed. For this reason, while team-taught models of DH training, including AHDA, may well use reflection, each of the instructors can benefit from building it in as an explicit value at the design stage.

As a result of running AHDA for several years, we recommend that those implementing the DEAR model pay particular attention to the following points:

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- Focus on participant projects and individual motivations, in order to scaffold learning and increase engagement with reflective components of the programme. This could be achieved through small group presentations about individual learning aims and, resources allowing, alternative pathways through the programme.
- Encourage peer support for the learning around the project, rather than the execution of the project, using group feed-forward and feedback opportunities. For example, students can be encouraged to adopt communication platforms that best suit them, such as WhatsApp, which create a self-moderated back channel that facilitates heutagogical learning outcomes.
- Ensure diversity of voices among trainers and support students in developing core knowledge around the nature of data and project management. One approach could be to involve individuals with expertise in project management and interdisciplinary collaboration, such as library, Alt-Ac and industry professionals in roles allied to digital humanities research and infrastructure.
- Aim for inclusivity by providing recordings of workshops and preparatory reading materials and exercises. Organisers may want to use a project blog for public outputs or draw on existing local technical resources, such as a virtual learning environment (VLE), where materials cannot be made public. Online learning may also lower financial overheads, but may come with a potential trade-off in cohort development that comes with in-person learning.
- The DEAR principles encourage trainers to develop learning environments that support active learning. This might require additional time commitment within the programme; if a course requires six hours of taught sessions, then an additional hour would allow for reflection on learning or application, for instance.

It should be considered that our implementation of the DEAR model was a non-credit-bearing programme, and relied on students and staff meeting several times over a period of four months. Residential programmes carry significant financial overheads, but in our case CHASE invested extensively in AHDA through the Training and Development fund, which may not be true of all programmes. One consideration for instructors is whether the programme is credit-bearing, a core requirement or extracurricular, which has implications for the availability of financial and administrative support. Scalability is also an issue, as we would argue that such an approach inevitably limits the number of participants. As organisers, we felt that a maximum of twenty to twenty-five students allowed for effective delivery of the programme aims and objectives.

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If the resources for delivering a full training programme are unavailable, the DEAR model has value as a diagnostic, self-assessment tool in terms of learning design, which can be deployed for instructors who might be building separate course modules in a short programme or by postgraduate researchers and PhD students who need to scaffold their own self-determined learning in DH. Furthermore, it has potential to become a modular, adaptable framework whereby the four components are remixed to fit local learning priorities. In this sense it operates at both the level of the individual and the higher education institution.

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Taking into account our findings, we argue that the DEAR model has great value for trainers working in a context where digital humanities skills are required. However to date the DEAR model has only been implemented within CHASE AHDA. We encourage other digital humanities instructors to adopt and adapt the DEAR model to their own educational contexts in order to test its application as a means of framing learning and teaching design within diverse digital humanities communities.

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Notes

[1] Personal correspondence with Clare Hunt, CHASE Doctoral Training Partnership Coordinator, 13 June 2019.

[2] See https://www.chase.ac.uk/cdf-open-call.

[3] https://chasedigitalage.wordpress.com/

[4] https://dhsi.org/

[5] https://www.dhoxss.net/

[6] https://www.ref.ac.uk/panels/units-of-assessment/

[7] https://scienceinthemakingblog.wordpress.com/

[8] *Postcolonial Digital Humanities* http://dhpoco.org/; *Global Outlook::Digital Humanities* http://www.globaloutlookdh.org/

[9] https://www.chase.ac.uk/bame-masterclass

[10] Feminist Duration https://www.chase.ac.uk/events/2019/11/1/feminist-duration-joan-anim-addo-activist-mothers-maybe-sisters-surely

[11] https://chasefeministnetwork.wordpress.com/call-for-sessions/

[12] https://www.chase.ac.uk/events/2019/10/22/decolonising-the-nuclearpublic-lecture-amp-workshop

[13] https://www.chase.ac.uk/events/2020/2/7/factcoding-amp-reanimnating-data

[14] See https://www.chase.ac.uk/research-placements

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