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**Transformation in interdisciplinary research methodology: the importance of shared  
experiences in landscapes of practice**

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**Abstract**

Current debates around the concept of boundary crossing stress the importance of boundary objects in bringing people together to share understandings. We argue that the boundary object is of secondary importance, and that what is important for the transformational potential of interdisciplinary understanding is opportunities for ‘*boundary experiences*’. We present three examples of interdisciplinary boundary experiences: the first describes a collaboration between an education academic and speech and language therapists; the second presents a research opportunity experienced by a group of education, architecture and sociology academics, alongside practising architects and educators; and the third reflects on the process of co-production involving academics from education, medical education, cultural and heritage studies, sociology, music, and social computing.

We argue that engaging in shared landscapes of practice, when accompanied by opportunities for dialogue and for developing relationships, creates meaningful moments of service, and thus has transformational potential. However, we believe that this necessitates a new way of thinking about research methodology. We advocate a co-production approach that is grounded in developing and maintaining relationships, and routinely provides opportunities for boundary experiences. This requires a more open and flexible approach to research design than is currently usually promoted within academic research infrastructures.

### **Keywords**

Interdisciplinary research, education, boundary experiences, transformation

### **Introduction**

The authors work in a Research Centre which is affiliated to a Humanities and Social Science Institute for Social Renewal which aims to support people to ‘thrive’ in a period of rapid change and makes reference to fairness, social inclusion, equality and compassion. This is important in a society in which inequality has been growing for the most part in the last 25 years and in which social mobility is stalled. Although our projects range across professional learning, out of school educational provision and combatting poverty and disadvantage, through to curriculum innovation and the use of learning spaces, the Institute reference points are significant in indicating our positionality. We do not align ourselves with a neutral bystander stance. Furthermore, there are pressures and inducements in academia to engage in interdisciplinary projects with one eye on potential impact. The latter in particular has not been unwelcome to us, although the precise implications may not always be clear. Nevertheless, we

view these opportunities for engaging with other disciplinary perspectives and resources as crucial in the generation of new hybrid research designs.

One potential consequence of such interdisciplinary engagement is a shift away from reporting, analyzing and explaining social phenomena towards the creation of social realities through aspects of co-production. This has led to a focus on co-production and associated methodological developments. Co-production or co-creation has been suggested as a suitable approach for interdisciplinary working because of its democratising potential, enabling the transformative capacity of research, and this notion is gaining traction within educational research (Shucksmith 2016; Nind 2014). Models and principles for co-production have been developed that include a consideration of the structural and relational factors that can impact upon collaborations, such as funding and capacity (Campbell and Vanderhoven 2016; Morton 2015). However, this recent attention has primarily been focused on the relationships between academics and non-academics (including traditionally excluded groups) rather than the potential of co-production to enhance interdisciplinary research methodologies. Nevertheless, the concepts of participation and collaboration enshrined within co-production provide a meaningful starting point for a consideration of interdisciplinary research.

Knowledge production and academic endeavour is conceptualised in terms of discipline, and the institutions in which these notions are entrenched are organised accordingly. Accompanying this are dichotomous notions of ontology and epistemology, which require researchers to position themselves in terms of perspective and methodological approach. Nevertheless, social problems or so-called 'wicked problems' such as educational inequality (Rittel and Webber 1973) cannot be tackled without understandings that extend beyond perspective and discipline (Goddard and Tewdyr-Jones 2016) and it is increasingly recognized

that most complex social issues and challenges require inter-disciplinary or inter-professional approaches (Edwards 2005). As such, ways need to be found to enable multiple interpretations to be encountered and understood.

Interdisciplinary research, as a notion, is contested (Aboelela et al 2007) but we would argue that, like multidisciplinary research, it recruits different disciplinary traditions to study a single problem, but that it further aims to bring researchers together, enabling a process of learning from each other, and additionally, has the potential to become transdisciplinary in order to transcend the boundaries between disciplines to create new perspectives and new ways of thinking about the world that can be sustained and developed over time. Such truly transdisciplinary work is, as yet, uncommon in educational research, but we would argue that an understanding of how research methodologies can provide and assist the capacity and potential for interdisciplinary working is an important first step in transformation. Multidisciplinary research has led the way in overcoming the barriers that can exist between disciplines, and mixed methodologies have been suggested as a way forward to meet the accompanying epistemological challenges (Johnson, Onwuegbuzie and Turner 2007). This thus requires new ways of doing things, forms of methodology that can encompass this approach, and a process of critical enquiry based on a more dynamic, open ontology, and an epistemology that can take account of multiple constructions of knowledge (Brown, Harris and Russell 2010, Klein 2004).

### **The nature and epistemological implications of boundary crossing**

The term *boundary crossing* was introduced to describe the processes by which professionals need to ‘enter onto territory in which we are unfamiliar and, to some significant extent therefore

unqualified' (Suchman 1994, 25) and 'face the challenge of negotiating and combining ingredients from different contexts to achieve hybrid situations' (Engestrom, Engestrom and Karkkainen 1995, 319). Although *boundary crossing* usually refers to a person's transitions and interactions across different sites (Suchman 1994), *boundary objects* refers to the artefacts that help those doing the crossing by fulfilling a bridging function (Star 2010). Akkerman and Bakker, in their 2011 review, discerned four mechanisms of learning at the boundary portrayed by current literature, which they summarise as identification, coordination, reflection, and transformation. Transformation has particular resonance for interdisciplinary research, as it is resonant of the potential for transcending disciplinary boundaries and the establishment of a new epistemology of knowing, and so we draw on their review to summarise the concept here.

They posit that studies that describe transformation processes consistently start with describing a confrontation with a problem that forces domains of expertise to reconsider their own practice and how it relates to the other. Recognizing a shared problem space often occurs as a direct response to confrontation. Transformation leads to significant changes in practice, and potentially even the creation of a new, in-between practice, sometimes called a *boundary practice*. Some (e.g. Edwards and Fowler 2007) use the term *boundary object* to refer to this shared problem space, in other words, the object becomes the motive for shared activity between sites of expertise. This definition of a boundary object is very different to that of a mediating artifact.

Akkerman and Bakker (2011) also refer to a third process in transformation which they term *hybridization*. They describe this as a creative process in which a new form of practice emerges, a hybrid, which develops from crossing the boundaries of existing domains of expertise. These hybrid practices can take many forms. What is then needed is a process of *crystallization*, i.e.

developing new routines or procedures. They conclude that dialogue and collaboration is essential in these processes.

Perhaps unsurprisingly, given the proposition that transformation leads to profound changes in practices they find that transformation processes are ‘difficult to achieve but, if successful, also imply sustained impact’ (Akkerman and Bakker 2011, 150). In methodological terms interdisciplinary research by its very nature offers opportunities for boundary crossing, but no guarantee of transformation. While Akkerman and Bakker identify ‘boundary objects’ as tools which facilitate learning processes, our interrogation of our work with researchers from a number of other disciplinary traditions exposes shared ‘boundary experiences’ as critical and thus this paper makes the case for shared experiences in relevant practice contexts. It is in this respect that we use Wenger-Trayner and Wenger-Trayner’s (2015a) metaphor of landscape. While their focus is professional learning we see parallels with learning in and through interdisciplinary research, in that we recognise how our own learning as practitioners of research has been transformed by shared experiences in practice contexts which help to surface the ‘complex system of communities of practice and the boundaries between them’ (p.13).

While we agree with Taylor’s (2009) proposition that interdisciplinary work ‘is not just about “borrowing” ideas – knowledge, theory and methods’ (Taylor 2009, 652), we find the need to be critical about our own work in this regard, which leads us to question whether genuinely new developments are always possible within interdisciplinary research. This is where transformatory potential through interdisciplinary research may be relevant, and in designing and selecting research methods we argue that there is a need to consider the extent to which they may facilitate transformation. Wenger-Trayner and Wenger-Trayner (2015b) conceptualise boundaries as potential ‘learning assets’ (2015b, 108), and propose that

meaningful engagement across boundaries can be transformative of both practice and identity. Our examples of interdisciplinary encounters allow us to examine critically how we have succeeded, or otherwise, in achieving such transformatory potential and thus developing the ‘new and constructive interdisciplinary developments’ that Taylor urges are required for interdisciplinary work to be worthwhile (Taylor 2009, 652).

Boundary crossing and all that it entails is a relatively recent research focus and not completely understood, not least in terms of demands on relationships. Edwards work on relational agency is important for understanding some of the complexities of boundary crossing and operating in scenarios framed as co-production. Taylor (1991), cited by Edwards (2005) points to our need to identify with common values and commit to socially oriented goals across communities that interact on common ground. Edwards quotes Goodwin (2005) on the importance of relationships in research: ‘Everywhere, however, we found that close relationships acted as important ‘social glue’, helping people deal with the uncertainties of their changing world’ (2005, 615). Relational agency is the capacity to recruit others for collaborative action, drawing upon their viewpoints, support and resources and offering one’s own in return for a common goal. This is in comparison to individual agency which will have limitations where complex inter-disciplinary approaches are required. (Edwards and Mackenzie 2005; Edwards 2005). She makes the point that individuals may have to step away from their institutional norms and expectations and in effect bend their rules. In co-production contexts this principle may equally apply to disciplinary norms as one responds to the interpretations of others because of the overriding significance of shared values and developing relationships.

## **Examining interdisciplinary encounters in research**

This paper introduces examples of interdisciplinary encounters from our own research experiences, which in each case have involved working alongside partners from other disciplines. Not all the researchers we present as collaborators in our examples are academic researchers - some are practice-based – giving us the opportunity to explore the juxtaposition of the boundaries between academics of different disciplines, and that of the practitioner-researcher and the academic. Educational research is often rooted in the practices of teaching and learning, and yet practice is often positioned as dichotomous to academia. This additional complexity results in a broader conception of interdisciplinary work and, we propose, enables more coherent and multifaceted learning.

A characteristic of our examples is our common intention for the research to support or influence the development of aspects of educational practices, either concurrently with the research process, or as a short or longer-term goal. As such we are concerned with the bodies of knowledge that are held within communities of practice and research and how these are shaped and mobilised through interdisciplinary research. Our contention is that including shared experiences of the practice context can be critical, and we will articulate the reality of this; the significance of being physically present together to experience the landscapes of practice. We are theorising these as ‘boundary experiences.’ In making sense of the qualities and significance of these boundary experiences we will also draw upon Kemmis et al’s (2014) Theory of Practice Architecture, which articulates three related dimensions of practice; *physical space* (including time, space, resource), *semantic space* (what is said and written and how language is used and developed in the practice), and *relational space* (the social practices,

often influenced by aspects of power and trust). Each of these dimensions plays a role in creating the characteristics of the boundary experiences, because each occurs in a specific multi-dimensional practice context. These practice spaces thus influence the potential of the research for learning through transformation.

Our examples also illustrate how ‘meaningful moments of service’ (Wenger-Trayner and Wenger-Trayner 2015a) can be created through ‘boundary experiences’. These moments of meaningful service arise as a result of what Wenger-Trayner and Wenger-Trayner term ‘knowledgeability’. In our examples this knowledgeability is held by the participants in interdisciplinary work, in that they are competent and knowledgeable in relation to the practice context, and also able to translate their ‘complex experiences of the landscape, both its practices and boundaries, into meaningful moments of service’ (2015, 23). This helps us to reflect on our experiences of interdisciplinary work, asking whether through meaningful moments of service it extends beyond the co-operative ‘borrowing’ recognised by Taylor (2009) and into more collaborative and co-constructive domains.

We would argue further that there are significant boundaries between research traditions and practice communities or community groups who are invited to become research participants or increasingly research partners in co-production enterprises. One of the complexities is that partners may not be co-producing one product but complementary products that are aligned in some way but catering to the needs or audience of the particular discipline or practice. One might talk more accurately about co-productions or parallel productions, where partners contribute to both their own goals and to those of their partners, as there is a mutual dependency or synergy. The parties are partially dependent, as they need each other and partially independent as they have different motivations and goals. There is an underlying belief that

what can be achieved by working together is greater than what might have been possible apart, however it would be misleading to describe this as a functional interdependence, as it has a spine of shared values.

The following are examples of our interdisciplinary encounters during the course of three different research projects. The first example centres on a collaboration between an education academic and speech and language therapists which aimed to develop coaching practices in schools, but evolved into an action research project that was highly dependent on the relationships that were developed. Our second example presents a research opportunity experienced by a group of education, architecture and sociology academics, alongside practising architects and educators, in an international context. Our third example describes and reflects on the process of a research study involving academics from education, medical education, cultural and heritage studies, sociology, music, and social computing working together to design, resource and manage a co-production project involving local organisations, schools and communities.

### ***Interdisciplinary encounter example 1: Developing and researching coaching practices***

The intention for this work was the development of inter-professional video-based coaching practices to encourage teachers and teaching assistants to create communication-rich pedagogies. This work was designed to meet the challenge experienced by practitioners in specific nursery and primary schools located in a multi-cultural city in the English East Midlands. In this context local demographic changes meant that the proportion of pupils learning English as an additional language was continuing to rise. Coaching formed part of an integrated approach to the professional practice development in the schools in response to these

changes and was led by experienced speech and language therapists (Lofthouse, Flanagan and Wigley 2016; Lofthouse 2016). Through their earlier work the speech and language therapists had been surprised by a lack of shared professional practices and knowledge with teachers and school leaders in relation to the links between teaching and learning and supporting speech and language development. Their decision to elicit the support of an educational researcher was driven by their experience of boundary crossing, and of attempting to encourage schools to view them less as child-centred clinicians and more as a source of valuable knowledge which could be deployed to develop pedagogy and the classroom environment. In essence what they felt they were lacking was what Wenger-Trayner and Wenger-Trayner (2015a) term ‘knowledgeability’.

Perhaps unusually the project was not initially conceived as research, having been initiated as a university-funded small business development project, and the transition to collaborative action research was an organic one, as explored in Lofthouse, Flanagan and Wigley (2016). The resulting interdisciplinary research team comprised an educational researcher who brought specific expertise of professional learning and coaching as well as educational policy and practices, and the two speech and language therapists who brought specific domain and practice knowledge as well as expertise gathered through working with children, schools and families in the city. The evolution from a business development focus to research-orientation raised interesting methodological and ethical questions given that the relationships between the educational researcher and speech and language practitioners were already established and new professional practices were already emerging. Of additional significance, because it is relatively unusual for action research, was the fact that the specific practice contexts in which the research was situated were schools where the members of the ‘research team’ were not routinely embedded.

The rationale for the original funded work was the mobilisation of the education researcher's specialist knowledge of coaching by the speech and language therapists and its application in education settings. In terms of the aims of the work, there were potential risks: for new practices to subsume existing ones, for managerial concerns to dominate practitioner development and for the two disciplines of education and speech and language to continually jockey for position in a knowledge hierarchy. Bringing in an educational researcher might have simply reinforced the boundaries between speech and language therapy and pedagogy given that the sites of the research were educational landscapes of practice, however the boundary experiences shared by the researchers were instrumental in limiting that effect. Their significance is illustrated through a descriptive vignette written from the perspective of the educational researcher:

*Early on in the project I visited a primary school alongside the speech and language therapists (SLTs), to meet with the senior leadership team. This visit followed a period during which the SLTs had provided whole staff CPD. The purpose of the visit was three-fold; firstly to facilitate the planning of the coaching cycles, secondly to allow me to familiarise myself with the school context, and thirdly to plan with the Headteacher the research interviews process. The schedule for the meeting was altered after our arrival. We had some time to kill and the SLTs were able to show me round some of the parts of the school, identifying features of the learning environment and practice which they felt supported or distracted from communication-rich pedagogy. They were also able to talk me through some of the features of the school population (staff and pupils) and thus make real for me the nature of the language development challenge. They introduced me to staff members, talked about some of the significant aspects of the school's history (including federation arrangements) and shared their personal and*

*professional knowledge of the local community. The meetings with the leadership team members were therefore situated in my richer knowledge of the school and the challenges that the staff faced. At times these meetings proved frustrating to the SLTs, as the senior leaders tended to stray from the 'agenda' of coaching and support for teachers to work with children with English as an Additional Language, talking instead, about Ofsted, governance, staffing changes and the demands of the primary curriculum and national tests. As an education specialist I recognised why the school leaders saw these as relevant dimensions. Despite the diversions the meetings did in part fulfil their purpose as tentative steps were made to planning the coaching and the research activities. Our original plans were modified by our shared experience in the school. It was following this school visit that we started to see ourselves as an 'interdisciplinary research team' as we had time to reflect, process and plan. I was able to explore with the SLTs the educational significance of the tangential information that we had gleaned. I was also able to take their site-specific perspectives with me when I returned to do the first of the Theory of Change interviews with the Headteacher, which enabled me to ask more pertinent questions that were explicitly linked to what I now knew about the school as a whole as well as the speech and language issues.*

This vignette illustrates how some of these risks of boundary crossing were ameliorated as the project progressed and the significance of 'local knowing' in the broader knowledge context became obvious (Wenger-Trayner and Wenger-Trayner 2015a). The foregrounding of local knowing was particularly enabled by the use of Theory of Change based methodologies (Laing and Todd, 2015) as the basis of structured interviews with participants. To a large extent the use of this specific research method was informed and modified through the development of what Wenger-Trayner and Wenger-Trayner term the 'social body of knowledge' (2015, 15),

which itself was significantly enabled and shaped by the shared site visits or boundary experiences.

***Interdisciplinary encounter example 2: Developing understandings of school buildings***

Previous experience of working across the disciplines of architecture and education to convene a conference and then produce a book about participatory approaches to designing and using schools (Woolner 2015) had demonstrated the potential of such cross disciplinary academic collaboration to develop understandings within an inherently cross-disciplinary area. Subsequently, opportunities arose to take part in international visits to schools in multidisciplinary groups comprised of academics and some practitioners. This example of interdisciplinary interaction focuses on the most recent of these visits to a cluster of schools in South Tyrol, Italy.

The group consisted of four educationalists, based in three different countries (UK, Iceland and Italy) with four different first languages, together with an academic architect from Portugal, a practising architect from Germany and an academic sociologist from Portugal. The architects commented that, within architecture, the site visit or ‘study trip’ is an established methodology. However, from an educational research perspective, it felt strange to be exploring a school without clear research questions or an existing collaborative relationship that could support an investigation of aspects of practice or specific elements of the education being provided. Instead the group’s intentions were considerably more open: to investigate the physical environment of the schools and consider how these might relate to pedagogy. The setting for this investigation further contributed to the sense of being outside everyone experience through the geographical and cultural remoteness of the schools.

The visit opened with the arrival of the party at the first of four schools, which sit within a larger federation of primary and secondary schools. They met the federation principal, who joined the group for the visits as guide and embedded educational practitioner. The schools are located within a high mountain region, some having very small rolls, and follow Italian education policy, but are German medium schools within this bi-lingual region.

The principal gave a brief introduction to the history of the school, where the designing of a new building had begun in 2000, as he was appointed, but the building was not finally completed until 2009. He mentioned some foundational ideas, including the ‘school as community’ and the intention that the children (approximately 100, aged between 7 and 12 years) would be treated as individual learners, developing competencies and moving to the next challenge. The group then visited the main teaching and learning spaces of the school, spread over the first and second floors of the school, which combine contained classrooms opening onto shared space that is used primarily for student self-directed learning. The members of the group moved around the space, respecting the quiet that was maintained by the children having removed outdoor shoes and talking in whispers.

After the observations of this learning space, the group reconvened in a craft room on the ground floor for more discussion with the principal about what he termed the school ‘pedagogic concept’, before going next door to visit the middle school (for 12-16 year olds) that is fed by the primary school visited and other, smaller, schools within the federation. Innovations in the middle school centred on physical modifications to a building that dated from the 1990s to make the environment more open, such as windows into classrooms from circulation space and removing walls around the central stairs. Also, the attic space, previously used for storage, had

been redeveloped to provide specialist art and craft space as well as spaces to do cross-curricular and project-based learning.

Two further visits were then made that day to a primary/nursery school in another village and to the newly built art space created in the grounds of a third primary school. Although the primary/nursery school was a much older building, probably dating to the early years of the 20<sup>th</sup> century, it was possible to see evidence of the same educational vision in the way the space was being used and the adaptations that had been made. Again windows had been added to provide visual connection between classrooms and the learning space beyond. This was similarly organised to that in the purpose-built school, with equipment and resources ready for learners to access themselves. A project with architecture students from an Austrian university had resulted in the former school teacher's apartment being co-designed with the school children to provide imaginative and unusual space for arts, science and projects.

There were occasions, through the day, when colleagues from differing disciplines made contributions drawing on their particular disciplinary knowledge or experience. Thus the sociologist questioned the assumptions apparently being made in the middle school about 'more able' and 'less able' students, while the architects immediately noticed the ceiling height of the new school building and discussed how this contributed to feelings of cosiness and being child-sized. The practising architect additionally pressed the principal, when he first mentioned a school vision, to clarify whose vision this was: that of the parents or the teachers? The discussions between the sites enabled the visitors to reflect on the disciplinary, academic or practice expertise drawn upon, and to begin to develop a multidisciplinary perspective.

These instances in the schools and the reflections of the group members start to indicate multidisciplinary working, but do not demonstrate the transformations of truly interdisciplinary collaboration. Additionally, we can see these instances as occurring at the boundaries between group members' disciplinary expertise and the practices in these schools. The boundary crossings appear to centre on *identification* of differences and some *reflection* on what this might mean, but, again, little evidence of transformation.

Suggestions of transformation occurring are to be found in the experience of the visit itself and in the changed perspectives of members of the group. Discussion within the group as the day progressed produced a shared appreciation regarding how the physical environment in these schools reflects and supports the educational values of the principal, which differed from the understanding that any of the contributors could have achieved alone. Achieving this shared perspective changed the individual understandings of these schools and of learning environments more generally. It seems clear that a 'study trip' involving this diversity of views, from differing disciplines, from practice and academia, from diverse cultural and linguistic traditions, must be qualitatively different from the more focused fieldwork conducted by architects sharing background, training and assumptions. It could be claimed that the group has developed a new boundary practice, a *hybrid* of architectural study and educational research, provoked by the shared problem space of location in a school, a site of unfamiliar educational practices. Through this encounter, ideas about these schools and the possible ways to approach pedagogical practices, here and elsewhere, were changed. Although the group members returned to their own home disciplines, their views of the intersection of architecture and education had been changed, enhancing their ability to conduct further interdisciplinary work.

### *Interdisciplinary encounter example 3: An interdisciplinary, collaborative curation project*

The Co-curate North East project was funded by the Arts and Humanities Research Council (AHRC) - under their 'Digital Transformations in the Arts and Humanities' theme. This aims to exploit the potential of digital technologies to transform research in the arts and humanities and to ensure that arts and humanities research is at the forefront of tackling crucial issues such as intellectual property, cultural memory and identity, and communication and creativity in a digital age. Methods of organising, interpreting, and using knowledge were central to the Co-Curate NE project. Co-Curate NE offered the opportunity to local schools and community groups in rural and urban settings to access and enhance knowledge from a broad range of museum collections and archives. Schools and community groups are often unable to access physical collections and archives because of distance or because demand for physical visits outstrips the capacity of the museum/archive. Co-Curate NE has developed digital access to address this challenge. It has opened up 'official' museum/archive and 'un-official' co-created community-based collections and archives through innovative collaborative approaches using social media and open data. The project has developed a digital platform which contains tens of thousands of resources exploring the narrative structures of North East heritage in the form of images, digital artefacts, stories, etc. all co-curated and co-produced with community groups and schools. The co-production in the Co-curate NE project was not restricted to the creation of the digital archive collections but operated on several levels. Importantly, the University research team was made up of representatives of different disciplines who needed to work together to design, resource and manage the project. The team therefore included academics from the disciplines of Medical Education, Cultural and Heritage Studies, Sociology, Music, Social Computing and Education, in partnership with 16 community organisations, including museums and schools. Work within the Co-Curate project involved some members of the team

– representing different disciplines – going into schools and community settings to work on specific activities. Co-Curate was explicitly about co-creation, but we were less clear about what the boundary objects were going to be and what the boundary experiences were. Key points were the moments in which people came into practice contexts. Some relationships were very easy, some were more fraught and a few did not get off the ground. Here we focus on a specific example, School X, in order to discuss themes that arose across the project.

School X is a successful high school (11-18 years) situated in a new town on the outskirts of the City of Newcastle. The participating group was made up 240 Year 7 pupils (aged 11-12 years) and nine teachers. The school senior leadership team has a reputation both for being innovative and outward-looking and continually seeking partnership opportunities that will stimulate both learning and teaching. In terms of curriculum development the school takes inspiration from a variety of sources but has focused recently on introducing project-based learning. In Year 7 the pupils all take part in three ‘I-Learn’ projects which cover the humanities (each term the project has either a History, Geography or Religious Education focus) but also incorporate the development of learning habits. The pupils work with one teacher during I-Learn, which has a significant impact on the student-teacher relationship.

When School X took part in the Co-Curate project the teachers worked together with the team to create the I-Learn project for the Spring Term. Each class of pupils was to research an aspect of their local history (themes were chosen by the pupils mediated by the teachers) using the Co-Curate website to access appropriate archives. The pupils and teachers worked together with 4 members of the wider Co-Curate research team who provided support with curating, research and use of the digital platform. Knowing that a final product which could be made available to a wide audience was a key feature of any I-Learn project, the Co-Curate team

enlisted Tyne and Wear Archives and Museums staff to arrange a final exhibition for the pupils' work. This added a new dimension to the pupils' outputs as they had to adhere to museum guidelines and standards in order to have their work displayed in a public space.

Going into schools is a challenge for educational researchers, because of the complex interactions and relationships at play, together with the time and resource restrictions schools are often under pressure from. For those from other disciplines the challenge can be greater through unfamiliarity. As a result, the existing relationship between School X and the educational researchers was pivotal. One of the researchers had been a book co-author with the headteacher and the initial teacher training tutor to the assistant headteacher. The school was also a pilot location for a Self Organised Learning Environment facility, sponsored by the university, so a number of researchers were familiar with a number of teaching staff.

In this case, there were different goals for each partner, which might be characterized as co-productions, as for example the school focused on the successful completion of the Year 7 local history project, the educational researchers on the deployment of a Theory of Change (Dyson and Todd 2010; Laing and Todd 2015) evaluation, Cultural and Heritage Studies on the use of digital archives to create new digital artefacts and Social Computing on the design and use of the website. Nevertheless, these separate productions were worked on, to at least some extent, by the collective; for example with the support of a researcher from cultural and heritage studies Year 7 students were able to access archives through the Co-Curate NE website, which in turn was further developed through the students productions that were uploaded to the site. Theory of Change interviews created opportunities for staff to articulate their aims and ambitions for the project and as a result seek specific resources and expertise from the research team, for example in negotiating an exhibition space for the students' work and in education researchers

working with and training a group of student researchers. For the school, this was an opportunity for students to develop new skills and experiences, for the researchers the opportunity to work with students to gather evidence of change for project evaluation. A significant experiential boundary ‘experience’ occurred when the school organized an assembly to launch the project with pupils. This was a high stakes occasion. For the school it was a chance to broaden horizons and imaginations in order to give impetus to the new project. For the researchers, who had been asked for help in planning and organising the launch, ‘delivering’ was important, both to improve the chances of a successful project for the school and to enhance credibility with their school partners. Accounts of research projects are usually written by researchers so it is not always appreciated that in partnerships researchers can be seen as inadequate and the weak link in achieving goals other than research. Nevertheless, here there was a genuine attempt for each partner to contribute to the success of one another’s goals.

The success of the work with School X stands in contrast to a few of the other groups within the project where outcomes were more limited. This enabled reflection on why such differences emerged. Ironically although Co-Curate was styled as co-production, with the implication that there would be a single activity with a single object, in the educational settings this became more complicated. There was no inclusive boundary object. Instead practitioners and academic researchers had separate goals and objects. At School X the I-Learn project was critical and there was considerable pressure on the pupils and staff to produce a panel for each class’s project for display at the museum. Thus the displays were a shared object for the school and the researchers with a curatorial background, as the panels had to be at a ‘museum standard’ threshold. For the evaluators it was the theory of change evaluation process that was most important, although without the progress of the I-Learn project the evaluation might be jeopardised. Thus there were a series of overlapping objects and at times ‘parallel objects’.

Without a shared object one might expect the working relationship between the partners to be under constant strain. Instead relationships were largely cohesive because reciprocity emerged. So although there was no one shared object there was a co-dependency, each party accepting that the other had good intentions towards them and could contribute towards their goal.

## **Discussion**

### ***Boundary experiences and transformation***

Wenger-Trayner and Wenger-Trayner (2015a) suggest that landscapes of practice are *political*, and in research terms this means that there is potential for power dynamics to heavily influence the research methodology in practice. The different competences and discourses associated with the researchers, who are also themselves practitioners from different professional disciplines, and others involved in these research projects could have created significant ‘noise’ through competing voices and claims to knowledge. They also suggest that landscapes of practice are *flat* and that despite hierarchies and a variety of mandates the ultimate production of practice is undertaken by the practitioners, who make significant use of ‘local knowing’. Finally they propose that the landscapes are *diverse* and this diversity creates unavoidable boundaries of practice across the landscape. This characteristic is replicated in an interdisciplinary research landscape, indeed it may be the perceived strength of interdisciplinary research. However those engaged in interdisciplinary research often lack a shared history of social learning and may even lack a common language through which to articulate knowledge or reflect on experiences and evidence.

Our first example encounter highlights that the relevant landscape of practice encompassed several bodies of knowledge associated with multiple connected communities of practice, forming what Wenger-Trayner and Wenger-Trayner (2015a) term a ‘social body of knowledge’ (2015, 15). The example illustrates the characteristics of landscapes of practice that they identify; that they are political, flat and diverse, and of the significance of what we are calling boundary experiences in learning from such landscapes. These boundary experiences consisted of shared experiences in the various sites of practice. On numerous occasions the education researcher worked alongside the speech and language therapists during meetings in which they were designing and reviewing their coaching practices. The speech and language therapists crossed the boundary in to the world of educational research, contributing to research seminars and conferences, and co-authoring a paper for educational research journal. In addition to their individual visits to the schools, where the speech and language therapists were conducting coaching, and where the educational researcher was undertaking research interviews, there were several occasions where the research team visited the schools together, talking to school leaders and teaching staff, and being able to experience first-hand some of the practices, cultures and environments there.

Similarly, in our second example, there were occasions throughout the visit day when colleagues from differing disciplines made contributions drawing on their disciplinary knowledge or experience (for example the architects noticing the ceiling height of the school). We can see these instances of interdisciplinarity as occurring at the boundaries between group members’ disciplinary expertise and the practices in these schools. The boundary crossings appear to centre on identification of differences and reflection on what this might mean, enabling the group to develop a new boundary practice, a hybrid of architectural study and educational research, provoked by the shared problem space.

We argue that boundary experiences seem to stimulate transformation where there is some genuine reciprocity and there may be a shared boundary object but more likely, parallel or intertwined objects, and neither can be achieved without the other. This was seen to be the case in example three where researchers from a number of disciplines and school staff contributed towards the success of one another's goals as articulated through the Theory of Change evaluation methodology. Through making one another's aims and ambitions explicit at the beginning of the project, participants entered into a relationship of relative co-dependency. In such circumstances, there is a sense that each participant in the boundary experience gets something out of it and we come to understand each other's object or, in some cases, their objective and can then assist in it being mutually achieved. In these cases of reciprocity transformation becomes a possibility (albeit not an inevitability).

### ***Knowledgeability and meaningful moments of service***

In our cases we see examples of 'knowledgeability' (Wenger-Trayner and Wenger-Trayner, 2015a) in that the co-researchers experience and interpret the landscapes of practice that they are researching using their own distinct disciplinary knowledge. Through the shared boundary experiences they develop a recognition of the relevance of their individual competences and knowledge to the research, and start to co-construct the social body of knowledge. This learning is conceptualised by Wenger-Trayner and Wenger-Trayner through the metaphor of a journey through the landscape. As in many shared journeys memories and artefacts are collected, and identities of the travellers are shaped by the experiences over time. Our first example illustrates this in that the researchers 'created, through reflexivity, iteration and reciprocity of practice and research, [their] evolving professional identities (Lofthouse, Flanagan and Wigley 2016,

529), much of which resulted from the boundary experiences. Perhaps most significantly in terms of research methods, knowledgeability offers the opportunity for moments of engagement (during what we term boundary experiences) to become ‘meaningful moments of service’ (Wenger-Trayner and Wenger-Trayner, 2015a). This is illustrated in the vignette in our first example. It is in such moments that we see genuine benefits from interdisciplinary research collaboration.

### ***Relationships, reciprocity and dialogue***

Our examples demonstrate that relationships matter. This has bearing both in complex projects but also increasingly around and between projects as part of everyday work as part of developing a research sensitive, co-production milieu in which one anticipates positive responses from potential research partners because they know, value and trust you. Increasingly research subjects are not naturally compliant with researcher’s requests. They are sensitized by reduced deference to authority and experts and increased awareness of individual rights. Le Dantec and Fox (2015, 1357) summarizing some bruising experiences in engaging with disadvantaged communities have concluded: ‘We need to ... make visible the work before the work, and the work to keep the work going, so its role in shaping the research and the outcomes are made more accessible’. They are referring to relationships, reputations, credentials and trust. For both engaging with community or practice partners you have to earn your spurs through being of value to the other. There is no necessity for practitioners or community to collaborate.

Hedges (2010), Groundwater-Smith and Mockler, (2010) and Hulme and Cracknell, (2010) all make similar points around the need to make constructive connections, develop mutual

understanding and generate mutual respect. In example 3, for instance, we argue that this feeling was forged through entering the practice context of the other and coming to understand their work. At School X the research team played a major part in the launch assembly, providing and introducing resources and helping to contextualise the students' forthcoming work. Thus the researchers move beyond a professional role and become a more vivid person who has credibility and currency within the context of the school projects. In return one of the staff from the school came to a project conference and provided an important contribution.

Relationships do not happen automatically and there needs to be a basis for rapport to be established. In the same example, the Theory of Change evaluation approach, adopted as a collaborative methodology provided an impetus for dialogue from the start of the project, as participants from the school and university took part in theory of change interviews and a joint steps of change document was negotiated and agreed. Furthermore, acting together in landscapes of practice can provide a lens for each participant to see what each other can bring. This is likely to have different effects depending on whether these opportunities are created flexibly and autonomously, or whether they contain an element of compulsion or statutory requirement. In a statutory context, people are under primary surveillance and generally will follow protocols. Interactions are routinised, and communication is based on professional roles. It is in emergency or discretionary contexts that the full force of boundary crossing and its learning processes can be experienced. In a more detailed consideration of example one (Lofthouse, Flanagan and Wigley 2016) such discretion, possibly caused as the work evolved into a research partnership rather than being pre-determined as one, enabled relatively flexible relationships which emerged over time.

Although only brief descriptions our cases exemplify how these inter-dependencies are created and sustained, given the discipline boundaries between the parties and their organizational drivers. This is swampy ground, but terrain that is not avoided. As LeDantec and Fox (2015, 1350) comment ‘the intellectual and political commitments of the research ... recognize the mess – methods play a part in the enactment not just the reporting of realities’. They recognize the subjectivities involved in such a position in working with disadvantaged communities in the USA and involves a substantial reversal of established traditions. In their terms their challenge was translating partners’ contribution and experience into research rather than starting with research and shoehorning it into a community contribution. In our examples, the boundary experiences became an integral part of the research design, but necessitated the researchers to cede some control over the design process. However, some of these experiences were opportunistic, and were not positioned at the time as crucial elements of the research design at the planning stage. Nevertheless, their value in the interdisciplinary research process was crucial in encouraging dialogue, shared understanding and meaningful moments of service. Designing in these boundary experiences opens new territory for methods and approaches that facilitate co-production (such as theory of change).

### ***Potential implications for doing interdisciplinary research***

We suggest that there is much to be gained in interdisciplinary research through entering the other’s practice context – going to school, youth centre, speech therapy, and being ‘ourselves’ not just a professional researcher. Authenticity develops. Trust develops. Relationships become less professional (but not in a negative way) and more personal as more things are revealed about each other.

It may be useful to think of interdisciplinary research itself in terms of its own practice architecture (Kemmis et al., 2014). If shared boundary experiences are to be enabled it may require planned changes to the physical space associated with the research architecture; for example through the scheduling of joint visits to acknowledge the value of time to simply co-experience the site of research. By accommodating such boundary experiences within the research design and allowing the research process a little more fluidity there comes the potential to alter the semantic and relational spaces of the research architecture. Different types of conversation arise, perhaps more exploratory, perhaps more reflective, shaping up social bodies of knowledge. In research terms moments of service might be most likely to become meaningful through an experience of reciprocity, which has dialogue at its core, and is aided by a more reflexive stance. Relationships may change, a sense of shared curiosity may lead to a sense of solidarity. It is in this context that those engaged in interdisciplinary research may be able to create and experience ‘meaningful moments of service’.

## **Conclusions**

Current debates around the concept of boundary crossing stress the importance of boundary objects in bringing people together to share understandings. We argue that the boundary object is of secondary importance. What is important for the transformative potential of disciplinary understanding to be realised is opportunities for ‘*boundary experiences*’. We stated previously that interdisciplinary work offers opportunities for boundary crossing, but no guarantee of transformation. We argue that by shaping (voluntary) opportunities to provide landscapes of practice, shared experience of sites and spaces of expertise, without fixed objectives and with an open, critical mind, accompanied by opportunities for dialogue, and developing

relationships, can result in a move beyond identification of difference to hybridization through the notion of boundary experiences. When working together with others, visiting familiar and not so familiar spaces with a view to co-production, understandings can be forged which transcend the known and familiar, and makes transformation more likely. Dialogical engagement is not, therefore, simply a bringing together of different disciplines towards consensus and complementarity, but a confrontation of difference and diversity and establishing a new order of practice.

This has implications for research methodology in interdisciplinary contexts. This way of working is relatively unusual in academic research, and certainly in educational research. For example *the work before the work* will not be accountable in any reckoning of workloads and it is not usually funded. The work can be thought of as sustaining a web of relationships, many of which will be dormant at any particular time, but need some maintenance if they are to be sparked into collaboration with a research dimension.

It necessitates a cultural shift, from thinking about research projects and how these are enacted, to thinking about research relationships, opportunities and locations for dialogue, and the needs of our collaborators. In many research projects, the boundary crossing is discretionary, and an additional element to the research processes rather than an integral part. Project design processes which require carefully worked plans may inhibit the kind of open ontology that is necessary for transformation. In addition, researchers need to develop the skills and capacities which enable them to engage in a more exploratory and collaborative research process, without sacrificing or weakening their own disciplinary contributions.

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