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Playing the interdisciplinary game across Education-Medical-Education boundaries: sites of knowledge, collaborative identities and methodological innovations

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Abstract

This paper aims to interrogate the potential and challenges in interdisciplinary working across disciplinary boundaries by examining a longitudinal partnership designed to research student experiences of digital technologies in undergraduate medicine established by the two authors (one from Education, the other Medical Education). The paper is situated in current methodological trends including the changing value of replicability and evidence based methods and increases in qualitative and mixed methods studies in Medical Education, whilst education research has seen growing encouragement for randomised controlled trials and large-scale quantitative studies. A critical analysis of the partnership interactions is framed by Holland's positional and imagined identities, negotiated across 'figured' worlds and the concept of epistemic games that guide knowledge construction. We consider social, political and cultural challenges and how 'in between' sites of knowledge were established where the academic identity of each was shaped by engaging with the other and new theoretical, methodological and ethical understandings were co-constructed. The paper concludes that despite the on-going challenges, 'bottom up' partnerships can contribute to a growth in interdisciplinarity which might itself be understood as a boundary object as this necessitates improvisation and boundary crossing and can therefore always be considered a matter of negotiation, creativity and collaboration.

Keywords: collaboration, methodology, ethics, discourse, epistemology, disciplines

Introduction

The aim of this paper is to interrogate interdisciplinary working across the boundaries of research in education and medical education in order to highlight the potential and challenges of interdisciplinarity and in particular how this contributed to the development of a co-researcher methodology. It examines a longitudinal partnership between the two authors (one from Education and the other Health Sciences) through a programme of research focused on technology enhanced learning, established in 2008. Through this collaborative endeavour, we show how new 'in between' sites of knowledge were established where the academic identity of each was shaped by the experience of engaging with the other and enabling new understandings of theory, methodology and ethical practice to be co-constructed.

Somekh et al (2005) have argued that whilst the social science research emerged originally to address issues concerning the nation state, the onset of globalisation has reframed the social sciences (and Education within this) towards wider concerns of culture, identity, difference, social and power relations across the globe and this in turn has affected the nature and scope of research methods and methodologies needed to address these concerns. They suggest that this has included a move towards more interdisciplinary research, which has long been resisted in the social sciences (ibid). For Nissani (1997) interdisciplinarity brings together distinctive components of two or more disciplines and in academic circles, these typically include knowledge, research, education, and theory. Nowotny et al (2001) refer to interdisciplinarity as a radical term which challenges the autonomy of disciplines and may facilitate researchers' reflections on their existing disciplinary practices, leading to new insights into accountability and quality (Strathern 2004). Furthermore, Wiklund argues that the boundaries or margins between disciplines can themselves become sites of knowledge and creativity (2015). Huutoniemi et al (2010, p83) define interdisciplinarity as"…based on active interaction across fields. This interaction takes place not only in the framing of research problems and coordinating knowledge flows between fields, but also in the execution of research and the formulation and analysis of results". Yet, interdisciplinarity is often seen as problematic, even in areas of research, which have always necessitated cross boundary working such as researching technologies in Education. In a review of interdisciplinarity in technology enhanced learning, Conole et al (2010,p 12) note that although 'the idea of successful interdisciplinarity has become widely accepted across academia, it rarely fulfils its promise in practice and there has been relatively little research into how to foster and promote interdisciplinary research groups'. Equally, across all fields, there are continuing concerns over the lack of a clear definition and evaluation of interdisciplinary research and its influence on career development (Gewin, 2014; Van Noorden, 2015). These have been further reflected in the recently published Stern Report on the UK's Research Evaluation Framework (REF). The report recognises the value of interdisciplinary research especially where universities commit to addressing complex, multifaceted 'Grand Challenges'. Whilst expressing confidence is how interdisciplinary research is judged in the evaluation exercise, the report recognizes that interdisciplinary research continues to be subject to cultural and structural constraints:

> *".... we remain concerned that the entry of high-quality interdisciplinary work into the REF may be discouraged; because individual scholars are wary about how it might be perceived or assessed, or because HEIs are cautious about presenting such research, and that disincentives to do such research may be present."* (Stern 2016, p15).

Whilst interdisciplinary research is rising overall (Van Noorden 2015) and policy and structural barriers are increasingly acknowledged, there appears to limited affirmative action to address such limitations or positively reinforce or reward for those taking up the challenge.

Furthermore, Wiklund highlights that another of the challenges is in creating knowledge and methods that can be operationalized in practice and action (Wiklund, 2015,) so that it not enough to have interdisciplinary aims if these cannot be made to work in practice. In this paper, we will follow the definition outlined by Huutoniemi et al (2010), focusing on interdisciplinary interactions across the whole research process and how new knowledge and understandings were practiced over time and pay particular attention to how the intertwining of disciplinary cultures and how occupying the spaces or margins can act as sites of knowledge creation and identity making.

In the next section, we consider some of the current trends in medical education and educational research and the development of interdisciplinarity in technology enhanced learning. We then outline the theoretical framing for reviewing our partnership based on Holland 's (1998) work on how identities, positionality and imagination in negotiating different cultural worlds and Collins and Ferguson's (1993) idea of epistemic games. This is followed by our analysis of the partnership, the participatory research methodology that was co-produced and the ethical challenges of cross boundary research. We discuss the influence of interdisciplinarity and boundary crossing on academic identities and the potential to generate new knowledge and approaches to research and ethics, political and structural constraints before offering our conclusions and implications.

Current Trends in Medical Education Research and in Educational Research

Medical education has traditionally been a distinct educational research field that has been heavily influenced by research in Medicine and other health sciences. Randomised controlled trials (RCTs) and evidence-based practice have become the norm for research on human subjects and advances in Medicine, in part through the potential for harm and blame that medical research needs to be mindful of. Yet, Somekh et al (2005) highlight that historically the evidence-based practice movement has been criticised for placing too much emphasis on RCTs in systematic reviews and ignoring the contributions of other forms of research. Furthermore, over recent years, there have been critiques emerging from within medical education that suggest that an over emphasis on 'what works' and searching for proof of effectiveness, causality and replicability as the goals of medical education research has led to a lack of theoretical engagement in learning and an oversimplification of educational practices (Bleakley, Bligh, & Browne, 2011; Regehr, 2010). Regehr has argued that medical education research should embrace the messiness of educational contexts and medical education research should focus more on *localised* practices, investigating what happens rather than 'did it work?' (Regehr, 2010). The leading journal 'Medical Education' has increasingly begun to welcome qualitative and mixed methods research over recent years including more radical and creative research methodologies such as narrative inquiry (see for example Clandinin & Cave, 2008; Monrouxe, Rees, & Hu, 2011). Yet, there remains some way to go on developing theoretical contributions to the field, for example in a recent systematic literature review on reflection and reflexivity in medical education, the need for more robust theorisation was again emphasised (Ng et al, 2015). This may be in part due to the constraints and prescriptions imposed by journals. For example, Medical Education (considered to be the leading journal) limits the word length of original research papers to under 3,000 words which makes it challenging to do justice to theorisation, as well as

background, methods and research results. Therefore although there have been interesting moves towards a broader interpretation of valid research designs and methods in medical education, there are still some major differences in what is valued in medical education and educational research, the development of theory and how research is reported and discussed.

In addition, such changes contrast with moves in educational research in the opposite direction with growing encouragement for RCTs and large-scale quantitative studies, as evidenced by new research funders such as the UK Education Endowment Foundation[1] focused on addressing the attainment gap in education through a programme of funded randomised controlled trials (or large scale quantitative studies) and systematic evaluations. Whilst we are not arguing that these moves in educational research are not valuable or valued, there is a danger as shown in Medical Education, that RCTs and evidence-based practice are seen as dominant. Furthermore, there is a tendency for policy makers to oversimplify and to attribute too much certainty to quantitative studies and statistical measures. As Goldstein (2015, p21) points out:

> "Social research is a highly contested area, whether published in a "reputable" journal or as a non-peer reviewed report to a sponsor. Policy-makers would do well to promote a wide debate about any findings that appear important, where technical and interpretational issues can be debated in terms that are widely accessible, and where other relevant research can be referenced."

Critiques can also be made of the validity of qualitative research in the social sciences, as Silverman (2015) notes in offering eight reminders for qualitative researchers in how such research should be conducted, including the need to avoid treating participant viewpoints as explanation and treating research as the equivalent of journalism which suggests that all educational research should adhere to the note of caution that Goldstein raises in the quotation above.

Clearly then, the trends in medical education journals away from the traditional pre-eminence of replicability, experimental methods and RCTs and towards an expansion of qualitative and mixed methods studies contrasts sharply with some of the trends in educational research towards evidence-based methods. Although this is currently mainly focused on the compulsory schooling sector, the move towards more measurement of learning and teaching in higher education, for example through the introduction of the Teaching Excellence Framework (TEF) in UK higher education is already influencing the kind of research being called for, such as research into 'learning gains' (HEFCE 2016) and the rise of the field of 'learning analytics' (see Timmis et al, 2016). Whilst this background of epistemological and paradigmatic upheavals is in some ways very challenging, it does suggest that interdisciplinarity may be beneficial not only in furthering new research questions and methods but in influencing one's own disciplinary field.

Interdisciplinarity in TEL Research

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[1] See https://educationendowmentfoundation.org.uk

The previous backgrounds of the two authors were very different, Medical Education and Botany for [Williams] and Education and Modern Languages for [Timmis]. However, in addition we had both been working for several years in the cross cutting field of Technology Enhanced Learning, albeit allied to two different subject communities (Medical Education and Education). Technology Enhanced Learning (TEL) crosses subject boundaries and may, itself, be regarded an interdisciplinary field spanning for example education, sociology, psychology, computer science, in different combinations, depending on the focus of the research (Conole et al, 2010). Despite its stated interdisciplinarity acknowledged by the three Networks of Excellences funded by the European Union (EU) between 2004 and 2012 (Kaleidoscope, ProLearn and Stellar), over time the breadth of the field and the wide range of different disciplines it encompasses has had an opposite effect and led to increasing fragmentation into sub-fields (Sutherland et al, 2012). Stellar, the third of the EU funded networks was designed to bring the disciplinary communities closer together and reduce the fragmentation in the field (see http://www.teleurope.eu/pg/frontpage). However, although there was significant collaboration over the 'grand challenge' themes of Stellar, the network members identified several underlying tensions that made it more challenging to co-produce the research (Sutherland et al, 2012). One of these tensions concerned the different philosophical and epistemological positioning that underpins the approaches to researching learning across disciplines and heavily influenced the focus of research and the units of analysis.

The partnership, which is the focus of this paper, emerged from our joint experiences of research and practice in Technology Enhanced Learning. We had known each other for a number of years, having previously worked in the same research institute. Through this, we had a shared history of negotiating and adapting to different perspectives and methodologies which assisted our partnership from the outset, although as will be explored, our shared understandings had limits, including epistemological differences relating to our backgrounds in different disciplinary research cultures. The following section will now examine our evolving interdisciplinary relationship and work.

Researching Digital Technologies across Disciplinary Boundaries

The partnership has been in operation since 2008 and developed through researching student experiences of digital technologies for learning in undergraduate medicine across a programme of internally funded research projects, known as TELME - Technology Enhanced Learning in Medical Education. In establishing the programme, we recognised that we needed to work at the interface of where our disciplines meet and to develop a shared and mutually beneficial research agenda, to create new knowledge, understandings and research methods. Our initial aim was to investigate how medical students were using digital technologies to support their studies, in particular once out in clinical settings, away from the university environment and the possibilities and constraints involved. We had different interests and motivations in establishing the programme. Williams, whose role is both research and practice focused, was particularly interested to research students' experiences of using technology in order to inform the development of technology enhanced learning tools and systems that are more aligned to students' learning, the curriculum and the context (including location) in which their learning takes place. Timmis, whose research centres on students' experiences in higher education (including through digital technologies) was interested in investigating the everyday practices of a different group of students, she had not worked with before and finding out how those practices changed as they moved across clinical and educational contexts. Since its inception, the programme has undertaken a series

of empirical research projects working with medical students, including a current study investigating the development of reflexivity through student initiated digital technology projects in medical education and will shortly be launching a website and working paper series.

In order to interrogate our experience and how the partnership influenced our identities and research practice, we employ Holland et al's (1998) theory of identity and agency in cultural worlds. This interpretation of identity incorporates reflexivity and agency whilst also acknowledging the societal structuring and positioning that shape our identities. This is encapsulated in Holland's concept of 'figured worlds'. Drawing on theoretical constructs from Bourdieu, Vygotsky and Bakhtin, a *figured world* is proposed as 'a socially and culturally constructed realm of interpretation in which particular characters and actors are recognized, significance is assigned to certain acts, and particular outcomes are valued over others' (Holland et al., 1998, p. 52). Figured worlds are therefore social encounters in which the positions of those taking part matter, they are socially organised and located in particular times and places. Holland et al (ibid) argue that both positional and figurative identities are developed and changed through how we act in different figured worlds. A disciplinary community or even an interdisciplinary community can therefore be considered as figured worlds. Through our encounters with different figured worlds over time, we gain new or changing identities 'through continued participation in the positions defined by the social organisation of those worlds' activity' (Holland et al, 1998, p41). Furthermore it is the crossing of boundaries in themselves that are significant and how new spaces and boundary objects are created or shared (Kerosuo & Engeström, 2003). Thus our academic identities are shaped by both positionality and imagination in negotiating, adjusting to and crossing the boundaries between different disciplinary worlds.

Related to this, we employ Collins and Ferguson's (1993) concept of epistemic games to interrogate the moves, constraints, and strategies that guided the construction of knowledge as we analyse how our partnership has unfolded over time. Collins and Ferguson refer to structures that guide scientific inquiry as *epistemic forms* and the set of rules and strategies that guide inquiry as *epistemic games* (ibid, p25). Developed from Wittgenstein's ideas on language games, they see epistemic games as moves and strategies that are understood over time which are epistemic because they refer to knowledge construction and how we make sense of the world. They highlight the differences between disciplines in their conclusions 'Different disciplines are characterized by the forms and games they use. As disciplines evolve, they develop more complex and more constrained epistemic forms and games" (ibid p 40). This is helpful in understanding how disciplinary discourses, structures and cultural practices contribute to or constrain our understanding and how new interdisciplinary 'games' might develop within a different 'figured world'. Through these dual lenses, we will reflect on our evolving relationship, its research interactions and challenges and how the academic identity of each was shaped by the experience of engaging with the other in the different figured worlds of Education and Medical Education.

Students as Co-researchers: Participatory Research Methodology

In establishing the TelMe programme, we were interested in understanding and investigating students' use and practices of digital tools and technologies (in various forms) and how this influenced both formal and informal learning and studying. Earlier work (Timmis 2012) had argued that obtaining authentic accounts of how students engage with digital technologies can be very challenging because this involves continual boundary crossing between personal

and private, formal and informal, institutional and personal spaces and gives rise to many ethical concerns associated with collecting data created outside of institutional 'walls' (Timmis, 2012). This can also result in research questions that do not adequately explore the lived experience of students using digital technologies (ibid). Equally, previous work by Williams (2011) on productive pedagogical partnerships between staff and students, alongside the work of Brew (2006) on undergraduate research also contributed to our understanding of how we might develop a co-researcher methodology which also offered opportunities for students to gain benefits from the research and make an active contribution throughout the research process (Timmis & Williams 2013). Students worked with us on developing shared goals, in shaping the project and its outcomes and in dissemination in including conference presentations and contributions to papers. This was found to be very beneficial to students' own learning and studying and to give them a greater understanding of research and research methodologies (ibid). The approach is also longitudinal rather than focusing on short term 'snapshots' and seeks to influence and change practice over time. The methodology has since been taken forward by both authors in subsequent independent research studies, as well as in current plans for further interdisciplinary work.

The development of this participatory methodology, not only enabled us to address some of the challenges of researching students' lived experiences with digital technology in a more creative and ethical way, it also enabled us to put our ideas and theorising into action (Wiklund, 2015). The methodology evolved over time, as we worked in partnership with groups of student co-researchers over several projects and through joint reflections on the process, which, as with the case of our theoretical work highlighted earlier, the process and our discussions acted as shared boundary objects. In some ways, it might be argued that working at the boundaries can offer more opportunity for methodological freedom and innovation because you are not subject to the same rules and traditions and the margins can be utilized as ' sites of knowledge production and spaces for methodological and theoretical creativity' (Wiklund, 2015, p130), although there are also risks that such innovations will not be so readily accepted if or when such innovations are taken back into disciplinary communities.

Literatures, Languages and Spaces

Developing our understandings of the different literatures and traditions that we were coming from was one form of boundary crossing we have had to embrace, in particular because of the very different discourses that medical education and education embody. This has continued to be a challenge that comes through when writing papers. Williams, coming from a scientific background was used to precision in language and the use of pre-determined and previously validated scientific terms. Timmis, from the Social Sciences and Education was used to a culture of contested terminology where language is used to support theorisation which can act as a means to find one's own voice in research (Lather, 2006). Initially Williams found the language of educational research to be opaque, described as 'full of ologies' and over elaborate at times, whereas Timmis sometimes found the literature in medical education to be under theorised and over certain in its claims. Journal formats (for example very short word lengths and specific requirements for structured abstracts and contents under given headings) seem to foster this certainty. Such differences in discourses makes writing interdisciplinary papers more difficult in terms of how they are written, the focus of attention in the writing and crucially where to publish.

The role of theory in our work also began from very different starting points and emerged as a critical 'boundary object' (Kerosuo & Engeström, 2003) for developing our interdisciplinary territory and through which we also challenged the assumptions and language in use. Whilst much of the theoretical work had its starting points in technology enhanced learning and educational research, our joint theorising helped us to overcome some of the early language barriers and develop a shared repertoire, which drew on work from medical education and situated the theorising in practice contexts (see Timmis & Williams 2016). Through lengthy, open discussions of our different assumptions and struggles and the process of joint writing, we have come to understand more fully the different languages and associated values of the 'other', and how technology enhanced learning overlaps or conflicts with the disciplinary cultures. Yet, it has been more challenging to find journals sympathetic to work that is created across these particular disciplinary boundaries, as Wiklund (2015) also highlights. Ideally, we aim to publish in both medical education and education journals in order to give the work a voice in both disciplinary communities. However this has been constrained by how researchers are positioned and the kinds of epistemic forms and discourses that are valued by particular (well regarded) journals which in turn reflects how they see the disciplinary worlds they represent (Holland et al, 1998).

Wiklund (2015, p121) observes that ' in my experience it is less common for social sciences and humanities researchers to walk 'to the other side', meaning towards medical and health sciences buildings – although it happens – than it is for health science and medical researchers to cross towards the social sciences and humanities.' This highlights the spatial dimensions to interdisciplinary work. When we established the Telme programme in 2008, we worked in different buildings on the other side of the university precinct and continue to do so, one of us works in an open plan space and the other in a dedicated private office which has meant that most meetings have required the kind of walking to the other side that Wiklund suggests and it is fair to say that Williams has worn away more shoe leather over the years. Lemke (2004) suggests that space and time (which are always inextricably linked) can act as resources for learning. We found that moving between different physical and cultural environments could be stimulating and assist in developing new thinking but we also found that it could limit face-to-face contact and access to resources could be different or unequal.

Ethical Practices across Boundaries

One area, where we have faced particular challenges in developing our interdisciplinary research, concerns ethical practices and processes. The expectations of ethics committees and associated procedures are different across disciplines and in medical education these are particularly robust as they are closely aligned to medical ethics procedures. There are government and international frameworks that guide research involving human participants in health sciences in university medical research, for example in the UK, the UK Research Integrity Office guidance on human subjects (UKRIO, 2016) and more widely the World Medical Association (WMA, 2008). As the various educational research projects we have conducted have all been with medical students, it made sense for ethics approval to be given by the Faculty of Health Sciences at the University of Bristol. Given the sensitive nature and ethical challenges that many health science research projects are focusing on and which involve patients and patient data often involving children or end-of-life patients, it is not surprising that ethics approval is a thorough process ensuring the project methodology is well designed and thought through and detailed from the outset. Furthermore, medical ethical procedures are predicated on the overriding principle of *primum non nocere* (above all/first 'do no harm')' (Bond, 2012, p101). Therefore there is a strong principle of caution and risk

avoidance behind the very detailed requirements and restrictions that are set out and must be adhered to. These procedures are not differentiated for medical education; the same procedures apply (at least in our university in the UK). These are designed to ensure the majority of ethical issues and potential challenges are identified and scrutinised in advance of ethical approval, including detailed research plans, research questions, all research instruments and consent forms are required up-front. In discussing the impact of such ethical processes on the social sciences, Schrag (2011) has argued that the medical model of ethics has now permeated all ethics committees and pose particular problems for social scientists as they create a climate of improbable dangers and over estimate potential risks, thus hampering the ability of researchers to carry out their work. Bond (2012) further argues compliance to the authority of ethics committees does not guarantee ethical commitment or engagement. Furthermore, we found that implicit in such requirements is the assumption that research designs are fixed in advance and will not change. With qualitative and in particular participatory or co-designed research, this is far from likely or desirable and as Tracy and Carmichael (2010) note, the process of the research is likely to go far beyond initial plans set out in an ethics application.

For example, in designing the various research projects, we have found that the practice of informed consent was rather different in the two disciplinary communities. In medical education research, there is an expectation that informed consent means that full details of all communications and research instruments (i.e. letters, consent forms, interview questions, observation schedules, survey questions) must be set in in advance without any deviation from what has been proposed, whereas in Education and the social sciences, whilst robust procedures for informed consent are required, there is more emphasis on the potential for change and on-going reflexivity. Consent forms in medical education have to make it more explicit that participation will have no bearing on educational progress or attainment for students taking part. This was even more challenging, when inviting students to act as co-researchers where students would not be positioned so strongly as participants and where they were being asked to take an active role in the research and for which they should be acknowledged and given credit in some form. Furthermore, in the most recent ethics application we were asked to make changes to our research instruments because we had a research question that included the word 'cultural' as in *'What institutional and cultural factors influence the development of productive reflection?'* which did not appear specifically in the interview questions we had provided This requirement to change suggests an expectation of literal mapping between research questions and what is to be asked in interviews and in our view, an over stretching of the boundaries of the ethics committee remit into the realms of influencing or controlling the research aims and design.

Discussion

The following sections now discuss some of the central themes emerging from the exploration of the TelMe partnership.

Identities and Boundary Crossings

Whilst much research on interdisciplinarity has focused on larger teams (e.g Tracy & Carmichael, 2010; Wiklund 2012) established to support a specific funded research project, ours was a 'bottom up' partnership, established to address our aspirations to work together. Understandably, this suggests a prior commitment and mutual trust, which has sustained the partnership for six years. However, we have highlighted earlier that, despite our prior shared

experience in the cross cutting area of technology enhanced learning, the different discourses and expectations of language in use between medical education and educational research were initially problematic and lead to some confusions and misunderstandings. Nevertheless over time, discourse has become a boundary object, acting a means of challenging our backgrounds and expectations. Glaveanu (2011) argues that shared language and symbolization are important in creating shared space but also emphasises paying attention to differences and the contribution of each co-workers' knowledge fields. Therefore it is not about ignoring one's background and history and different disciplinary discourses in use but findings ways to acknowledge and bring language complexities to the fore. Holland et al (1998) argue that identity is not fixed, nor a set of clothes to be put on. Rather, it is how we act in encountering new 'figured' worlds that influences our identities and that rather than seeing identity in essentialist terms, we should consider identity as the 'self in practice' (ibid, p.31).

Discourse or specifically how language is used differently in different contexts (Bakhtin & McGee, 1986) can be considered a key part of identity making and influence on how we, in this partnership have worked in challenging differences and joint theorising. Further to this, working with different literatures and publishing traditions allowed us to examine the different positioning of researchers in the two disciplinary figured worlds and to jointly work out how to overcome or resist the expectations of research in the two domains. It also helped us to find our own ways of making our work visible in a joint space, through developing our own website and working paper series (see URL removed for anonymity). Holland et al (1998) see these kinds of improvisations as critical to how we form our identities and how identities can change and resist the positions that a particular world assigns to us. Therefore it might be argued that interdisciplinarity and researching education across disciplinary boundaries demands resistance as well as adaptations of identity but it is through such struggles that strategies and creative thinking emerge and shared epistemic games and discourses can be constructed (Collins & Ferguson, 1993).

Sites of Knowledge and Creativity

We have shown how engagement in our longitudinal interdisciplinary partnership has supported new theoretical thinking and practices to emerge, recognising differences and improvising to address challenges. It could therefore be argued that new sites of knowledge opened up between the disciplines which were both productive and creative (Wiklund, 2012), providing a 'third space' 'in which alternative and competing discourses and positionings transform conflict and difference into rich zones of collaboration and learning' (Gutierrez et al 1999, p286 - 287). Such spaces, as in our case, can therefore provide opportunities to examine differences in language, theorising, methodology and the practice of research and to create new possibilities as result. Lather also highlights the possibilities that emerge in what she refers to as 'stuck places', arguing for multiple ways of doing educational research:

 "in terms of finding our way into a less comfortable social science full of stuck places and difficult philosophical issues of truth, interpretation and responsibility. Neither reconciliation nor paradigm war, this is about thinking difference differently, a reappropriation of contradictory available scripts to create alternative practices of research as a site of being and becoming" (2006, p52).

Whilst not referring specifically to interdisciplinary work, this seems to acknowledge that 'thinking difference differently' is incredibly important to both researcher identities and the

quality of research produced. In our partnership, the differences between us became useful epistemic games and improvisations for generating new theoretical and methodological knowledge. Through these strategies, a collaborative and shared identity was then made possible. However Wiklund (2015) warns that there is also potential for such spaces to become a kind of 'no-man's land' where you operate outside of accepted cultural norms and practice, for example as we found in the difficulties of publishing and the methodological and theoretical limitations which we have experienced in some peer reviews of our papers. This suggests that more could be done to highlight the difficulties experienced and to call for a more open dialogue with publishers and other bodies (for example research assessment or governance organisations).

It is also worth considering what contribution this kind of interdisciplinary boundary crossing and working in third spaces makes to methodology and methods. Gunnarsson (2006) suggests that through interdisciplinary projects, external validity and social robustness in research can be improved by the grounding and added contextualisation of different methodologies. By bringing together our disciplinary backgrounds and prior knowledge, together with our existing expertise and shared understandings of technology enhanced learning methodologies, we have expanded our ethical mindfulness and helped us to create alternative forms of dissemination and mechanisms for giving voice to our research. Most importantly, we were able to develop a more targeted and contextually relevant co-researcher methodology.

Ethical and Structural Constraints

The ethical challenges and differences in ethical process and practices outlined in our account above also offered an opportunity for new understandings to emerge by jointly engaging in the ethical processes of the two disciplines. Tracy & Carmichael (2010) highlight how key ethical tenets such as 'confidentiality' might have different meanings in an interdisciplinary team and how this can lead to expanded understandings. Whilst confidentiality and informed consent did not appear to have very different meanings in our case, the expectations of how the consent process was enacted influenced both its form and conduct which need to be adapted to suit in particular the more rigid expectations of medical education and this challenged and deepened our views of what it means to be ethical researchers.

However, in our case, differences in interpretations within the team were not as influential on how we acted as the strongly framed structures that it was necessary to engage in and the different socio-political positioning of ethics in the two disciplinary areas. This was one area where it was necessary in our partnership to 'play the game' and respond to the additional requirements in the Health Sciences Faculty process, despite concerns about the validity and necessity of such requests and the lack of attention paid to the interdisciplinary context of the research. Schrag (2011) has suggested that Social Sciences are already far too heavily influenced by a medical model of ethical processes and practices and there is often an imbalance in responsibility between reviewer and reviewee and no right of reply. However Bond (2012) argues that although there are problems with ethical review processes, the importance of how these provide a warrant for a relationship of trust between scientists and society should be recognised. Nevertheless, Bond (2012) acknowledges that difficulties are more likely to arise 'when social scientists are reviewed by panels more used to biomedical research or quantitative research and misapply these expectations to qualitative research' (ibid, p111). Lather (2006, p.51-52) argues that 'standards and practices grounded in the philosophical assumptions of logical positivism are not appropriate for paradigms based on epistemic indeterminancy' and this, we suggest is a particular challenge for interdisciplinary

partnerships in managing ethical procedures in research designed to break new ground and deliberately cross epistemological and methodological boundaries. This required careful negotiation to ensure that we could comply with requirements whilst remaining methodologically consistent. Nevertheless, understanding ethical practices in other disciplines and how the wider debates and motivations can contribute to deeper ethical engagement. However, it seems clear that ethical policy and practice needs to acknowledge interdisciplinarity more directly and offer more guidance on overcoming the conflicts in ethical procedures across different disciplines, without constraining methodological diversity.

There are also wider political and structural constraints on expanding 'bottom up' interdisciplinary research programmes beyond local partnership models such as our own, through, for example the ways in which internally funded research partnerships are supported and valorised. In universities, particularly those that are research intensive, structural boundaries between academic schools and faculties are often well defined and inflexible, leading to tribes and territories (Trowler et al, 2012) which makes collaboration more challenging. In our own institution, financial and research support systems and expertise tend to be faculty specific and not set up to work across those boundaries, this is particularly challenging with joint funding applications and sharing financial resources and gaining joint recognition, for example in how such projects are identified and recorded. Furthermore, research accountability mechanisms such as the UK's Research Excellence Framework are still very limited in their capacity to adequately encourage, value or reward interdisciplinary research (Stern, 2016; Gewin 2014). This in turn drives institutions and individual researchers to continue to focus on disciplinary communities as the primary locus for research excellence, despite this being recognised as a barrier to the kinds of interdisciplinary research and larger research collaborations that are thought desirable both nationally and internationally (see for example the recently established Newton Fund[2])(Stern 2016).

Conclusions

We suggest that this paper has offered policy, practice and theoretical contributions towards understandings of interdisciplinary research. To conclude we offer our suggestions on policy and practice implications, followed by some theoretical insights as starting points for further discussion. Despite the political and structural challenges discussed above, we suggest that the partnerships such as our own can generate more targeted and creative research designs, as well as informing more diverse educational practices, in this case in medical education. Williams found that the partnership has also offered a renewed focus on students as the object of study in research and more confidence in embracing educational and social science theories, whilst Timmis found medical education and medical ethics challenged her preconceptions and expanded her knowledge of disciplinary contexts. For both authors, inhabiting an interdisciplinary 'in between' space has strengthened alternative perspectives on understanding the experience of medical students towards a more heterogeneous understanding of student learning and the resultant influence on the design and evaluation of innovation programmes in higher education. In seeking to establish similar interdisciplinary partnerships, it may be helpful to ensure that time is planned in for understanding each other's disciplinary communities through attending conferences, events, and reviewing literature thereby learning to 'walk to the other side' (Wiklund, 2015) in order to understand the

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[2] http://www.newtonfund.ac.uk

epistemic practices and sites of knowledge that other partners have come from. We would further argue, that discussing and resolving the differences and misunderstandings that arise in the language and the shared problem of cross boundary ethics are identity making practices which challenge both individuals and the disciplinary established norms and positions and through which new figured worlds at the boundaries can be established (Holland et al, 1998).

As discussed earlier, there is a need for more open dialogue on interdisciplinarity issues with governance, research evaluation and publishing organisations, which goes beyond high level aspirations, towards more practical discussions with researchers from different disciplines to ensure that issues of theory, methodology and discourse are explored and debated. Exploring ways to reward and acknowledge interdisciplinary partnerships also needs to more serious discussion and affirmative action (Van Noorden, 2015). Furthermore, we highlighted that ethical policy and practices within institutions and at a policy level, should acknowledge the challenges of interdisciplinarity in relation to ethics more directly and offer more guidance on overcoming the conflicts in ethical procedures across different disciplines, without constraining methodological diversity.

We also argue that interdisciplinarity has the potential to increase methodological validity and creativity. Gunnarsson (2006) suggests that external validity and social robustness are improved by the grounding and added contextualisation of working with different methodologies. Additionally, the scrutinising, interpreting and challenging of methods and theory that are necessitated when these are introduced as boundary objects in 'in-between' figured worlds (Holland et al, 1998) and the necessity for methodological choices to be recontextualised or adjusted implies that research validity is likely to be enhanced. Through these encounters, interdisciplinary partnerships also have the potential to contribute to methodological diversity and improved validity in each of the disciplinary communities from which they emerge or are associated with.

Holland's concept of identity as self in practice (Holland et al, 1998) helps to highlight how identities are not fixed or boundaried but enacted through our participation in new or changing figured worlds. For Holland, identities are always changing, produced through our engagement in resisting and adapting to the positions we encounter and through our creative improvisations and agency in seeking ways to overcome the challenges of social organisation we face (ibid). Crossing boundaries between figured worlds involves identifying boundary objects that must be negotiated and shared (Kerosuo & Engeström, 2003). We argue that interdisciplinary partnerships have to construct new 'in between' figured worlds in which discourse, theoretical constructs, methodologies and ethical processes become boundary objects through which contradictions can be acknowledged and then re-created as alternative research practices and new sites of knowledge. Working with boundary objects and through the 'stuck places'(Lather, 2006) therefore helps to develop the necessary collaborative identities and improvisations for interdisciplinary working.

Furthermore the process of improvisation to overcome the boundary crossing challenges, such as those identified in this paper are necessarily creative practices that require the agency of all actors. Finally, we suggest that the discourse of interdisciplinarity might itself be understood as a boundary object as necessitates improvisation and therefore is always a matter of negotiation, creativity and collaboration.

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