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ENCOURAGING INTERDISCIPLINARY COLLABORATION: A STUDY OF ENABLERS AND INHIBITORS ACROSS SILOS IN HIGHER EDUCATION

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Abstract

Within UK Higher Education Institutions (HEIs) there is evidence of limited interdisciplinary communication and engagement (Macfarlane, 2006). The focus on discipline-based working practices has created a lack of awareness regarding research taking place elsewhere that may overlap with or bolster work being undertaken by the researcher (Bess & Dee, 2012). Teams that work across discipline-based boundaries acknowledge their differences and work to build trust through finding the strengths in researcher differences, and in so doing are more likely to succeed in collaboration (Johnston et al, 2011). This article builds upon the work of Siemens et al (2014) who developed a model for effective interdisciplinary collaboration. The research looked at the impact of, and engagement with, interdisciplinary collaboration on individual researchers and their differing needs. Through identifying the enablers and inhibitors of interdisciplinary activities in addition to the different needs and approaches of researchers at different stages of their careers, a framework for best practice has been developed.

Keywords: Interdisciplinary; collaboration; silos; Higher Education

INTRODUCTION

Within UK Higher Education Institutions (HEIs), there is evidence of discipline-focused funding and an increase in specialist journals which limits the flow of

interdisciplinary communication and engagement (Macfarlane, 2006). Whilst discipline-focused funding has benefited many researchers through both competition and subject focus, it has also acted to further increase the divide between disciplines and limit potential interdisciplinary collaboration opportunities. Within Higher Education (HE) there is a need to specialise in an area of study; we cannot be experts in all subjects (Senge, 2010). However, by becoming too focused on one subject, these discipline-focused working practices have created a lack of awareness regarding research taking place elsewhere that may overlap with or bolster work being undertaken by the researcher (Bess & Dee, 2012).

Teams that acknowledge their differences and work to build trust through finding the strengths in researcher differences are more likely to succeed in interdisciplinary collaboration (Johnston et al., 2011). In 2014 Siemens et al. developed a model for effective interdisciplinary collaboration. The model compares two dimensions: the level of disciplinary difference and the equity of academic control by each individual. The premise of the model was to provide a mechanism for understanding factors that enable interdisciplinary co-creation, to enhance the desire for this approach. The model highlights the need to identify the degree of difference between disciplines and the level of control for each researcher. In doing so, a balance can be found that is mutually beneficial for all researchers involved in the co-creation, leading to improved team interactions and working practices.

RESEARCH FOCUS

This research sought to identify factors that can enable or inhibit interdisciplinary collaboration within an HEI in order to seek methods in which to enable increased interdisciplinary activity. By building upon the work of Siemens et al (2014) it is the aim of this research to provide a framework of best practice approaches and enablers

as well as the identification of potential inhibitors with a focus on the needs of the individuals.

Different disciplines are fundamental for the success of a HEI, but these differences can create conflicts relating to organisation and prioritisation, which leads to miscommunication and negative interactions. Whilst research has been undertaken to look at collaboration, little appears to have been undertaken which focuses on how researchers can effectively connect in order to undertake collaboration, especially across disciplines, and how, once in place, the different experiences and demands of the individuals involved can affect this experience.

It is the intention of this research to help fill the gap in the understanding of why researchers struggle to engage with interdisciplinary collaboration. The developed best practice framework can then be used within HEIs to further encourage and enable interdisciplinary collaboration with a focus on the individual researchers involved.

DISCIPLINES WITHIN HIGHER EDUCATION

Within Higher Education, disciplines can vary enormously and are so different from one another that it can be difficult to identify one clear definition that covers them all. For HE, the most relevant explanation for a discipline would be one such as that outlined by Krishnan (2009), who describes discipline as “a form of specific and rigorous scientific training that will turn out practitioners who have been ‘disciplined by their discipline’ for their own good” (p. 8). This use of the concept of discipline allows an institution to organise its learning and production of knowledge with a systematic approach that splits management and leadership across a number of areas. This divisional structure has benefits in that it separates the faculties into their own separate sub-structures in which they can focus on their own disciplines and develop working practices and policies that suit their individual needs. However,

in doing so this compartmentalises disciplines and complicates interdisciplinary activities due to the potentially conflicting priorities and demands of the different stakeholders involved.

Kurland et al. (2010) suggest that within a university, staff members are narrowly focused on their disciplines and not aware of work taking place around them. This leads to difficulties in communicating across the disciplines, creating bias/distortion of the message. Bui and Baruch (2010) agree that the way universities are broken down into subject disciplines "creates a false impression that the real world is divided into fragmented parts" (p. 231). A study conducted by O'Brien and Guiney (2018) highlighted that whilst staff put high emphasis on the importance of working relationships, other disciplines within an institution are given less priority than those with which one has an immediate interaction. This can lead to the development of barriers, inhibiting co-creation across disciplines.

INTERDISCIPLINARY COLLABORATION

Collaboration is a process in which different parties are involved in the design, knowledge sharing, and production, as well as feedback, of a project. Within academia this generally means (but is not limited to) co-creation of a piece of research by multiple researchers. Interdisciplinary collaboration comes when this piece of research is carried out by researchers from different disciplines and subject backgrounds (Dollinger et al., 2018). For example, a journal article discussing the impact of Covid-19 on the sports industry could be co-created by researchers from disciplines including sport management, economics, health studies, and strategic management.

The importance of collaboration is discussed by Gibbert et al. (2002) who found that knowledge-sharing practices allowed for improved predictions of future market

opportunities, improved processes, and created more value for the institution, as it 'casts a wider net'. This is in agreement with the work of Siemens et al. (2014) who discuss that Interdisciplinary co-creation works best when the individuals take the time to identify a common ground with regards to methodology, research approaches, language, etc. Sharing best practice requires flexibility and a desire from everyone to make it work.

A study conducted by Trust et al. (2017) demonstrated that staff saw a positive impact on their professional practices with their engagement in collaboration across disciplines. This was further supported by Gee (2012) who discussed that removing barriers allows for knowledge to be distributed, highlighting individual expertise and creating a more positive working environment. To facilitate the removal of barriers, the effective use of communication across disciplines is essential. Leimer (2009) asserted that information does not filter through an organisation if the information being communicated does not appear to add value to the individual's daily work. It is therefore necessary to assess the different ways in which the same information may need to be shared, depending on the audience.

ENABLERS AND BENEFITS OF INTERDISCIPLINARY COLLABORATION

An article by Nameth and Wheeler (2018) discussed their experiences of working across their two disciplines to produce research. They identified three underlying assumptions that were integral enablers of their successful partnership: being ready for learning, having a commitment to collaborative learning, and seeing each other as peers. This work identified that it was essential to ensure that the co-creation was equally mutually beneficial, thereby respecting one another's areas of expertise (Eisler, 2010) and using their own knowledge brought from their separate disciplines to act as a critical friend. This would meet Siemens et al.'s (2014) highest level of interdisciplinary co-creation success, in which shared control in different disciplines leads to increased creativity. Due to their shared control and mutual respect,

Nameth and Wheeler (2018) were able to act as critical friends, allowing them to ask for further explanations within different areas of the work, helping to define pedagogical practice (Nameth & Wheeler, 2018).

Interdisciplinary collaboration can build a sense of greater equity and provide early career researchers (ECRs) with valuable mentoring and role models (Burroughs, 2017). Collaboration allows individuals who might not otherwise be able to conduct new research the support and development they need (Johnston et al., 2011). The European Research Council now offers grants for "proposals of an interdisciplinary nature which cross the boundaries between different fields of research" (ERC, 2011, p. 12). Interdisciplinary co-creation has the potential for facilitating breakthroughs in knowledge and understanding and fosters innovation (Yegros-Yegros et al., 2015).

INHIBITORS AND LIMITATIONS OF INTERDISCIPLINARY COLLABORATION

Coordination of interdisciplinary collaboration can often be an issue. This can be due to a lack of a common academic language shared meanings, and communication, as discussed by Siemens et al (2014). There is also an increase in demand on the resources to manage the research across disciplines, departments, and faculties. Research on the costs of interdisciplinary collaboration highlighted issues including poor career structures for academic interdisciplinary researchers within faculty-based departments, as well as low self-esteem of researchers (Millar, 2013). Additionally, Yegros-Yegros et al. (2015), state that high-ranking journals discriminated against research in which the focus of the journal was not the main discipline discussed within an article. This contention is supported by Levitt and Thelwal (2008), who found that the number of citations of multidisciplinary journals (those related to more than one disciplinary category in the database) were roughly 50% less than single-disciplinary journals.

Higher Education is a highly specialised and competitive environment, which can often cause a sense of isolation that prevents the growth of staff and the development of collaborative working practices (Trust et al., 2017). This sense of isolation is compounded by feedback that discusses how promotion opportunities are based on personal performance, often seemingly encouraging an inward-focused approach to working (O'Brien & Guiney, 2018). This isolation then further limits an individual's opportunities to develop their own expertise by learning from and collaborating with others.

EMERGING ISSUES

In summary, within HE, a discipline is viewed as a specific area of training and research that allows an institution (and the wider HE environment) to organise its learning and research in a systematic manner. In doing so, silos of knowledge and working practices are created that can lead to the isolation of disciplines from one another. However, when academic researchers do work across boundaries/silos, the literature suggests that the resulting work can be more innovative than those focused within one discipline.

The literature also suggests that whilst there are clear benefits to mentoring and working with peers, within these discipline-based silos there is an imbalance of academic control based on hierarchy, specifically seen between ECRs and the professoriate. This imbalance is further exacerbated by a lack of communication and networking opportunities with others outside one's own discipline.

RESEARCH STRATEGY

The research strategy, for this paper, was a qualitative case study seeking to determine factors that enable or inhibit interdisciplinary collaboration among academic researchers, in order to identify best practices. A triangulation method

was used to test the validity of multiple sources of data for this research, related to experiences of interdisciplinary collaboration within a post-1992 HEI (Carter et al., 2014).

DATA COLLECTION

The method of data collection was qualitative through a combination of interviews and a focus group using a stratified sampling approach. Due to the current quarantine measures for COVID-19 the interviews were held via online resources such as Zoom and Skype. A similar format was used for the focus group.

Synchronous online interviews allowed for spontaneity and a semi-structured interview approach combining a structured approach of pre-planned questions whilst allowing for flexibility if the participant raised a point of interest not covered by the questions in place (Salmons, 2011). The triangulation method of carrying out interviews across a range of roles and academic grades has ensured that a wider picture of the factors enabling and inhibiting interdisciplinary collaboration across disciplines within the HEI have been identified, and has also allowed for testing of the validity of reoccurring themes and responses.

Academic staff from within the following roles were interviewed in order to gather the stratified sample across the HEI; senior leadership role, programme leadership, academic researchers who had not held a line management role (i.e. a role in which they managed other academic staff within a department), academic researchers who had previously held a line management role managing other academic staff within a department, and ECRs.

In addition to a series of interviews, focus groups were also scheduled. Initially the focus groups were split into two groups: Focus Group 1 – academic staff members in Lecturer and Senior Lecturer positions who do not hold leadership or employee line

management roles, and Focus Group 2 – academic staff members (Principal Academic, Associate Professor and Professoriate positions) who hold leadership roles.

The focus groups explored the experiences and opinions of academic staff who work within defined disciplines. The questions and discussions were used to draw out the individuals' personal experiences of inhibitors and enablers of interdisciplinary collaboration. Through this line of enquiry, methods for encouraging interdisciplinary collaboration were gathered which were then used to build upon the work of Siemens et al. (2014).

Due to a number of issues and complications facing HE staff during the COVID-19 restrictions, one of the two focus groups had to be disbanded. In order to still gather a rich and diverse level of data, those attending that focus group were instead interviewed at times convenient to them using the methods outlined above.

FRAMEWORK FOR DATA ANALYSIS

In order to ensure a robust framework of analysis for this research, NVivo software was utilised to assist with coding and analysing the data. The value of this approach is that it allows the data collected to be coded via reoccurring themes, and provides insight into the development of the interdisciplinary co-creation framework. This approach also allows for continuous and flexible analysis of the data throughout the collection period and write-up.

The framework for data analysis comprises five key stages (Hackett & Strickland, 2019):

- Familiarisation through transcription and noting key themes.
- Constructing a thematic framework through a review of the themes and key topics that emerged. This framework is then used as a system of coding.

- Indexing and sorting responses using the coding system via NVivo software.
- Data summary and display via a table identifying overall themes and related feedback. This allows for an overview of responses making it easier to determine patterns and compare responses for each theme.
- Mapping and interpretation through use of the data table and the coding undertaken using NVivo. This allows a researcher to select relevant excerpts and quotes to explain emerging themes and identify responses that are in direct contrast with one another (providing an opportunity for further analysis to explain such differences).

RESEARCH LIMITATIONS

When conducting multiple interviews and focus groups there is a danger that the researcher will develop a collective narrative of the information provided, and can overlook individual narratives that may differ. To mitigate this danger, it was essential that whilst looking for overall themes, weight is still given to the differences which occur within each narrative (Stewart et al, 2007). Additionally, there is potential for an interview to produce contrived data, suiting the needs of the interviewee rather than being a true representation (Charmaz & Bryant, 2011). Through the collection of multiple interview data sources, this potential issue can be mitigated as the breadth of data gathered highlights any potential outliers.

A potential limitation for data gathered through focus groups is that the demographic of a focus group does not always represent the full demographic of the wider population, as there may be an imbalance of grades/roles represented (Stewart et al., 2007). To minimise this, the focus groups were arranged dependent on current academic gradings within the HEI. One focus group contained academic staff from grades 6 to 8. The second focus group contained academic staff from grades 9

upwards who held one or more forms of employee management and leadership position. In reporting the data, each interviewee will be referred to as Academic 1, Academic 2, etc., to ensure anonymity.

BENEFITS OF INTERDISCIPLINARY COLLABORATION

All those interviewed identified benefits to interdisciplinary collaboration. Four themes emerged from the responses:

- **Interdisciplinary collaboration increases output**. This can be due to additional funding opportunities, a higher number of potential publication sources, and the dividing of workloads, which saves time.
- **Interdisciplinary collaboration increases researchers' knowledge** through the use of different theories and methodologies applied to similar subjects and through learning about new subjects.

- **Interdisciplinary collaboration makes the work more innovative,** as it brings together a host of ideas and complementary knowledge to expand on the subject matter. Academic 4 stated, "Working across disciplines is successful as it brings together different ideas on the same subject matter. They are linked but can be approached very differently dependent on discipline and so we all learn from one another."

- There is an **awareness that no discipline can work in isolation** as they are all interlinked. Academic 3 noted that "You cannot work in silos, everything is joined." Focus Group Attendee 2 agreed, noting in relation to their own discipline, "Marketing cannot be studied in isolation. Brands links to psychology (perceptions etc) as well as economics."

All of those interviewed saw a number of benefits in interdisciplinary co-creation. Each interviewee had produced research individually but also as part of a team of interdisciplinary researchers, and so had first-hand experience with both approaches. Academic 2's response was an interesting exception to the otherwise similar responses received. Academic 2 commented that "It (interdisciplinary collaboration) can be forced and doesn't always fit - disciplines emerged to deal with different issues".

Whilst disciplines by definition are created in order to focus on separate issues/subject matters, Academic 3 highlighted that no subject or activity happens in isolation. Whether it is overt or not, disciplines and their associated research have implications that reach across discipline-based boundaries. This is supported by studies conducted by Crane (2010), who stated that "communication between cultural fields within … disciplines occurs because of a set of free-floating paradigms or theoretical frameworks that all these disciplines share in varying degrees" (p. 4).

LIMITATIONS OF INTERDISCIPLINARY COLLABORATION

As with the identified benefits, the limitations of interdisciplinary collaboration responses come under four main emerging themes:

- **Reputational damage** from not remaining 'pure' to your discipline, as noted by both Academic 1 and Programme Leader, who commented that "During an interview for a promotion I was advised not to spread myself too thin and to focus on my own research discipline."

- **Lack of autonomy**. Some interviewees felt that when working as part of a research team they did not have full control or ownership of the material, which

can impact the direction and outcome of the work in a way that they did not want.

- The **competitive nature** of academia.

- Members of a research team **taking credit for the work of others,** further defined as a power distance between ECRs and the Professoriate.

These themes can be further grouped into two areas: remaining 'pure' to a discipline, and the power struggle around autonomy and hierarchy. The apparent fear is that due to the competitive nature of academia and the discipline-focused approach of a number of prominent journals, coupled with the need for regular quality publications, researchers are nervous to step outside of their discipline for fear of not meeting the needs and demands of their role (Macfarlane, 2006). This sentiment is agreed upon by Klein (2009), who states that traditional 'disciplinarians' seek to remain faithful to their discipline; those who seek to work in an interdisciplinary approach are turned from specialists within their fields into generalists who are not held in the same regard as someone who remains faithful to their discipline. From the data gathered, it is clear that whilst there is rhetoric from the HEI promoting interdisciplinary collaboration, this approach is not enabled nor actively promoted, allowing the ongoing mistrust of stepping outside one's discipline to continue unchecked. As Academic 1 stated, "The University encourages co-creation but does not facilitate. The HEI strategy is measured at individual level." and therefore does not acknowledge the value of co-created efforts. Focus Group Attendee 3 commented that recognition of work undertaken is only awarded to a project lead and not to other members of the co-creation team, further exacerbating the issue of competition between staff, driven by the need to have their own name as lead researcher.

The second, wider theme of perceived power struggles in interdisciplinary collaboration either based on the need for autonomy or due to hierarchical

influences (for example, research conducted by ECRs and members of the Professoriate) was most significantly noted by ECRs interviewed. This is likely because they are the individuals who feel the negative aspects of this approach, whereas the more senior staff may have reached a position within their careers when power struggles are no longer a concern for them individually. Power struggle is theorised by Hofstede (1991) within his Power Distance Theory, which is defined as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (p. 28). Thus, as ECRs are perceived as being less 'powerful' within the hierarchy of a HEI, they are the individuals who believe in and experience this inequality, whereas more senior staff will not identify with this divide. The idea that ECRs believe that they are less powerful than senior staff/the Professoriate is summed up by the Programme Leaders' comments during the interview in which they stated, "You have to manage egos, especially for senior staff working with junior staff such as a Professor working with an ECR. Often as an ECR you feel you have to accept what the Professor says". Spendlove (2007) discusses how those who undertake a career in academic are advised from an early stage to question everything. It is clear that work in this area needs to be undertaken to encourage and empower ECRs to question more senior staff and to encourage senior staff to enable ECRs to question without fear of reprisal. In this way the power distance can be reduced, and work carried out in a more collegiate manner.

ENABLERS OF INTERDISCIPLINARY COLLABORATION

Each of the HEI researchers interviewed were able to suggest enablers which they believed would encourage and enable collaboration. Unlike the inhibitors, the suggested enablers were not separated by hierarchy/power distance. It is interesting to note that the same enablers were suggested by staff with varying levels of experience and management responsibility. This speaks for the value placed on the

interpersonal nature of all of the suggested enablers. These suggestions came under three emerging themes, all of which focused on the importance of developing a sense of community and collegiality. Those themes were:

- **Informal networking and social activities**. Both internal and external forms of networking were recommended by all interviewees and focus group members.

- **Line managers enabling interdisciplinary collaboration** through mentoring, sign posting and goal setting.

- **Communications**.

When looking at informal/social opportunities Jameson (2012), discusses how, within HE, there are many examples of “critical corridor talk” (pg 2). This ‘space’ provides opportunities for staff to discuss topics and issues informally amongst themselves. These informal and social conversations are opportunities to swap ideas and share best practice approaches. Academic 2 discussed how they felt that collaboration should happen organically though social interactions and informal networking; "A lot of people are more productive with people they meet through conferences via the social events that are organised. These are important parts of conferences and shouldn’t be overlooked." The benefit of social interactions was also noted by Focus Group member 3 who commented, “The most successful people have the best parties. Networking and relationships are key, you have to invest time in developing networks and find who you can work with. You need access to opportunities.”

This critical corridor talk is where we can begin to move beyond the silos of disciplines and make the outcomes and ideas that emerge real. These networks can encourage staff to connect with others and collaborate. Critical corridor talk can be in a virtual or physical network. A growing body of research suggests that critical corridor talk, as a form of networking, is an important part of maintaining a sense of

wellbeing within a constantly changing and scrutinised environment such as HE (Bryman, 2007).

Line managers who empower their staff are essential when encouraging interdisciplinary collaboration. In instances when there appears to be a power distance/hierarchical issue for researchers, line managers are critical for enabling staff through signposting, offering mentoring (or enabling mentoring elsewhere), and goal setting. Leimer (2009) states that "institutional research professionals can contribute to institutional goals, even transformation, by helping to foster a broader organizational view, operating as a connector and facilitator of collaboration, and stimulating organizational learning" (p. 86). A line manager as a connector is essential for staff who are in the early stages of their career and so are feeling the power distance. Academic 4 noted that the "Deputy Head of Research encouraged me to speak to the professoriate during a professoriate away day and discuss what it is that ECRs need in order to collaborate with them successfully. This was a positive shift as it gave the ECRs a voice." This positive leadership approach enabled Academic 4 (an ECR) to break down the power distance in a positive and constructive manner. A successful HEI is built on its actions, knowledge, values, and ideas as a collective. The goal of line mangers should therefore be to remove any barriers that hinder individuals and teams from taking appropriate action (Finch et al., 2010).

Lastly, responsive and effective use of clear and open communication strategies across disciplines is essential to facilitate and enhance collaboration and ensuring that barriers remain down. This includes giving feedback and encouraging the sharing of ideas and opinions to enable staff members to work collaboratively and ensure coordination and consensus-based decision making across silos in addition to a shared accountability (Beltran & Miller, 2019).

INHIBITORS OF INTERDISCIPLINARY COLLABORATION

Each researcher interviewed identified a number of potential inhibitors of interdisciplinary collaboration. These responses can be grouped into three themes:

- Hierarchy
- Lack of communication
- Departmental silos

The power distance perceived by staff, especially ECRs, plays a large part in inhibiting interdisciplinary collaboration. The feedback gathered from the ECRs interviewed showed a belief that early in a researcher's career it is expected that they will work with their supervisory team and professoriate, with an understanding that the senior researcher will be the one to receive the acknowledgements and benefits of the work produced, even if, as discussed by a number of those interviewed, the ECR is the individual who completes the majority of the work. One of the ECRs interviewed commented that "Sometimes people take advantage of you and so the research benefits them and not you, especially earlier in your career." This perceived inability to question a more senior researcher appears to go against what, in HE, is often seen as a general rule of thumb, in which academics are encouraged to constantly question (Spendlove, 2007). Through senior researchers not encouraging more junior members to question, debate, and argue their points, and failing to ensure a fair distribution of credit and acknowledgement of work undertaken, it would seem that they are failing to allow the ECRs to grow and develop. Rather than maintaining this hierarchical approach, it would be more beneficial for all involved if senior researchers were to act as mentors, encouraging questioning and debate, and seek to ensure a fair acknowledgement of work undertaken by the various team members. This approach has been shown by many to encourage innovation and improved outputs, and so the lack of mentorship for ECRs is a missed opportunity for the HEI (Schweizer & He, 2018).

Another significant inhibitor identified by the majority of those interviewed was a lack of communication from the HEI. This led to conflicting messages being communicated at different levels; for example, Academic 4 noted that they were aware that the University's "Senior Leadership Team (SLT) promote it (interdisciplinary collaboration) and people on the ground want to do it but middle management gets in the way." This lack of clear communication was reflected in comments such as that by the Programme Leader, who noted, "My Supervisor advised me to stick with the people you know and who compliment your work and don't worry about looking to find new people to work with," which is in direct opposition to the communication from the SLT who have embedded interdisciplinary co-creation within the university strategy. Collaborating to meet university and strategic initiatives and goals is not a new concept; however, if this is not being clearly communicated through all levels then the HEI is failing to enable staff to meet its own strategic priorities, setting itself up to fail (Dishman & Stephan, 2019). The most notable way in which this lack of communication seems to be happening within the HEI is that there is no clearly identified networking and social interaction opportunities. In fact, of all those interviewed, only Academic 5 stated that they were aware of university-managed networking opportunities. This would indicate that although opportunities have been put in place, the fact that no other interviewee was aware of these opportunities would be due to a lack of communication, and so the majority of researchers have been unable to take up these opportunities.

Lastly, all interviewees discussed how there is an expectation from some, especially those in management at the departmental level, that researchers should focus on working within their own disciplines and departments and not look to undertake interdisciplinary collaboration for fear of not remaining 'pure.' Whilst this belief was not a formal institutional approach, for some it was a clearly communicated recommendation from their line managers and supervisors. From the research

conducted, it can be asserted that this siloed approach to research is due to two main reasons. The first is that research success is measured at departmental and individual levels within the HEI, so staff will be discouraged from activities which could reduce the success of the department. Secondly, traditional views of academic research often indicate feelings of superiority within one's own discipline when viewing that of another (Klein, 2009). Focus Group Attendee 3 stated that from a 32-year career in academia, they believe that "academia is not generally interdisciplinary, it takes a classic western approach to enquiry which is reductionism."

Kezar and Eckel (2002) assert that it is difficult for staff members to engage in a new approach unless it is made meaningful to them. HEIs therefore need to build compelling stories or cases for why interdisciplinary collaboration is important. HEIs should also work to identify organisational practices that block interdisciplinary collaboration, such as lack of professional acknowledgement for all members of team-based research, and remove them (Eisenberg et al., 2015),

A FRAMEWORK FOR INTERDISCIPLINARY COLLABORATION

From analysis of the data collected, in combination with the relevant literature, a number of themes have emerged in relation to enablers and inhibitors of collaboration which seek to progress the work of Siemens et al. (2014), which focused on only two aspects of interdisciplinary co-creation. Through assessing these themes, it has been possible to identify a number of best practice approaches which can be implemented within an HEI to increase interdisciplinary collaboration. These practices include incorporating the benefits and limitations of co-creation that have been identified within an HEI, to mitigate inhibitors and encourage enabling activities. These approaches have been collated into a framework for interdisciplinary collaboration (see Figure 1).

Figure 1.

Framework for Interdisciplinary Collaboration

Theme	Best Practice Approach	Benefit
Networking and Social Interactions	Informal networking events for all staff	Critical Corridor Talk and the development of informal social activities for staff promotes wellbeing, innovation, and increased engagement.
	Social events for all staff	Creates a safe space for meeting new colleagues and discussing ideas which can lead to co-creation.
	Faculty-based individual responsible for networking and communicating opportunities	Identifying an individual who can signpost and act as a guide for each faculty/department demonstrates the importance of interdisciplinary co-creation of research to the wider staff body and ensures ongoing dissemination of one clear message to all staff.
Hierarchy and Line Management	Mentoring	Empowering and encouraging staff and providing a source for signposting to networking opportunities has a positive impact on ECRs and provides a safe space for questioning.
	Provision of time for interdisciplinary activities	A formal provision of time for interdisciplinary co-creation of research demonstrates the value placed on the activity by the HEI and encourages and empowers researchers to engage.
	Funding for conference attendance	A formal provision of funding attendance at specific conferences in relation to interdisciplinary co-creation of research demonstrates the value placed on the activity by the HEI and encourages and empowers researchers to engage.
	Training for ECRs	Empowering and encouraging ECRs demonstrates the HEI's commitment to interdisciplinary co-creation of research and provides networking opportunities outside of the ECRs own department.
	Training for professoriate	Regular formal training for the professoriate demonstrates the value placed on interdisciplinary co-creation of

		research by the institution and encourages movement away from a hierarchical approach to research team recognition.
Communication	Clearly signposted resources on intranet site	Information easily accessible for all staff in one shared location
	Regular communication from SLT relating to interdisciplinary activities	Staff at all levels understand the strategic importance placed on interdisciplinary co-creation of research and so are more likely to engage with it.
	Discussion Boards	Information easily accessible for all staff in one shared location, offers a virtual safe space for discussions, making connections, and sharing ideas
	Improved signposting to RDS activities	Information easily accessible, increasing uptake and demonstrating HEI's focus on enabling and encouraging interdisciplinary activities. This will encourage more staff to engage and provides line managers and mentors with a further source of support for staff, especially ECRs.
Departmental Silos	Case studies demonstrating value and impact of interdisciplinary co-creation	Academic researchers engage when they understand the benefits and impact of an activity or approach; by making the value and impact clear, more staff will engage.
	Research project advertising across all departments	Raising awareness of activities across the HEI allows academic researchers to engage in projects which they would not otherwise be aware of, allowing for increased innovation
	Training at all levels on HEI strategy and need for interdisciplinary activity	Staff buy-in and engagement will increase when there is an understanding of impact and clear evidence of support and recognition from the SLT.
	Formal recognition of interdisciplinary co-creation	Encourages interdisciplinary co-creation of research when researchers can see clear benefits for their career in engaging.

CONCLUSION

From the research and analysis undertaken, it appears evident that the work of Siemens et al (2014), although useful, focused only on the difference between the disciplines involved in the research and levels of control once interdisciplinary co-creation activities have been established. Whilst this work provides a useful model for understanding the impact of the difference in these two areas, the research undertaken highlights the importance of creating an environment that enables interdisciplinary collaboration, progressing beyond generalisations and focusing on the impact that individuals and their interactions have on the process.

A successful HEI is built through a culture of collective actions, knowledge, values, and ideas. The goal should therefore be removing the barriers that hinder academic researchers from working across disciplines (Finch et al., 2010). Additionally, HEIs must develop the means to allow for social and formal interactions that cultivate collaboration, using the framework developed through this research.

By expanding the work of Siemens et al. (2014) with a focus on the differing nature of researchers' needs based on areas including hierarchy, personal needs, and the way in which their individual HEI enables interdisciplinary collaboration, the developed framework provides a tool by which HEIs can actively focus their communication, staff training, and networking to both enable and encourage increased interdisciplinary collaboration.

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