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The 'roots/routes to fruit' model: developing a 'fruitful' collaborative network across universities

Gary Beauchamp^a , Sammy Chapman^a , Stephen Atherton^b , Julian Ayres^c , Nick Young^a , Tom Crick^d , Owen Davies^e, Sue Horder^c , Carl J. Hughes^c, Mathew Jones^f , Panna Karlinger^b , Sue Layland^e, Anthony Lewis^g, Caroline Lewis^h , Jeff Lewis^a  and Kaydee Owen^e 

^aCardiff Metropolitan University, Cardiff, United Kingdom; ^bAberystwyth University, Aberystwyth, United Kingdom; ^cWrexham University, Wrexham, United Kingdom; ^dSwansea University, Swansea, United Kingdom; ^eBangor University, Bangor, United Kingdom; ^fOpen University, Cardiff, United Kingdom; ^gMonmouth Comprehensive School, Monmouth, United Kingdom; ^hUniversity of Wales Trinity Saint David, Swansea, United Kingdom

ABSTRACT

This study explores the development and dynamics of the Wales Collaborative for Learning Design (WCLD), a multidisciplinary network across eight Welsh universities. Funded by Welsh Government, the WCLD aimed to foster collaboration in digital learning design while supporting individual and collective academic growth. The study aimed to investigate what factors impact on the development and sustainability of a personal and professional, multidisciplinary Higher Education collaborative network. Using a collective autoethnographic approach, the research explored the network's evolution, highlighting the interplay of person attributes, facilitating conditions, and professional relationships. Findings revealed key factors including trust, open-mindedness, and consistent communication as essential to the network's sustainability and success. Further findings illustrate how positive constraints, diverse career stages, and interdisciplinary opportunities underpin growth and productivity. 'Outcomes' included enhanced institutional impact, significant personal and professional conversations, and the cross-pollination of ideas within and beyond the network. When considered as a process, the findings underscore the value of cultivating intentional, yet adaptable, collaborative networks to support higher education innovation and personal academic development. This culminates in the 'Roots/routes to Fruit' model. This original contribution builds on existing theory surrounding significant, collaborative, collaborative networks and provides a process for future interdisciplinary, multi-institutional, collaborative networks to build upon.

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Introduction

In all phases of education, including Higher Education (HE), educators engage in a range of potentially significant networks, both within and between institutions, which enable and encourage significant conversations. The importance of, and potential for, such significant networks is an emergent concept within education, although the 'science of team science' (Tigges et al., 2019, p. 261) is still an evolving field. Many studies, however, focus on conversations and networks within teaching and learning, while 'less attention has been given to informal developmental processes' (McCune, 2018, p. 308). Indeed, Lokhtina et al. (2022, p. 304) assert that, although studies have examined teams across international networks, 'rarely are the interactions within research teams explored'. Therefore, this study aims to investigate what factors impact on the development and sustainability of personal and professional, multidisciplinary Higher Education collaborative networks, using the Wales Collaborative for Learning Design as an example. Thus, the current study's originality is in examining the significance in personal, professional and academic development *within* a team/network, incorporating the perspectives of those at different stages of their academic career. Like Boschman et al. (2021), it offers reflection on an 'origin'

CONTACT Gary Beauchamp  gbeauchamp@cardiffmet.ac.uk  Cyncoed Campus, Cyncoed Rd, Cardiff, CF23 6XD, United Kingdom

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story, where members of a current network reflect back on the development of a project from inception (not just in the moment) and how and why it became, and continues to be, significant to individuals. This *process*, the collaborative development of the network and the impact on its' individuals, results in the later outlined 'Roots/routes to Fruit' model.

Context

In HE, some networks and collaborations are enforced by structures within a university, and/or existing collaborations between universities. Others are serendipitous, in that they are formed by newly available funding to specifically encourage collaboration, but the partners are organically chosen by the partner universities. One such network, the Wales Collaborative for Learning Design (WCLD), has been funded by Welsh Government (WG) since early 2021 for staff time, related equipment and seminars/events for teachers, with a project Research Assistant (RA) and RAs for each university. The RAs are full members of the project team, attend all meetings and events and have an equal voice in discussions.

The only fixed starting point was WG appointing a lead academic and the opportunity for all nine universities in Wales to receive funding to join. At the time of this study, eight universities in Wales took up this funding¹ and each nominated at least one member of staff to the project. At the time of the research, the WCLD was a relatively fixed group ($n = 13$), who had known each other for just over three years. A notable feature of the team, however, was the serendipitous range of experience from research assistants and early career researchers through to experienced Professors. The group meet weekly online, but also at least two in-person events during the year, except during COVID.

The remit of the network was set by WG:

'to exploit the synergy between Welsh Government projects and initiatives in digital learning design by using research and practice expertise, alongside that gained from international partners'.

As such, the remit provided focus, but also allowed opportunities to develop original ideas.

This study focuses on *process*, the collaborative development of the network and the impact on individuals, not *outcomes*, the role of technology or the pragmatic and practical outcomes of the work of the network, to provide new insights into the personal professional potential of developing significant networks in higher education. To focus on the processes of the network, the following research question forms the basis of the research:

RQ1: What factors impact on the development and sustainability of personal and professional, multidisciplinary Higher Education collaborative networks and why?

Literature review

Significant networks

Significant networks are categorised into two broad categories: large networks based on resources and research; or much smaller networks (often as small as ten people in total) (Becher & Trowler, 2001). The smaller network is usually more closely aligned with the concept of significance, with more focused, purposeful conversations taking place. In addition, most research on significant networks in HE focuses on developing teaching and learning, including both academic staff and doctoral students (Soomere & Karm, 2021). A large body of research has been conducted in order to understand the factors most relevant to significant networks as a concept. As a result, the factors that are most significant within some networks is already known. For example, Pyörälä et al. (2015) identified the role of meaningful conversations in teachers' significant networks in a teaching academy. Similarly, Boschman et al. (2021) noted the nature of trust in building significant conversations (often private), between trusted and trusting individuals, while exploring a Community of Practice (CoP) in Scholarship of Teaching and Learning. Furthermore, Poole et al. (2019) found that group members sought out those with similar beliefs for highly valued interactions. In common with other studies of significant networks (e.g. Roxå et al., 2011; Roxå & Mårtensson, 2009), they highlight the importance of trust as a starting point, but note that this trust is multifaceted between different groups of people. Simon and Pleschová (2021) also observed the importance of trust in PhD students and significant others in pedagogic conversations for academic development. Specifically, the level of trust felt by individuals, and subsequent freedom and confidence

to openly share their 'felt difficulty' (Dewey, 1933) of personal teaching and learning experiences, is important when considering the significance of a network or specific conversations. Goffman (2000) labels this as the 'backstage' of the teaching process, where an individual is afforded the opportunity to confide in another within a private environment – echoed by Roxå and Mårtensson (2009). It is important to note that no significant contributions to this strand of the literature have been made in recent years. This further explains the need for this research to be conducted in order to validate, consolidate and further findings related to the factors that impact a significant network in the contemporary world.

Much existing research into significant academic networks, however, has been conducted with networks within one national context (e.g. Pyörälä et al., 2015), one university (e.g. McCune, 2018), or even one pair of 'life partners' (e.g. Spitzner & Meixner, 2021). Therefore, this study aims to provide a collaborative, multi-institutional, and interdisciplinary lens through which significant networks can be further investigated. Koris and McKinnon (2023) extended the concept into international online conversations, with a focus on academic development in teaching practice. Beauchamp et al. (2024) extend this idea to emphasise the importance of a mixture of online and in-person significant conversations between international partners, in both formal and informal settings across countries. However, extensive research regarding the factors most significant to collaborative, multi-institutional, and interdisciplinary networks has not been conducted. Therefore, this represents what is not yet known within this strand of the literature and a further rationale for why the present study is needed.

Affordances and constraints

Theorisations of affordances and constraints have been researched in a range of Human Computer Interaction (HCI) contexts, such as educational technologies. In analysing a virtual collaboration, Lokhtina et al. (2022) employed the concepts of affordances and constraints to study the experience of members of a new international research group. These constructs are helpful to study groups and demonstrate elements of what is known within the existing literature, but Lokhtina et al. (2022, p. 315) negative interpretation of constraints, as 'a quality/property of an object that limits its possible value or use', misses the opportunity to exploit the *positive* potential of this concept. This demonstrates an aspect of theory that is not yet fully known as it has not yet been applied in this context. The concept of affordances originates in the work of Gibson (1986) and may be considered as 'the attributes of the setting which provide potential for action'. As such, they may be considered enabling factors, *if* recognised by those involved. Constraints, originating in the work of Greeno & Middle School Mathematics through Applications Project Group (1998), are *not* the opposite of affordances (Kennewell, 2001). They are complementary and necessary for activity, and 'are the conditions and relationships amongst attributes which provide structure and guidance for the course of actions' (Kennewell, 2001, p. 106). We argue below that 'attunement' (Greeno & Middle School Mathematics through Applications Project Group, 1998, p. 8) to the original conception of affordances and constraints, supports not only how an individual participates in an activity system, but also allows an 'explanation of activity' (Greeno & Middle School Mathematics through Applications Project Group, 1998, p. 8) as a significant network evolves. These theories surrounding affordances and constraints, whilst already known in the literature, largely exist within the field of technology, specifically HCI. Therefore, a further gap that this study aims to address is the lack of affordance and constraint theory relating to significant networks, as well as the positive framing of such concepts unlike previous research.

Through the present study, it is hoped that existing knowledge related to the most important factors of significant networks will be reinforced and further understood. Additionally, applications of affordance and constraint theory in an under-researched context aims to uncover what remains unknown in this cross-section of the literature. The reviewed literature, synthesised understandings and identified gaps all demonstrate the need for this study in providing new and original insights across the reviewed fields of literature.

Methods

This study employed a self-reflective (Chang et al., 2012), collective autoethnographic (CAE) approach to examine the experiences and insights of the WCLD network. This was most suitable as CAE is 'a

methodology that permits educators to share and interrogate their practices, activating critical reflection, experimentation, ... while also cultivating a community of learning' (Valiente-Riedl et al., 2024, p. 1). In this context, WCLD members work as reflective practitioners (Amundsen & Wilson, 2012), where self-reflection is a key component of organisational learning which moves beyond simply identifying and correcting errors to questioning the fundamental principles and goals that drive their actions. As Argyris and Schön (1978) argue, this approach can facilitate double-loop learning, where team members question underlying assumptions and values. This deeper level of reflection, with a resultant potential 'modification of deeply held values, beliefs, and assumptions' (Auqui-Caceres & Furlan, 2023, p. 757), can lead to more profound insights into the development and significance of significant networks and conversations whilst providing a robust framework for the study outlined in Figure 1.

The project leader and RA (the interview and analysis team [IAT]) led the research. The project leader conducted all focus groups, acknowledging Trowler's (2014) concept of 'close-up research' in HE, emphasising the importance of insider knowledge in understanding the complexities of academic practices and cultures. It was also important, however, to acknowledge the potential for power imbalance (Beauchamp et al., 2021) where the project leader acted as interviewer. This was addressed by ensuring participants understood their rights and creating a non-judgmental atmosphere (Karnieli-Miller et al., 2009).

Synchronous online focus group discussions (SOFGDs)

Existing relationships within the network had fostered an environment of trust, potentially allowing more honest and open responses (Unluer, 2012). To exploit this, the research design incorporated four synchronous online focus group discussions (Woodyatt et al., 2016), a familiar environment due to weekly online project meetings that provided participants with what Alase (2017) refers to as a place of comfort.

Each focus group discussion contained a range of experience, with all participants afforded an equal opportunity to contribute (Sim & Waterfield, 2019) and equity of power in the researching relationship (Lapadat, 2017). Each focus group was structured around open-ended questions and prompts. Probing questions elicited deeper insights (Cousin, 2009) as participants were encouraged to interrogate the 'how' and 'why' (Adams, 2015). The resultant collective conversations (Kamberelis & Dimitriadis, 2011) encouraged comfort and familiarity, but also provided the opportunity to contest or challenge another's views (Gill et al., 2008), facilitating insights into complex social dynamics and shared meaning-making processes.

Whilst the study focused on the WCLD network, other relevant experiences were welcomed to supplement or compare 'critical incidents' (Patton, 2002). Questions were provided before the focus group to enable preparation and pre-reflection allowing for detailed and considered reflections, rather than what immediately springs to mind (Mamede et al., 2012). This resulted in 'thick descriptions' (Geertz, 1973) necessary for qualitative enquiry.

Anonymous online surveys

An anonymous online survey consisting of the same questions posed during the focus groups was circulated after the focus group discussions. This provided participants with a voice outside of the face-to-face setting, allowing possibly controversial, personal beliefs and experiences or concerns to be shared openly and willingly (Braun et al., 2021) and, importantly, anonymously. Survey responses were incorporated into the transcriptions, allowing complementarity, where different methods are used to measure overlapping, but distinct, facets of a phenomenon (Greene, 2007). In this study's context, the combination of qualitative methods of data collection was most suitable in order to combat any pre-existing dynamics, as well as allowing the phenomenon being investigated to be examined from multiple perspectives and angles (Symon & Cassell, 2012).

Sample

The study involved a total of 13 university staff from eight HEIs. Careful facilitation of the focus groups, alongside anonymous surveys, developed a 'climate of equitable participation' (Kornbluh, 2023, p. 5).

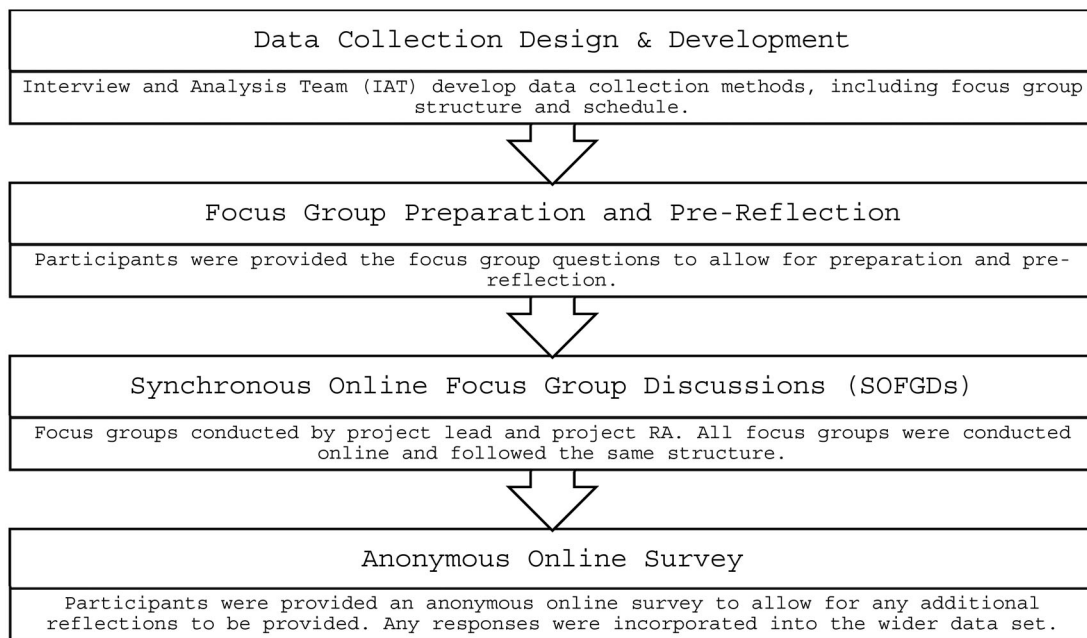


Figure 1. Process of methodology & data collection methods.

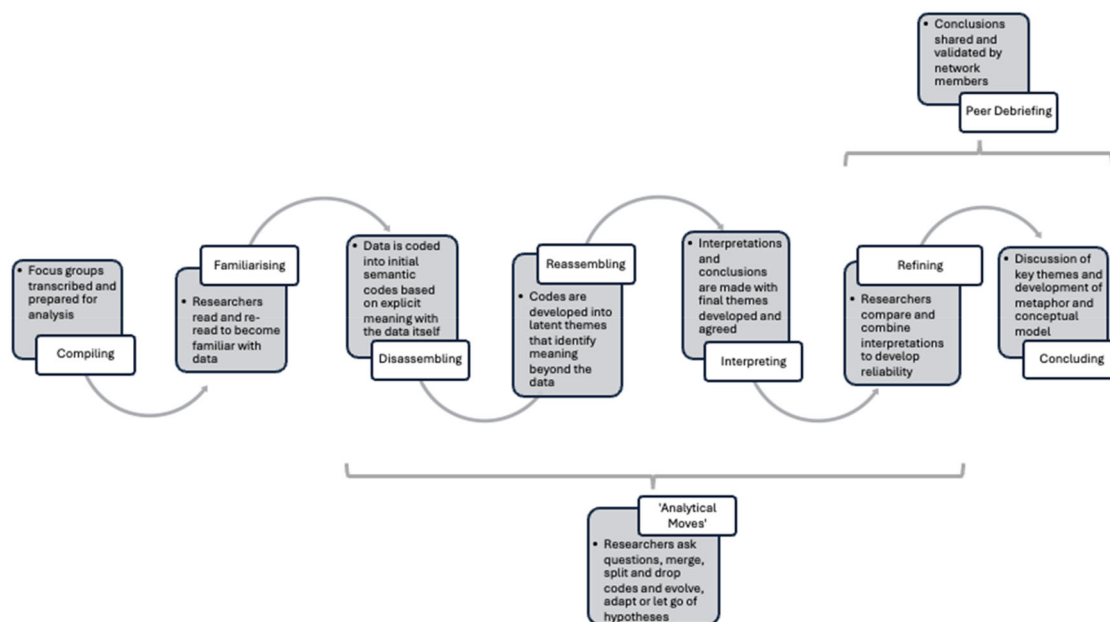


Figure 2. Process of data analysis methods.

Analysis

The analytical processes followed are outlined in figure 2 (above). These steps take inspiration from Castleberry and Nolen (2018) 'Compiling', 'Disassembling', 'Reassembling', 'Interpreting' and 'Concluding'. Additional processes of 'Refining' (Chapman & Beauchamp, 2025), 'analytical moves' (Grodal et al., 2021, p. 592), and 'Peer Debriefing' (Creswell & Miller, 2000) were implemented to address the demands of conducting in-depth thematic analysis between two researchers, the IAT, within a wider network.

Due to prior relationships, knowledge and dynamics (Onwuegbuzie, 2003), it was important to acknowledge any potential 'active' researcher bias that may be subconsciously enacted during each stage of the research, particularly the analysis phase. The IAT, who undertook the thematic coding, employed strategies to avoid enacting *a priori* hypotheses (Greenwald et al., 1986). Recognising the

Table 1. List of initial semantic codes.

Theme	References	Focus groups
Autonomy	9	3
Collegiality	3	2
Open-Mindedness	4	2
Willingness to Trust	16	3
Willingness to Actively Participate	3	3
Common Aim	7	4
Shared Interest	7	4
Consistent Communication	11	4
Network Size	8	3
Facilitation by Leadership	9	3
Interdisciplinarity	23	4
Different Career Stages	15	3
Sustainability	4	3
Informal Opportunities	21	4
Rapport	15	3
Motivation	3	2
Engagement	3	3
Member Appreciation	6	2
Project Deliverables	4	3
Combatting Isolation	7	2
Institutional Impact	11	3
Connecting Networks	3	2
'Fruitful' Conversations	9	4

challenges of insider research (Greene, 2014), a structured analytical process was implemented requiring justification for all interpretations based on empirical evidence (Srivastava & Hopwood, 2009). Additionally, 'bracketing' (Tufford & Newman, 2012) was employed to approach the data with fresh eyes. These measures were conducted before any analysis of the data began to ensure that any subsequent analyses took place in a 'goal free' environment (Scriven, 1991) where all processes could be conducted as inductively as possible (Braun & Clarke, 2022).

The IAT used Nowell et al. (2017) process of team thematic analysis, beginning with reading and re-reading to ensure familiarity (familiarising) with the data (Naeem et al., 2023). Initial semantic codes (table 1) were shared (disassembling) to ensure common meaning (O'Connor & Joffe, 2020) and develop inter-coder reliability (Coleman et al., 2024). This resulted in the initial codes outlined in table 1 (below), with organisation of all coding conducted via NVIVO software.

Once initial semantic codes were identified, latent themes were developed (reassembling) to generate meaning beyond the data itself and reach agreed interpretations and conclusions of the data (interpreting). The thematic analysis involved 'analytical moves' (Grodal et al., 2021, p. 592) including: asking questions of the data; examining puzzles; dropping, splitting and merging categories; contrasting or relating categories; and finally, evolving and letting go of working hypotheses (Fischer & Guzel, 2023). This included the comparison, scrutinization and incorporation of each researchers' coding (labelled by Chapman and Beauchamp as refining) to establish additional reliability in the analytical techniques previously used (Belotto, 2018).

Once themes and sub-themes were generated (Braun & Clarke, 2022), taking inspiration from McKim's (2023) collaborative reflection, they were shared with interviewees to enable peer debriefing (Creswell & Miller, 2000) and validity, in the form of member checking (Varpio et al., 2017). This allowed the resultant analysis to realign with the collective autoethnographic methodology framing the study. Agreed themes were confirmed and are presented in figure 3 (below).

Lastly, these themes and sub-themes were developed into the 'Roots/routes to Fruit' model (concluding), a metaphor used to capture and easily communicate the findings of the study to its' intended audience and users (Straus et al., 2011). In the words of Steele, Baird and Davies, this 'made the findings clearer and more manageable while also allowing various audiences to make sense of their own experiences of interactions' (Steele et al., 2022, p. 99).

The resultant model was inductively developed during the final stage of analysis. Following interactive semantic coding, the IAT team collaboratively synthesized the emergent latent themes and used metaphorical reasoning to represent their interconnections and communicate findings to its' intended

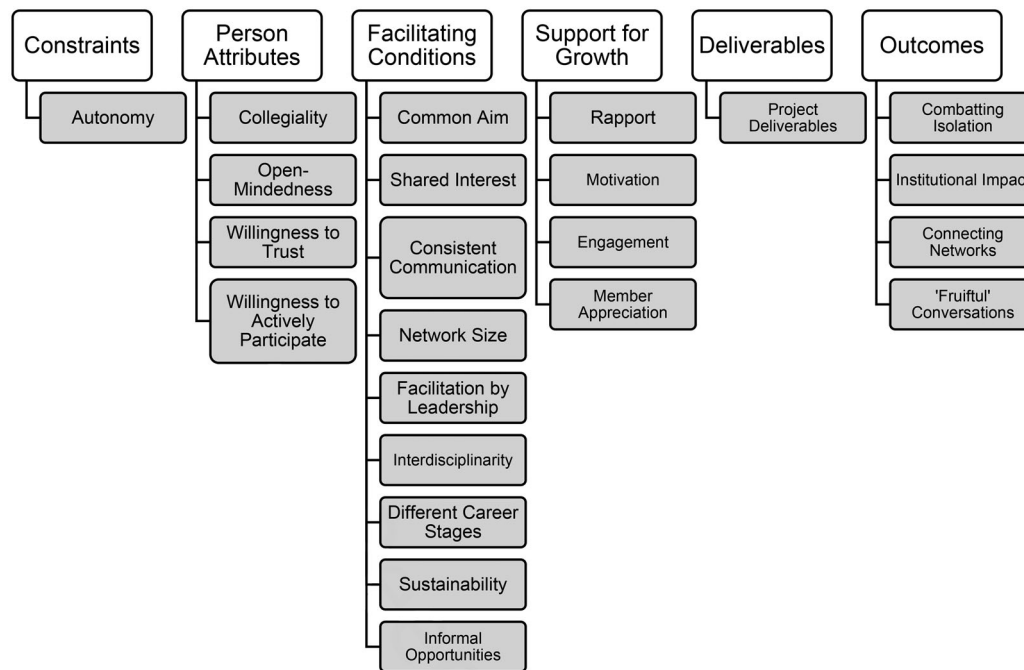


Figure 3. Mapping of developed themes and sub-themes.

audience. The resulting model is grounded in the data while also reflecting the interpretive role of the team in shaping its final form.

Reflexivity

Despite the strategies outlined above, navigating the complex landscape of reflexivity within an insider-researcher context creates a variety of supporting and potentially limiting factors (Finefter-Rosenbluh, 2017). As members of the network being studied, the IAT had a sound foundation to build from. In other words, the IAT already had a good understanding of the phenomenon in question, access to those belonging to the wider network and knew what questions might elicit rich data to be analysed for the purposes of the study. However, through being insider-researchers the IAT may have brought preconceived ideas and judgements into the methodological and analytical phases of the researching process. Therefore, it was deemed important to outline the possible factors at hand and how these were regarded by the IAT.

The initial research design and identification of the research aims and questions were discussed amongst the IAT as well as the wider network members. This ensured that the research was shaped by multiple perspectives and not limited to the perspectives of the IAT alone. During the data collection process, the IAT was able to successfully collect rich data related to the overall research aim and research question via the questions asked during the Synchronous Online Focus Group Discussions (SOFGDs). Prior relationships and an understanding of the overall network dynamics was a benefit of the insider-researcher status, bringing an additional layer of trust and openness that participants may not have felt with an unknown research team. However, participants may have been less willing to share controversial or opposing views during data collection as a result of the IAT being members of the network. As previously outlined, steps were taken to address this with anonymous online surveys provided. Finally, prior knowledge, perspectives and interpretations may have been enacted throughout the analytical processes outlined throughout the study. In particular, theme development and subsequent interpretations could have been impacted by prior researcher perspectives. Again, strategies were employed to address and limit this potential impact, such as member checking and robust analytical frameworks,

but it is important to outline the researchers' prior relationship with the participants and the phenomenon being researched.

As members of the wider network being investigated (the WCLD), there was an awareness that such phenomenon did in fact exist. In this context, the IAT may have held preconceived perspectives on *what factors impact on the development and sustainability of personal and professional, multidisciplinary Higher Education collaborative networks and why?* Through robust analytical processes and member checking with the wider network, it is hoped that these perspectives have been limited as much as possible. In addition, the IAT may have felt the need to find an answer to the research question based on such preconceived notions of its' very existence. Again, analytical processes did not allow room for the IAT to develop codes, themes or interpretations that did not originate from the data itself. This also applies to the development of the resultant model. As such it is once again hoped that through this detailed reflexive account and the strategies outlined throughout, that the IAT have transparently and honestly navigated the difficult, but rewarding, insider-researcher context that this study presents.

Results

The final themes were:

- Constraints
- Person attributes
- Facilitating conditions
- Support for growth
- Deliverables
- Outcomes

These, and related sub-themes, are considered in turn, with anonymised participant quotations to represent the patterns and meanings of the data, whilst staying true to each participants' original sentiments (Lingard, 2019).

Constraints

The structure for action (constraints) provided the focus inherent in the project remit and funding. In simple terms, the structure was provided as 'They are funding us and they're telling us what to do' (Brian), and 'We're a funded network ... Therefore, the funder can set the agenda, and at one level they always have' (Seth). This can, however, be viewed as giving the network a purpose or focus. Alexia, however, identified the importance of the network remit evolving as

A lot of these projects that I've worked on, they had a purpose. And when they managed to meet the objectives, the objectives of that group, or that conversation, they tend to die away.

The positive nature of constraints was summarised by James who stated that: 'There's a need for that kind of structure, but not overly structured. It's an interesting balance'.

Autonomy

Interviewees noted the growing autonomy of the network, which meant that: 'At some point, we were able to say, well, no, this is a waste of time. We think this is important' (Seth). This only works, however, if the funder is perceived to listen, as in this project, with the outcome that despite 'a potential tension between a funder directing you, we've got the position where the funder is willing to listen and actively asks actually' (David). Hence, autonomy can be considered the outcome of a positive dialogue between funder and network, which can lead to evolving constraints.

Person attributes

An important part of exploring individual professional and academic development is how individuals, at all stages of their academic career, are perceived to respond to the views of others and new ideas, and their perceived willingness to trust and participate. The results highlighted particular characteristics that were perceived as effective in encouraging both individual and team growth.

Collegiality

Collegiality was a strong theme in the results. Dale contextualised this, asserting that, 'Often organisations are pitted against each other. And actually, the end result is it reduces growth. Instead, you should look at working collaboratively'. Participants suggested that collegiality was an attribute they had previously found hard to develop in other networks, but Alan asserted that 'generally, this group plays well together. And I think that is really unique'. To explain why, Alan went on to discuss how the attribute of collegiality was interlinked with rapport:

You have got to work with people you like, but you also work with people that are kind of saying 'well, we're in this for the right reasons, not necessarily, you know, for whatever other purpose', and I think that is what is key in making this successful.

Open-mindedness

Open-mindedness was perceived as important when forming and sustaining an effective network. It refers to the disposition of the network members:

'the values of fairness and equity so that people are clear that this is about the collective, the group, the network, whatever you want to call it, rather than individuals within that' (James).

Additionally,

'I think that it's about having an openness and honesty, and respect for the people ... , and also a willingness to take risks, and perhaps challenge some of those conversations or add in your own ideas without feeling that they would be laughed at' (Eve).

Willingness to trust

An important attribute was willingness to trust. Betty reflected that other networks have been less trusting, where 'There's that very guarded approach, which isn't helpful if you're looking at something which is designed to be collaborative'. Phoebe suggested trust amongst the network is important when collaborating on a consistent basis, as 'you need to have a level of relationship, of experience, familiarity'.

Ultimately, trust resulted in more 'productive conversations' (Brian). Further, trust can have the simple effect of making members of the network more willing and motivated to participate:

I think it just reinforces that you want to work with people who you trust, and you can sort of spend time with and then it just turns into really productive conversations about research, policy and practice (Brian).

Whilst trust can develop over time, the *willingness* to trust others was also perceived as an important personal attribute to have when first joining the network.

Willingness to actively participate

Active participation was important and Dale highlighted the need for 'consistency with regards to not just attending one meeting, and then we never see them again'. Brian also linked active participation to a clear purpose as:

We don't want people who are just occupying a seat, there is something around new people who are engaged and bring some diversity of expertise or experience to the table.

Facilitating conditions

To enable further growth a range of affordances (attributes of the setting which provide potential for action) were perceived as important by all career stages:

Common aim

A facilitating affordance was having a common aim within the network. A 'shared collective vision' (Bob) was necessary to enable all network members to envisage 'where we [the network] want to go' (Bob). This was echoed by Betty, who stated that, 'it has to be centred around some type of shared vision or shared foundation of which we're working from'. Eve expanded on this point further, using the concept of a 'shared purpose'. Indeed, Peter labelled this as the 'foundation' for the network and highlighted the focus that this can bring:

I do think there has to be a shared foundation or shared identification of the problem, and this is what we're trying to solve. ... So, I think that that adds coherence and focus. So, I think it's important.

Shared interest

It was important to identify 'common interests' (Alexia). Participants outlined the network's significance in providing a space to collaborate and converse with those who had shared interests. David highlighted that 'this was the first opportunity really, for me to collaborate with others who had similar interests'. Alexia outlined how shared meaning and interest contributed to the effectiveness of the network:

I think the biggest part [of an engaging network] is joint challenge, finding the areas of joint need, and interest and opportunity to address the things that have meaning to the individuals within the group.

A shared interest in the overarching focus of the network transcended career stage, as 'you see that it is more about person's interests rather than, you know where they are in their career' (Alan). Ultimately this brought the network closer together, as 'while they all have their own expertise, there's an encompassing area of interest that leads me to everyone in the group' (Bob).

Consistent communication

Consistent communication was important. This can take many forms, but was summarised as 'ongoing communication, regular check-ins and feedback, updates' (Alexia). Participants stressed the importance of 'frequency' (James), consistency and signposting next steps, with David noting that 'I sort of noticed things, like the ongoing communication, the weekly catch ups have been really useful to be kept in the loop, but also to think about where we go next'. It was stressed that ongoing online and face-to-face communication were essential forms of communication, as 'both are important. ... When we're all working, trying to meet at a specific time. I appreciate both really' (Eve).

Network size

A related factor was the size of the network, suggesting that if the network grew too large, too quickly, then active participation and communication may become difficult. Brian highlighted how the network may become fragmented, or disparate, as:

There are different challenges when you suddenly have a much bigger network, and you also don't want to be seen to be [saying] there's 'core' members and then there are other members.

Nevertheless, it is important to note that increasing the size of the network was regarded as worthwhile if a clear purpose, benefit or rationale was evident:

So, if we're bringing in more members from our institution, then we're able to sustain that because ... putting all this on one person can be quite challenging with everybody's workloads. So, I think widening that group has masses of benefits and also brings in more perspectives, different expertise, that adds to the group. (Eve)

Facilitation by leadership

The facilitating leadership style of the group was important. Bob specified this does not need a strict hierarchy or chain of command, but simply a procedural duty of managing the network effectively:

Somebody has to take control of the structuring of it. So, a shared understanding and acknowledgement ... about who is ... in charge of structuring and recording and holding the information (Bob).

The outcomes included 'giving opportunities for people to contribute' (Bob) and efficiently moving network activity forward, as 'things have happened behind the scenes between each meeting. So, we're coming in, and actually we are progressing' (Yasmin).

Also, the leadership maintained the original values and beliefs of the network as new members joined, so 'it feels like a safe space, and I think that's what enables it to happen. And again, it's because of the facilitation and the openness of everybody who's involved' (Alan).

Interdisciplinarity

Interdisciplinarity provided 'different directions' (James), 'different views' (Phoebe) and 'different backgrounds' (James). Ultimately, this allowed access to a wide 'range of skill sets, background and experience' (Brian). Yasmin summarised the positive impact on the network:

... [we've got] scientists, we've got the psychologists, we've got the education kind of researchers, but we also have people that have been on the ground as teachers for years, and it has that very different angle that you wouldn't be able to get staying within your own institution.

This wide range of disciplinary lenses allowed different perspectives to be considered, but also identified any gaps in the evolving group knowledge base by 'having that think about what we've got already in terms of skill sets, and where our gaps are, is always an important thing to do' (Phoebe).

Different career stages

A key aspect of cultivating the network was ensuring that a wide range of experience was present. This overcame the notion that

If you stick a group of ageing professors in a room or a group of early career researchers in the room, they're all knowledge, but it's different knowledge. And they won't necessarily learn a lot from each other as they all have the same, I don't say level of knowledge, but the same type of knowledge (Yasmin).

Additionally, the network gave space for those 'newer to the field' to talk and collaborate. This was perceived as important as 'being able to find ways to find the space to have those contributions from people who are maybe newer to the field is really, it's hard, but it's really important' (Seth). Once everyone is given an opportunity to engage in such a space, benefits were felt within the network, and having a range of voices and perspectives ensured the network continually interrogates what they consider to be knowledge. This benefit is best framed by Dale who explained:

It was the Rumsfeld quote, 'you don't know what you don't know'. And I think that does come up quite a lot. It's those little bits, you think 'I hadn't considered it, I hadn't thought of it. And I wasn't aware of it. But now I want to go further with it'.

Sustainability

Ultimately, to 'keep it going' (Bob), the network needs to become 'a thing ... an entity' (Brian) in the eyes of its members. When this is successful, 'We all feel part of, and at the table, and heard and listened to. I think that's how you sustain it ... It's hard to put your finger on it, but it feels sustainable' (Eve).

Informal opportunities

Informal opportunities are chances ‘to socialise, and chit chat and get to know people’ (Phoebe). Knowing each member of the network both professionally and personally was important as

We’ve got to kind of understand each other a little bit better. And it just doesn’t mean in this context, it means about the person, their values, their ethos, their epistemologies, around education, all that kind of stuff (Eve).

Informal opportunities, both planned and unplanned, were important in building understanding. Alexia noted ‘the [planned] informal programme is as important, or even more important than the formal one’. An example of planned informal was provided by James, who described how ‘the social aspect of getting a group of people together, the night before, on a social thing, that’s where the real relationship starts to develop.’ This is because

I think it gives you a very different space, if you’re doing like a workshop for a whole day. And then you go out for dinner, and you’re just having those informal conversations, that’s when you can send those bring some really good ideas. And I guess also, it’s, it makes it a bit more engaging and satisfying (Brian).

An example of an unplanned informal context was again the opportunities provided by a different space, even if it is

just those incidental chats you have over getting a coffee, that’s when really you get to grips with those technicalities and challenges that people might have faced that you probably wouldn’t have had if you’re just on Teams.

Informal opportunities, particularly *planned* during in-person meetings, allow everyone to ‘build a relationship’ (Phoebe), and engage in ‘trusted conversations’ (Brian). Planned informal opportunities can sometimes be forgotten when considering the maintenance of a network, but

just building those friendships, whether they’re sort of social friendships or professional friendships, I think this is kind of probably underestimated in ... descriptions of [formal] networks (James).

This introduces the opportunity for network members to gain what one participant labelled ‘social capital’ (Alexia), allowing the network to evolve.

Support for growth

As a result of the facilitating conditions, a range of growth factors were generated from the data.

Rapport

Rapport can be as simple as ‘They just feel a bit more comfortable, and you feel a bit more comfortable with them’ (James) and often grew from informal opportunities. The benefit is that: ‘I think we’ve established ourselves and we have the relationships to have those critical friend type conversations, and we have the credibility to push back’ (Brian). Once established, social cues and boundaries are more easily navigated as you can:

take that formality out of it, and it is a bit more of a laugh, and jokey and a little bit more informal. You kind of learn where those boundaries are in a sort of social context (Yasmin).

Rapport sustained the network because ‘as humans, we come back to that social nature of the way we interact ... the social aspect of that is probably going to be really, really important’ (James).

Motivation

As well as any extrinsic motivation provided by HEI pressure to take part in a network, the facilitating factors led to a strong intrinsic motivation:

A sort of passion to make a difference or a passion that technology can make a difference, or, you know, doesn’t really matter where that’s come from, but there’s this kind of in intrinsic drive, I think, in all of us to, to make this work (Yasmin).

This intrinsic motivation becomes self-perpetuating, potentially even beyond funding being withdrawn:

I'd still want to be at this table, which is really an important factor for me because of the nature of this significant network in a sense that I would still, even if the WG were not going to continue funding, I still would want to be here (Eve).

Engagement

To support growth, consistent and effective engagement in the network was required as 'we don't want people who are just occupying a seat' (Brian). The conditions for growth are when members 'are engaged and bring some diversity of expertise or experience to the table' (Brian). Subsequently, engagement becomes an almost a default 'position for you when you're engaging in discussion' (Dale).

Member appreciation

For growth, all members need to feel valued and appreciated, where the network gives 'a voice to everyone, and value those contributions' (Alexia). This takes place when the network is a 'safe space' (Alan), where members feel their views are appreciated. Yasmin posited that

I don't like the word safer, but I do I feel like I can say stuff in a meeting. It might not be right, and people might not agree with me, but actually, I feel listened to. And that's really important.

This was echoed by Eve, who stressed that 'We all feel part of, and at the table and heard and listened to. And, yeah, I think that's how you sustain it. And it's hard to put your finger on it, but it feels sustainable'. (Eve)

Deliverables

Project deliverables

Once the facilitating conditions and support for growth were generated, the data identified the importance of the network achieving deliverables, namely the specified 'strict objectives and described results or outputs, ... you need to have them' (Alan). Ultimately the funder must 'have their project outputs and then manage to complete a project' (Seth). Although identified in the project remit, there was an additional need to look beyond 'to have outputs to really deliver something that is meaningful for all parties. So that's ... more challenging' (David). As such, the deliverables are also a route to other outcomes that were not required, or even expected, by the funder, and were not delivered to that body, but remained within the network. Additionally, even in adversity when challenges arise in achieving deliverables when deadlines loom, once 'the cards are down' (Yasmin), 'that's where the real relationship starts to develop' (James).

Outcomes

A range of outcomes benefited all members of the network regardless of their experience or career stage:

Combating isolation

Peter explained, 'sometimes, you feel like you're doing it on your own, in your own institution, it's really nice to hear about challenges in other places, and how you overcame them'. Or, as Eve stated,

I think it is helping to change mindsets a little bit and open ours as well, because I can be quite insular myself. So, in a much wider group I'm going to talk about those kinds of things.

Alan outlined the reassuring element of the network, reporting, 'it's quite reassuring to kind of have that validation, other people think like this'. As well as personal reassurance, the network seemed to combat isolation in thinking as

I think it provokes us to think about things either a little bit more broadly or a little bit more deeply than we might have in our own local silos (Alexia).

The result was that 'I think that there's a very comfortable feeling about this network that I've not necessarily had with others. If I'm honest' (Eve).

Institutional impact

Such impact on the individual also provided 'quite a significant impact, I would say, at a local [HEI] level' (David). For example, Peter reported: 'I think it just gives you that confidence to try things in your own institution'. This is 'really valuable for you where you work', as 'it sort of helps you to have a kind of broader view and a better perspective' (Alan). Additionally, the interdisciplinarity of a network encouraged greater interdisciplinary discussions within an institution. For example, Dale (who works in an education department) reported that 'I think a lot more staff now are wanting to go and talk with a computing team and feel more confident with regard to going and talking to them'.

Some participants attempted to conceptualise the impact of the network. It was felt that the ability to 'influence' was important. This is exemplified by Alan asserting that 'We call it knowledge exchange, but I think it's probably more influence exchange, I think, is probably a better description'. He further suggested the process can be viewed as a 'circle of influence', whilst providing an example of how the cyclical nature of the impact was felt at an institutional level: 'That conversation then goes back to your institution, and then that starts to influence actually what's happening on your course'.

Connecting networks

For some network members this was their first, and only, external (to their HEI) network, but others belonged to two or more, both within Wales and beyond. Regardless, the data reveal that the bidirectional flow of ideas, cross-fertilisation stimuli of thinking and 'joining the dots' between networks was an important factor in making the network effective, valued and impactful. As Eve explained, 'We're managing to spread that impact and influence amongst our networks, as well as our own institutions'. This was in part due to the interdisciplinary nature of the network, as 'I think that's helped to sort of bring it together on that level as well, sort of drawing in different areas of government and also different disciplines across the board' (David).

The benefit of becoming connected to so many individuals from various networks was specifically highlighted, for example,

I think it's the branching out from that as well ... there have been so many explorations and good opportunities that have come ... from being part of this group ... support with examining or to be a reference for someone or to help proofread a paper or something like that (Yasmin).

Yasmin went on to highlight these opportunities would not have come about without the network, as 'There are opportunities that don't always come around institutionally, and it's so much more fruitful I think, when you've got those working relationships with people'.

'Fruitful' conversations – significant, incidental and serendipitous

Data revealed three inter-related forms of dialogue which can all be regarded as 'fruitful conversations' (Yasmin). Incidental conversations were those that were initially part of the planned topic of discussion, but branched off to another 'meaningful discussion' (Brian). This was also true of continuing planned conversations *within* the meeting space (in-person or online), such as 'discussions that you have around the coffee machine, or whatever it might be' (Betty). In addition, continuing topics from planned conversations *outside* of the meeting space in social settings were important.

The conversations which take place as a result of social activities provided 'that opportunity for incidental learning from each other in the social aspect and I really enjoy those as well' (Alexia). Such conversations were incidental to the meeting focus, but without the stimulus of the meetings they may not have happened. For example,

I was having a conversation over dinner with someone ... I use a lot of stuff that he said about because they were like a year ahead of us with implementing their virtual learning environment, the same as we are doing now. I really used all of that knowledge (Alexia).

Serendipitous conversations were not necessarily related directly to the content of the project, but 'a moment we never really anticipated' (Brian). This was often a result of the diverse and unpredictable way that members joined the group (e.g. their university put them forward), which could result in 'that sort of chat, you find out that you have similar interests in other places' (James).

Both incidental and serendipitous conversations may not go any further, but still may hold merit in their own right. In addition, however, both types of conversation may end up being significant, or even a conversation which does not fit either category (such as planned discussion within a meeting) may be regarded as significant – and 'fruitful' - by those taking part.

Discussion

Throughout the data analysis an overarching theme of growth, both individual and as a team, was recognised and summed up by the concept of fruitfulness. This suggested the analogy, or conception, of a bulb being planted (person attributes) within a pot (project constraints) with soil (facilitating conditions) to focus and control growth, both in the form of roots (support for growth) and the stem (deliverables). This process, if each factor and condition is successful will bear fruit (outcomes), which is outlined below to frame the discussion. This is summarised in a conceptual model in [figure 4](#): The 'Roots/routes to Fruit' model.

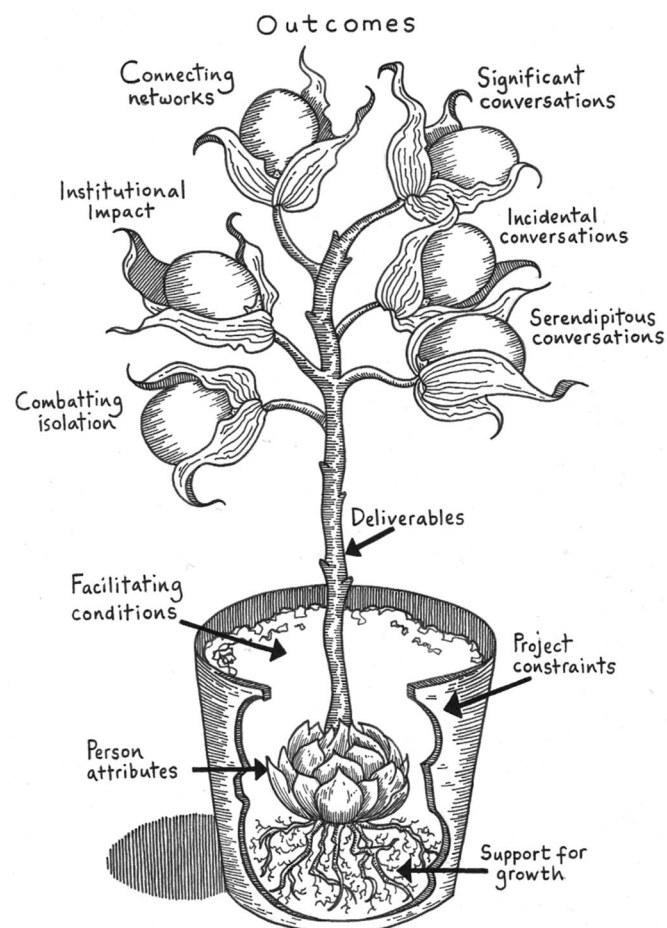


Figure 4. The 'Roots/routes to Fruit' model.

The pot (project constraints)

The project began with an empty 'pot' provided by the funder, the size predominantly defined by the funds available. As such, this provided the (positive) constraints, or structure for action (Kennewell, 2001), for the network. These also included time periods and defined, but not limited, core deliverables. The constraints thus provide 'structure and guidance for the course of actions' (Kennewell, 2001, p. 106) and help to explain the activity (Greeno & Middle School Mathematics through Applications Project Group, 1998). As such, these may be considered the pre-conditions for growth.

The bulb (person attributes)

Following the plant analogy, the 'bulb' represents the personal attributes of members of the network: Collegiality; Open-Mindedness; Willingness to Trust; and Willingness to Actively Participate. Trust has been a common requirement in studies of significant conversations (e.g. Beauchamp et al., 2024; Boschman et al., 2021; Roxå et al., 2011; Roxå & Mårtensson, 2009), encouraging both private, backstage (Goffman, 2000), and more public interactions within the network. While apparently self-evident, the current study suggests this is tied to a willingness to trust, being open to new ideas and then being willing to take an active part in the network.

The soil (facilitating conditions)

For the bulb to grow it requires soil, which is represented in this study as a wide range of facilitating conditions: Common Aim; Shared Interest; Consistent Communication; Network Size; Facilitation; Interdisciplinarity; Different Career Stages; Sustainability; and Informal Opportunities. We suggest these are not developed sequentially, and not every condition must be present (although they were in the project under study), but they are required to facilitate growth of the network – the better the soil, the more the growth - and allow the personal attributes previously identified to flourish. In particular, the notion of interdisciplinarity and members being at different career stages resonates with Poole et al. (2019, p. 68) suggestion that 'diversity of thought is generally a good thing'. Importantly for what follows, informal opportunities in different spaces are significant in both formal and informal situations, both planned and unplanned. This echoes Beauchamp et al. (2024, p. 1087) study of significant networks with diverse international membership, which found that 'time spent in different localities helps to build relationships through a range of formal and informal activities, with a range of different voices present'.

The roots (support for growth)

If these conditions are in place, roots are required to anchor the plant as it grows: Rapport; Engagement; Member Appreciation; and Motivation. These factors provide the affordances (Gibson, 1986) as features of the setting (in this case human rather than physical artifacts) that provide potential for action as they are *perceived* by all members of the network. This creates an 'ecological niche', which is 'built and transformed by members of the species through the species' typical ways of acting' (Rietveld & Kiverstein, 2014, p. 328). The roots, provided by the support for growth factors, accord with Gibson's (1986) concept of a niche, which is a set of affordances relating to *how* an animal lives, rather than *where* it lives. The collegial behaviours identified offer support for growth.

The stem (deliverables)

With all the preceding factors in place, the 'stem' of the project was the deliverables, both those agreed in the original remit, and those which have developed organically as the project evolves. This focus ensures that the direction of travel remains focused, but, continuing the plant analogy, the stem (and subsequent fruit) cannot grow without necessary conditions and support.

The Fruit (outcomes)

The role of conversations in developing networks has been a feature of previous research into significant networks (e.g. Beauchamp et al., 2024; Pyörälä et al., 2015; Roxå et al., 2011; Roxå & Mårtensson, 2009), but the current study identifies specific types of conversations that are meaningful, or fruitful, for participants. Both incidental and serendipitous conversations are fruitful in the own right, but both can also become significant. In addition, any conversation that takes place in the network can become significant in itself. It does not need to be significant to the project or deliverables, but can be personally or professionally significant for a variety of unpredictable reasons. The important factor is that the conversation would not have taken place at all without the network. Previous research suggests that significant conversations are those that 'are situated and contextualised by time, location, trust, in formal and informal meetings in cross-disciplinary teams' (Beauchamp et al., 2024, p. 1087). The current study suggests they also need to be 'tangible and have relevance and there's purpose. So that's how I would see it as significant' (Dale). There can be 'significant benefits for all of us in so many different ways' (Eve), suggesting that conversations will become significant for different people for different reasons, both tangible and imperceptible.

The fruitful outcomes also extend to more personal, or affective (Patariaia et al., 2015), factors, such as combatting personal and academic isolation where the network provides support, new direction or impetus; for instance, in research when no-one else is doing it in that person's university. Beyond the individual, the network is fruitful in terms of institutional impact, for instance, where it provides academic outputs that would not have happened without it, or new evidence of impact locally, nationally or internationally.

Last, but by no means least, members of the network are also members of other networks and start to see synergies and connect them. Extending Førland and Roxå (2024) notion of network constellations, members of the network move from being stars in that constellation to connecting with stars in other constellations, whilst leaving each constellation intact, but enhanced. Extending the plant analogy, this cross-pollination of networks appears mutually beneficial for all concerned. These new linkages represent reciprocity (Patariaia et al., 2015), with mutual learning and exchanging of ideas.

Overall, the 'Roots/routes to Fruit' model outlines the *process* of developing and sustaining an effective personal and professional collaborative Higher Education network. As such, each theme and sub-theme answers the original research question and aim of the study, whereby Project Constraints, Person Attributes, Facilitating Conditions, Support for Growth, Deliverables and Outcomes are all *factors that impact on the development and sustainability of a personal and professional, multidisciplinary Higher Education collaborative network*, with the developed model addressing the 'and why' aspect of the study's original research question.

Limitations and future research

This study presents findings from a national, multi-institutional, multifaceted (different disciplines and career stages) network addressing the lack of research that currently exists across multiple disciplines and institutions. However, as such, the generated themes remain context-specific and lack widespread generalisability beyond the network in question. These limitations specifically relate to the one nation, one network, multidisciplinary, Higher Education focus of the study presented, as well as the possible bias of insider researchers within the collective autoethnographic approach.

Future research could explore the study's findings in varied contexts and countries and also seek to test the 'cross-pollination' effect through examining multiple, interlinked or intertwined networks. Additionally, the model itself could provide the basis for further research. This would allow for the study's findings to be validated and challenged beyond their current means (one nation, one network, multidisciplinary, Higher Education), whilst providing a platform for the 'Roots/routes to Fruit' model to be further validated. The findings could be furthered to investigate whether the insider knowledge of the researching team was necessary to understand the complex factors at play or whether any bias existed within their perceived success and impact.

Conclusion

This research highlights the significant benefits of network participation for individuals and institutions, emphasising growth as a central theme through the analogy of planting a bulb (personal attributes of its members) that bears fruit (the outcomes of the project). By identifying key pre-conditions, facilitating conditions, and supportive factors for growth, this study illustrates how networks combat isolation, inspire new research directions, and drive impactful outcomes locally, nationally, and internationally. Thus, this addresses the study's central aim of identifying what factors impact on the development and sustainability of a personal and professional, multidisciplinary Higher Education collaborative network. The concept of cross-pollination further underscores the interconnected nature of networks, fostering synergies that amplify mutual benefits. These findings are presented in a unique, original model that depicts the factors, and interplay of such factors, key to developing and sustaining a successful personal and professional Higher Education network. The study's context-specific limitations are acknowledged, with further research necessary to validate, consolidate and build upon the findings presented within this study. Future research could explore these findings in diverse settings and investigate the cross-pollination effect across multiple networks to build on these promising insights.







Note

1. Since the research was conducted, the ninth university joined the project.

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ORCID

Gary Beauchamp  <http://orcid.org/0000-0001-7268-5027>
 Sammy Chapman  <http://orcid.org/0000-0001-6181-4268>
 Stephen Atherton  <http://orcid.org/0000-0003-4651-9695>
 Julian Ayres  <http://orcid.org/0009-0007-3363-2628>
 Nick Young  <http://orcid.org/0000-0002-9246-6822>
 Tom Crick  <http://orcid.org/0000-0001-5196-9389>
 Sue Horder  <http://orcid.org/0009-0007-5666-3080>
 Mathew Jones  <http://orcid.org/0000-0002-2903-9756>
 Panna Karlinger  <http://orcid.org/0000-0002-3836-725X>
 Caroline Lewis  <http://orcid.org/0009-0009-6658-1534>
 Jeff Lewis  <http://orcid.org/0000-0002-7725-9630>
 Kaydee Owen  <http://orcid.org/0000-0002-8198-1175>

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