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### Article

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# **Learning together, learning apart: Integrated action learning through a socio-technical systems lens**

## **Abstract**

To contribute to current debate concerning approaches to teaching and learning for researching complex work-based problems, we focus on the Doctorate of Business Administration (DBA) programme. We examine the development of an integrated action learning approach as part of a part-time DBA offered by a university in the UK. In adopting the lens of socio-technical systems (STS) theory we address two important questions; how can action learning be adapted on a DBA programme to enhance students' learning together and learning apart? And, what insights can be drawn from conceptualising DBA learning as a socio-technical system? Through the collection of natural data from student feedback, meeting notes, action logs and the facilitators reflections, we develop a framework of integrated action learning as a socio-technical system. Through this framework we propose a model of action learning that enhances the ability of students to learn together and learn whilst apart. We also reflect on how technology has enabled distance learners to interrogate their complex work-based problems through collaborative questioning, focused on research-based inquiry, both together, and apart on their own learning journey.

**Keywords:** Adaptive action learning, Technology, Collaboration, Research based inquiry, Critical reflection

## **Introduction**

Doctorate of Business Administration (DBA) candidates are distinctive in Higher Education; they come from a diverse range of fields and generally study part time, whilst working in senior positions at the same time. As there is an explicit focus on developing professional practice and personal learning through their research, DBA students must learn to simultaneously navigate both practitioner and academic worlds to develop strategies to understand a complex work-based problem. Action learning is credited with the ability to improve practice by questioning ways of working, therefore for DBA students can offer an opportunity to not only develop one's self, but also enhance wider practice (Pedler, Burgoyne, and Brook, 2005).

The teaching and learning model of a DBA is usually based around group activities where students learn together, and significant periods of independent study where students learn apart. Students must continuously engage with the development of both their practice and knowledge to become autonomous learners. This is a difficult task and it is important that we provide suitable opportunities and support to enable such lifelong learning. This paper explores how a model of action learning can be developed through conceptualising the process of bringing students together as a socio-technical system, to develop an approach that facilitates effective learning together and learning apart on a DBA programme. Two questions are asked, firstly, how can action learning be adapted on a DBA programme to enhance students' learning together and learning apart? Secondly, what insights can be drawn from conceptualising DBA learning as a socio-technical system? We present an illustrative case by drawing on a longitudinal reflection of naturally occurring events in the development of an integrated approach to action learning. We use a self-ethnographic approach to examine the case.

**Professional Doctorate – Doctorate of Business Administration**

Professional Doctorates, which include DBA programmes, are designed for experienced professionals to make a contribution to knowledge and/or practice. They usually consist of taught elements, with students contributing to their own professional practice (Bourner, Bowden, and Laing, 2001). A basic principle of Professional Doctorates is that candidates use their experience and expertise as a starting point (Costley and Lester, 2012), then engage with the academic body of knowledge to make sense of the intricacies of becoming a scholarly-practitioner (Wasserman and Kram, 2009). The specific focus of DBA education is research based inquiry, with candidates researching complex workplace problems (Lester, 2004) and focusing on the development of practical and theoretical knowledge. As per doctorates more generally, undertaking a research project with the end product being a thesis is expected of DBA candidates (Neumann, 2005). For DBA students, it is therefore more about becoming a researcher, rather than doing research (Anderson and Gold, 2015). A distinguishing feature between professional doctorates and PhDs is the mode of research, often referred to as ‘mode 2’, where there is a focus on a situated view of knowledge (Anderson et al., 2015). Students must reconcile academic fundamentalism and the social, political and economic environment which is under investigation, to enable possibilities for action and change (Tranfield and Starkey, 1998). Therefore, navigating learning as a DBA candidate requires both scientific expertise and non-technical communications to facilitate the production of knowledge. The production of knowledge requires the transferring of learning, reflection and assessing the impact of work (Griggs et al., 2018). This thoughtful action, as Lester (2004) notes, is what enables Professional Doctorates to advance both knowledge and practice (Gibbons, 2000). Due to the expectations of a Professional Doctorate and the profile of students, there are still questions about the approach to developing effective learning environments (Maxwell, 2003; Bourner and Simpson, 2014).

As professionals seeking to examine their practice, students are inextricably entwined with their research. They are encouraged to build on their extant knowledge but this may mean assumptions are made about what they think is happening, or what they think they will find (Coughlan, 2007). Reflective practice, a core element of DBA research, enables candidates to gain a deeper understanding of themselves and their research, with the focus on changing or developing practice (Klenowski and Lunt, 2008). Consequently, there is a strong emphasis on reflection to facilitate introspection on experience to navigate the researchers' role and personal learning through examining, reviewing and reconstructing assumptions. Learning on a DBA extends beyond this. It is not an individual process of learning, but aims to contribute to, and disrupt, complex organisational issues. Critical reflection aims to question and expose dominant practices to empower action (Brookfield, 2009). It requires individuals to gain awareness of the socio-political environment in which they are embedded and question their values and assumptions (Sambrook and Stewart, 2008). The process of critical reflection, within an educational context, has been said to require a collaborative approach to enable opportunities to bounce ideas and understanding with others perceived as helpful in supporting this development (Corley and Thorne, 2005). Consequently, to enhance learning on the DBA programme, opportunities to learn together to develop critical awareness should be examined. This paper will discuss how a model of action learning has been developed on a DBA programme to enhance learning.

### **Action Learning for Doctoral Education**

Action learning is a process of “learning from concrete experience and critical reflection on that experience, through group discussion, trial and error, discovery and learning from one another” (Zuber-Skerritt, 1993, pg. 45). Although there are many approaches to action learning

(Marsick and O'Neil, 1999), they all promote reflection to solve real world problems or tasks (Pedler, Burgoyne, and Brook, 2005). Action learning for Professional Doctorates can help students to develop their capabilities as professionals and their capacity to bring about change that contributes to professional practice and the advancement of knowledge (Bourner and Simpson, 2014). In this, students are encouraged to develop insightful questioning skills to clarify the nature of the research problem, reflect on possible solutions and then take action. Developing these skills can empower individuals to take action by giving a sense of responsibility and instilling confidence (Haith and Whittingham, 2012). This questioning insight is integral to be able to disrupt and contribute to wider organisational development.

Typically focused on practice or leadership development (Wilson, McCormack, and Ives, 2008; Edmonstone, Lawless, and Pedler, 2019), there are challenges associated with the development of scholarly-practitioners through DBA research. The focus of action learning sets could be seen in this context as primarily focusing on individual learning (Pedler and Attwood, 2011), by looking at the organisation in different ways, understanding the work and perspectives of others and influencing students' own work. However, Pedler and Attwood (2011) suggest that action learning can and should contribute to social capital and not only individualistic tasks, through the development of networks or the building of new relationships. Social capital, referring to relationships and networks that provide shared knowledge and support (Taylor, Jones, and Boles, 2004), is developed when individuals who would not ordinarily meet form networks of trust and mutual understanding (Davenport and Daellenbach, 2011). Social capital is established within and outside of action learning sets. Candidates do look beyond themselves as learners, with the aim of developing both professional practice and themselves as scholarly practitioners. This self-knowledge, developed through action learning, may provide the most useful, practical value which pertains to the ethos of action learning

(Bourner and Rospigliosi, 2019). Correspondingly, the intent of DBAs is to engage with organisational challenges, therefore a model of action learning should look to take advantage of the opportunities for self-reflection to develop professional practice.

Action learning is different from other forms of self-reflection, as it is undertaken with a mutually supportive group that enables individuals to challenge one's own thinking (Wilson, McCormack, and Ives, 2008). Action learning sets provide a 'safe space' for members to practice questioning their assumptions and challenging their ways of thinking and doing (Corley, 2006). This aspect of action learning is vital for candidates on Professional Doctorates, which tend to be distance-learning courses, as it can be easy to slip into old ways of thinking when re-entering the workplace, even when adopting a scholarly practitioner perspective. In our current case, candidates meet face-to-face for only a short period over the first three years of their course, so this group requires the ability to meet virtually. Consequently, we ask two research questions; how can action learning be adapted on a DBA programme to enhance students' learning together and learning apart? And, what insights can be drawn from conceptualising DBA learning as a socio-technical system?

### **Socio-technical systems theory**

Socio-technical systems (STS) theory was developed from research conducted through the Tavistock Institute on work organisation in the coal industry, which concluded that productivity was reliant on the integration of social and technical aspects (Trist and Bamforth, 1951). The technical system is concerned with processes, tasks and technology. Whereas, the social system places importance on people's attributes and authority structures. Successful outputs are as a consequence of the interaction of these systems; therefore one should not be focused on in

detriment to the other. STS emphasises the development of self-regulating workgroups (Appelbaum, 1997). Similarly, in higher education, active and student regulated learning is increasingly perceived as essential to enable students to manage complexity and lifelong learning (Cassidy, 2011; Lumpkin, Achen, and Dodd, 2015). Self-regulated workgroups within a STS are said to be more motivating and satisfying to work within as they meet individual's needs (Appelbaum, 1997). Therefore, applying this to action learning can help to support and develop students' needs within the group. Furthermore, developing self-regulated learning skills is vital for doctorate completion (Kelley and Salisbury-Glennon, 2016). These workgroups cooperate to share resources to achieve their outcome. Therefore, the system in this context is the interrelated components that work together to enhance effective learning on a DBA programme. This system also reflects elements of action learning; with students undertaking complex work-based problems, engaging with their problems together, sharing resources, whilst working individually on their own research projects. Action learning's refusal to be designed and pushed into one approach, and the opportunity for an evolving practice (Brook, Pedler, and Burgoyne, 2012) permits opportunities to link it with overarching theories, as has been done for Communities of Practice theory (Lawless, 2008).

Online learning works as a socio-technical system, integrating the teachers and learners (actors), the environment (structure), the knowledge and skills being communicated (task) and the online platforms used for teaching (technology) (Upadhyaya and Mallik, 2013). This takes into account the system as a whole, which enables us to look at learning and teaching that is responsive to changing needs (Cummings, 1978). For learning on DBA programmes, although there is a need for scientific expertise, this is adapted to, and integrated for, each student differently depending on his or her own research project. Similar to designing working practices, a rigid mechanised teaching structure, where there is a clear direction, such as in



undergraduate and postgraduate programmes, would not work for a research programme. Rather than focusing on task design, in the context of the DBA programme of teaching, STS theory considers the workgroup as the point of reference for work design (Cummings, 1978), and consequently reacts to the needs of individuals. Therefore, taking a STS approach to designing teaching practices for doctoral students allows for the consideration of individual needs and task flexibility. Teaching through a STS is therefore not purely to introduce technology to improve learning, but to integrate the technical and social systems to enhance the experience of learning for the individual.

STS theory can also act as a vehicle for social interaction. Socio-technical capital, as coined by Resnick (2001), provides a framework for understanding how technology can facilitate the development of social capital. Integrating online capabilities along with traditional face-to-face methods enables learning that happens in class to be reinforced, by enabling opportunities for reviewing experiences in depth with their group (Mumford, 1996). Online learning, when orientated towards collaboration, empowers collaboration through social interaction between learners and tutors (Liaw, Chen, and Huang, 2008). Creating this collaborative environment can enhance learning experiences and can help to increase engagement (Robinson and Hullinger, 2008; Huang, 2019). Therefore, working alongside the traditional face-to-face teaching, this opportunity to engage together online can enable students to connect and apply learning to their own context. On the DBA, as students primarily learn whilst apart, online learning enables them to come together again changed, prepared to learn together.

Although progress has been made integrating digital technologies into teaching, it is still very much instructor driven, which for advanced learners is not always the most prudent. Integrating online learning into a predominantly distance learning course opens up the opportunity for

virtual action learning sets, which enables students to come together at times when they are apart to continue to work together (Plack et al., 2008). This ‘blending’ of methods, over a sustained period, enables students to move to a deeper level of knowledge and understanding through collaboration. Technology and action learning can enable a sense of continuity and has been found to be highly effective to support face-to-face teaching (Edmonstone and Robson, 2014). In the case of distance learners who are researching in their own organisations, this is especially important.

### **Illustrative case: Reflection on Learning Together, Learning Apart**

We use the theoretical frame of STS theory to examine how action learning has been adapted to enhance students’ ability to learn together and learn apart through the implementation of social and technical systems on a DBA programme. There are four key elements to the approach to action learning; developing collaborative questioning between students, enhancing technology utilisation, fostering an environment of research-based inquiry and framing knowledge and skills through critical reflection. At the core is the development of collaborative questioning to bring students together to develop questioning insight allowing them to tackle their complex work-based problem (Pedler, 2017). We are therefore concerned with how a socio-technical system can be developed to enhance these elements of action learning for students who learn together and learn apart, and examine each element in turn with reference to our illustrative case.

The focus of this study is a DBA programme in a university in the North West of England and is one of the most established Professional Doctorates in the university. With teaching delivered through a blended learning approach over a three-year period, the DBA is cohort-

driven consisting of four one-week residential workshops, monthly virtual action learning sets, and supervision via distance learning. DBA candidates study part-time and are likely to hold senior management positions. It is common that they have been absent from higher education for a long time. The DBA is research-driven with a clear application and impact for business practice. However, candidates often struggle initially to grasp research concepts and make connections to practice due to their relative absence from higher education, coupled with the high demands of their commercial worlds.

We present an illustrative case by drawing on a longitudinal reflection of the development of an integrated approach to action learning. We use a self-ethnographic approach to examine the case. Alvesson (2003) defines self-ethnography as a study in which the researcher-author describes a cultural setting to which they have a “natural access” and is an active participant on more or less equal terms with other participants. For the purposes of this research, the authors’ experience as a DBA programme team allow natural access as active participants on more or less equal terms with the other participants (the DBA students). The data is drawn from the team, who position themselves as practitioners of action learning.

The intention of self-ethnography is to draw attention to one’s own cultural context (Alvesson, 2003). The focus being on what goes on around oneself rather than putting oneself and one’s experiences in the centre (as opposed to auto-ethnography). For this research, it is the authors’ experience as a DBA programme team observing the naturally occurring events that are going on around them. For example through DBA workshops, team meetings and action learning sets. These naturally occurring events are subsequently framed and discussed using a STS lens.

*Developing collaborative questioning between students*

In adopting the lens of STS theory, it is important that social aspects of the action learning sets are designed to reinforce the behaviours expected (Appelbaum, 1997). The actors play an important role in the advancement of action learning on the DBA. Such actors can be the students, staff, supervisors, colleagues, or any individuals involved in teaching and learning. Action learning sets encourage opportunities to develop collaborative questioning to find new ways of moving forward, as evidenced by student feedback; “*creating an action at the end of the set [is] very helpful in finding a focus for the next meeting*” (Staff-Student Liaison Committee, 2020). This practice is done together as a group, to find solutions to wicked problems, or to foster insight into a developmental, methodological or process opportunity. In our case, we have extended opportunities for collaborative questioning into ‘Research Cafes’. These are workshops where we focus on certain aspects of research; literature and context, methodology and impact/contribution. We have noticed that students’ ability to articulate their research and question their peers have developed with continued opportunities for collective efforts to reflect on research and practice.

Action learning sets promote networking and meet the social needs of students. Participation in action learning sets can vary between groups. Fewer participants limits the discussion and results in the demotivation of future participation, therefore providing less value to students. This is seen in our case, with an action learning set participant noting, “*attendance had been poor across my action learning set [it limits the discussion]*” (Staff-Student Liaison Committee, 2020). When there are not enough students in a set for them to share problems and learning, two sets can be merged to enable sufficient members to be present. With sets merged, we find that more students are in attendance generally as they feel a higher sense of group identity. We have noticed that when only a few students attend, those who are there are unable to explore their own issue from a range of perspectives and miss out on the opportunity to

collaborate with others. In addition, those who do not attend tend to lose focus on the direction of their research, are unable to share challenges with their peers and discuss ways of overcoming these challenges, and miss out on the social capital developed in the action learning sets.

Furthermore, even if individuals are not able to attend action learning sets, the virtual learning environment is designed to maintain the momentum and stops students feeling isolated. Drawing on experiences of individuals who have been involved in action learning sets on DBA programmes, O'Farrell (2018) reflect that the take-up from set members and the buy-in to the process is integral to the action learning experience. Additionally, Englisch (2018) praises the commitment to the practice of staff in reinforcing the principles of action learning, which encourages the engagement of individuals in action learning and collaborative questioning.

On what can be a lonely endeavour, we found that students feel less isolated when they are able to come together continually throughout the course of the programme to gain social support. In a recent feedback session, a DBA student highlighted “*opportunities for peer support are beneficial to combat the natural isolation that occurs between [taught] workshops*”. Students continually highlight that collaboration and social support are important for their doctoral experience (Hutchings, 2017; Parker, 2009). The importance of the individuals within the action learning sets to support DBA learning can be seen through the commitment of others to the group, the opportunity for questioning from others and the development of learning communities.

*Enhancing technology utilisation*

An aspect of the DBA programme that has been utilised more fully in the last 3 years is the integration of technology into action learning sets. In our case, action learning sets are held virtually, and have been found to be especially beneficial for international students (Edmonstone and Robson, 2014). Although there are limited examples of virtual action learning (VAL) within the literature, it has been suggested that this should be treated as a distinctive form of action learning, and there are opportunities to understand its role within learning (Dickenson, Burgoyne, and Pedler, 2010). VAL is an integral part of action learning on our DBA programme as it enables students to come together whilst learning apart, both on their individual projects and as distance learners. In our case, the programme team notice that having the opportunity to meet virtually has been important for many of the students, therefore we are increasing opportunities to do this (DBA Action Control Register, April 2020). Students repeatedly identify that this is an important part of the programme as it helps to reduce isolation and increase opportunities for support and discussion of their research.

Issues of remoteness have been identified for virtual action learning (Pedler, Hauser, and Caulat, 2014), but in our case, groups are brought together in face-to-face workshops prior to commencing the action learning sets. We have seen that if students do not have the opportunity to develop relationships prior to meeting online the commitment to groups has declined. This observation has been integral for facilitating the uptake of the virtual action learning sets, making sure that all involved are aware of the process and how it is integrated into other areas of the course (Collins and Callaghan, 2018). The workshops do not constitute induction sessions, which may be more suitable to occur online (Pedler, Hauser, and Caulat, 2014), but rather individuals meeting and developing relationships and trust before embarking on their action learning journey.

In addition, we have introduced mechanisms to keep a log of action learning sets. A multi-user collaboration tool is now used to log actions, questions, insights and reflections. This form of asynchronous VAL has been used for senior leaders on a management development programme, finding positive results for learning, behaviour change and outcomes (Waddill, 2006). In our case the facilitator takes notes of meetings, which draw out key ideas and insights to enable students to come back and reflect on what has been discussed. Students then develop these further between sessions, sharing their progress, resources and questions. This practice has also enabled the continuation between action learning sets. As students come from different parts of the world and are in busy careers, it is not always possible to come together in the same way they could if working in the same organisation. Students can refer back to this evolving document, reviewing both their own progress and how others are progressing on previous actions.

Although the integration of technology has positively influenced experiences, there are hindering issues around 'extra-technology' (Hutchings, 2017). We have noticed challenges for students in being able to connect and interact with the technology. For example, the virtual teaching platform that is available to the university is cumbersome to access and in many cases, students struggle to connect. In a recent Student-Staff Liaison Committee, this was an issue raised, in which students felt that the difficulties associated with the technology affected their ability to engage with the action learning sets and their interest in engaging further. In addition, even for those that had been able to connect, the audio and visual can be very poor, which consequently affects their ability to engage. We have also observed that for some sets, issues with technology have meant that action learning sets have disbanded and even with the introduction of new technology we have not been able to pick up momentum with these groups.

The multi-user collaboration tool has been beneficial here to allow individuals to check in or check back on discussions if issues have arisen due to connection problems.

We note an interesting outcome from our focus on advancing the notion of learning together and learning apart on our DBA programme. The integration of technology to facilitate collaborative questioning has prompted students to interact in their own virtual environments, for example, virtual writing retreats. We can clearly see how the virtual action learning sets have enabled and supported community development and collaboration. This integration of asynchronous and synchronous forms of technology enabled collaboration has fostered a sense of community where students can seek further opportunities for collaboration. We reflect on how in our case the DBA students have very much adopted the ‘comrades in adversity’ identity (Revans, 2011, pg. 39).

#### *Fostering an environment of research based inquiry*

Individuals do not exist alone, and learning does not occur in isolation; interaction happens within a social system in the environment, e.g. as part of the teaching processes. Interaction is also part of the structure of a STS. Students must learn to navigate the structure they are in, whether that be their organisations, their disciplines or the academic environment. For the DBA, the focus is on research-based inquiry specifically orientated towards research-based problems, utilising both theory and practical expertise to question and identify solutions. Research-based inquiry is an integral component of action learning in this context as students start asking questions and taking action related to their research context. One action learning set participant notes how the “*discussion is helpful*” to navigate problems.



As action learning progresses, research-based inquiry encourages wider critical reflection about assumptions, moving to a deeper level of understanding. With the complexity of DBA learning, action learning can help to make progress in tackling issues that may occur in managing social and political issues within the business and management environment. We have seen instances where students have had to navigate pressure from stakeholders (e.g. employers or funders) as to the direction and/or timeline of their research. In one example, a student initially had organisational buy-in as to the focus of the DBA research, yet due to the rapid pace of change within the business, such support has subsequently been lost. The action learning processes has helped students in navigating these pressures and challenges. For our DBA students, learning occurs through active engagement with their research problem and by creatively approaching problems through active experimentation. In applying STS theory, it can be seen that through collaborative questioning students move to *being* a researcher as opposed to just *doing* research (Anderson and Gold, 2015). This position is a distinguishing feature of action learning at DBA level compared to action learning at Masters, where more research has been conducted (for example; Edmonstone and Robson, 2014; Harrison and Edwards, 2012). Reflecting the mode of study for DBA candidates, commitment to both academic concepts and the social and political context of the research problem is made possible through action learning.

#### *Framing knowledge and skills through critical reflection*

An important element that has supported the development of action learning is creating an environment of critical reflection across the programme (Sambrook and Stewart, 2008). Where it had previously been a stand-alone element, opportunities for reflection are now integrated across the DBA programme; both within the workshops as a constant thread throughout the sessions and, importantly, reinforced through the action learning sets. In comparing

experiences over the years of being on the programme, one action learning set participant noted “*the structure [of the action learning sets] is much improved, with more time to breathe and reflect*”. By having a clear focus on the task, we have demystified the intention of the action learning sets and hence set a clear agenda and purpose (Mendonça et al., 2015), which connects students in their questioning insight.

Students on the programme often start out in the action learning sets by having clear ideas about what they want to do and why, yet as the action learning sets progress students go through a paradigm shift, finding new ways of doing and thinking. On the DBA, this may change the way they approach their research. For example, one student initially engaged as a strong positivist due to their previous training, but then shifted to a wider understanding about the nature of knowledge and how they develop their practice. The action learning set member refers to their paradigm shift through their engagement with reflective practice and action learning, liberating them from linear thinking to examine the complexity of their practice. This reflects action learning that eschews this form of thinking in favour of engagement with real-life working (Marsick and O’Neil, 1999). In another example, an action learning set member had a clear idea as to what the right approach to their research was to ‘fix’ the problem, however they soon recognised that this is a more complex interaction. Through unpicking the issue and challenging their original assumptions, they were able to recognise the politics and power at play in organisations.

Learning through critical reflection encourages students to not only think about developing and working within current structures, but to consider the political and social tensions they face (Vince et al., 2018). Within the action learning sets, candidates work on re-orientating their thinking in relation to their role as a practitioner, and reflecting on their approach to research,

often by questioning their long-held assumptions. This reflects elements of Critical Action Learning, which emphasises politics and power and how this may impede or support learning (Edmonstone, 2019). This emphasis is reinforced through the active role of the facilitator, where students are asked to question the social and political forces that their research is bound within and to apply this learning to their wider work. Therefore, it is not enough for students at DBA level to reflect on one's own assumptions, but to review practices through a critically reflective lens (Brookfield, 2009).

### **Integrated Action Learning as a Socio-Technical System**

In drawing on STS, we derive a framework for integrated action learning by reflecting on our experiences and observations as a team working on a DBA programme, which is represented as Figure 1. Our holistic framework shows how working together to engage in collaborative questioning increases students' ability to develop critical reflection through exploring assumptions with others. As discussed above, this collaboration is also important to balance professional context and academic needs in practice research. Such an approach develops an environment of research-based inquiry whereby students question the context they are researching and working in. Technology, as described above, has been integral in enabling students to develop collaborative questioning by creating opportunities to come together and develop collective responsibility for learning. Technology allows us to come together on the DBA in ways that would not be possible in a purely face-to-face environment and to continue with all aspects of the programme despite the challenges presented through the Covid-19 pandemic.

Figure 1: Integrated action learning as a socio-technical system framework

## **Conclusions**

Using STS theory as a lens through which to view action learning on the DBA programme has allowed us to highlight four key aspects to enable learning; technology utilisation, critical reflection, collaborative questioning and research-based inquiry. Through the case, we set out to answer two key questions: how can action learning be adapted on a DBA programme to enhance students' learning together and learning apart? And, what insights can be drawn from conceptualising DBA learning as a socio-technical system? We address these questions below.

We find that the effective utilisation of VAL to complement the characteristics of the DBA programme structure is critical and emphasise the importance of the technical component of the STS. We have evidenced how a multi-user collaborative tool can be utilised to allow students to learning synchronously (together), as well as asynchronously (apart), and thus fits with the adopted blended delivery model of the programme. This mechanism allowed collaborative questioning to flourish. Adapting the action learning approach to embrace critical reflection has seen students transition from having fixed and assured ideas at the beginning of the programme, which is a common characteristic given the typical demographic of a DBA candidate, to taking paradigm shifts in finding new ways of doing and thinking. This has led to students identifying themselves as 'being' researchers, rather than simply 'doing' research.

Adopting STS has also enabled the ALS to adapt and embrace the social aspects of the programme. A wider social component exists through face-to-face learning that quickly enables a strong sense of community, however mirroring this in a virtual setting is more challenging. Through simple processes, such as restructuring and merging action learning sets

to increase participation and decrease loneliness, through to embracing the use of virtual writing retreats, the ALS have adapted and aligned to the key social aspects of the programme in order to facilitate learning together and learning apart. Our study therefore provides numerous examples of how action learning can be adapted on a DBA programme to enhance students' learning together and learning apart. Additionally, in developing Figure 1, and by conceptualising DBA learning as a socio-technical system, we present a holistic framework offering insight into how the different elements of the approach to action learning can be complementary in providing a synergistic approach to a DBA programme.

In summary, we emphasise the critical importance of creating spaces for students to embark on collaborative questioning when together, and also whilst apart. We have done this on our DBA programme by providing opportunities for collaboration by using technology to provide virtual spaces both through VAL and multi-user collaboration tools. Surrounding this technological approach is a social platform that embraces a culture of learning communities and the 'comrades in adversity' identity (Revans, 2011, pg. 39). We therefore suggest that STS is of critical importance in integrating the social and technological environment to enhance action learning on a DBA programme.

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