ARTICLE

Using Technology-Enabled Learning Networks to Drive Module Improvements in the UK Open University

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This paper describes a work-in-progress action research project to investigate how technology-enabled learning networks may achieve practical organisational improvement outcomes in the author's own institution, a UK distance learning higher education (HE) context. Collaborative learning technology, typically used for academic learning or professional development, affords the geographically scattered and disparate practitioner stakeholders involved in distance learning module design and delivery the ability to grapple together with a problem area requiring improvement.

In this particular context, there is a perennial organisational need to close a feedback loop between remote module tutors and campus based teams, to develop a joint understanding of teaching and learning design challenges, and to put tutors as close as possible to the development of solutions. However, there is insufficient conceptual and practical understanding about the mechanisms by which this unfolding process of technology-enabled organisational learning might happen. Conceptual frameworks in the field of learning networks and networked learning are still developing (Sloep, 2016).

The aim of this research is to investigate the active use of learning networks to achieve practical improvement outcomes, and to explore a new conceptual framework covering all stages of the required learning process. The research aims to make an original contribution to the call for actionable knowledge in organisational research, using a collaborative, equitable and rigorous action-oriented and theory-building approach, which also aims to achieve measurable impact.

1. Introduction and Research Aim

This paper describes a work-in-progress action research project to investigate how technology-enabled *learning networks* may achieve practical organisational improvement outcomes in the author's own institution, a UK distance learning HE context. Although 'learning within and between organisations has been identified as central to the processes of public service improvement' (Rashman, Withers and Hartley, 2009, p. 465), the theme of technology-enabled learning networks applied to the subject area of organisational learning is still in its infancy. More exploration is required about how the affordances of collaborative learning technology, typically used for academic learning or professional development, can be deployed in organisational learning and improvement processes. Collaborative learning technology affords the geographically scattered and disparate practitioner stakeholders involved in distance learning module design and delivery, the ability to work together to grapple with a

problem area requiring improvement. Fresen and Boyd (2005) highlighted a complex 'web' of interrelationships between these practitioners. The technology presents the possibility that each practitioner, wherever located, can contribute their own individual insights and work through an exploratory improvement process in which they learn together how to achieve change for the better, across the different contexts and boundaries of the university.

In this particular HE distance learning context, there is a perennial organisational need to close a feedback loop between remote module tutors and campus based teams, to develop a joint understanding of teaching and learning design challenges, and to put tutors as close as possible to the development of solutions. Can learning networks help to achieve this? The aim of this research is therefore to investigate the active use of learning networks to achieve practical improvement outcomes, and to explore a new conceptual framework covering all stages of the required learning process.

The term 'technology-enabled' is used to distinguish a collaborative learning activity enabled by technology that was not previously achievable, in contrast to 'technology-enhanced' learning (TEL), which is intended to convey an enhancement to previously existing educational practice.

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2. What is a Learning Network?
Learning networks connect individuals together in order to achieve some goal, or address a specified challenge or problem area. The working definition of a technology-enabled learning network in this project is:

> *a task-driven technology-mediated intervention, connecting together individuals of disparate backgrounds to learn how to address a specified outcome or goal; the learning may be formal, informal, social, organisational or creative.*

This project is focused on the use of technology-enabled learning networks for one particular type of learning*: organisational learning, to achieve practical improvement outcomes*, where these are defined as:

- **practical:** based in real life experience or activity, as opposed to in thought, theory or imagination
- **improvement:** organisational change for the better, as evaluated by participants in the learning network and other interested stakeholders
- **outcome:** the way the collaborative activity by participants in the learning network turns out.

Learning networks may be contrasted to other collaborative organisational learning arrangements such as Communities of Practice (CoPs). In a CoP, it is the existence of the shared practice – 'a common set of situations, problems and perspectives' (Wenger, McDermott and Snyder, 2002, p. 25) that allows members to share knowledge. In contrast, there may be no such shared competence or identity in a learning network, which may bring together individuals of very disparate backgrounds to address a particular organisational challenge or solve a problem.

3. Theoretical Foundations and Conceptual Frameworks in the Field
The process of concept formation is still in an immature state in the field of learning networks and networked learning generally (Sloep, 2016). For the purposes of this research, Boyd (2017) identified three conceptual frameworks available in the literature:

- The Value Creation Matrix (Wenger et al. 2011), later developed into the Value Creation Framework (Wenger-Trayner, 2014), which is a conceptual framework for planning and evaluating the value of learning enabled by community involvement and networks, deriving from Communities of Practice literature
- the Cultural Historical Activity Theory (CHAT) framework, as described in Yrjo Engeström's theory of expansive learning (Engeström, 2001)
- an 'activity-centred analytic framework', which has been formulated specifically for learning networks (Carvalho and Goodyear, 2014).

The three frameworks were originally considered because they have all been applied to the research of learning networks, and explicitly depict the *collaborative activity* of individuals coming together to work towards some purpose or to produce some outcome. The frameworks were compared with each other, and a series of common categories identified. These categories were used to drive a theoretical, or deductive, thematic analysis (Braun and Clarke, 2006) of learning network interactions, held in a discussion forum. Boyd (2017) found that there was however an alternative way of interpreting the discussion forum data, which was then analysed in a second inductive phase. This inductive interpretation concerned the unfolding narrative involved in the different stages of the action research cycle. The study concluded that the frameworks appeared insufficient in conceptualising the social mechanism of interactions by which the required organisational learning process happens, and that there is merit in exploring a new conceptual framework.

4. Research Questions and Objectives
The primary objective of this doctoral research is thus to answer the following research questions:

1) *What practical improvement outcomes can be achieved from the technology-enabled learning networks under investigation?*
2) *How can the mechanisms of technology-enabled organisational learning to achieve practical improvement outcomes best be conceptualised?*
3) *What factors enable or constrain the achievement of practical improvement outcomes using technology-enabled learning networks?*

A secondary objective is to develop practical guidelines for the support of future learning network facilitators, who may be practitioners as opposed to dedicated researchers.

5. Methodology and Analytical Techniques
Within a pragmatic research philosophy, action research has been chosen because the purpose of a collaborative action research strategy is to 'understand and improve' (Bradbury, 2015), and to engage in a project which *seeks* the achievement of a practical improvement outcome, in order to research about the mechanisms required to achieve it. The three conceptual frameworks described in the literature are also explicitly based on collaborative activity, this being defined as the practical actions jointly undertaken by the participants. They are inherently practical in nature, as is the nature of organisational learning itself, described as 'a process of individual and shared thought and action' by Rashman *et al.* (2009, p. 470).

An insider action research approach (Coghlan and Brannick, 2014) is therefore being underpinned by Grounded Theory Method (GTM). The joint originators conceived grounded theory as a methodology to *discover* theory from data and thus respond to a 'major task confronting sociology today', that of producing theory that resonates or fits with empirical situations, and is understandable and applicable by laymen and sociologists alike (Glaser and Strauss, 1967, p. 1). A grounded theory is a product of the method, hence the prevalent use of the acronym GTM to differentiate between method

and product, however in the literature they are used interchangeably.

The Coghlan and Brannick (2014) three-legged table model for insider action research, as illustrated in **Figure 1**, is being used to embrace two action research cycles operating in parallel. Within a specified context and purpose, issues are first collaboratively constructed using insight from different practitioners. This is then followed by planning action, taking action and evaluation, to feed into the next cycle. Inquiry is undertaken into both the *content*, or action part of the project, plus the unfolding organisational learning *process* required to achieve practical improvement outcomes, as well as examining premises or underlying assumptions about the context and purpose.

GTM is being used to support *learning about the process*, to provide a systematic and rigorous analysis and theory building approach within the overall action research methodology. As data is collected and analysed on the learning network interactions in an iterative and inductive manner, this will help judge to what extent the three existing conceptual frameworks can be adapted and extended, or whether a new framework is justified.

The empirical context for this work is a series of learning networks specifically created to explore the research questions. Learning networks were established for three Open University modules using discussion forums, each in a specially developed Virtual Learning Environment (VLE) course website. A VLE website was chosen in contrast to any other collaborative technology because it is very familiar and accessible to all university staff, available at no additional cost, and secure and confidential for discussing matters relating to internal practice and improvement.

In the first action research cycle, associate lecturing staff (Tutors, or Associate Lecturers) were invited to provide feedback on conceptually challenging 'Tricky Topics' being experienced by students. Tricky Topics are conceptual or other problems that students are facing which act as barriers to learning. They may arise from incomplete pre-knowledge, essential concepts, terminology or existing intuitive beliefs. For further information there is a freely available Badged Open Course (Open University, 2018) developed by the Open University, on *Teaching and Learning Tricky Topics,* as a practice-based application of Threshold Concepts theory (Meyer and Land, 2006).

The feedback from tutors was achieved by running a two week discussion forum in the learning network, to gather insights and prepare for a one hour online workshop, facilitated by a Tricky Topics specialist in a web conferencing room in the learning network site.

A second cycle was undertaken for one particular module, based on the analysis of issues from the first. Various learning analytics, including a 'map' of the learning design, was presented to tutors. This visual device maps out designed study hours across a taxonomy of different types of learning activities, according to an Activity Types Classification Framework (Conole, 2012). Also aggregated VLE engagement data plotted against the learning design mapping was presented as a visualisation, see Nguyen et al. (2017) for further explanation of these visualisations. The visualisations were explained and interpreted for tutors and module team members, to assist towards the further co-construction of issues and the planning and taking of action. This was facilitated in a one hour web conferencing workshop by a senior manager in STEM with responsibility for learning design. This time it was followed up by a two week discussion forum to discuss issues raised and seek ideas for in-presentation teaching improvements or adjustments, in contrast to the previous preparatory discussion which ran before the workshop.

After the discussion forums were complete, the qualitative data was exported from the forums and loaded into qualitative analysis software. The systematic techniques of GTM as described by Urquhart (2013) were used to code the data excerpts in a process of *iterative conceptualisation*
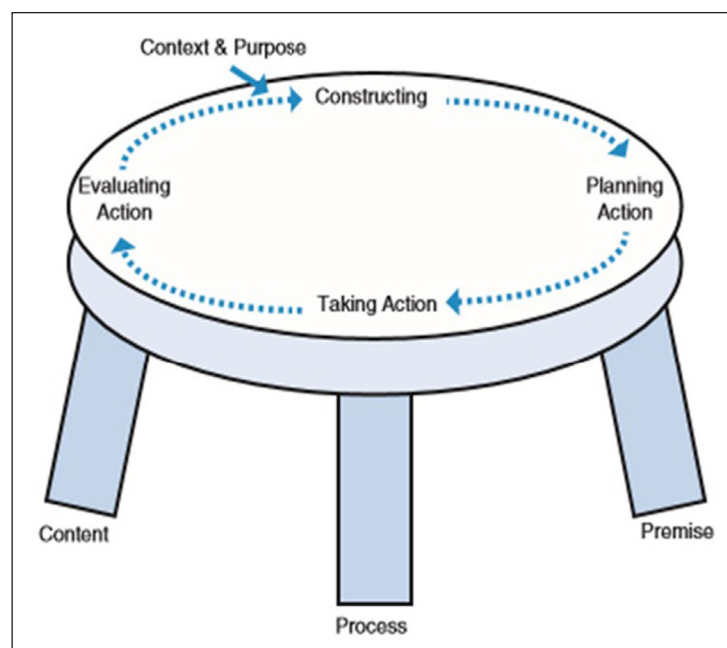

Figure 1: The action research table top model.
Source: Coghlan and Brannick (2014, p. 13).

(Urquhart, Lehmann and Myers, 2010), and to represent this ongoing process visually in a manner which could be shared with the practitioners and stakeholders involved.

6. Current Findings
The first research question:

RQ1: What practical improvement outcomes can be achieved from the technology-enabled learning networks under investigation?

is related to the content, or action part of the project, as per the table top model in **Figure 1**.

The second research question:

RQ2: How can the mechanisms of technology-enabled organisational learning to achieve practical improvement outcomes best be conceptualised?

is related to the unfolding organisational learning process required to achieve practical improvement outcomes. Findings are therefore structured in this manner.

6.1. RQ1
In the action research first cycle, tutors in all three modules successfully articulated a series of Tricky Topics. The learning network for one second year degree level module in STEM was particularly successful. The STEM module also identified a series of other issues that were particularly challenging to students, including *volume and pace of learning material, student knowledge at the start of the module*, and *drill and practice of concepts.* As a result of the identified Tricky Topics, a series of four innovative intervention videos were suggested and produced by the tutors themselves, and included on the live module website. The innovative approach of two tutors in a science laboratory, discussing together topics which students find challenging, has since been replicated in other modules.

The learning networks for the other two modules had significantly lower levels of engagement due to several operational constraints and challenges across the duration of the project. These challenges will be documented as part of the answer to RQ3, as factors constraining the achievement of practical improvement outcomes using learning networks.

A second action research cycle is now being undertaken for the STEM module, based on the analysis from the first. Concerns about volume and pace of learning material are being further explored, using the learning design mapping and VLE engagement data to support the discussion. An initial action under trial is the development of 'signposting' materials to assist students who may be struggling to keep up with the planned study schedule. Further actions underway include gaining direct feedback from students on their level of preparedness, *study behaviour,* whether engaging with the VLE or using alternative offline study formats, and reactions to the videos and signposting materials.

6.2. RQ2
In the path towards conceptualisation of the mechanisms by which the unfolding process of organisational learning takes place, open codes have been assigned to all excerpts in the learning network interactions from the discussion forums. In the first cycle, a wide variety of feedback was recorded. Tutors possess detailed insight into student challenges and many have long-standing experience, not just in the modules in question, but in other related modules, how the modules have historically related to one another at the university, general experience of subject teaching, and comparison with practice in other universities. They drew on all of this experience in the discussion forums. The open codes have initially been related and grouped together into categories, using Spradley's (1979) semantic relationships, as described by Urquhart (2013). An *integrative diagram* was produced, which gives a clear picture of the analytical path and stimulates thinking about relationships between categories.

A provisional version of this first integrative diagram is illustrated in **Figure 2**. Current categories refer to *discussion strategies* used in the discussion forum, *tutor experience, tutor expectations and emotion*, and *reference to university current and historical practice*, all of which resulted in the *identification of issues* being faced in the module, and *identification of role players* who may need to be involved in further network discussions. The issues identified in addition to Tricky Topics primarily identified learning design and delivery challenges.

The integrative diagram has also been converted to an interactive spreadsheet in which the qualitative evidence can be directly retrieved for each code. The aim of this interactive device is to share the evidence for the analysis, and underpin the collaborative learning process for interested stakeholders and network participants.

A similar analytical exercise has been undertaken for the second action research cycle, embracing the planning of actions as a result of issues identified. Using the GTM technique of *constant comparison,* new data has been compared with existing codes and categories to see if they fit and are workable, or whether new codes and categories are required. The integrative diagrams are interim artefacts which are part of the journey towards *theoretical coding*, or identifying the relationships between categories. Theoretical coding is described by Urquhart (2013) and first proposed by the co-founder of grounded theory (Glaser, 1978; 2005). Urquhart (2013, p. 116) underscores that 'without thinking about relationships, we cannot claim to be building theory'.

7. Discussion
This work-in-progress project illustrates one innovative approach to the integration of theory and practice. It connects the disparate and geographically scattered practitioners across the different boundaries of a highly complex distance learning higher education institution. Aiming to achieve joint ownership in a collaborative and equitable improvement process, it puts tutors close to the
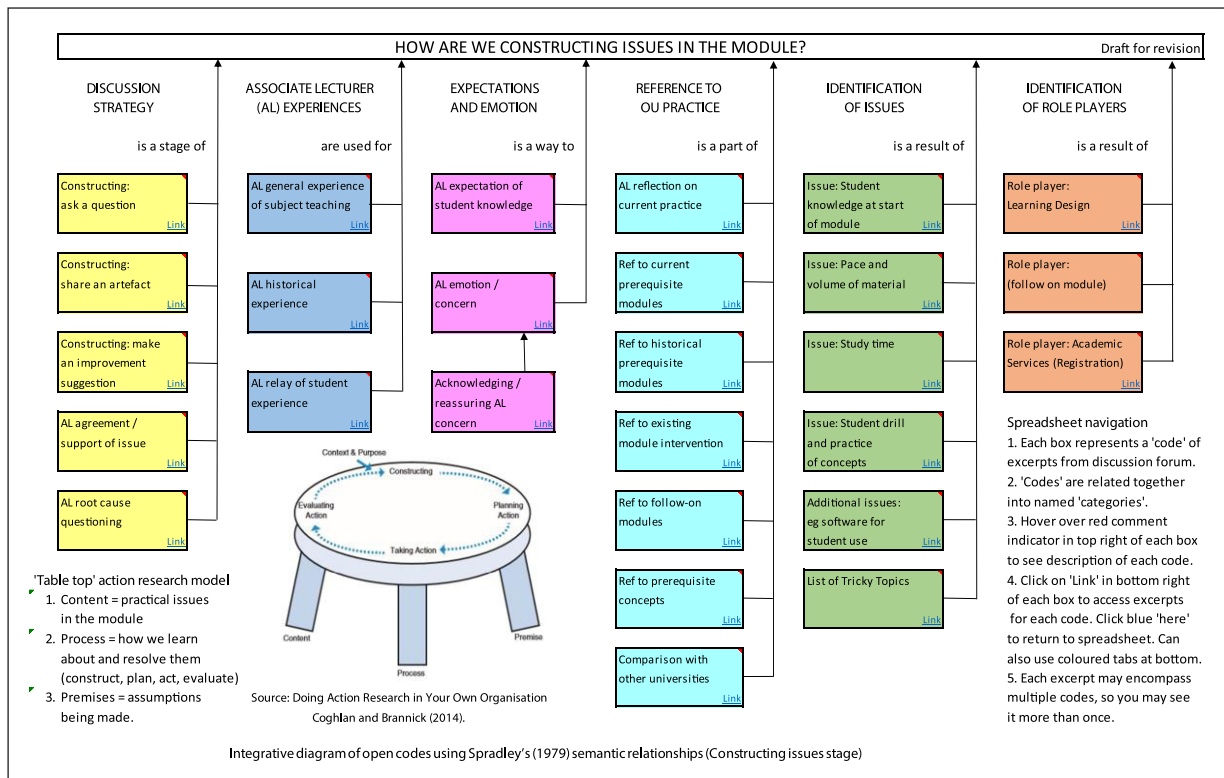
HOW ARE WE CONSTRUCTING ISSUES IN THE MODULE? Draft for revision

DISCUSSION STRATEGY	ASSOCIATE LECTURER (AL) EXPERIENCES	EXPECTATIONS AND EMOTION	REFERENCE TO OU PRACTICE	IDENTIFICATION OF ISSUES	IDENTIFICATION OF ROLE PLAYERS
is a stage of	are used for	is a way to	is a part of	is a result of	is a result of

Column 1 (Discussion strategy):
- Constructing: ask a question [Link]
- Constructing: share an artefact [Link]
- Constructing: make an improvement suggestion [Link]
- AL agreement / support of issue [Link]
- AL root cause questioning [Link]

Column 2 (Associate Lecturer experiences):
- AL general experience of subject teaching [Link]
- AL historical experience [Link]
- AL relay of student experience [Link]

Column 3 (Expectations and emotion):
- AL expectation of student knowledge [Link]
- AL emotion / concern [Link]
- Acknowledging / reassuring AL concern [Link]

Column 4 (Reference to OU practice):
- AL reflection on current practice [Link]
- Ref to current prerequisite modules [Link]
- Ref to historical prerequisite modules [Link]
- Ref to existing module intervention [Link]
- Ref to follow-on modules [Link]
- Ref to prerequisite concepts [Link]
- Comparison with other universities [Link]

Column 5 (Identification of issues):
- Issue: Student knowledge at start of module [Link]
- Issue: Pace and volume of material [Link]
- Issue: Study time [Link]
- Issue: Student drill and practice of concepts [Link]
- Additional issues: eg software for student use [Link]
- List of Tricky Topics [Link]

Column 6 (Identification of role players):
- Role player: Learning Design [Link]
- Role player: (follow on module) [Link]
- Role player: Academic Services (Registration) [Link]

'Table top' action research model
1. Content = practical issues in the module
2. Process = how we learn about and resolve them (construct, plan, act, evaluate)
3. Premises = assumptions being made.

Context & Purpose — Constructing — Planning Action — Taking Action — Evaluating Action — Content — Premise — Process

Source: Doing Action Research in Your Own Organisation Coghlan and Brannick (2014).

Spreadsheet navigation
1. Each box represents a 'code' of excerpts from discussion forum.
2. 'Codes' are related together into named 'categories'.
3. Hover over red comment indicator in top right of each box to see description of each code.
4. Click on 'Link' in bottom right of each box to access excerpts for each code. Click blue 'here' to return to spreadsheet. Can also use coloured tabs at bottom.
5. Each excerpt may encompass multiple codes, so you may see it more than once.

Integrative diagram of open codes using Spradley's (1979) semantic relationships (Constructing issues stage)

Figure 2: Integrative diagram of open codes at the constructing issues stage for a STEM module.

identification of challenging module design and delivery issues, and the development of solutions.

The integrative diagrams make a first analytical step towards conceptualising the mechanisms of an effective technology-enabled learning network, and how the components relate together. Whilst acknowledging different merits of the three existing conceptual frameworks in the literature, putting these aside and using GTM is enabling development of an initial model which would not have been derived, had any of the other frameworks been applied.

Insider action research is recognised as one way to contribute to the development of new organisational capabilities, which enable an organisation to achieve its intended outcomes (Coghlan and Shani, 2008). *Learning mechanisms* are identified in the literature as planned organisational structures and processes that can encourage learning and enhance organisational capabilities (Lipshitz, Friedman and Popper, 2007; Shani and Docherty, 2008; Coghlan and Brannick, 2014). However despite the affordances of collaborative learning technology and the emerging research area of networked learning, there is little conceptualisation of possible organisational learning mechanisms using learning networks, especially in a way which may be transferable to other contexts in an actionable manner.

Sannino and Engeström (2017) refer to this current demand for *actionable knowledge* in organisational research. Understood as 'collaborative and generative possibility knowledge intertwined with transformative action', they describe 'looking in vain' for recent discussions of 'theoretically and methodologically ambitious approaches' in major journals. This research aims to make an original contribution to this call.

The findings of the project will also provide progress towards the 'systems' view identified by Wenger-Trayner et al. (2015), as necessary to analyse learning and problem-solving capability across the boundaries and interrelationships of a complex system, using approaches yet to be invented.

8. Next Steps and Plans for Future Work

The action research cycles and accompanying GTM analysis will continue, to support the unfolding process of constructing issues, and planning, taking action and evaluating. This will include participants' perception and experience of the new learning mechanism. At least one other module will be considered, in a process of *theoretical sampling* (Urquhart, Lehmann and Myers, 2010), and to start to develop practical guidelines for the support of future learning network facilitators, as per the secondary objective. The GTM analysis will consolidate and strengthen the emerging conceptual framework. It will then be compared back to the three existing frameworks in the literature along with any additional relevant frameworks which have been identified, using the GTM technique of *theoretical integration.*

The aim in this project is to generate a substantive conceptual framework relevant to the local context, then to assess transferability to other contexts. GTM is being used to underpin *learning about the learning process* required to achieve practical improvement outcomes, as depicted in **Figure 1**. The intention is to use the products of GTM analysis, across all stages of the action research cycle,

to construct theoretically robust actionable knowledge which will serve both academic and practitioner communities in the context of Higher Education and further afield.

Competing Interests
The author has no competing interests to declare.

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