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Exploring interdisciplinary academic development: the Change Laboratory as an approach to team-based practice

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ABSTRACT
Higher education institutions are under increasing pressure to offer interdisciplinary education programmes; however, their implementation is not uncomplicated. Particularly where parts of a programme are delivered by different departments, academic development activities to change practices and develop a coherent interdisciplinary programme are problematical. This paper describes a team-based academic development activity aimed at improving student experiences of an interdisciplinary programme by seeking to resolve pedagogical, organisational and structural tensions. The activity is in the form of a Change Laboratory, a formative intervention method that builds on the theoretical framework of Cultural-Historical Activity Theory. Using this approach, participants were able to analyse and discuss the programme in a neutral interdisciplinary forum not available in academic development initiatives at the micro level of the individual teacher.

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Team-based academic development; Change Laboratory; Cultural-Historical Activity Theory; interdisciplinary education

Introduction
Higher education (HE) institutions are under increasing pressure to offer interdisciplinary education programmes that provide a high degree of employability (Jacob, 2015; Millar, 2016). However, interdisciplinary programmes have resulted in increasingly complex academic and organisational structures that challenge current practices and pedagogies (Knight, Lattuca, Kimball, & Reason, 2013). While such interdisciplinarity has its merits, it is not without its problems. Research has shown that students often experience interdisciplinary programmes as fragmented due to a lack of coherence and poor module sequencing (Hatzakis, Lycett, & Serrano, 2007; O’Neill, Donnelly, & Fitzmaurice, 2014). Although many HE institutions have responded by implementing a wide range of academic development activities aimed at improving teaching and learning quality, the majority of these initiatives have focused on the development of the individual teacher (Chalmers & Gardiner, 2015; Gibbs, 2013). Nonetheless, research indicates that teaching practice is also influenced by both local academic cultures and disciplinary differences, where the departmental context is generally considered to be of greater significance.
(Heinrich, 2017; Knight & Trowler, 2000; Trowler, Saunders, & Bamber, 2012). Hence, where parts of a programme are delivered by different departments, changing practices aimed at developing a coherent interdisciplinary programme adds further complexity to academic development.

This paper describes a team-based academic development activity aimed at developing more coherent student experiences of an interdisciplinary programme by resolving pedagogical, organisational and structural tensions such as lack of programme coherency and collaboration between the departments responsible for delivery. The intervention is in the form of a Change Laboratory (Engeström, Virkkunen, Helle, Pihlaja, & Poikela, 1996; Virkkunen & Newnham, 2013) carried out with teachers from different disciplinary and departmental backgrounds who all taught on an online pharmacy programme.

**Background**

Responsibility for the delivery of the online pharmacy programme is shared by three departments, resulting in a complex academic and organisational structure. Since its inception in 2003, programme management has initiated a range of academic development activities, such as seminars and workshops, mainly directed at the micro level of the individual teacher. Although these teaching quality initiatives have been regularly organised, they have thus far not been successful in resolving the tensions and challenges around programme coherency or led to increased collaboration between the three departments.

As a researcher and academic developer, I have worked closely with the programme for 10 years. Based on this long-term experience and on current research (Engeström, 2011; Kerosuo, Kajamaa, & Engeström, 2010), I initiated a Change Laboratory intervention to try to resolve observed tensions and challenges within the interdisciplinary programme. A further goal was to investigate how a development activity involving collaborative expansive learning can serve as a model for team-based interdisciplinary academic development in HE.

The Change Laboratory method, originally developed by Engeström et al. (1996), is a tool for supporting participants in redesigning their work practices. It aims to result in an expansive learning cycle where participants, in this case members of the programme teaching team, are able to analyse existing practice, focus on critical tensions and contradictions, and collaboratively develop and implement new models or ways of working (Engeström, 2001; Engeström & Sannino, 2010). The aim of the present study was to investigate in what way the Change Laboratory activity facilitated the participants’ collaborative analysis and development of curriculum coherence on the interdisciplinary online pharmacy programme.

The Change Laboratory method has previously been implemented and researched in a variety of settings, ranging from hospitals (Skipper, Musaeus, & Nøhr, 2016) to libraries (Engeström, Rantavuori, & Kerosuo, 2013). There is little research on Change Laboratory interventions in an HE context, although Cultural–Historical Activity Theory (CHAT) is increasingly being applied as an analytical tool, for example, to explore the place of research in the work of teacher educators (Berg, Gunn, Hill, & Haigh, 2016) and the implementation of educational technologies (Pettersson, 2015).

The next section describes the theoretical framework underpinning the Change Laboratory method. An overview of the setting and process is then presented and data and
methods of analysis described. Findings are presented and discussed and finally, conclusions are drawn concerning the development process of the participants and the potential and challenges of Change Laboratory as a team-based academic development activity for interdisciplinary programmes.

**Theoretical framework**

The Change Laboratory method builds on the theoretical framework of CHAT where the context for understanding human actions is the activity system (Leont’ev, 1978). An activity system is conceptually depicted as a unit of human activity with six interconnected components: subject, object, mediating artefacts or tools, community, rules and division of labour (Engeström, 1987).

Figure 1 illustrates the activity system of the interdisciplinary online pharmacy programme investigated in this study. The subject, here the programme teaching team, is part of an activity system working towards the object of the activity, the development and delivery of the pharmacy programme. The relationship between subject and object is mediated by tools such as educational technology or the teaching strategies used to support the learning processes of the students. Achievement of the object is simultaneously influenced by the community, in this case the programme teaching team, the division of labour between participants, and rules, which comprise explicit and implicit norms, university and programme policy and regulations.

From a CHAT perspective, change and development in activity systems are driven by contradictions arising within and between activity systems (Engeström, 1987). For example, in an interdisciplinary programme such as the pharmacy programme, contradictions can arise between the objects of the different departments involved, where the object of one department may be to produce tailor-made modules of high quality while that of another department is to produce generic modules as cost effectively as possible.

Figure 1. The activity system of the online pharmacy programme (adapted from Engeström, 2001).
Contradictions act as driving forces of change, generating tensions that can lead to innovative attempts at development if participants have the opportunity to work collaboratively to solve them. By analysing tensions and disturbances as a part of a Change Laboratory intervention, participants are able to develop an awareness of the causes and roots of contradictions, which in turn can facilitate the development of a solution (Engeström & Sannino, 2010).

An important aim of a Change Laboratory intervention is to initiate and facilitate expansive learning among the participants (Virkkunen & Newnham, 2013). Expansive learning is described as the process in which an activity system resolves its internal contradictions by constructing and implementing new models or ways of working (Engeström, 1987, 2001). The expansive learning cycle can be described as a stepwise process involving seven phases called learning actions (Engeström, 2001; Virkkunen & Newnham, 2013). An ideal–typical sequence of learning actions in an expansive learning cycle is illustrated in Figure 2.

In the initial questioning phase, underlying primary contradictions appear as troubling but diffuse tensions and disturbances in the activity system. During the analysis of both past and present factors influencing the activity, secondary contradictions between two or more components of the activity system may be manifested. In the implementation phase, when the new model is put into practice, tertiary contradictions appear between the new way of working and remnants of the old. Finally, during the consolidation phase quaternary contradictions emerge between the new way of working and neighbouring activity systems such as that of the department or institution (Engeström et al., 2013).

Figure 2. Expansive learning cycle (adapted from Engeström, 1987).
The process of expansive learning can be understood as the detection and resolution of successively evolving contradictions, involving cycles of identifying problems, questioning, searching for the core source of problems and finally the development and implementation of new models or new ways of working (Virkkunen & Newnham, 2013). The Change Laboratory carried out in this study followed the typical sequence described: participants moved through the steps of the expansive learning cycle experiencing all four types of contradictions. This process of development is not always straightforward and may involve both deviations and resistance, where smaller cycles of problem solving and learning can occur within the main cycle (Engeström, 1999) as indeed was the case in this study.

Context

Over a period of one semester, spring 2014, the researcher carried out a Change Laboratory intervention with a group of 12 teachers working on an online, interdisciplinary pharmacy programme at a university in northern Sweden. At inception in 2003, the programme consisted solely of a Bachelor of Science in Pharmacy programme (BSc Pharm) but diversified in 2010 to include a Master in Pharmacy (MA Pharm) and in 2012 a Master of Science in Pharmacy programme (MSc Pharm). Responsibility for the delivery of modules on the pharmacy programme is distributed between three departments A, B and C belonging to two faculties: Medicine and Natural Sciences. Departments A and B deliver mainly foundational modules in chemistry and biology whereas department C is responsible for the professionally focused pharmacy modules. A programme board consisting of representatives from each department is responsible for joint management of the programme.

The pharmacy programme is delivered almost entirely online using a variety of educational technologies blended with two or three on-campus meetings per semester for laboratory work. As a consequence of the online delivery mode, several teachers are geographically dispersed throughout Sweden. The majority of teachers who took part in the Change Laboratory were physically present at meetings, while between one and three teachers at every meeting participated virtually using the web conferencing software Adobe Connect®. This necessitated the use of digital screens and tools to present and share materials online and to facilitate collaborative work.

Permission to carry out the Change Laboratory was obtained from the programme board who welcomed the intervention as a possible solution to recognised quality issues such as lack of module cohesion and sequencing. Participation in the activity was voluntary; an invitation to participate and a brief description of the activity were sent to teachers, management and student representatives by the researcher. Altogether 12 participants, comprising three members of the programme board (who were also teachers on the programme), eight teachers and one student representative, took part in the Change Laboratory intervention.

Change Laboratory sessions were conducted every 14 days during lunch break (90 minutes) a total of nine times. A follow-up session was conducted after 2 months and semi-structured interviews were carried out with six of the original participants after 2 years.
Mirror material

The Change Laboratory method employs the Vygotskian principal of ‘double stimulation’, involving two sets of stimuli with different roles (Sannino, 2015; Vygotsky, 1987). The first stimulus, also referred to as mirror material, was provided by the digital presentation of concrete examples of tensions or disturbances in the working practices of the programme by the researcher. In the present study, the examples used were drawn from focus group interviews with students and student module evaluations. The researcher used the mirror material to provoke collaborative efforts and engagement by Change Laboratory participants to seek solutions to the contradictions experienced. The analysis and resolution of problems identified was facilitated by the introduction of conceptual tools such as the triangular activity system model (Figure 1) as a second stimulus. Using the second stimulus as a tool, participants were able to analyse the object of their collective activity, in this case the pharmacy programme, examining how rules and division of labour have emerged historically, how the community functions, where contradictions between components occur and how components may be changed for the better. During the analysis and modelling process, participants moved between past, present and future scenarios, facilitating discovery of the historical origins of the problems and expression of ideas of possible future ways of working.

Data collection and methods of analysis

Data were collected before, during and after the Change Laboratory intervention. The intervention consisted of nine 90-minute sessions, which were video recorded using Adobe Connect®, and transcribed by the researcher. Technicalities and off-topic contents such as discussions of module content were not included in the detailed analysis. As a first step, the transcribed material was analysed to identify expansive learning actions by specifying the epistemic function of each speaking turn using the framework of the seven expansive learning actions presented in Figure 2 (Engeström, 1987). As a second step, the transcribed data was analysed to trace the emergence of tensions and contradictions in the expansive learning process, where participants were forced to question and analyse present practices. As these critical points can be characterised by clusters of discursive disturbances such as conflicts and dilemmas (Kärkkäinen, 1999), they were identified in the data by the frequency of the expansive learning actions of questioning and analysing. Excerpts used to illustrate results were translated from Swedish to English by the English-speaking researcher.

A request to participate in follow-up interviews was sent after 2 years to all Change Laboratory participants and six participants replied positively and were interviewed. The follow-up interviews were audio-recorded and transcribed verbatim by the researcher. The dates, contents, mirror materials and tools used in the nine Change Laboratory sessions are summarised in Table 1.

In a Change Laboratory intervention, the researcher is also directly involved in the process together with the participants and acts not only as designer of the sessions but is also a participant in and analyst of the process (Engeström, Engeström, & Kerosuo, 2003). The intentions of the researcher were therefore made explicit to participants and taken into consideration during the process of analysis (Virkkunen & Newnham, 2013).
The expansive learning cycle is described, followed by a more detailed description of the critical tensions and contradictions encountered by the participants. Excerpts of data from the different phases of the expansive learning cycle provide an indication of the focal tension of the phase in question. Where excerpts are used to illustrate findings, the participants are referred to as M1–3 for members of the programme board, T1–8 for teachers, S1 for the student representative and R for the researcher.

**Expansive learning cycle**

As can be seen in Figure 3, the Change Laboratory followed the general model of an expansive learning cycle described earlier and all seven types of expansive learning actions were found in the data. Most frequent were actions of questioning (54) and analysing (40). Modelling occurred only 18 times whereas examining the new model or new way of working took place 27 times. Actions of implementing occurred seven times, evaluating the process 12 times and consolidation five times.
Overall, this Change Laboratory focused more on questioning and analysing the situation than on modelling and implementing a new solution. As Figure 3 shows, the first two sessions were dominated by actions of questioning and analysing. These dropped significantly in session 3 as participants began modelling a new way of working to rise again suddenly in session 4 when it became apparent that the proposed model did not work and historical analysis of the problem became necessary. Questioning once more rose abruptly in session 5 as contradictions emerged between the new model and old ways of working. In the sixth and seventh sessions, examination of the model became dominant when participants struggled to find a new way of working that would function. Implementation began in the later phases of the learning cycle, in sessions 6, 7 and 8, followed by the evaluation of the process and consolidation of the model in session 9.

**Sessions 1 and 2**

In the first two sessions, participants discussed the purpose of the intervention and the problem area they wished to work on. Initially their choice of area was broad and participants were reluctant to identify issues as being problematic, making general suggestions for the development of the programme, for example, to introduce new modules into the programme.

- **T1** If we think through the programme as a whole, we can see which [modules/topics] can be moved, or added, or taken away
- **M1** Yes, overhaul the programme, make changes, create more opportunities for specialisation
- **T1** There could be things that are missing or things that overlap
- **R** Do you see a problem today with the structure of the programme? How does the problem show itself?
- **M1** Not exactly … It’s a question of optimising the programme. There are students who work full time and study; maybe we have too little content in places or it’s too easy?
- **S1** I think there’s too little content on the Bachelor’s programme. It’s too easy, so when students get to the Masters programme they think they can carry on working at the same time, but they get a shock.

**Figure 3.** Evolution of frequencies of different expansive learning actions over the course of the Change Laboratory.
Based on data gathered prior to the intervention, mirror material was presented in the form of excerpts from focus group interviews with students which illustrated a lack of coherence between modules on the programme. Analysis of the Change Laboratory participants’ discussions showed the emergence of latent primary contradictions between their desire to provide the ‘optimum’ programme and the reality of incoherency within the programme. As the session continued, more examples of primary contradictions could be seen as participants identified new problem areas and began to criticise present practice on the programme.

M1 When I was working on the national audit assessment I got a pretty good idea of how modules are connected in the programme. But one thing that I couldn’t really understand were modules B I and II – how do they fit in? Do they contain the right topics? That’s where I see a problem.

M2 Let’s begin by mapping the modules. While we’re doing it we should keep our eyes open for possibilities to optimise. Check if there are things that are covered twice in different modules and that there’s progression between modules on different levels.

T1 I see a problem between the C modules on the BSc and those on the MA; students just don’t understand many of the concepts on the MA.

T2 If you look at the learning objectives for the modules you can see the problem.

T1 There’s a huge step between modules. There’s a gap in knowledge.

At the end of session 2, several participants began proposing ways of working with the perceived problems of lack of coherence and sequencing between modules by mapping and comparing the learning objectives of modules from the BSc, MA and MSc Pharm programmes.

Session 3
The expansive learning actions of the group diverged from the ideal–typical cycle of Figure 2 in this session. Although the intention of the researcher was to go deeper into the historical roots of the problem, participants resisted suggestions to do so and continued to focus on the development of new ways of working to improve coherence between modules. The model suggested at the end of session 2, to compare learning objectives, was readily accepted by the participants and quickly implemented.

T5 What I feel when I read these [module learning objectives] is that it’s really difficult for me to know what’s missing or not, do you understand? When it’s my own field it’s no problem.

M1 Between us we can cover most of the modules.

T6 But there’s no one from department B here?

T1 This [Change Laboratory] is the only constellation where we can discuss the programme as a whole. It’s really a pity that they aren’t here.

Despite difficulties implementing the new model for working with modules and prompting by the researcher to return to an examination of the historical roots of the problem, testing of the model continued. The expansive learning actions taken by the participants deviated from the intentions of the researcher, taking a smaller cycle within the overall expansive learning cycle. Nevertheless, the deviation did not change the overall long-term object of the intervention and in the following session the expansive learning cycle continued (Engeström et al., 2013).
Session 4
As can be seen in Figure 3, the participants’ actions of analysis and criticism once more increased in session 4 as it became clear that the proposed new way of working could not be successfully implemented due to the absence of participants from department B. The fourth session can be seen as a critical point in the development of expansive learning where there is a qualitative change in the nature of the participants’ discourse and an increase in the quantity and type of their expressions of contradictions and analysis.

Prompted by the researcher, the participants returned to a historical analysis of the problem, working with the activity system triangle to examine systemic contradictions within the programme organisation. During the process of analysis, participants discussed the development of the original BSc Pharm programme into three levels: a BSC Pharm, MA Pharm and MSc Pharm. Using the activity triangle, they were able to analyse how the object of the activity had changed but the rules, division of labour and community had not adjusted to the new object, resulting in secondary systemic contradictions between components, as illustrated in Figure 4. The emergent contradictions between the subject, community and object have resulted in a breakdown in collaboration between the departments and teachers involved in the programme. However, as the complexity of the programme has increased, cooperation between departments has become essential to coordinate modules across the three programmes.

Secondary contradictions between the rules governing the organisation of the programme and the object are also manifested in conflicts concerning decision making within the programme.

*T1* Every module on the programme is controlled by a teacher, who acts as a kind of ‘king’ over their course. If a module has been approved, is there no way to change it now? Surely the programme board should be able to change things?

Figure 4. Contradictions in the activity system of the programmes expressed by participants during session 4.
M3 It’s the department who is ultimately responsible for modules, not the programme or the teachers.

M3 So even if we create a model here for collaboration, what effect will it have?

T7 I agree that it would be great if we can create and agree on a model for development but we’ll never be able to dictate to departments what they must do.

Sessions 5 and 6

Despite doubts concerning the implementation of the new model, participants continued to work on the development of a model that could involve teachers from all three departments involved in the programme. Evolving from the original idea of ‘overhauling the programme’ a method of working with the learning objectives of the modules, creating a matrix where modules could be matched and compared, was developed and evaluated. Initially this matrix was visualised by the participants using whiteboards and later developed as a text document.

T3 I think showing the connections between modules is very important, but it’s difficult to show them over the whole programme, it’s almost incomprehensible! Something we could do is to create a document for each group of modules [subject area] and note where we’ve seen problems.

T6 Yes, but how do we keep the documents updated? How do we all get access to them?

Tertiary contradictions emerged between the new model of activity, to collaboratively overhaul the modules of the whole programme, and old ways of working where departments worked independently on modules. Participants found themselves in a ‘double bind’ situation (Engeström & Sannino, 2011); there was a need to find a way to improve coherence in the programme but at the same time they could not see a way to solve the problem of lack of collaboration with department B.

M1 We have a big problem in that department B are not here taking part in this [Change Laboratory]. I don’t understand how we can get them to come, they’ve been invited, and I’ve reminded them twice. I don’t know how the hierarchy works but I don’t think the programme board has the power to force them to come either.

T7 Teachers need to listen to the needs of the programme and not just their own or the departments’ wishes. They need to work with us!

Different strategies to involve teachers from department B were discussed, ranging from exerting pressure through the programme board or head of faculty to offering incitement in the form of extra funding for participation in development activities, but no concrete decisions were taken.

Session 7

An online tool, Popplet©, was introduced to facilitate participation by teachers who were not physically present at the Change Laboratory sessions. This made it easier for those not physically present to comment and add information online when convenient.

T6 The online solution [Popplet] is a great idea. It means we can access the documents anytime. We’re all very busy and can’t always be at every meeting. We should use the technology to make things easier.

T3 Yes, you’re right. We can fill in the learning objectives, see the connections between modules and write comments. Everyone can see what’s written online.
**Session 8**

During session 8, participants worked on refining the new model for working with modules and made preparations for the presentation of the model to the whole programme teaching team. The presentation was carried out by the Change Laboratory participants at a teaching team meeting between sessions 8 and 9 and concrete decisions were made at the meeting how to continue with implementation.

**Session 9**

After implementing the new model, the participants concluded at a follow-up session after 2 months that it was not feasible for the whole group to work on the entire programme, mainly as department B continued to be absent from collaborative discussions. A new solution of working in smaller subject groups was suggested and implemented.

**Follow-up interviews after 2 years**

From the follow-up interviews carried out with six participants, it became evident that the cycle of expansive learning had not continued. Quaternary contradictions were encountered between the activity system of the programme and that of the institution when the programme tried to implement the new model. The power structures and rules governing the university system were in conflict with the needs of the programme.

Although the main cycle of expansive learning halted, smaller expansive cycles carried out by subject groups from department C continued for more than a year, resulting in revision of existing modules and creation of a new module.
M2 My department [C] has taken over quite a lot of modules now from department A, and
teachers have transferred to us. So now our department has 70% of the modules. That’s
been a big change; we only had 30% before.

T3 Well, I’ve changed departments, which is better […]. Maybe not as a direct outcome of
the Change Laboratory, but discussions started there – where do you belong, who should
you cooperate with? It became clearer anyway after the Change Lab.

Some of the smaller subject groups were not as successful, for example, in department A.

M1 I was really looking forward to making changes after the Change Lab. But I think that
the entire development work in department A stopped. I didn’t have the mandate to
drive the process in the department, only for the programme. This is quite common
because the programme exists at one level and the department and faculty at
another.

Participants were also asked to reflect on their experience of the Change Laboratory
process and were mainly positive. They felt that the shared process of working with the
solution of contradictions and ideas and suggestions for improvement had been impor-
tant. It provided a forum for communication and collaboration and the opportunity to
see the programme holistically.

T1 Working together in the Change Laboratory has given us a forum for discussion that
didn’t exist before since we belong to different departments and faculties.

T5 I can now see the programme as a whole and not just my module, and think about
what’s best for the programme. I think it’s important since this is a vocational education
program, it needs to be coherent.

M1 It’s hard to change things in the university in general. But if we continue to work with
this method the advantages could be immense. We all create courses from our own
subject knowledge, we include what we think is important but we seldom see things
from the point of view of the programme. We need to be more in agreement over
what’s best for the programme and not just for my subject or module.

Discussion

The purpose of the Change Laboratory was to alleviate pedagogical, organisational and
structural contradictions within the pharmacy programme, thus enabling the development
of more coherent student experiences of the programme. Initially the participants inter-
preted the absence of a serious crisis as license to maintain the status quo. However as
the Change Laboratory progressed, the group’s original aim to ‘optimise’ the programme
evolved into a deeper examination of tensions and contradictions within the activity
system of the programme; contradictions that were observable in a lack of collaboration
between the three departments involved. While the systemic contradictions met by partici-
pants have been faced and overcome many times previously, they keep returning. Contra-
dictions within the activity system of the programme, such as lack of coherency and
collaboration, have caused problems for many years. These contradictions cannot be
eliminated by means of temporary solutions and circumventions. Processes involving
expansive learning such as the Change Laboratory can, however, contribute to their sol-
ution and provide participants with better strategies for resolving future contradictions
(Engeström et al., 2013).
On a practical level, the group was able to develop and test a new way of working that enabled them to work collaboratively online to examine course content and propose changes in programme structure. At a deeper level, work to resolve the underlying organisational conflicts both within the activity system of the pharmacy programme and between the activity system of the programme and that of the institution did not continue. In the face of external pressures and constraints, work on the overhaul of the programme as a whole halted. Quaternary contradictions between the established traditional structures of the university and the activity system of the programme limited the expansive potential of the intervention and the successful implementation of new practices.

Although the main cycle of expansive learning halted, smaller expansive cycles carried out by subject groups from department C continued, resulting in the revision of existing modules and creation of new modules. The members of this group encountered fewer tensions or contradictions between the object of the programme, to improve coherency between modules, and that of the department to improve the student experience. Tensions experienced, for example, concerning disposition of time, could be quickly solved due to well-functioning communication channels within the department. Other subject groups from department A were not able to continue the cycle of expansive learning; participants were unable to solve the contradictions between the constraints and teaching culture of the department to produce cost-effective modules and those of the programme to increase coherency and quality on the programme. Programme evaluations carried out in September 2016 show that curriculum coherence within the programme has improved, although students continue to experience some fragmentation and lack of sequencing between modules. The necessity of further collaboration and work across disciplinary boundaries to improve coherency remains.

The Change Laboratory created a neutral, interdisciplinary communicative space within which to work on current problems, facilitating a collaborative understanding of practice and the necessity of joint responsibility in maintaining and developing the programme. Participants were able to develop an awareness of the needs of the programme and the necessity for collaboration across the boundaries of disciplines and departments for programme coherence to be achieved.

**Limitations of the Change Laboratory method**

The online, geographically distributed nature of the Change Laboratory in the study did not seem to act as a barrier to implementation. The participants were all experienced online teachers adept at using and communicating via educational technologies. The participants did, however, find it challenging to find time to attend the sessions on a regular basis, yet as was seen in their evaluation of the Change Laboratory they considered the intervention to have been worth the effort.

**Conclusion**

The Change Laboratory shaped the participants’ analysis and collaborative development of curriculum coherence in the interdisciplinary online pharmacy programme by providing the participants with the opportunity to historically analyse contradictions within the
pharmacy programme and visualise new ways of working. During the process, they were able to begin work on the resolution of pedagogical, organisational and structural tensions through a team-based approach to academic development and to work towards effecting a more coherent student experience of the programme.

The team-based approach to academic development using the Change Laboratory intervention was successful in that it provided a neutral forum for the discussion of the needs and development of the programme across departmental boundaries. Participants were able to analyse and discuss the programme in an interdisciplinary forum not available in previous academic development initiatives at the micro level of the individual teacher.

The results of this study seem to indicate that an interventionist method such as the Change Laboratory can be used as a team-based development activity to facilitate the collaborative development of an interdisciplinary programme or similar academic development initiative.

Notes

1. Although the term ‘academic development’ can have different meanings internationally, it is used here as synonymous with ‘educational’, ‘staff’ or ‘faculty’ development.

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