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ARTICLE

Unpacking (in)formal learning in an academic development programme: A mixed method social network perspective

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Unpacking (in)formal learning in an academic development programme: A mixed method social network perspective

How and with whom academics develop and maintain formal and informal networks for reflecting on their teaching practice has received limited attention even though academic development programmes have become an almost ubiquitous feature of higher education. The primary goal of this mixed-method study is to unpack how 114 academics in an academic development programme developed internal (within their programme) and external (outside their programme) learning and teaching relations. A secondary goal is to highlight the affordances of social network analysis methods in conjunction with qualitative approaches for academic developers to understand the (in)formal learning processes in their academic development programme. The quantitative results indicate that participants maintained 4.84 relations within their AD programme and 3.17 external ties. The qualitative results indicate that most academics developed a range of emotional, academic and professional support links, which mostly were outside the academic development context. Participants needed an outlet to share their feelings, challenges and frustrations about their teaching and their experiences on the AD programme. These feelings were shared with people they trusted, primarily close friends and colleagues. This study provides a social perspective of the formal and informal relations on academic development, and argues that social network analyses techniques can help academic developers to make these relationships visible.

Keywords: academic development, informal learning, social capital, social network analysis.

Introduction

While academic development (AD) programmes have become an almost ubiquitous feature of the Higher Education landscape in the UK (Parsons, Hill, Holland, & Willis, 2012; Trowler & Bamber, 2005), Australasia (Gray & Radloff, 2008) and parts of Europe (Postareff, Lindblom-Ylänne, & Nevgi, 2007; Rienties, Brouwer, & Lygo-Baker, 2013; Stes, Min-Leliveld, Gijbels, & Van Petegem, 2010), how academics develop and maintain formal and informal networks to reflect upon their teaching practice has received limited attention. There is an increased recognition in the literature (Cornelissen et al., 2014; Rienties & Kinchin, 2014; Roxå & Mårtensson, 2009; Roxå, Mårtensson, & Alveteg, 2011) that informal contexts of academics, and academic development in particular, play an important role how academics are discussing and

reflecting on their teaching practice, which in turn helps them to shape, construct and adjust their beliefs and actions towards teaching and learning.

Several researchers indicate that it is important to recognise the social element of professional development programmes (Rienties & Kinchin, 2014; Roxå et al., 2011; Stes et al., 2010). Moolenaar, Slegers, and Daly (2012) argue that teachers may engage in either passive or active dialogue about their teaching practice with their colleagues and other contacts in both formal and informal interactions. For example, in an explorative study of informal networks of 106 teachers, Roxå and Mårtensson (2009, p. 555) found that “these conversations open up the possibility of constructing and maintaining – and perhaps partly changing – an understanding about the realities of teaching”.

In one of the first studies measuring formal and informal academic development interactions through social network analysis, Rienties and Kinchin (2014) found that AD participants developed on average 4.00 internal (within AD programme) and 3.63 external relations (outside AD programme) after nine months, and discussed their teaching 128 times per year with “externals” (see Rienties & Kinchin, 2014 for more details on frequency of contact). Follow-up quantitative modelling indicated that these learning networks were predicted by their membership in group-work within the AD programme, the respective department participants were working in (for informal exchange), and friendships developed over time (both within and outside the AD programme).

In AD, it is considered crucial for colleagues to reflect and engage in dialogue about their teaching practice (Kinchin, Lygo-Baker, & Hay, 2008; Postareff et al., 2007; Stes et al., 2010). However, there are few studies on how participants engage in dialogue with each other, socially co-construct and share knowledge together beyond the formal AD programme environment (Cornelissen et al., 2014; Van Waes, Van de Bossche, Moolenaar, De Maeyer, & Van Petegem, Forthcoming). It is necessary to unpack how participants in AD programmes learn from the experiences of each other, as research has highlighted that social network

developments influence learning processes and learning outcomes (Cela, Sicilia, & Sánchez, 2014; Hommes et al., 2012; Katz, Lazer, Arrow, & Contractor, 2004). How academics develop social network relations and engage in general with the AD programme may be dependent on the design of the academic development programme (Clarke & Reid, 2012; Ziegenfuss & Lawler, 2008), the “external” network of participants (Akkerman & Bakker, 2011; McCormick, Fox, Carmichael, & Procter, 2010), and/or the organisational cultures within the participants’ departments (Daly & Finnigan, 2010; de Lima, 2007).

The primary goal of this study is to unpack how academics in an AD programme developed internal (within their formal AD programme: Research Question 1) and external (outside their AD programme: Research Question 2) learning and teaching relations. A secondary goal is to highlight the potential advantages and limitations of using social network analysis (SNA) methods in conjunction with qualitative approaches for academic developers to understand the (in)formal learning processes in their academic development programme. Using data collected from two consecutive implementations of an academic development programme in the UK, in this mixed method study we triangulated SNA (Baker-Doyle, 2014; Cornelissen et al., 2014; Katz et al., 2004; Rienties & Kinchin, 2014) with qualitative techniques (free response exercise, interviews) in order to unpack how 114 academics built and developed (in)formal learning relations. SNA techniques are criticised by some researchers (McCormick et al., 2010) for providing limited insights into teachers’ networks and they suggest it can only be used as a metaphor on how teachers develop networks; however, in this mixed method study we aim to illustrate that SNA can be a useful method for academic developers and researchers to obtain insights in the (in)formal learning processes of AD, which can be used for further development of the programme.

The role of (in)formal academic development on social networks

Social network theory makes the assumption that people’s behaviour is best predicted by the web of relationships in which they are embedded. Social network analysis constitutes the measuring and

understanding of social interactions between entities (e.g., academics, groups, departments); and hence does not focus exclusively on individual behaviour (Katz et al., 2004). These social interactions are diagrammatically represented as a network diagram, where the nodes represents the entities (i.e. the participants in the AD programme) and the connecting lines between the nodes represents the relations (or ties).

Research in the context of primary school teachers in the US, the Netherlands and Portugal have provided robust and reliable evidence that social networks have a strong impact on trust, collective efficacy (Moolenaar et al., 2012), sharing of lesson materials (de Lima, 2007), teacher involvement in shared decision-making (Daly, Moolenaar, Bolivar, & Burke, 2010; de Lima, 2007), and schools' innovative climate (Daly & Finnigan, 2010; Daly et al., 2010). While in primary education settings studies using SNA are increasingly common, only three studies (Rienties & Kinchin, 2014; Roxå & Mårtensson, 2009; Van Waes et al., Forthcoming) have focussed on academic development contexts in higher education, and in particular to what extent participants in AD informally learn *beyond* the boundaries of their AD programmes.

Roxå and Mårtensson (2009) found that most academics discussed their teaching experience and reflections with a limited number of (mutually trusted) colleagues with whom they reciprocate the sharing of each other's knowledge in a private setting. Using longitudinal modelling, Van Waes et al. (Forthcoming) found that most academics maintained primarily relations with colleagues, while only incidental relations were build within the AD. In contrast, Rienties and Kinchin (2014) found that academics maintained on average four links with other academics in an interdisciplinary AD programme. Furthermore, academics maintained on average three contacts outside their AD to discuss their teaching practice. Therefore, Rienties and Kinchin (2014) argue that these interactions may have an impact on AD within and beyond the classroom.

It is well-documented that academics primarily construct their own identity based upon their collegial network (Roxå & Mårtensson, 2009) and their department/academic discipline (Clarke & Reid, 2012; Kinchin

et al., 2008; Rienties & Kinchin, 2014; Roxå & Mårtensson, 2009). For example, participants in an AD programme may have different sets of persons with whom they share their practice: fellow AD programme participants; departmental colleagues; friends; their partner; family; etc. However, their departmental colleagues may have different beliefs and values towards teaching and learning than those discussed during the AD programme, and hence the participants need to construct their teaching identity based on an integration of these sets of beliefs (Kinchin et al., 2008; Rienties et al., 2013; Rienties & Kinchin, 2014; Van Waes et al., Forthcoming). This identity integration may be influenced by departmental structures, which may have a strong impact on the uptake of AD activities (Daly & Finnigan, 2010; Daly et al., 2010; Rienties & Kinchin, 2014; Van Waes et al., Forthcoming).

Therefore, the extent that participants engage and interact in an AD programme is a complex function of individual motivation and drives, group dynamics (Akkerman & Bakker, 2011), strength of social ties (Baker-Doyle, 2014; Daly et al., 2010), departmental pressures (de Lima, 2007; Kinchin et al., 2008), and external relations. As argued by several researchers (Daly et al., 2010; Moolenaar et al., 2012; Rienties & Kinchin, 2014; Roxå et al., 2011), SNA techniques may allow academic developers and researchers to make these complex relations visible. The question-stem of a SNA questionnaire has a substantial influence on the types of social networks a researcher can explore (Hommes et al., 2012; Katz et al., 2004). According to Hommes et al. (2012), friendship networks explore passive information exchange between people, while working and learning networks in an AD context explore the (in)formal communication about teaching-related activities.

In particular when triangulating these quantitative modelling techniques with in-depth qualitative analyses, a potential rich picture may emerge how academics develop formal and informal relations to discuss and reflect upon their teaching experience (Baker-Doyle, 2014; Rienties & Kinchin, 2014). Using a context of

an academic development programme at a UK university, we will illustrate the potential advantages and limitations of using social network analysis techniques in conjunction with qualitative approaches.

Research questions

1. To what extent did academics develop teaching and learning relations with other academics in an UK academic development programme, and what was the basis for these relations?
2. To what extent did academics develop teaching and learning relations with network contacts outside the formal AD programme, and what was the basis for these relations?

Method

Setting

114 academics from four faculties (arts & social science, business & economics, engineering & physics, health & medical science) at an university ranked consistently in the top 20 of league tables in the UK participated in a 18 month AD programme, consisting of four modules¹. In contrast to traditional, workshop-based AD accredited programmes taken by early-career academics in the UK where participants follow a pre-described programme with typically a bi-weekly two hour session on topic A, B, C (Parsons et al., 2012), this programme uses a distinct approach starting from the academics' daily practice and reflected on the educational problems academics may face (Rienties & Kinchin, 2014). During the first module, participants worked together on these educational problems in small-groups consisting of four or five members, using principles of inquiry-based learning (Rienties & Kinchin, 2014). The meeting times and setting for each small group were negotiated with the tutor. As a primary learning objective, participants were expected to develop greater understanding of their role as an academic within the learning environment.

During the second module, again in small-groups, participants had to design a new curriculum or module. Some groups redesigned an existing module, while others designed a new (fictitious) module. In the

first two modules the group outputs were presented to a wide university audience. With an estimated workload of 150 hours per module, the majority of hours were self-study, as only five face-to-face meetings of two-three hours with an academic developer were arranged per module. During the third and fourth module, participants conducted an individual piece of action research within their own teaching practice.

Participants

The average age of the 114 participants was 36 (range 26-57) and 56% of the academics were male. No significant differences in terms of demographics or organisational backgrounds were found between the two implementations, so we could merge the datasets together. Participants were from 23 different departments, primarily from business (14%), engineering, hospitality & tourism (both 11%), mathematics (7%), psychology and biosciences (both 6%). Ten participants had no other department member following the programme in their respective cohort. The majority of participants were within the first year and half of their contract at the university as it is a contractual obligation to follow the AD programme. This meant the participants were not familiar with most of the other participants except for those perhaps in their own discipline. All of the participants participated voluntarily for two sessions: the SNA and free-response exercise. Participants who were not present during the session(s) were contacted via email. The participants were guaranteed that the results would be completely anonymised and participation was voluntary.

Instruments

Social Network Analysis of friendship, working, and learning and teaching networks

First, we used a closed-network analysis technique (Daly et al., 2010; Rienties & Kinchin, 2014) after participants had worked together for nine months, whereby lists with names of the 54 and 60 participants were provided. Participants answered three Social Network questions, namely “In the AD programme, I have learned from...”, “I have worked a lot with ...” and “I am friends with ...” in a check-box manner. Second, we

asked participants using an open-network approach (Daly et al., 2010; Rienties & Kinchin, 2014) the following: “In addition to members of the [AD] programme, we are interested to know with whom you discuss your learning and teaching issues (e.g., how to prepare for a lecture, how to create an assessment, how to provide feedback). This could for example be with a colleague, a friend, family, or partner who is not following the [AD] programme.” Participants were asked the name of each network contact, the frequency of contact (as proxy for strength of tie), the type of relation, and where each contact works. A response rate of 88% was established for the open and closed SNA questions.

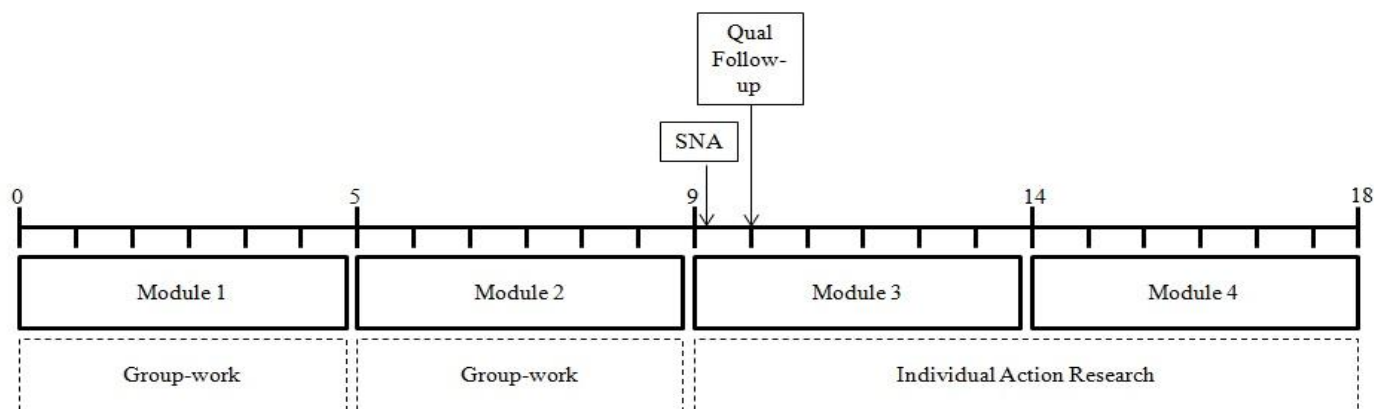
Qualitative follow-up reflection exercise

In line with recommendations of Daly and Finnigan (2010), the social network analyses were triangulated with qualitative techniques to gain richer data on the complex relationship patterns in academic development. One month after the SNA questionnaire was distributed, we presented the results in the form of three social network graphs (i.e., learning & friendship network of AD, external network) during one of four face-to-face sessions, which were attended by 45 and 32 participants respectively.

First, participants were asked to reflect individually on the social network graphs for about ten minutes using predefined questions (e.g., what is the first thing that comes to mind when looking at these networks?; Why do you choose these persons to talk to (and not others)?; To what extent is it challenging to work with people from different disciplines?; In hindsight, would you have chosen the same group members?). Note that more detailed, follow-up questions were raised during the second implementation (e.g., many AD participants seem to discuss their teaching and learning practice with colleagues and external contacts outside the AD. Why?; If you speak to people outside the AD about your teaching and learning practice, what kinds of things do you speak about? Why do you choose these persons to talk to (and not others)? Were these conversations useful (or not)?).

As a second step, participants worked together in pairs and were asked to discuss their own reflections and compare notes for five minutes. Third, a 15-20 minute general discussion was facilitated four times by one of the authors of this article, which was recorded. One hour after the open dialogue exercise was completed, participants who were working on a different task with their respective facilitator were asked to share their written personal reflections. The verbal responses of 77 participants were recorded and transcribed, and 37 out of 77 (48%) participants who attended the follow-up session were willing to share these reflections.

Figure 1 Timeline of academic development programme and research



Data analysis

Figure 1 illustrates the time line of our study. Both authors analysed the transcribed qualitative data (i.e., recordings of sessions, returned reflections by participants) to identify key concepts to reflect the meanings attributed to the data (e.g., Lichtman, 2013). The participants’ reflections data were open-coded and an inductive approach was used to determine the arising themes (Thomas, 2006). Reflections were coded based on the type of external they referred to and the issues they shared. The session recordings were used to corroborate these themes.

Results

Research Question 1: Learning and Teaching relations within AD

In order to illustrate the power of SNA for academic developers in unpacking formal and informal learning, Figures 2-3 illustrate the learning and teaching networks of the 54 and 60 participants in the AD programme after nine months respectively. The colour and shape of the node represents the respective faculty of each participant. Note that the visualisation software tool Netdraw positions the academics at random across the X- and Y-axis based upon the (perceived) social interactions between academics, whereby academics who share similar connections are positioned more closely together (Rienties & Kinchin, 2014). Being on the left of the graph is not necessarily better or worse than being on the right, top or bottom, but academics with similar connections are positioned closer together. Four aspects can be distinguished from these figures.

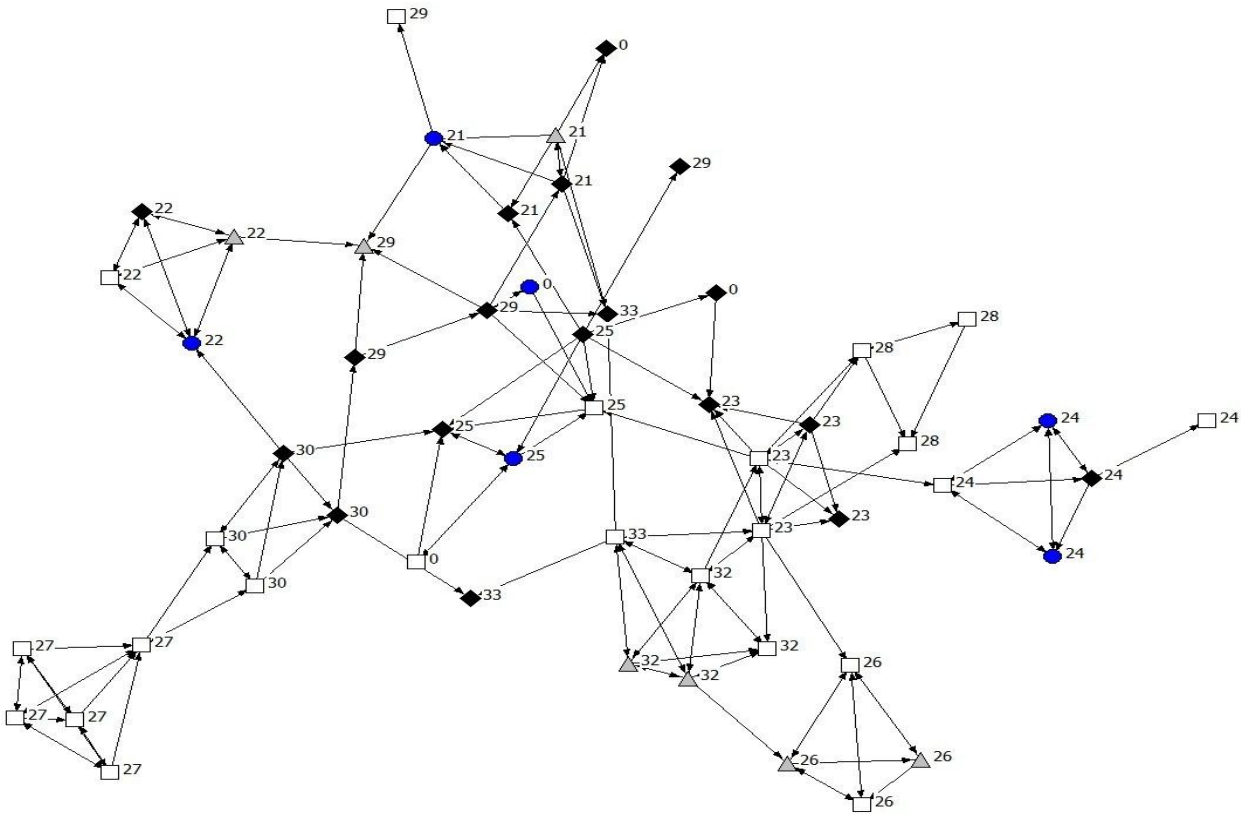
First, most academics developed cohesive links within their assigned group, as most academics were positioned closely to academics with the same group number. For example, on the left of Figure 2, four members (each from a different faculty) of group 22 were connected to each other, while on the left in Figure 3 five members of group 35 (three from arts and social science faculty, two from other faculties) were connected to each other. *Academic developers could use these SNA visualisations to identify how cohesive the learning climates within groups are. Perhaps group 29 in Figure 2 or group 38 in Figure 3 might warrant some further investigations why some members were not connected to their group.*

Second, some academics were positioned centrally in the network (indicating that several academics learned and shared knowledge and expertise with these participants), while some academics were positioned on the outer fringe of the network and were not well-connected to other academics in the academic development programme. Most of the eight academics who joined after the first module (indicated by group 0) were on the outer fringe of Figures 2-3. One academic from group 42 on the top left of Figure 3 had no links after nine months in this program (indicating that he did not learn from his 59 colleagues, but also

implying that none of his 59 colleagues indicated to have learned from this academic). *Academic developers could use these SNA visualisations to identify whether particular participants or groups are isolated, or even “at risk”.*

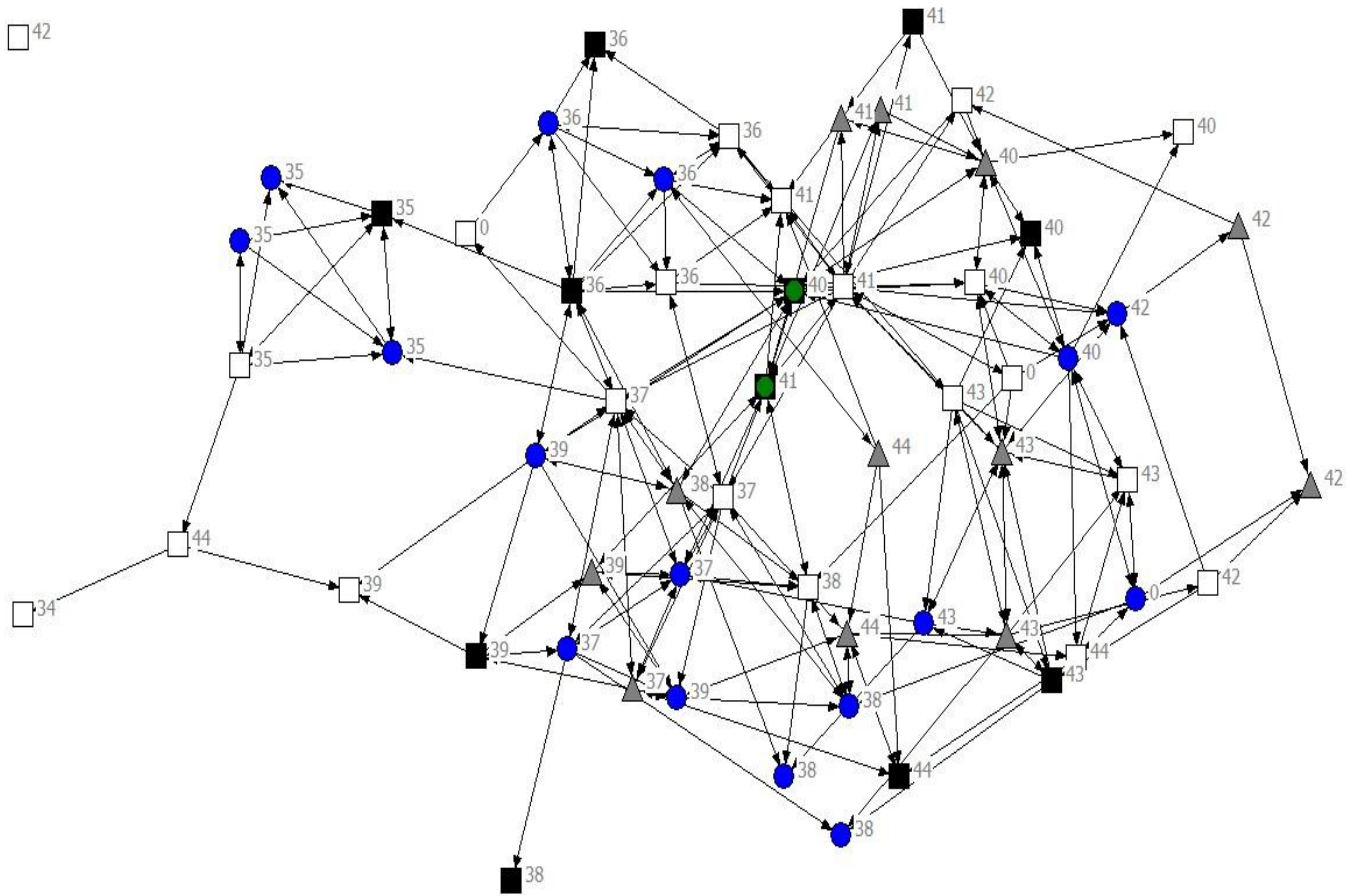
Third, most academics developed interdisciplinary learning relations with academics (as illustrated by links between nodes with different colours and shapes), either within their own assigned group or within the wider AD programme, perhaps with the exception of group 27 in Figure 2. *SNA visualisation tools allow academic developers to include various categorical variables (e.g., gender, age, discipline, nationality) to test (for example) the impact of culture and disciplinary background on (in)formal network development.*

Figure 2 Learning & teaching network after nine months (Implementation 2011)



Blue circle = Arts & Social Science; White square = Engineering and Physics; Black diamond = Business & Economics; Grey triangle = Health and Medical Science. Numbers refer to respective group divisions during module 1

Figure 3 Learning & teaching network after nine months (Implementation 2012)



Fourth, although many cohesive learning links were established in assigned groups, many academics maintained (informal) links with AD participants outside their group. For example, in Figure 2 the health and medical science academic from group 22 indicated to have learned from a colleague from the same faculty of group 29, while his arts and social science academic was nominated as a learning node by a business and economics colleague from group 30. *Academic developers could use these SNA visualisations to identify informal learning patterns between groups, and identify (potential) bridge builders who can help to generate new insights for other groups.*

Quantitative analysis

Although network visualisations give important first impressions of the social network patterns, follow-up quantitative analyses can allow academic developers to determine whether these patterns were statistically significant. In this article, we will focus only on basic descriptives, we refer to other published research (Baker-Doyle, 2014; Moolenaar et al., 2012; Rienties & Kinchin, 2014) for a more detailed discussion of more advanced statistical analyses and affordances of SNA methods. In Table 1, the descriptive statistics of social ties within and outside assigned groups are illustrated, as well as learning ties outside the AD programme. On average, participants developed 3.09 friendship relations within the AD programme. Of these friendships, 1.07 friendships were based upon the initial group division during the first module, while 2.02 were based outside their first group and can be characterised as informal ties. Participants had on average 4.84 learning and teaching relations within the AD programme, of which 2.30 were based upon the initial group division. A similar distribution was found in terms of the working network.

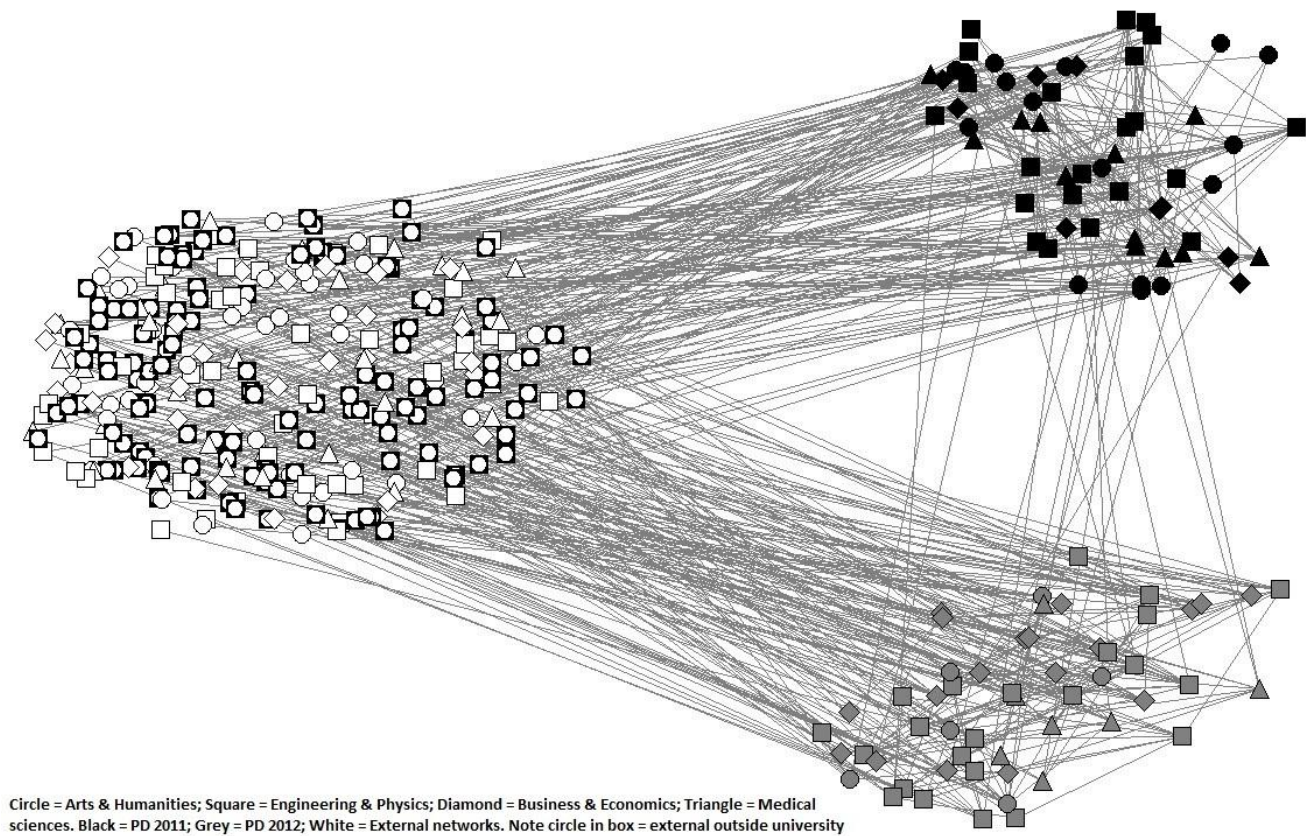
Table 1 Social ties within and outside groups/academic development

	M	SD	Range
Friendship within group	1.07	1.23	(0-4)
Friendship within AD	3.09	1.97	(0-10)
Work relations within group	2.37	1.29	(0-4)
Work relations within AD	4.84	2.22	(1-11)
Learning within group	2.30	1.36	(0-4)
Learning within AD	4.84	2.43	(0-15)
Learning outside AD	3.17	2.31	(0-10)
Same discipline	2.39	2.06	(0-8)
Externals outside the institution	0.94	1.11	(0-4)

Research Question 2: Learning and Teaching relations outside AD

In Figure 4, the learning and teaching network of the two cohorts and their external network contacts are illustrated. The grey and black colour indicates the participants in the AD programmes, while the white nodes are external relations. 293 network contacts outside the AD were used to discuss learning and teaching issues. 92 (81%) participants indicated they discussed their learning and teaching practice with external relations. Although the visualisation is complex, Figure 4 highlights the intensity of the usage of the informal network outside the academic development programme for most participants, whereby participants of the second cohort also learned from the experiences of the first cohort. *Open network approaches allow academic developers to map and analyse the informal social relations outside the academic development programme.*

Figure 4 External and internal learning and teaching network



In terms of informal learning outside the formal AD programme, academics on average maintained 3.17 ties, whereby 75% of these external links were with colleagues from the same discipline. Quite remarkably, most participants had at least one person with whom they discussed their learning and teaching practice outside their own institution. In other words, while academic developers will mostly only “see” part of the academics’ reflections and interactions within their assigned groups, 5.71 (2.54 + 3.17) informal learning and teaching links on average per academic were used outside the “vision” of the academic developer. *Academic developers need to take into consideration informal and external networks of academics, as most academics seem to learn more from people outside their formal AD.*

Qualitative analyses

While the quantitative analyses indicated that many academics maintained informal relations outside the AD programme to discuss their teaching and learning practices, the underlying mechanisms how and why they chose some colleagues or external contacts cannot be inferred. The qualitative analyses tried to unpack with whom and what participants discussed with their colleagues or external contacts and whether this varied depending on the type of contact. From the open-coding of the data, three broad thematic areas arose which were grouped as professional, emotional and academic support.

The data suggested that there was a strong indication that participants needed to find an outlet to share their feelings, in particular their challenges, anxieties and frustrations about their teaching, and their experiences on the AD programme in particular. This sharing of feelings was cathartic, for example, one participant remarked it kept her sane whilst another thought the conversation process itself was the most useful element of the AD programme. However, the analysis suggested that *emotional support*, this ‘offloading’ and sharing of feelings, could only be achieved with people they trusted, such as close friends, colleagues and family, in line with previous findings (Roxå & Mårtensson, 2009). This suggests that each

participant had a trusted (mini) network that they belonged to, and relied on for their emotional support. This network was mainly outside the confines of the academic environment.

Contrasting with this emotional support, participants used their university colleagues for academic and professional support, as was previously found by Rienties and Kinchin (2014). *Academic support* refers to support with studying the AD programme, whilst *professional support* refers to support with the participants' teaching practice. Participants were keen to share their professional practice with other colleagues (same and different discipline) in order to learn from each other, particularly at their own level in contrasting their different approaches to teaching (Rienties et al., 2013; Ziegenfuss & Lawler, 2008).

The quantitative data indicated that 52 participants discussed their teaching practice with their senior colleagues. Qualitative data indicated there were some formal occasions that seem to promote these discussions, such as in performance reviews, where one participant had to discuss the teaching practice and module evaluation feedback with the line manager; or when participants discussed their teaching practice with their module leaders or senior colleagues familiar with the subject area. In the latter case, participants indicated an appreciation of discussing these areas with their colleagues, whom were more experienced and were familiar with the specific learning context (e.g., understanding of the subject area, the respective student cohort), and hence could provide teaching tips that were discipline-specific, such as assessment design. As participants in the AD programme worked in interdisciplinary groups, social interaction opportunities with colleagues outside the programme allowed participants to gain an in-depth disciplinary perspective. The creation of the social networks within disciplines based on the subject area possibly could occur without the AD programme acting as a catalyst.

Finally, participants indicated that they were not only evaluating their own teaching practice through the AD, but they were continuously evaluating the purpose of the AD programme itself by discussing with their colleagues their experiences on the AD programme and its usefulness of the programme to them after

their completion. This suggests that participants may cultivate social networks that can influence their attitudes towards actively participating in academic development. Participants, however, were also evaluating their teaching practice with respect to other disciplines, other universities as well as other university cultures. One participant indicated that she was interested in the cultural differences of teaching in the UK and the US, whilst other participants indicated that they wanted to obtain fresh perspectives in their teaching from other disciplines and external colleagues. Therefore, these external social networks were potentially useful to participants to learn about new pedagogies and socially compare their teaching practice. *In other words, academic developers need to recognise that participants use formal and informal social relations inside and outside the AD programme for a variety of complex (emotional, academic and professional support) reasons.*

Discussion and conclusion

Whilst across the globe academics undertake academic development programmes as individuals, it is important to recognise the social element of such programmes (Rienties & Kinchin, 2014; Roxå & Mårtensson, 2009). Our primary goal was to identify how academics in an AD programme developed internal (within their formal AD programme) and external (outside their programme) learning and teaching relations. As was previously found in our first study (Rienties & Kinchin, 2014), the vast majority of academics extensively used network contacts outside their AD to discuss learning and teaching issues. On average, participants maintained 3.17 external ties and 4.84 relations within their AD programme. Although the vast majority of these external ties were with colleagues from the same discipline, most participants had at least one person with whom they discussed their teaching practice outside their own institution.

Follow-up qualitative analyses indicated that academics were primarily building these (invisible, informal) relations to obtain and share emotional, academic and professional support. Most of our 114 participants needed an outlet to share their feelings, in particular their challenges and frustrations about their teaching (de Lima, 2007; Roxå et al., 2011). Sharing of feelings and reflections of teaching practice is an

important ingredient for further academic development (Postareff et al., 2007; Roxå & Mårtensson, 2009; Roxå et al., 2011). However, academics were mostly sharing their feelings with people they trusted, such as close friends, colleagues and family. Contact with senior colleagues during performance reviews or module design discussions helped academics to connect their theoretical experiences from the AD programme with their practical experience in their discipline.

A new contribution of this study to the field of AD research is that academics actively discussed their perceptions and experiences of the academic development programme itself with their formal and informal relations. While a positive experience of one academic might tip the balance of a group of academics working together in AD in a positive manner, a negative experience might have a longer lasting effect on academic development beyond the training room. For example, in Figure 4 several participants from the second cohort were actively discussing their experiences with participants from the first cohort, as well as with colleagues in their respective departments. A negative experience of an academic during the first cohort might have sustained negative effects on subsequent new academics from the same department. In other words, a form of transactive memory (Borgatti & Cross, 2003; Katz et al., 2004) or cultural values (Roxå et al., 2011) within departments may be present about the reputation and effectiveness of academic development programmes, which most academic development research takes for granted. In line with Roxå et al. (2011), due to historical legacy (and the impact of informal relations) changes in academic development programmes may take a long time to have an impact on academics' perceptions and values.

Additionally, we highlighted seven ways that academic developers running AD programmes can use SNA methods together with qualitative approaches to identify arising issues and devising appropriate strategies, for example, the use of SNA to identify “at-risk” participants. Using this information, academic developers can construct an intervention to re-engage participants (such as moving the participant to another group). Further, if groups were identified as having cohesive learning climates, then the academic developer

can provide spaces for group members to continue sharing practice after the programme completion and thereby also becoming ambassadors for the programme. Finally, as informal and formal relations influence the teaching support received by participants, academic development programmes should encourage participants to reflect on, explore and perhaps cultivate relationships that can positively affect or shape their teaching practices. Further, while in the past the technical barriers for adoption of SNA techniques and methods were substantial (Cela et al., 2014; Katz et al., 2004), with increased availability of (almost) free software packages (e.g., Gephi, UCINET), relatively simple to use Windows-based menu structures, substantial support materials and this special issue in particular, the timing seems to right for academic developers to explore the affordances of SNA techniques.

Limitations and future research

A crucial limitation of our findings is that both closed and open SNAs of learning and teaching networks were self-survey instruments, whereby socially desirable behaviour might influence the results. However, a large body of research (e.g., Borgatti & Cross, 2003; Hommes et al., 2012; Katz et al., 2004) has found that SNA techniques provide a robust predictor for actual social networks and AD programmes in particular (Rienties & Kinchin, 2014; Van Waes et al., Forthcoming), especially given our high response rates (88%) and the triangulation of the results.

A second limitation is that this study only considered the social interactions during the progress of the AD programme. It would be interesting to investigate if the internal connections remained active after the programme had ended, and if those at the centre of the network maintained their links for longer than those on the fringes. A third limitation of the study is that the physical distance between participants and their externals were not measured and this may have affected the intensity of contact. However, with the popularity of social media and emails this distance may not have a significant impact, but it is perhaps worthwhile to determine

not only whether distance had an impact on the intensity of contact but also whether this was affected by the medium of contact. Such a study will inform practice on how to foster teaching and learning relations.

Furthermore, future research is needed to determine what the (positive/negative) impact of departmental values and attitudes on academic development are, and whether, if at all, positive experiences in one implementation of academic development have an impact on subsequent implementations. Finally, the context of AD in higher education in the UK (Parsons et al., 2012; Rienties & Kinchin, 2014) may be substantially different from other contexts across the globe. Given the increased affordances, cheap and easy-to-use SNA tools, we encourage AD researchers to explore the social interactions in AD using SNAs within their own (cultural) context. For example, it may be interesting to further explore to what extent participants in other AD programmes develop comparable/different internal and external network connections, and how these networks are influenced by different instructional designs, organisational and (inter)national cultures.

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ⁱ The four modules: Theory and practice of teaching; understanding the curriculum; research in practice – part 1; research in practice – part 2.