



Fostering Research Engagement in Partnership Schools: Networking and Value Creation

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Fostering Research Engagement in Partnership Schools: Networking and Value**Creation**

INTRODUCTION

“Writers for many years, however, have urged teachers to become more consistent consumers of research, and some have proposed that teachers themselves conduct research as a means of improving teaching” (Wann, 1953, p.337). This quote may seem to be taken from one of the recent policy documents on promoting an evidence-informed, research-engaged teaching practice in schools, however, it belongs to Kenneth Wann referring to American teachers during the ‘30s and ‘40’s from the previous century. The call for teachers and schools to become more research-engaged is therefore by no means new, but is now resonating stronger than ever with government efforts to improve research impact and educational quality in the United Kingdom (U.K.) and many other countries (Brown, 2015; Greany, 2015; Menter, 2013). Recent efforts in policy and practice have primarily been made regarding the idea of (re)structuring school-university partnerships from centered on the university to more school-centered or hybrid types (e.g., Beauchamp, et al., 2013; NCATE, 2010). Although searching for the right formal partnership structure is important and at times challenging, strengthening the informal, social network structure and interpersonal relationships in partnerships that enable collaborative learning is equally important, but often overlooked (Author, 2015; Dhillon, 2009; Martin, Snow & Franklin Torrez, 2011). This study examines this social dimension of partnerships and focuses on exploring the development of research-engaged relationships among colleagues at a secondary school that is part of a longstanding school-university research partnership in the U.K. It seeks to answer the question: “In what way and to what extent, (i) are research-engaged relationships developed and (ii) is value for practice created among colleagues of a school-university

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3 research partnership school?” This exploration is intended to serve as an instructive case
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5 study and provides insight from a social network perspective as to the way that research
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7 engagement among school staff can be fostered in (partnership) schools.
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THEORETICAL FRAMEWORK

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15 Currently the British education system is changing rapidly; policy makers are aiming to
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17 strengthen quality in the system by encouraging it to become more autonomous (e.g. rise of
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19 Academies), diverse (e.g. increase of Free schools), practice-led (e.g. Teaching School
20
21 Alliances) and ‘self-improving’ (Greany & Brown, 2015). One important way of supporting
22
23 this development is through developing collaborative school-university networks that can
24
25 encourage research engagement in schools and support teachers to find, share and use
26
27 relevant research findings to improve their educational practice (Author, 2015; Brown, 2015;
28
29 Campbell & Levin, 2012; Greany, 2015). The next sections describe factors that play a role
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31 in fostering research engagement among colleagues in schools and a social network
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33 perspective on understanding the development of research engagement among school staff.
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Towards Research-Engagement in Schools

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42 The Anglo-Saxon world has a long history of promoting research engagement with teachers
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44 and schools (e.g., Corey, 1949, 1953). In the U.K. most prominently scholars like Stenhouse
45
46 (1975) and Elliot (1976) in the 1970s began to argue that teachers needed to be research-
47
48 informed and involved in educational research. This was seen as a new way to bridge the
49
50 perceived gap between educational research and practice and as a promising avenue to
51
52 improve teaching in schools. However, over the years that followed it became evident that
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54 building such research engagement in schools is challenging and “bridging the gap between
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3 the findings of academic educational research (of whatever kind, quantitative or qualitative)
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5 and the very different kind of knowledge that teachers use, and need to use, to inform their
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7 professional craft of teaching, is not a simple matter” (McIntyre, 2005, p.369).
8
9

10 Godfrey (2016) distinguishes four essential factors that play a role in developing
11
12 research engagement in schools. Firstly, the importance of learning school organisations is
13
14 emphasized: schools that support staff to experiment and take risks and encourage the
15
16 growth of professional learning communities in which knowledge can be developed, shared
17
18 and used for improving practice. Brown and Greany (forthcoming) add that in such schools
19
20 the use of research is a cultural norm where research-use is encouraged as part of the
21
22 learning environment. Secondly, attention is drawn to the importance of teachers who are
23
24 actively including research findings in their professional judgments and teaching practice. As
25
26 professionals such teachers critically engage in and with research (Author, 2013; Brown &
27
28 Zangh, 2016). Thirdly, the crucial importance of school leadership is stressed in nurturing
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30 and developing school structures and cultures for successfully engaging in research and
31
32 creating valuable knowledge (Borg, 2010; Davies, Hamilton & James, 2007). Scholars have
33
34 found that this does not only concern formal structures, but also the informal social
35
36 structures of collegial networks in school. They observed that in many cases the knowledge
37
38 and ideas from research flow informally through interpersonal relationships among
39
40 colleagues (Author, 2015; Brown & Zhang, 2016; Finnigan & Daly, 2014; Leat, Reid &
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42 Lofthouse, 2015) and find that “research is rarely used in a linear way; rather, the process of
43
44 transferring research into practice occurs in a multidimensional, complex way that is social
45
46 and interactive ... it unfolds within a social ecology of relationships” (Finnigan & Daly,
47
48 2014: 3). Consequently, leaders in schools need to understand, and intentionally navigate and
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50 foster these informal social networks where research-based knowledge is shared and used for
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3 improving school practices (Brown & Zhang, 2016; Finnigan & Daly, 2014). Fourthly,
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5 attention is drawn to the significance of “systemic connectivity” that refers to the fact that
6
7 schools should not only focus on themselves, but remain ‘outward-looking’. Such outward
8
9 looking schools participate in broader research partnership networks not only for their own
10
11 benefit, but also for their commitment to the wider educational community (Wilkins, 2011).
12
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14
15 The abovementioned engagement factors resonate with the underlying case study. A
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17 school with high “systemic connectivity” is studied, i.e. it is part of the Schools-University
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19 Partnership for Educational Research (SUPER) in Cambridge. The case study examines the
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21 role of the partnership school’s organisational structures (formal/informal), and leadership
22
23 in promoting research-engaged interaction among their school staff. The development of
24
25 these research-engaged relationships among school colleagues is inherently social in nature
26
27 (Leat et al., 2015). Therefore it was decided to adopt a social network perspective that
28
29 facilitates the study of such interactions.
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36 **A Social Network Perspective: Developing Research Networks in School**

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38 Social network theory provides insight into the social structures and processes involved in
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40 changing education that are distributed across individuals and levels of the educational
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42 system (Daly, 2010). Generally speaking, social network theory is concerned with the pattern
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44 of social relationships that exists between people in a social network (Scott, 2000). A social
45
46 network perspective extends the primary focus on individuals to understanding the
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48 interaction with the larger social infrastructure in which they reside (Borgatti & Foster, 2003;
49
50 Cross, Borgatti & Parker, 2001). It is argued that individuals may be influenced by their
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52 positions in the network structure (Moolenaar, 2012). For example teachers being central in
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54 a network where new ideas for teaching are shared may explain their positive view of the
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3 school's innovative climate (Author, 2014). Scholars have found that highly centralised
4 network structures dominated by one or a few members are effective in sharing codified
5 knowledge or information (for example, a research report) (Cummings & Cross, 2003), but
6 inhibit the access to and sharing of noncodified knowledge that is more difficult to articulate
7 (for example, about creating a more inclusive classroom practice) (Daly & Finnigan, 2010a,
8 2010b). Furthermore, research suggests that densely connected networks, which have many
9 relationships, tend to move knowledge more quickly through the network than less dense
10 networks do (Borgatti & Foster, 2003; Daly & Finnigan, 2010a, 2010b).

21
22 Scholars consider that social networks epitomise teachers' collaborative interactions
23 when engaging in and with research (Leat et al., 2015). In the study of research engagement
24 among school colleagues two types of research networks can be distinguished (Author,
25 2013): (1) "Being Informed by Research", i.e. discussing and collaboratively using research
26 findings with colleagues, and (2) "Doing Research", i.e. discussing and collaboratively using
27 research methods with colleagues (cf. Brown & Zhang, 2016; Leat et al., 2015). The
28 interactions in the "Being informed by Research" network typically involve "content
29 knowledge" about the topic that was investigated (e.g. jointly experimenting with research
30 findings about new ways to support pupils' writing skills). The interactions in the "Doing
31 Research" network involve "procedural knowledge" pertaining to the research design and
32 methods used (e.g. discussing how to conduct a specific kind of interview). Scholars have
33 argued that engagement of school staff in such networks can lead to five interrelated types of
34 value creation (Wenger, Trayner & De Laat, 2011). These are summarized in Table 1 below.

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This study explores in what ways these type of values are created when colleagues in a partnership school engage in discussion and joint application of research findings and methods to understand and improve their practice.

METHOD

Context***Schools-University Partnership for Educational Research***

The Schools-University Partnership for Educational Research (SUPER) is a long-standing collaboration between the Faculty of Education at the University of Cambridge and local schools. It was established in 1997 with the primary purpose of examining “whether, and if so how, the Faculty and a group of schools could work effectively as a partnership so as to serve the research interests of all members” (McLaughlin et al., 2006: 14). At present the SUPER network comprises eight secondary schools, a lower school and a consortium of ten primary schools together with the Faculty of Education. Each school has a nominated Teacher Research Lead (TRL), a member of the school staff, typically a middle leader, who provides the link between the school and the Faculty. Each school also has a Critical Friend (CF), who is a member of the Faculty team, which is led by the SUPER Partnership Coordinator (SPC). TRCs, CFs and the SPC meet each half-term for a day to review progress on the annual action plan, share ideas and issues, and to forward plans. CFs also regularly visit their link schools to support the TRL and typically work with groups of staff understanding research linked to the agreed SUPER research focus. SUPER’s work is showcased at the annual SUPER conference and represented at a range of academic and practitioner conferences. To help build research capacity in SUPER schools, the Faculty also

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1
2
3 had a bespoke 2-year part-time Masters route primarily targeting teachers in the network to
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5 develop researching professionals.
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10 *Partnership School*

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12 The partnership school is a state secondary school; it is a mixed comprehensive with 880 on
13 roll including 270 in the Sixth Form. Table 2 summarizes the demographics of the school
14
15 population in comparison to the national averages.
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18 [INSERT TABLE 2 ABOUT HERE]
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23 In 2010 the school joined SUPER. In this research network one of the school's Assistant
24 Head teachers divides her week as a Teaching Associate in the Faculty. Several teachers have
25 completed and are working towards a Master's of Education (M.Ed.) that is embedded in the
26 SUPER network. As part of the network two of the school's teachers who are SUPER M.Ed.
27 graduates have become TRLs with the role of connecting their school to other partnership
28 schools and the Faculty. Since joining the partnership there has been an increasing focus on
29 knowledge sharing amongst school colleagues, and staff are encouraged to access relevant
30 research and conduct small-scale enquiries to inform their discussions and enhance their
31 teaching and leadership practices. In the school year that was subject of the study (2014-
32 2015) the school established "enquiry groups" in order to actively involve all teachers and
33 teaching assistants in collaboratively researching the key aspects of the School Improvement
34 Plan. Examples of that year's enquiry group topics were: effective feedback, English as
35 additional language, growth mindsets and writing for purpose. Teachers opted into these
36 groups according to their interests and/or appraisal foci and discussions with line managers.
37
38 The groups were mainly steered by SUPER MEd students and teachers who had experience
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3 at Master's level thus sharing their knowledge of research methods and promoting their
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5 leadership capacity (22% of teaching staff have Master's degrees).
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Research Design

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10 We used a multi-method longitudinal case study design to examine the nature, development
11
12 and outcomes of research-engaged networks among staff in this partnership school. Such a
13
14 case study approach is most appropriate for our phenomenon of interest, as it has a level of
15
16 complexity that requires multiple data sources to gain an in-depth understanding (Yin, 2003).
17
18 A cognitive social network approach was adopted that investigates people's perceptions of
19
20 research-engaged (social) relationships, processes and outcomes in their own right (Tasselli,
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22 Kilduff & Menges, 2015).
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Data Collection

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30 *Survey.* An on line questionnaire was administered twice among school staff in July
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32 2014 (T1) and July 2015 (T2) with response rates of 64% (T1) and 75% (T2). Sample
33
34 demographics are included in Table 3.
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37 [INSERT TABLE 3 ABOUT HERE]

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39 The survey asked questions about demographic information (i.e., gender, position,
40
41 experience), perceptions of research engagement among school colleagues, and social
42
43 network data of the collegial interaction around research in school. The repeated survey
44
45 aimed at capturing changes in the perceptions and interactions of engaging in research with
46
47 school colleagues.
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51 The research engagement scale was composed of four items, based on earlier
52
53 scholarly work on research-engagement in schools (Author, 2015; Borg, 2010; Godfrey,
54
55 2016; Handscomb & MacBeath, 2003; Sharp, et al., 2006; Wilkins, 2011) and captured
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57 perceptions of sharing and using research findings among school colleagues as well as the
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3 school leadership's role in support of such interactions. For the social network data we asked
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5 school staff to assess the frequency of interaction (1=most days; 2=weekly; 3=termly) for
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7 four types of research-engaged interactions that related to the two types of research network
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9 that were distinguished in the theoretical framework.
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11

12 The first two referred to "Being informed by research":
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- 14
15 1) How often do you discuss new ideas/findings from educational research that could
16
17 improve your classroom practice with this person?
18
19 2) How often do you collaborate in applying new ideas/findings from educational
20
21 research to improve your classroom practice with this person?
22
23

24 The other two referred to "Doing research":
25

- 26
27 1) How often do you discuss methods or tools of educational research with this
28
29 person?
30
31 2) How often do you collaborate in applying methods or tools of educational research
32
33 in your practice with this person?
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35

36 Respondents were then able to select names from a complete roster of school staff. Such an
37
38 approach is considered to provide high response rates, and strengthen the validity of results
39
40 (Lin, 1999; Scott, 2000).
41

42 *School Documents.* In order to explore changes in research engagement in school, the
43
44 minutes of various team meetings (e.g. Department meetings, Senior Leadership Team
45
46 meetings) were collected. Parallel to the timing of the collection of survey data, documents
47
48 were collected for academic years 2013-2014 (T1) and 2014-2015 (T2). This resulted in the
49
50 collection of 178 documents (T1=85; T2=93).
51

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54 *Value Creation Stories.* After the survey at T2 Value Creation Stories (VCS) were
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56 collected among school staff who had participated in the survey at T2. These stories aimed
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1
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3 at capturing staff experiences with engaging in activities in the school's research network and
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5 at the different types of value that were created in these activities during the academic year
6
7 2014-2015 (between T1 and T2). Staff were provided with a format that supported the
8
9 writing of brief narratives. This format was based on the work of Wenger and colleagues
10
11 (2011) and adapted to study research networks (See Format in Appendix). The format was
12
13 explained to staff and several examples were provided. School staff were invited to produce
14
15 one to three stories (see Table 3 for examples of reported research activities and types of
16
17 value creation). From the T2 survey respondents 31% provided a VCS that resulted in a total
18
19 of 27 VCSs from 21 staff members.
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21
22

23
24 *Individual Interviews* – Based on the preceding analysis of the survey and VCSs ten
25
26 members of school staff were selected for an individual semi-structured interview.
27
28 Interviews focused on exploring participants' perceptions of participating in the school's
29
30 research network. Network Centrality measures were used to select core and peripheral
31
32 members of the "Doing Research"-network (T2), because analyses had revealed the
33
34 strongest change in this network. Five members that comprised the core of this network
35
36 were selected. The core members were distinguished based on the staff members' highest
37
38 scores of two centrality measures: *indegree centrality* and *betweenness centrality* (Borgatti, Everett,
39
40 & Johnson, 2013). *Indegree centrality* refers to the number of staff members that identify a
41
42 school colleague as someone with whom they are engaging with in "doing research". High
43
44 *indegree centrality* means that these staff members are sought out the most by their colleagues
45
46 in the research network. *Betweenness centrality* refers to the extent that a staff member is in
47
48 between of other pairs of colleagues in the network. Staff members with high *betweenness*
49
50 *centrality* are considered well positioned to connect staff members and broker their expertise
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52 in the research network. Also five random peripheral members outside the core of this
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3 network were selected that had provided a VCS referring to their engagement in an activity
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5 in this “Doing research”-network. Investigating the perceptions of these core and peripheral
6
7 network members allowed for a broader and deeper understanding of the nature, processes
8
9 and outcomes of this school’s research network. Participants provided their informed
10
11 consent. Interviews were recorded and lasted 20-45 minutes. An interview protocol was used
12
13 to explore perceptions of social interactions, research engagement, leadership and value
14
15 creation in this school’s research network during the academic year 2014-2015. Table 4
16
17 provides examples of VCS narratives and interview questions.
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22 [INSERT TABLE 4 ABOUT HERE]
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24 *Data Analysis*

25
26 Analysis took place on the levels of the whole school research network, and individual staff
27
28 members in school.
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30 31 32 33 *Whole School Research Network*

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35 Surveys and school documents were analysed to understand the way that research
36
37 engagement developed in school.
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39
40 *Survey* – Social network analysis was used to examine aspects of the network
41
42 structure, i.e. the patterns of interactions in the school’s research networks (Wasserman &
43
44 Faust, 1994). Social network data obtained from the questionnaires were entered into
45
46 network software ‘UCINET’ (Borgatti, Everett & Freeman, 2005) to calculate network
47
48 measures. Visual representations of the networks were generated by using software
49
50 ‘NetDraw’ (Borgatti, 2002). Data was joined for the two network questions about “Being
51
52 informed by research” and in a similar fashion for the two network questions about “Doing
53
54 research”. This allowed for an overall examination of the two research networks, one
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3 representing all the collegial interaction referring to “Being informed by research” and one
4 referring to “Doing research”. We dichotomized the data for both these research networks,
5
6 i.e. we focused on the presence or absence of the most frequent interactions (weekly or most
7
8 days). These frequent collegial interactions were considered the best estimate of research-
9
10 engagement in school.
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14 At T1 and T2 we measured the schools’ research networks’ *size*, *average degree*, *density*,
15
16 *centralization*, *fragmentation*, *reciprocity*, and *E-I index* to gain insight into school staff’s interaction
17
18 around research and relational patterns. *Size* refers to the number of network members in a
19
20 network. *Average Degree* refers to the total number of relationships divided by the total
21
22 number of network members. *Density* refers to the ratio of the number of existing
23
24 relationships to the possible number of relationships between network members in the
25
26 network. Density ranges from 0 (no relationships in the network) to 1 (all network members
27
28 are connected). *Centralization* refers to the difference between one or a few highly central
29
30 network members with many relationships and the other more peripheral network members.
31
32 Centralization ranges from 0 (all network members have the same number of relationships)
33
34 to 1 (all network members have one relationship in the network with the same single
35
36 network member). *Fragmentation* refers to the proportion of pairs of nodes (network
37
38 members) that cannot reach another by any means. Fragmentation ranges from 0 (all of the
39
40 pairs of nodes can reach another) to 1 (none of the pairs of nodes can reach another).
41
42 *Reciprocity* refers to the ratio of the number of reciprocated relationships to the total number
43
44 of observed relationships in the network. Reciprocity ranges from 0 (no reciprocated
45
46 relationships in the network) to 1 (all observed relationships are reciprocated). The *E-I index*
47
48 refers to the degree of group-embeddedness and cross-group connections and is used to
49
50 explain the degree of closure within and between subgroups in a network. The E-I index
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3 ranges from -1 (all relationships are inside a certain group) to 1 (all relationships go outside a
4 certain group). Outcomes were compared between networks at T1 and T2.
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6

7
8 *School Documents* – The collected minutes of team meetings were analyzed separately
9 for academic years 2013-2014 (T1) and 2014-2015 (T2). For each type of team meeting the
10 number of presentations that included research citations to inform the collegial discussions
11 were counted. After that the proportion of presentations with research citations from the
12 different types of team meetings was compared between T1 and T2.
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22 *Individual Perceptions of Research Engagement and Networks.*

23
24 The way individual members perceived the research engagement of school staff and their
25 collegial interactions in their school's research network was investigated as follow.
26
27

28
29 *Survey* – For comparison over time we chose to match T1 and T2 data sets to ensure
30 that the individual perceptions of research engagement and the size of personal (so-called
31 “ego”) research networks in school were compared for the same set of participants.
32
33
34
35
36 Matching of data sets resulted in a sample of 36 staff members for the perceived research
37 engagement and 25 staff members for the personal research networks.
38
39

40
41 The Research Engagement scale was composed of four items. Principal component
42 analysis (PCA) confirmed that the four items loaded highly on a single factor explaining at
43 T1 83.1 % and at T2 71.9% of the variance, both with sufficient scale reliability (see Table 5).
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47 [INSERT TABLE 5 ABOUT HERE]

48
49 Outcomes of the Kolmogorov-Smirnov tests revealed that the distribution of data was not
50 normal for the Research Engagement sample and the personal research networks. In order
51 to make comparisons between T1 and T2 samples we therefore selected the non parametric
52 Wilcoxon matched pairs sign test for our analyses.
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Value Creation Stories – VCSs were coded. Codes were based on our theoretical framework; reported activities were coded for being part of the two distinguished types of research networks, i.e. “Being informed by research” or “Doing research”. Reports of value creation were coded based on the five different types of value creation that were distinguished in theory (Wenger et al., 2011), i.e. *immediate value*, *potential value*, *applied value*, *realized value*, and *transformative (or reframing) value*. An overview matrix was built that summarized fragments pertaining to these codes and allowed for cross-cell analyses focusing on the main differences and similarities among participants’ VCSs (Miles & Huberman, 1994).

Individual Interviews – The interviews were transcribed verbatim. The analysis of the interview transcripts focused on gaining a deeper understanding of how school staff perceived engagement and value creation in their collegial research network in school in the academic year 2014-2015. We focused on the main concepts of this study and the transcripts were coded for (1) Formal Design (i.e. adopted structures, strategies and activities to promote research engagement in school); (2) Social Interaction and Engagement in Research, for a) school colleagues; b) school leadership); (3) Value Creation (i.e. Immediate, Potential, Applied, Realized, and Transformative value). Examples of fragments pertaining to these codes are presented in the results section. Two matrices were built that summarized in their cells the fragments pertaining to each of these codes: one summarized the perceptions of the five core network research members and one summarized the perceptions of the five peripheral network members that were interviewed (Miles & Huberman, 1994). Subsequently cross-cell analyses took place within and between the two matrices focusing on the main differences and similarities in cells from which overarching themes were formulated.

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6 The collection and analyses of survey data, VCSs and interview data were conducted by the
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8 first author and school documents were collected and analysed by the third author. As a
9
10 form of peer debriefing, each step in the process of analysis and its outcomes were discussed
11
12 with the research team (first, second and third author) and where necessary the primary data
13
14 were revisited (Miles & Huberman, 1994).
15

RESULTS

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19 In accordance with our data analyses the results are presented on the research network levels
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21 of the whole school, and individual school staff.
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25

Whole School: Increase of Collegial Networks and Engagement in Research

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27
28 Analyses of the whole school research network revealed a significant increase in perceived
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30 research engagement in school and collegial interaction around research over the course of
31
32 the school year.
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School Staff is Getting on Board with Research with Support of School Leadership

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40 The graph of the “Being informed by research”-network in Figure 1 shows an increase in
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42 discussing and collaboratively using findings from research among school colleagues over
43
44 the course of the school year.
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46

47 [INSERT FIGURE 1 ABOUT HERE]

48
49 The graph of the “Doing research”-network in Figure 2 also shows an increase in discussing
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51 and collaboratively using research methods among school colleagues during the school year.
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54 [INSERT FIGURE 2 ABOUT HERE]

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Comparison of the two graphs show that the most intense increase in collegial interaction took place in the “Doing research”-network (Figure 2) where from a few disconnected pockets of involved staff now almost every staff member became engaged in doing research. Figure 2 shows that in particular teachers joined this network and that school leaders became more central in the interaction, better connecting to the teachers. The outcomes of the network measures in Table 6 underline this observation and further explore this change over time in the two research networks.

[INSERT TABLE 6 ABOUT HERE]

The increase in *ties*, *average degree* and *density* show that in both research networks the quantity of collegial interaction increased over the school year with the strongest growth in the “Doing research”-network (*Average degree*=+594%; *Density*=+733%). Both research network structures became less fragmented and somewhat more centralised. The quality of the interaction in terms of reciprocity increased with again the strongest gain in the “Doing Research”-network (*Reciprocity*=+619%). Outcomes of the *E-I Index* reveal that overall in both research networks staff began to interact more with colleagues in other positions. The strongest change is in the “Doing research”-network where at the beginning staff tended to interact more with colleagues in the same position (T1 *E-I Index*= -0.026) and began to interact more with colleagues in other positions towards the end of the school year (T2 *E-I Index*=0.425). This is most evident for the Senior Leadership Team (SLT) who at the start were mainly interacting with other SLT members (T1 *E-I Index*=-0.474) and shifted to an outward focus where they predominantly sought interaction with staff members in other positions, such as the teachers and heads of departments (middle management) (T2 *E-I Index*=0.424). As their central position in Figure 2 already hinted to this finding may indicate

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1
2
3 that SLT members shifted their approach and tried to get more teachers and heads of
4
5 departments on board with research, in particular engaging them more in doing research.
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8 The observed increase in the collegial interaction in the school's research networks
9
10 and the supportive role of SLT is confirmed by the significant increase in the sizes of
11
12 personal research networks and in the perceived research engagement of staff and SLT in
13
14 school between T1 and T2 (see Table 7).
15
16

17 [INSERT TABLE 7 ABOUT HERE]
18

19 Also the analysis of school documents pointed to an increase of research engagement of
20
21 teachers and school leaders. Table 7 shows for every type of team meeting an increase in the
22
23 presentations that included research citations to inform collegial discussions. On average the
24
25 proportion of presentations referring to research considerably increased from 39.3% (T1) to
26
27 64% (T2) (see Table 8).
28
29

30 [INSERT TABLE 8 ABOUT HERE]
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32

33 **Individual Staff: Developing Relationships, Engagement and Value in Research**

34
35 Analyses on the individual level gave more insight into the interplay between formal and
36
37 informal dimensions of the school's research network and in what way this promoted
38
39 research engagement and value creation among school staff.
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45 ***Different Types of Value are Created at Different Places in the Research Network***

46
47 Results from the Value Creation narratives in Table 8 show that during the school year staff
48
49 were engaged in both Research Networks, but tended to be more involved in the discussing
50
51 and application of research findings ("Being informed by research"-network). This
52
53 difference aligns with the measures of the research networks at T2 in Table 2 (*Average degree*
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FOSTERING RESEARCH ENGAGEMENT

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2
3 in the “Being informed by research”-network=5.471 and in the “Doing research”-
4
5 network=2.971)
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7

8 [INSERT TABLE 8 ABOUT HERE]
9

10 Furthermore Table 8 reveals that both staff members at the core and periphery of the
11
12 research network experienced value creation from their participation in network activities.
13
14 Participants reported on each of the five types of value creation and did not seem to be
15
16 related to their position in the school organization. Participants referred the most to the
17
18 creation of *potential*, *applied*, and *realized* value in their research networks. *Transformative value*
19
20 creation was predominantly experienced by participants (5 out of 6) who participated in
21
22 activities in the “Doing Research”-network. These participants comprised teachers as well as
23
24 middle and senior management members and most of them (5 out of 6) belonged to the
25
26 periphery of the “Doing Research”-network. Analyses of interviews with five core and five
27
28 peripheral members of the “Doing research” network further explored the development of
29
30 research engagement among colleagues and these different types of value creation in the
31
32 school research network.
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40 ***Value Creation in the Interplay between Formal and Informal Dimensions of***
41
42 ***Research-Engaged Networks***
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45 The Core of the “Doing Research” network (Figure 2) consisted of four SLT members and
46
47 one Head of Department. The selection from the Periphery comprised of the school’s
48
49 Teacher Research Lead (TRL), two students (in service teachers) in the final year of the
50
51 SUPER M.Ed. programme, and two teachers. The Core that consisted of leadership
52
53 members in the school took an “organic” approach of growing research-engagement among
54
55 colleagues that could feed into their school’s development. This approach consisted of
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FOSTERING RESEARCH ENGAGEMENT

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3 creating formal structures/routines and adopting a leadership approach that encourages
4 collegial interactions and nudges staff towards research involvement. One SLT member
5 explained:
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10 “It isn’t about telling people to do things, there are things that would nudge
11 people to do them...[Our approach] produced a more collegiate staffing;
12 professional relationships which were structured and engineered”
13
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16
17 Analyses of both the core and periphery members indicated two main formal structures that
18 were considered key in influencing the more informal dimension of colleagues interacting
19 around research, i.e. the school’s Professional Learning (PL) plan and its involvement in the
20 SUPER network. For both structures is explored in what way it influenced the informal
21 dimension of collegial interaction around research and what perceived value was created in
22 these interactions.
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31 *Research-Engaged PL* – In the year of the study the school’s PL plan was perceived to
32 increasingly encourage and support more research-informed development activities for
33 school staff. This was most evident from two developments that participants reported on: (a)
34 the Enquiry Groups that were established during this study, and (b) the School-wide Action
35 Research project that was conducted in that same year.
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42 For the Enquiry Groups the four SLT members of the Core stressed the *potential*
43 *value* of these groups as an organisational strategy to include all school colleagues in research
44 activities and to align research-engaged PL activities with their school improvement
45 priorities. One of them explained:
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51
52 “The enquiry groups are tied directly to the school development plan, so the
53 themes that run through the school development plan run through the
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FOSTERING RESEARCH ENGAGEMENT

1
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3 department development plan, which run through their appraisal, discussions and
4
5 foci I suppose.”
6
7

8 The peripheral members appreciated the time that was created for connecting to colleagues,
9
10 and engaging in research through these Enquiry Groups; for the interviewed teachers it was
11
12 the first time that they were involved in research. One of the teachers perceived *immediate*
13
14 *value* from it and enjoyed discussing and collaborating with colleagues of other departments:
15
16

17 “That was my first experience in an enquiry group to be honest with you...She
18
19 [SUPER M.Ed. student] was the one that presented us with lots of research and
20
21 studies...and we then created these strategies for questioning that then we
22
23 adapted to our different subjects...And the good thing about it is that we came
24
25 from very different subjects, so there was my colleague from art, and there was
26
27 me, and we paired up when we did the observations. And I think that was the
28
29 first time I was observing in an art lesson.”
30
31
32
33

34 This teacher explained that after they finished their collaboration in the enquiry group
35
36 she now continued to informally chat with this colleague in the Art department about
37
38 research-related topics. Although this may suggest that research engagement among
39
40 previously disengaged staff was encouraged through these groups, one of the M.Ed.
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42 students also remarked that the added value of research for teachers without a research
43
44 background was not always evident; she noticed that some of them were focusing
45
46 more on obtaining a superficial quick idea for their teaching than gaining a deeper
47
48 understanding of their practice and engaging with research:
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53 “I was involved in one of the enquiry groups but I think...if there was a short
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55 kind of snappy idea about what could improve your practice that wouldn't really
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FOSTERING RESEARCH ENGAGEMENT

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3 take a lot of time to plan or implement, then people were a lot more willing to do
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5 it.”
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8 The Action Research Project was different from the Enquiry Groups in a sense that it was
9
10 not initiated by SLT, but the TRL (Periphery member) and a Head of Department (HoD)
11
12 (Core member). Their drive for engaging in this collaborative research project was the
13
14 *potential value* of improving literacy skills for pupils in school that was among that year’s
15
16 school development priorities. The TRL used insights she developed during her SUPER
17
18 M.Ed. and collaboratively developed with the HoD a school-wide development strategy, and
19
20 gained approval from SLT. The strategy focused on involving colleagues in the design of the
21
22 study and intervention, getting HoDs on board and subsequently the teachers. They
23
24 reported on the *applied value* of trying out new classroom strategies, but both of them were
25
26 not convinced that they created *realized value* and fully succeeded in improving literacy skills
27
28 across the school. However the collaboration with colleagues in itself held *immediate value* to
29
30 them and they both appreciated meeting more often with colleagues and engaging in more
31
32 research-informed conversations with them. The TRL explained: “The project gave me the
33
34 chance to work with others, to collaborate, and to lead and I really valued that because it
35
36 reinvigorated my professional practice and my sense of purpose.” The HoD enjoyed the
37
38 collaborative relationship with the TRL and noticed the *potential value* he had developed by
39
40 learning to lead such collaborative research project for school improvement: “The TRL I
41
42 suppose was my entry ticket to the research culture of my school...I learned more in that
43
44 year than I think I've learned in a long time...this was the first whole-school project I've
45
46 tackled, and the TRL’s expertise and her leadership ultimately was invaluable.”
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54 *Research Partnership* – Both core and peripheral participants referred to the importance
55
56 of being part of the SUPER network for encouraging research-engaged interactions among
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FOSTERING RESEARCH ENGAGEMENT

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3 school colleagues. Besides the position of the partnership's TRL that led the aforementioned
4
5 Action Research Project, participants emphasized two other key elements of this partnership
6
7 model: (a) its embedded M.Ed. programme, and (b) the hybrid position of one of the
8
9 school's SLT members who was also part of the partnership's network's Faculty team.
10
11

12
13 The Masters programme embedded in the SUPER network was regarded by the core
14
15 participants as a powerful organisational strategy to build capacity for research and
16
17 development in their school. They noticed the *potential value* of Masters theses that were
18
19 informing school development and the new ideas that Masters students brought to the
20
21 school and were sharing with colleagues. One of them explained:
22
23

24 "I think you've got enough people in school that have done Masters now, and you
25
26 do get a bug...I think that's the thing, you've got enough people in the school who
27
28 are actually really keen and really interested [in research] and I think the SUPER
29
30 helps with that."
31
32

33
34 The peripheral participants also noticed this *potential value*. The two interviewed teachers
35
36 appreciated the way that they could learn about Masters students' study topics and use them
37
38 in their classroom practice. However the TRL and two Master's students also experienced
39
40 that research engagement among colleagues was still developing and not all department
41
42 colleagues were supportive of Master's students' research. One Master's student reflected on
43
44 her experiences of sharing research in her department:
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46
47

48 "It depends; if you're interested in research then those people are on board with
49
50 you. If they're not interested there's kind of a thing about the whole contract of
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52 'Research is useless'. We've tried to do it, it doesn't work.' That kind of attitude
53
54 and that was definitely prominent in my department. They were not keen on the
55
56 idea of research at all. I didn't understand why..."
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FOSTERING RESEARCH ENGAGEMENT

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3 The importance of the hybrid position of one of the staff members who was part of both
4 the school's SLT as well as the Faculty's partnership team was emphasized by both the core
5 and peripheral members as a significant link between school and university that encouraged
6 research engagement among school colleagues. One of the core members appreciated that
7 this person connected them to the work at the Faculty: "I think she has been very
8 instrumental...She brings us back to what's happening in the Faculty...that's her job actually
9 to be that link." This person was in charge of the aforementioned school's PL and the
10 interview participants noticed the *immediate value* of her supporting Masters students and
11 encouraging other staff in conducting research. Also she was perceived to foster *potential value*
12 creation, by linking research in a structural way to PL and school development. Not
13 surprisingly this person belonged to the Core of the research network and she described her
14 approach of building research engagement among her colleagues as "drip feeding" in which
15 she constantly sought to foster *potential value* creation, by informally connecting colleagues in
16 school as well as in the Faculty based on their ideas and research topics

CONCLUSION AND DISCUSSION

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19 This study aimed to shed light on the understudied social dimension of developing research
20 engagement among colleagues in schools. Multiple methods were used to investigate the
21 development of research-engaged relationships among colleagues of a school-university
22 research partnership school and what types of value were created in such a research network.
23 In answering our main research question it can be concluded that overall school leadership
24 adopted an approach in which they combined the development of formal structures (such as
25 a research informed PL approach) and informal networking (taking up central roles in the
26 collegial research networks) to foster a significant increase in the research-engaged
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FOSTERING RESEARCH ENGAGEMENT

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3 interactions among staff in school. This approach led to diverse types of value creation at
4
5 both the core and periphery of the school's research network. More specific key findings are:
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- 8 1. *Key Role of Leadership*: Outcomes suggest that the perceived change in this network
9 was influenced by a purposeful strategy of the school's leadership team. Initially the
10 "Doing Research" Network existed primarily of SLT members who were mainly
11 collaborating among each other in doing research. Over the course of the academic
12 year leaders made a significant shift in interacting more around research with
13 teachers. The analyses indicate that they played a central role in purposively reaching
14 out to teachers and engaging them in research.
15
16
- 17 2. *Interaction Formal-Informal Dimensions*: Two formal structures played a key role in
18 fostering the significant increase in research-engagement among staff, i.e. the
19 research-informed PL approach (key elements of Enquiry groups, and school-wide
20 Action Research project) and the involvement in the SUPER network (key elements
21 of the partnership's TRL, embedded M.Ed. program and hybrid school-university
22 educator). The research activities in both structures were intended to tie in with their
23 school development priorities. These formal structures were perceived to also
24 informally "grow" research-engagement in school by promoting the informal, social
25 dimension of collegial interacting and collaborating around research.
26
27
- 28 3. *Different Types of Value Creation*: The outcomes of the increased research engagement
29 were diverse and different types of value were created for educational practice at the
30 Core and Periphery of the research network. These types of value creation did not
31 seem to be related to participants' formal positions in the school organisation.
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33 Overall, most reports were on the perceived *potential*, *applied* and *realized* types of
34 value creation. *Transformative value* creation was predominantly experienced by
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FOSTERING RESEARCH ENGAGEMENT

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3 participants in the “Doing Research”-network, in particular in the periphery of this
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5 network. Interviews revealed that the Core members in this “Doing Research”-
6
7 network -in their formal leadership positions- focussed primarily on the creation of
8
9 *potential value* for increasing research-engagement for the development of their school
10
11 organisation.
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15 Next these three key findings are discussed in relation to each other and the theory.
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18 19 **Fostering Research Engagement: Importance of Leadership and Partnership**

20
21 The study’s first key finding confirms outcomes from other studies (e.g., Borg, 2010; Brown
22
23 & Zhang, 2016; Davies, et al., 2007; Godfrey, 2016; Greany, Handscomb & Varley, 2014;
24
25 Wilkins, 2011) that show that school leadership plays a crucial role in fostering engagement
26
27 among school colleagues in doing research as well as in sharing or using research findings in
28
29 practice. The network and interview analyses in this case study suggest that SLT members
30
31 who succeed in promoting research engagement do not remain on the sidelines, cheering
32
33 their staff on in research activities, but are actively participating in discussing research
34
35 evidence, using research findings and collaborating in doing research with their school
36
37 colleagues. Such purposeful and strong commitment of school leaders in sharing and using
38
39 research is considered crucial in building a culture where using research becomes the cultural
40
41 norm; where school leaders ‘walk the talk’, model, coach and discuss research and in this way
42
43 increase the buy-in to research among colleagues in school (Brown & Zhang, 2016). Results
44
45 indicate that SLT in this partnership school understood the importance of the informal,
46
47 social dimension of building research engagement in school, facilitating collegial dialogue,
48
49 and navigating their school’s collegial network. School leadership fostered the collegial
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51 research networks in two major ways.
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The first way comprised school leadership's efforts in creating formal structures that facilitate, foster and embed research-engaged interaction in school, such as the research-engaged PL, and the membership of the school-university research partnership (see Key finding two). Establishing these formal structures created important space within the school day for staff to spend time with research, receive support in using research and to also (informally) engage with their colleagues in and with research (Brown & Zhang, 2016; Godfrey, 2016; Greany, 2015).

The second way involved school leadership's personal efforts in informally encouraging their staff to engage in research. Network analyses revealed that SLT-members began to connect more to groups with other positions in school, for example crossing the boundaries between the SLT group and groups of teachers. Such "boundary crossing" is considered important for promoting research in schools and partnerships (Akkerman & Bakker, 2011; Author, 2015; Dallmer, 2004).

The study's second key finding confirms that research partnerships between schools and universities can be fruitful contexts for research engagement to grow in schools (Godfrey, 2016). It draws attention to elements of what authors have described as the hybrid or 'third' space of partnerships in which faculty from school and university can meet and collaborate (Greany, et al., 2014; Martin et al., 2011; Zeichner, 2010). Such space was purposefully created in the SUPER network to encourage faculty from school and university to jointly engage in discussing and conducting research. Analyses emphasized two key elements of this hybrid partnership space that contributed to the increase of research engagement in school: (1) Partnership roles that required working in and with partnership schools as well as the Faculty of Education (i.e. the TRL and hybrid school-university educator), and (2) a Teacher education program that allows (in-service) faculty from schools

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(students) and university (Faculty teaching in the program) to connect research to improving practice in partnerships schools (i.e. M.Ed. program embedded in the partnership). We reckon that these two distinguished elements of a school-university research partnership can be powerful drivers of fostering research engagement in partnership schools.

Value Creation in Research-Engaged Networks

In the context of research networks our results (key finding 3) support the existence of the five types of value creation that Wenger and colleagues (2011) distinguished. The seeds of engaging in research germinated across the collegial research networks and staff members reported on a range of types of value creation. This is an important observation since it expands our limited empirical knowledge about the benefits of engaging in research and school-university partnership for school practice (Greany et al., 2014). Also, in a broader sense we consider this a significant observation in the light of the current educational context in England. Currently there is an expectation for the educational system in England to become self-improving (Department for Education, 2010; Hargreaves, 2010); a system in which on the one hand schools are granted more autonomy, and on the other hand the Government is raising the bar, putting accountability mechanisms in place to hold schools to account (Greany & Brown, 2015) and even showing (heavily contested) preferences for the type of research evidence (i.e. Randomised Trials) to be used in schools (Goldacre, 2013; James, 2013). This context of increased accountability easily triggers policy-makers and school leaders to focus on evaluating the added value of research-engagement in terms of measurable impact, i.e. performance gains of schools, teachers and pupils (Leat et al., 2015). Although we agree that *realised value* is indeed an important goal of engaging staff in schools in research, our third key finding shows that the fruits of increased research engagement are

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3 more diverse, e.g. staff reporting on how they were reinvigorated through discussing
4 research with colleagues (*immediate value*); staff starting to experiment more with new ideas in
5 their teaching practice (*applied value*) and staff recognizing the *potential value* of new knowledge
6 for improving their practice in the future. Some staff even reported on being transformed
7 through their engagement in the research network activities: they claimed it had changed the
8 way they viewed their practice and what they considered important in their education. Our
9 results suggest that this transformative power of research engagement is perhaps most likely
10 to be found among staff that conduct research themselves. However, we wondered why
11 *transformative value* was predominantly reported by peripheral members of this “Doing
12 Research”-network. Was this just a coincidence or could the difference between central and
13 peripheral actors be explained from their network position? One explanation might be found
14 in the fact that the school leaders -who comprised the core of this network- focused on a
15 different type of value creation, i.e. the *potential value* for school development by providing
16 opportunities for their staff to engage in research activities. In that sense the core members’
17 agenda seems to have differed from the peripheral members’ one; with central school leaders
18 focusing more on collaborating with many colleagues in research to encourage research
19 engagement across their school and being less submerged in the process of research to fully
20 experience its transformative power for their own practice.
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LIMITATIONS, RECOMMENDATIONS, AND FUTURE STUDY

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49 This case study revealed quite remarkable outcomes in terms of increasing research-engaged
50 interactions among school colleagues. However, we need to consider what Godfrey (2016)
51 identified as the “systemic connectivity” of research-engaged schools. We note that the
52 growth that we witnessed was part of a longer development process in the partnership
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FOSTERING RESEARCH ENGAGEMENT

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3 school that began when the school joined the SUPER Network five years before. Although
4
5 this study provides an instructive case study and may provide guidance for building research-
6
7 engagement in schools, we realize that the school was at certain stage of its growth and our
8
9 findings will probably not apply in the same way for schools in other growth stages. In
10
11 agreement with other scholars we surmise that it requires first a certain level of professional
12
13 learning community in which subsequent research engagement can flourish (Brown &
14
15 Zhang, 2016; Godfrey, 2016). The exploratory nature of this case study implies that
16
17 generalisation of the results will require follow-up studies in which our findings could for
18
19 example inform hypotheses that can be further explored in other partnership school
20
21 contexts and across a higher number of cases. For schools in a similar growth stage we
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23 would recommend experimenting with the strategies that appeared successful in this study
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25 and further explore the types of value that are created within them.
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APPENDIX

Format Value Creation Story

My Name:	STORY <i>NOTE: You don't need to fill in all the boxes. Your story doesn't need to go all the way to 4 and 5. (Please describe as detailed as possible)</i>
1. What happened? *Describe a meaningful activity you participated in this year where research findings/ideas were shared or used in school (e.g. conversation with colleague, a project, etc.). *From what piece of research was the idea taken? *What was your experience of this activity (your thoughts, feelings)?	
2. What did it produce for you? *Describe any resources, ideas, documents, new connections, etc. that this activity produced for you. *Why do you think it might be useful?	
3. How did you use this resource in your practice? *Explain how you used/tried to use the produced resource(s) (see question 2) in your practice. *What did it enable? *What would not have happened otherwise?	
4. What were the outcomes? a. Personal: *Explain how it affected your success (e.g. improved student outcomes, being a better teacher) b. Organizational: *Has your participation in the activity contributed to the success of your school? (e.g. improved outcomes on organizational goals)	
5. Did it change the way you think about what is important? Sometimes you experience changes in your understanding of what is important (e.g. change in learning goals for your students; change in vision or strategy of your school). If so, please describe it here.	

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FIGURES

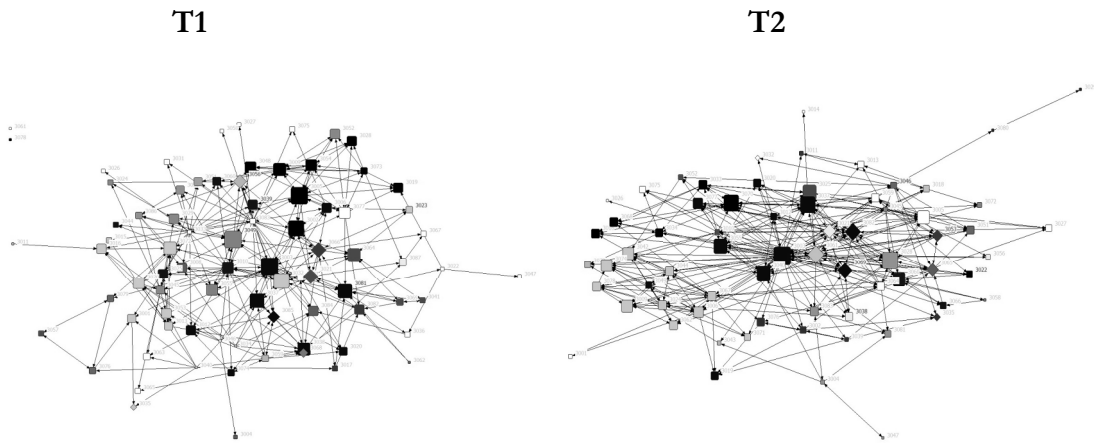


Figure 1. Being Informed by Research: Colleagues Discussing and Using Research Findings

Note. T1=July 2014; T2=July 2015; Nodes=School staff; Nodes are sized by their Degree Centrality;
Lines=Discussing and Collaboratively Using Research Findings

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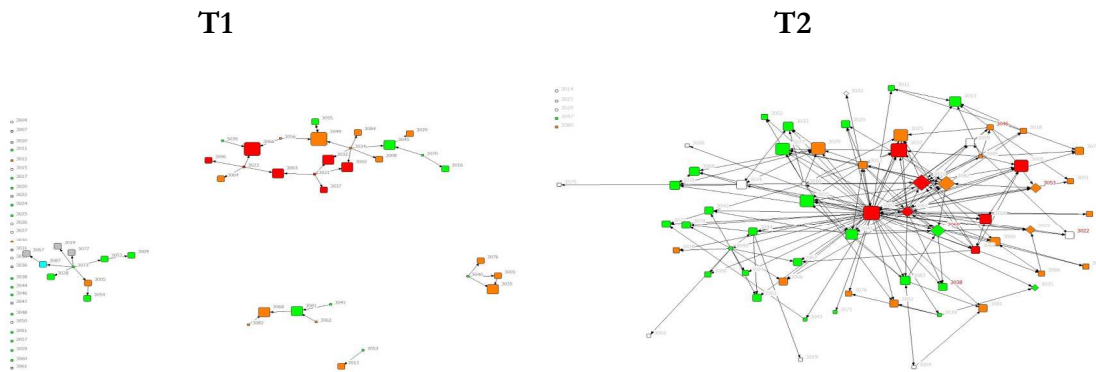


Figure 2. Doing Research: Colleagues Discussing and Using Research Methods

Note. T1=July 2014; T2=July 2015; Nodes=School staff; Nodes are sized by their Degree Centrality (bigger nodes have more ties); Nodes are Colored by their Position (Green=Teacher; Orange=Middle Manager; Red=Senior Manager); Lines=Discussing and Collaboratively Using Research Methods;

TABLES

Table 1. Types of Value Creation in (Research) Networks (Wenger et al., 2011)

Type of Value	Description	Example
Immediate value	Activities and interactions as having value in and of themselves	An energizing or inspirational conversation with a colleague
Potential value	Value that lies in its potential to be realized later	creating new connections with colleagues with certain expertise or developing new ideas for teaching
Applied value	Value put into use	changing teaching practices or procedures
Realized value	Value reflected in performance improvement	improved student outcomes or organizational structures
Transformative value	Value reflected in reconsideration of learning imperatives and the criteria by which success is defined	adapting curriculum or school development plan

Table 2. Demographics of School (2015)

	MEG	FSM	EAL	SEN
School				
Population	70.9%	35.7%	49.7%	5.2%
National				
Average	27.7%	28.7%	15.1%	12.4%

Note MEG=Minority Ethnic Groups.; FSM = Free School Meals;
EAL= English as an Additional Language; SEN= Special Educational Needs

Table 3. Sample Characteristics at T1 and T2

		T1		T2	
Gender	Male	29	(36%)	19	(28%)
	Female	51	(64%)	49	(72%)
Position	Teacher	33	(41%)	27	(40%)
	Middle Manager	19	(24%)	21	(31%)
	Senior Leadership Team	8	(10%)	7	(10%)
	Other	5	(6%)	13	(19%)
	Unknown	15	(19%)	0	(0%)
Years of experience at the school	0 - 4 years	29	(36%)	25	(37%)
	5 - 10 years	15	(19%)	27	(39%)
	10> years	8	(10%)	8	(12%)
	Unknown	28	(35%)	8	(12%)
Years of experience as an educator	0 - 4 years	11	(14%)	12	(18%)
	5 - 10 years	19	(24%)	22	(32%)
	11 - 20 years	16	(20%)	13	(19%)
	>20 years	14	(18%)	12	(18%)
	Unknown	28	(35%)	9	(13%)

Note. T1= July 2014; T2=July 2015; T1 n = 80; T2 n = 68

Table 4. Examples of Interview Questions and of the Activities and Value Creation in Research Networks Reported on in the Value Creation Stories

Research Network	Research Activity	Types of Value Creation	Interview questions
Being Informed by Research	<i>'A copy of a professional journal was lent to me by a colleague. I found one teacher action research article about a new writing framework. It seemed a better way to engage students in general and my EAL students in particular. I adapted it and used for my Arts Classes.'</i>	<p><u>Immediate</u> <i>'It was so refreshing to be able to bounce my ideas off of a colleague experienced in research.'</i></p> <p><u>Potential</u> <i>'I got new ideas for adapting my lessons.'</i></p> <p><u>Applied</u> <i>'I incorporated strategies in lessons and monitored them.'</i></p> <p><u>Realized</u> <i>'Theory grades have improved for all my students. My pupils are more engaged in learning.'</i></p> <p><u>Transformative</u> <i>'I realized that some skills for my students are more generic and need to adapt my curriculum accordingly.'</i></p>	<ul style="list-style-type: none"> - What happened exactly? - What were your thoughts and feelings during the research activity? - What did it produce for you? - What role did your colleagues play in this activity? - Is it easy to discuss research and methods with school colleagues? Why? - Is it easy to also collaborate in research with school colleagues? Why? - What role did your school's leadership play in this activity?
Doing Research	<i>'I conducted interviews with my students. I discussed the research findings with 2 of my students and we discussed intervention strategies to raise their achievement. We incorporated them into 12 weeks of lessons and monitored them.'</i>		

Table 5. Items and Factor Loadings of the Scales to Assess Research Engagement

Research Engagement (T1 α =0.932; T2 α =0.867)	T1	T2
Staff discusses research findings to improve classroom practices.	.89	.78
Staff applies research findings to improve classroom practices.	.90	.86
Management creates opportunities for staff to discuss research findings.	.93	.86
Management encourages application of research findings to practice.	.93	.89

Note: n = 36 T1=July 2014; T2=July 2015

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Table 6. Overview Measures Research Networks T1 and T2

	Informed by Research		Doing Research	
	T1	T2	T1	T2
Nodes	80	68	80	68
Ties	320	372	40	202
Avg Degree	4.000	5.471	0.500	2.971
Density	0.051	0.082	0.006	0.044
Fragmentation	0.479	0.308	0.992	0.703
Centralisation (In degree)	0.077	0.114	0.032	0.076
Reciprocity	0.217	0.257	0.026	0.161
E-I Index - Position	0.346	0.372	-0.026	0.425
E-I - Teacher	0.127	0.107	0.111	0.266
E-I - Middle Management	0.614	0.392	0.111	0.506
E-I - Senior Management	0.130	0.487	-0.474	0.424

Note: T1=July 2014; T2=July 2015

Table 7. Wilcoxon matched pairs sign test (one-sided)

	T1 –T2	SE
Research Engagement (n=36)	.003**	34.79
Personal Research Network Size – Content (n=25)	.011*	32.74
Personal Research Network Size – Procedural (n=25)	.001**	34.81

Notes: * $p < 0.05$, ** $p < 0.01$; T1=July 2014; T2=July 2015

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Table 8. Proportion of presentations in team meetings including research citations to inform collegial discussion (academic years 2013-2014 and 2014-2015)

Meeting type	Number of meetings per academic year		Proportion of presentations including research citations to inform discussion	
	T1	T2	T1	T2
Training Days	5	5	38.9% 7 out of 18	78.9% 15 out of 19
Staff meetings	7	7	38.9% 7 Out of 18	47.6% 10 out of 21
Year Team meetings	5	6	30% 3 Out of 10	44.% 4 Out of 9
Department meetings	8	8	N/A	N/A
Middle Leaders meetings	5	6	30% 3 out of 10	58.3% 7 out of 12
Extended Staff meeting	3	5	100% 3 of out 3	100% 5 out of 5
Senior Leadership Team meetings	37	39	44.4% 12 out of 27	71.9% 23 out of 32
Curriculum & Achievement meeting	15	17	33.3% 7 out of 21.	59.3% 16 out of 27
Total	85	93	39.3% 42 out of 107	64.0% 80 out of 125

Note T1= Academic year 2013-2014; T2=Academic year 2014-2015;

Middle leaders= Heads of Year and Heads of Department

Table 9. Value Creation Stories: Reported Value Creation in Research Networks

	Position	Research Networks		Value Created in Research Activity				
		<i>Informed by</i>	<i>Doing</i>	<i>Immediate</i>	<i>Potential</i>	<i>Applied</i>	<i>Realized</i>	<i>Transformative</i>
1 ^P	MM	X			X	X	X	
2 ^P	Teacher	X				X	X	
3 ^P	Teacher	X			X			
4 ^P	MM	X				X	X	
5 ^{C*}	SLT	X		X		X	X	
6 ^P	MM	X	X		X	X	X	X
7 ^P	SLT	X	X					X
8 ^P	Teacher	X			X	X	X	
9 ^{P*}	Teacher	X	X		X	X	X	X
10 ^{P*}	Teacher	X	X		X			
11 ^P	Teacher	X				X	X	X
12 ^{P*}	MM	X			X			
		X	X		X	X	X	X
		X			X	X	X	
13 ^{C*}	SLT		X		X			
		X			X	X		
		X			X			
14 ^P	SLT		X	X				
15 ^P	MM		X	X				X
16 ^P	MM	X			X	X	X	
17 ^P	Teacher		X		X			
18 ^{P*}	Teacher	X			X	X	X	
			X	X	X	X	X	
19 ^P	Teacher	X			X			
20 ^{P*}	Teacher	X	X	X	X	X	X	
21 ^{C*}	MM	X	X		X	X	X	

Note. MM=Middle Manager; SLT=Senior Leadership Team Member; P=Peripheral Member 'Doing Research' Network C=Core Member 'Doing Research' Network; *=Selected for follow-up interview

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We want to thank dr. Bethan Morgan from the Faculty of Education at Cambridge and the anonymous reviewers for sharing their valuable comments on previous versions of this article.

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