

WORK AND LIFE IN ACADEMIA

The establishment of formal research groups in higher education institutions

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This article explores the significance for academic staff members of research groups established and formalised as part of research strategies at university faculties. It also explores the levels of participation and stresses the importance of such group-related activities with regard to the level of participation, perceived impact on research quality and researcher training. The study is based on data from a survey and in-depth interviews with academic staff at Norwegian universities as well as document reviews. It provides evidence that formalised research groups can have a positive effect on the quality of individual research as well as researcher training. The study reveals significant differences between fields of science with regard to the importance of such groups for research activities and quality. Nevertheless, it finds that they contribute to more institution-based research, and also in subjects and qualifications where the research has primarily been conducted on an individual basis, such as in the humanities. These groups cannot simply be understood as a legitimating device for scientific communities due to changing funding and steering criteria; rather they manifest themselves as modes of academic work serving as a supplement to, rather than substitute for, other forms of cooperation.

Keywords: *research groups; organisational structure; academic collaboration; scientific work; research modes.*

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Research has become an increasingly important part of the core business of higher education. In the Nordic universities in particular, research constitutes an increasing share of the budgets. Hence, universities pay more attention to an organisational solution to serve their research mandate in the best possible and most efficient manner. In this regard, the creation and formalisation of research groups at the institutional level are becoming increasingly important ingredients in the institutional strategies of the Nordic universities.

The term ‘research group’ has traditionally been used for a formal or informal collaboration between several researchers – for example, a professor, an associate, a technician, one postdoctoral and two or three doctoral students – with the purpose of working on a set of projects related to a particular research problem. Today, the concept of the research group is also used to mark a formal organisational level in universities and colleges (Kyvik & Vabø, 2015; Michelsen & Vabø, 2014). Typical research groups have been most common in experimental natural science and medical science, where research training is an integral part of the group’s work. Research groups have been described as ‘the engine of productivity in research and effectiveness of graduate training’

(Etzkowitz, 1992). In recent years, however, the concept of research groups has gained a different and more extended significance. Formalised research groups have become more common, even in disciplines and fields of science traditionally characterised by personal autonomy, research organised on individual basis, and collaboration characterised by broader informal, communicative networks (Becher & Trowler, 1989).

We no longer see universities only as a specific type of institution, but as organisations adapting and evolving in relation to current strategic goals. Research groups can be seen in relation to the typical objectives of all contemporary universities aiming to create a more research-intensive and competitive academic environment. Other developments, such as the creation of larger university departments, rapid growth in the number of doctoral students, increased demands for research management, and external funding, have seemingly also led to a need for a clearer organisational framework around the basic activities of universities and colleges.

But what does the establishment of formal research groups offer as an alternative to the informal groups that previously existed? Will the quality of research and

research training be better? This article discusses these questions based on results from both a large-scale survey and nine in-depth interviews conducted with academic staff at Norwegian universities.

The literature on epistemic communities gives us an insight to understanding linkages between types of knowledge and organisation of knowledge production. Furthermore, governance and institutional perspectives are relevant for understanding the drivers for change in the environment of the knowledge communities and individual academics who conduct their research at universities.

The study provides evidence that formalised research groups can have a positive effect on the quality of individual research as well as on researcher training, and that they contribute to more institution-based research, and also in subjects and qualifications where previous research has primarily been conducted on an individual basis.

Changes as part of reform agendas may take on a symbolic character, because it is important to show willingness to change in line with external expectations to legitimise continued existence and resource access. We argue, however, that our data provide strong indications that formalised research groups also have established themselves as part of the expectations and work practices of academic staff, as a supplement to, rather than substitute for, other forms of cooperation.

Literature review

Internationally, there have been many studies about research groups that touch upon the issue in this article – the significance of formalised research groups for quality of research and research training. In the 1970s, an international research team conducted a comprehensive study of the research groups in science and technology (Andrews, 1979), a study which was followed up by a number of other investigations. Three main factors were discussed: communication and collaboration, manager role, and size of the groups. In addition, the role of groups in the training and socialisation of new researchers has been studied, particularly in the United States (Delamont, Parry, & Atkinson, 1997; Meschitti & Carassa, 2014). Although the bulk of this literature is based on studies of informal research groups, the results are highly relevant for our own investigation.

A recurring question, about research groups, is how large such groups should be. It has been a common assumption that the groups should not be too small or too large to constitute functional units. An extensive review of the literature in the field concludes that in the natural sciences, a favourable size seems to be three to five researchers plus doctoral students and technical staff. If research groups are larger than this (5–12 people), there are generally no economies of scale, because this size represents a natural maximum for effective communication (Johnston, 1994). However, much of the literature

concerning optimal research group size is based on data collected between 25 and 40 years ago, and it is therefore reasonable to ask whether the results are still valid. Since then, the numbers of researchers permanently and temporarily employed at universities and colleges have increased substantially, and research groups have been given more responsibility for financing their own activities. It would therefore be reasonable to assume that many groups have become large. More recent studies, on the other hand, suggest that there is a limit to how large research groups should be before the size itself becomes an obstacle for internal communication and collaboration between team members. An important reason for this is that if groups are too large, the group leaders, who are usually the best researchers, get very little time to focus on research because of the work of leadership, guidance, and applications for financing new projects (cf. Wheelan, 2009).

It may also be important to look at the composition of research groups and recruitment practices. Several studies point to how size, together with factors such as academic status, age structure, and gender, is important for scientific productivity (Bauer, Schui, von Eye, & Krampen, 2013; Horta, 2011; Kenna & Berch, 2012). Through participation in a research group, a new member gains access to professional contacts and partners at other universities and in other countries. Studies have shown that small research teams often collaborate with other groups nationally and internationally, and that international cooperation increases the probability of publishing in recognised journals and achieving more citations (Andrade et al., 2009). Groups composed of individuals with various external partners will be more likely to draw on a comprehensive knowledge reservoir than teams made up of people with common background, and so be more likely to engage in creative research (Guimerà, Uzzi, Spiro, & Amaral, 2005). It is thus not sufficient to study the effects of group size on the quality of research in isolation from external partnerships, and professional networking groups are a part of this.

How do formalised research groups, as strategic measure, affect scientific academic practice in terms of quality, content, productivity, and forms of cooperation? We know from many studies that universities and disciplines are characterised by a high degree of autonomy. Research and higher education policy itself tries to intervene in professional practice by impulses from governmental, supranational, or even local strategic objectives. In relation to the current trend of creating research groups, many university and college environments since the late 1980s have been the subject of extensive merger processes, both between institutions and between departments, but the intended effects of more interdisciplinary cooperation and effective use of resources, better quality, etc., may not have been obtained as a result. A recent study of centres of excellence (COEs) shows, for example, that these new cooperation constellations in a Norwegian context

are of symbolic character, because investigators involved in practice continue as before with previous patterns of cooperation (Langfeldt & Borlaug, 2016). The Ylijoki (2003) study in Finland found that changing external financing conditions contributed to more collective project organisation in the humanities although researchers continue to work in their traditional way.

There are a number of quantitative and qualitative factors which are important for creating a research environment of high quality: intellectual resources, expertise, the right level and scope of external and internal financial resources, stimulating group dynamics, national and international networks, good recruitment, and a good level of publishing. A combination of research group size and other factors such as the composition of research groups – for example, in relation to status, job category, age, and gender – is all relevant. Furthermore, the context and the knowledge type or discipline produce different combinations of relative importance for the creation of a high-quality academic environment, depending on the research problem.

Data

The results presented in this article are mainly based on the survey conducted by the Nordic Institute for Studies in Innovation, Research and Education (NIFU) among permanent academic staff in the higher education sector in 2013. Academic staff are asked about membership in research groups, the significance of such groups for research quality, researcher training, collaboration as well as their view on the role of group leaders (Kyvik, Reymert, Vabø, & Alvsvåg, 2015; Kyvik & Vabø, 2015). The survey is part of a larger research project on changing forms of organisation and management in Norwegian higher education, funded by the Ministry of Education and Research. In total, 4,440 full-time academic staff completed the survey (Waagene, 2014; Waagene & Reymert, 2015). In our analysis, we look at distribution by the type of institutions, which we have divided into four groups: traditional universities (Oslo, Bergen, Trondheim, and Tromsø) (1,743 academic staff), colleges (179 academic staff), new universities (645 academic staff), and state colleges (1,873 academic staff). Regarding research fields, we have limited ourselves to looking at the traditional universities, because many programmes at new universities and colleges are multidisciplinary, thus making it difficult to interpret the distributions of the field.

Our understanding of the new types of research groups would benefit from further in-depth studies, emphasising the various functions of these groups in different fields of science and institutional contexts. To analyse the impact of such groups, membership on research quality should also be possible by linking individual respondents with bibliometric data (see Kyvik et al., 2015 for a testing out of this approach). Nevertheless, although including views

of staff in the university college sector could have revealed the significance of such groups in institutions where research is less developed, the data presented within the framework of this article provide a representative picture of the nature of research groups as they are perceived by academic staff at universities.

This article relies on the responses from the above-mentioned study. Although the data are self-reported and therefore subjective, patterns of response can still give a good indication of what research groups mean for the individual faculty members, because we nevertheless found good representativeness of the material (52.5%), and the low number of sensitive or controversial questions. We have supplemented the survey material with a smaller qualitative study at the University of Oslo where we examined websites and documents describing and evaluating research groups; we also conducted nine in-depth interviews with academic staff at two faculties. This part of the study has provided a better picture of the thematic profiles of research groups, their numbers and sizes, the mandate and status assigned to these groups in the governance structure as well as how they are evaluated within the faculty governance of these issues (Alvsvåg, 2016). Although these reports deal with specific features of research organisations by the respective faculties, we found that they confirm many of the findings of the survey material.

Context

With some exceptions, the traditional university departments in Norway were created in the wake of the development of the university system during the 1960s. The dominant organising principle was that of an institutional framework for human resource management and teaching assignments. Research organisation, however, has been characterised by formal and informal groups and networks criss-crossing the institutionalised university subjects (Henkel & Vabø, 2006/2000). Principles for organising departments and faculties, however, have changed considerably over the past few years (Michelsen & Vabø, 2014). Research schools, study programmes, research centres, COEs, and, eventually, education are examples of activities organised across the institutional structure (Nyhagen & Baschung, 2013). Internationally, it is increasingly common to convert the faculty into ‘schools’ in order to contribute to better integration between research, teaching, and resource allocation across departments (Geschwind, 2010). A recurring theme in the issue of the organisation of universities and colleges is to create more collaboration across disciplines and subjects. Research groups can be understood as part of this trend. An example of this can be seen in an evaluation of the research programme at the Faculty of Law at the University of Oslo where it was highlighted that research groups helped soften a rigid faculty structure (Faculty of Law, University of Oslo, 2010).

In Norway, most institutions organise research groups (Kyvik et al., 2015), although with varying requirements for membership and with different purposes. At the traditional universities, the formal research groups are largely based on previous informal groups in science, medicine, and technology, whereas in the humanities and social sciences there is more organisational innovation.

Formalised research groups, at both universities and colleges, must be understood in a Nordic context, where the state almost fully finances the universities' teaching and research budgets. Hence, the institutional leadership is delegated the authority to develop and govern research strategies on behalf of the central authorities.

At the University of Oslo, we made an inventory of the number of research groups based on information available on the faculties' websites in 2014. The count shows that there are over 400 groups. Half of these are at the Medical Faculty and a quarter at the Faculty of Natural Science. The Faculty of Social Sciences has only a few groups. These data show that there are different practices between faculties in the way such groups are organised, and that the groups have different purposes. The size of the groups varies widely, from 1 to 56 members. Most groups have a membership of between 2 and 25. The Faculty of Medicine has many small groups, but also many having the order of 15–25 members. We reviewed the evaluation reports from faculties of the university: law, education, and theology (Faculty of Educational Sciences, University of Oslo, 2013, 2015; Faculty of Law, University of Oslo, 2010; Faculty of Theology, University of Oslo, 2013).

In the past few years, research groups have become an important forum for stimulating more cooperation, scientific publishing, and promotion of strong research. That said, all reports point to problems in realising the potential of such activities, for example, as a result of internal competition between different groups.

The purpose of the establishment of formal research groups, as can be seen in the institutions' and faculties' strategic plans, includes strengthening internal research cooperation at the faculties. This should facilitate better management of research to create good academic and social environments for doctoral candidates, postdoctoral, and academic staff to contribute to the implementation of faculties' research strategies and to create an organisational framework for the application for external research funding.

At the University of Oslo, we find that the various faculties have different approaches to the organising of research groups as a strategic tool. By initially creating large groups, the Faculty of Law intended to blur the boundaries between faculty governance level, departments, and staff grouped around various topics for teaching and supervision. Thus, the interim evaluation of these groups revealed that subgroups and, hence, new boundaries had

emerged within this new organisational framework. In the Faculty of Mathematics and Natural Sciences, formalisation of research groups was a deliberate strategy to encourage top-level research as well as to create environments capable of competing for international funds. Through a strategy aiming at the so-called change environment, particularly promising milieus are identified and granted resources. Although the Faculty of Social Sciences in Oslo made the deliberate choice not to create research groups; this organisational tool has gained great importance at the Faculty of Humanities, especially on issues related to recruitment and integration of doctoral students. According to the web pages, this faculty has around 25 research groups, from Ancient History, Culture and Religion to Democracy, Governance, Law and Working Life, and Modern Philosophy. Nevertheless, we find that the same but smaller Faculty of Humanities in Bergen displays around 50 such groups on their web page, which illustrates, most likely, how different knowledge traditions and cultures and strategies shape this new organisational framework at the local level.

Types of knowledge and style of research

Based on typologies of knowledge – 'hard' versus 'soft' and 'pure' versus 'applied' – Becher and Trowler (1989) point out common patterns in research style between different types of knowledge, for example, regarding cooperation and publishing practices.

In subjects of science and technology, hard or pure is less fragmented with regard to research ideal than such soft interpretation subjects as humanities, which have a virtually unlimited number of research problems. In the 'pure hard' sciences, it is more common to work cumulatively within a given theoretical and methodological framework. In humanities and social sciences, it is often the individual researcher's interpretations that are in focus; therefore a tradition of a high degree of personal autonomy, and an individualistic way of working, prevails. These fields are also distinctly characterised by a high degree of specialisation as well as fragmentation augmented by different beliefs about which thematic, theoretical, and methodological orientations are viable in the subject. In the natural sciences, it is more common to work cumulatively and to collaborate; in laboratory experiments, there are necessary cognitive and practical divisions of labour. Such differences in mode are expressed in various dissemination practices where it is common to publish articles jointly in the sciences, unlike the humanities, where it is far more common to publish monographs.

The differences outlined above are two extremes on a scale. However, such stereotypical representations of complex disciplines, which are constantly evolving in terms of function and form of research organisation, can help us visualise the differences between the disciplines. For example, there has always been research in the

humanities, but cooperation assumes other forms than in the sciences, more like communicative networks and looser structures. Differences in research traditions are therefore an important backdrop when reviewing the self-reported data from the survey.

The level of participation in research groups

The survey among the permanent academic staff in universities and colleges found that 58% are members of one or more groups of researchers at their institutes or departments. There are major differences between the institutions: at the traditional universities, this applies to 72% of the staff, 65% at the new universities, while 58% of the staff in colleges are members of a formal research group. At the traditional universities, membership in formal research groups is close to 80% in the natural sciences, technology, and medicine; about 70% in the social sciences; and a little more than 50% in the humanities.

The question is ‘what does such membership entail for the individual faculty?’ As indicated in Table 1, membership of a group does not mean that this is necessarily the most important arena for individual research. A little over one-third of the members of a formal research group ‘predominantly’ perform their research within the framework of the group. Almost as many say they mostly work alone, and around a quarter say that they ‘predominantly’ perform their research with colleagues at the institution, unaffiliated with a formal research group or an international network.

There are major differences between disciplines in the way research is performed. At the traditional universities, medicine and health stand out clearly: 60% of those who are members of formal research groups state that they ‘predominantly’ conduct their research in these groups. This applies to only one-third of staff in technology, natural sciences, and social sciences, and a quarter of staff in the humanities. This means that for many membership of these groups is of little practical importance; they perform their research either alone (as in humanities and social sciences) or in collaboration with researchers at other institutions, especially abroad. In the natural

sciences and humanities, participation in international networks is of greater importance than participation in formal research groups at their own institutions.

Apart from the factors mentioned above, our informants from the University of Oslo also reported on the added value of being a member of a research group with regard to academic quality enhancement, such as writing together and receiving feedback on one’s work. A research group could serve as a favourable academic and social environment, contributing to increased productivity. Furthermore, it was said that membership of research groups provided information about relevant calls for research proposals. As a relatively informal venue, it made it easier also to access equipment and resources, technique and expertise, as well as administrative support. Research groups were a strategic organisational tool for the positioning and status enhancement or visibility of certain research areas.

Furthermore, the informants stressed that contemporary research funding criteria, both internal and external, from the national research council as well as the strategic priorities of the university and faculties, value research based on collaboration. Although in the natural sciences it is taken for granted that collaboration is a precondition for being granted funding, in the humanities collaboration in research groups was deemed an expectation and an asset, both from research funding granting bodies and partners at national and international levels.

Group members’ assessments of formal research groups

An important purpose of establishing formal research groups is to strengthen the quality of research at institute or department level. Survey results show that research groups are considered important for the quality of research at all educational institutions. Of those who are members of the groups, 38% of staff in universities and colleges agree ‘to a large degree’ and 33% agree ‘to some degree’ that the research group is important for the quality of their research. Less than 15% disagree. There are only small differences in these assessments between various

Table 1. Percentage of permanent scientific staff at the traditional universities who are members of a formal group of researchers at their institutes or departments, ‘largely’ conducting their research in the following ways.

	Humanities	Social sciences	Natural sciences	Technology	Medicine and health
Works alone	58	42	16	21	14
With colleagues at the department without attachment to a research group	14	17	12	16	29
In a formal research group at the university	22	34	34	35	60
In a national network	12	10	15	13	15
In an international network	27	29	42	27	25

From NIFU (2015).

educational institutions. However, a significantly higher percentage of group leaders (54%) agree ‘to a large degree’ that a research group is important for the quality of their research compared to other members (33%).

At the traditional universities, over all the majority of those who agree with this statement are in medicine and health, and in the natural sciences and technology (Fig. 1). Because many researchers conduct most of their research within the framework of a research group, the likely interpretation is that the work of the group leads to good research. Also in the social sciences and humanities, over half of those who are members of a research group wholly or partly agreed with this, and only a fifth disagree. The group leaders in all disciplines, in general (with the exception of technology), to a far greater extent than the other members have a positive view on the importance of the formal groups.

Research collaboration

The aim of organising research activities at universities and colleges in groups is to create cooperation between individual researchers to strengthen the quality of research and to carry out tests and experiments that require co-ordinated effort. The reason behind is that either such processes are laborious or they require the efforts of people with complementary expertise – what Stankiewicz (1979) conceptualised as intellectual synergy.

In the survey among university and college staff, 30% of the group members responded they ‘strongly agree’ and 36% said they ‘somewhat agree’ that research groups strengthen cooperation among the academic staff. This result applies to the institutions as a whole, and also in the individual disciplines, as shown by the distribution

of responses at the traditional universities (Fig. 2). In general, more group leaders (39%) than other members (27%) ‘strongly agree’ that research groups strengthen cooperation among the academic staff of the departments or sections.

The role of research groups in the training of PhD and master’s students

Most of the research groups at the traditional universities have engaged a number of doctoral and master’s students, both because they provide important workforce in research projects and because participation in research groups is an important input to the research profession (Meschitti & Carassa, 2014).

There is not one model, rather several models for what are critical factors (Delamont et al., 1997; Louis, Holdsworth, Anderson, & Campbell, 2007). The literature on academic research has highlighted that an environment must have a sufficient size to develop and provide quality education, adequate supervision capacity, and opportunities for collaboration on publishing between academic staff and doctoral candidates. Larger units offer doctoral candidates more diverse learning opportunities and a better social environment. A number of studies have shown that size is a critical factor in the biological sciences, and primarily in laboratory subjects, where a certain number of people are required to achieve cooperation and guidance, cooperation around common issues, and sharing of common material and intellectual resources. Having several people gives more opportunities to get involved in projects and to publish. In the humanities and social sciences, a one-to-one relationship between the candidate and the supervisor is more common.

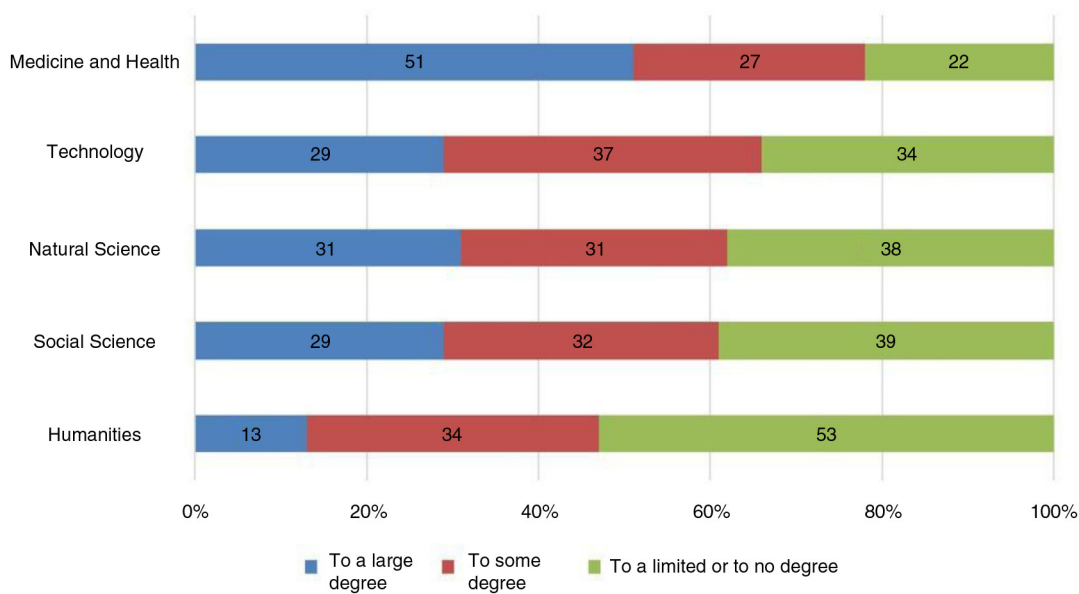


Fig. 1. Percentage of permanent scientific staff at the traditional universities stating that a research group is important for the quality of their research (NIFU, 2015).

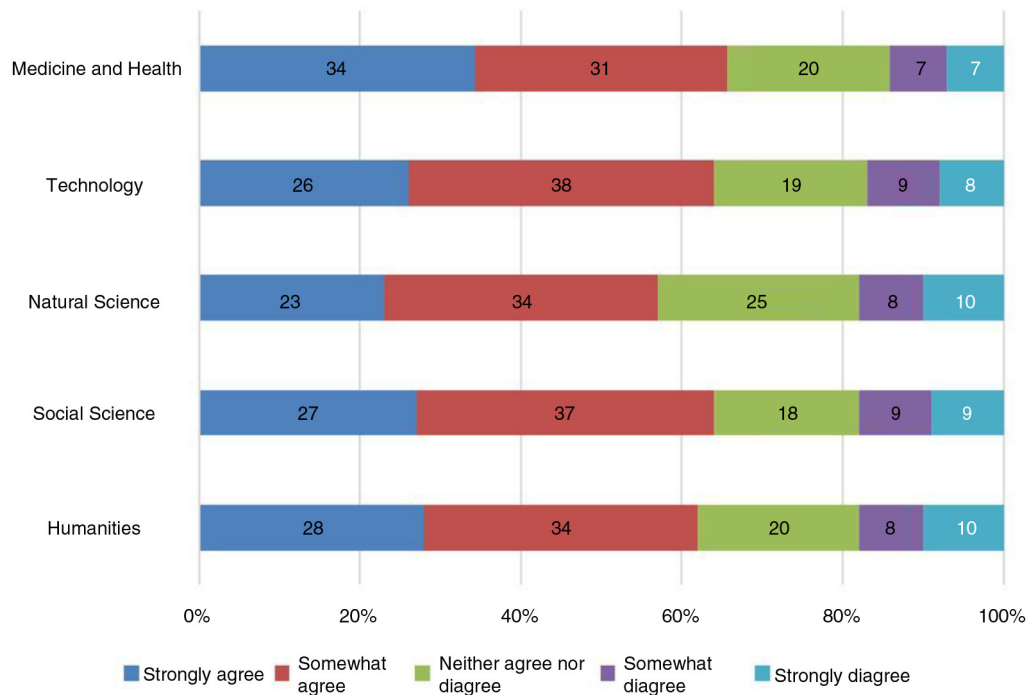


Fig. 2. Percentage of permanent scientific staff at the traditional universities reporting that research groups have strengthened cooperation among the academic staff at the department or division (NIFU, 2015).

The processes that significantly affect the implementation and quality of doctoral education – recruitment, monitoring of the individual candidates, tutoring, academic, and social integration – take place at the group level. Norwegian universities therefore place great emphasis on integrating PhD students in research groups or tutors' research projects. This applies particularly in the natural sciences, technology, and medicine, and, to some extent, in the social sciences and humanities. A review of several surveys among PhD students drew the following conclusion (Thune et al., 2012): PhD candidates belonging to a research group are generally more positive in their assessment of PhD training and the supervision or support they receive. Candidates who belong to a research group also report having access to more resources and report acquiring a broader set of experiences and competences than candidates who work independently.

Our survey shows that at the traditional universities, 58% of those who are members of a formal research group involve PhD students 'to a great extent' in their research and development (R&D) projects. This was the response from 78% of group leaders; among the other members, the response was 49%. Master's students are less involved in staff projects; however, 27% said that they are 'to a great extent' involved in research projects. In this area, there are major differences between disciplines. The humanities and social sciences involve less than 40% of the group member PhD students 'largely' in their projects; in medicine and health, it is 60%, and in

science and technology it is over 80%. A fewer number of research groups involve master's students 'largely' in their R&D projects: below 20% in the humanities and social sciences, 25% in medicine and health, and about 40% in science and technology.

In medicine, technology, and science, more than 50% of the staff at the traditional universities thus entirely agree with the statement that research groups play an important role in the doctoral programme (Fig. 3). This also applies, to a certain extent, in the humanities and social sciences. Regarding master's education, it is primarily in science and technology that these groups are important.

Also in this field, the leaders of the research groups are far more positive than the other members. While 63% of managers at the traditional universities 'strongly agree' that research groups play an important role in doctoral education, this applies to only 35% of the other members. Similarly, 28% of group leaders believe the same about master's education compared with 20% of the other members.

In our institutional case study at the University of Oslo, we found that research projects are largely regulated through funding criteria. Hence, they typically focus on the strategic research priorities of the faculty, include PhDs, and meet the expectation of PhDs being integrated in consolidated research groups. Research groups are seen as an opportunity to avoid the classic trap where a candidate lacks support. Doctoral candidates included in research groups have access to more resources (supervisors,

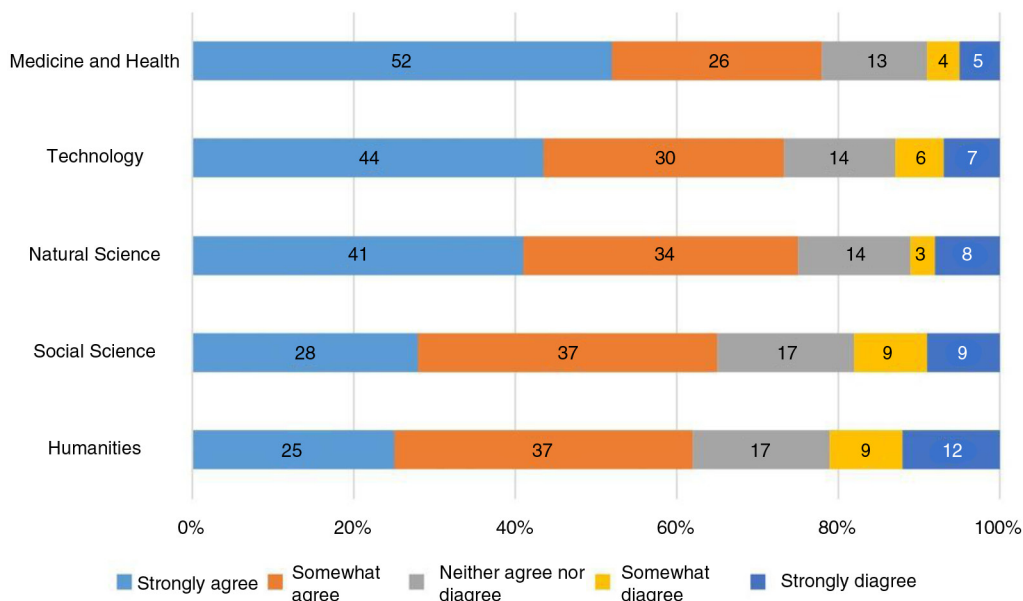


Fig. 3. Percentage of permanent scientific staff at the traditional universities who completely agree that research groups play an important role in doctoral and master's education (NIFU, 2015).

co-located office space and laboratories) and also get experience from the operation of a larger research project that will benefit them later in their careers. All in all, convergence between funding criteria and allocation of resources is decisive for understanding the acceptance of this new mode of institution-based research at university faculties.

Research groups were seen as an investment beneficial to building skills in the long run, especially if young scientists were members. Continuity made it easier to get funds. Alongside pragmatic reasons, the increasing knowledge specialisation was highlighted as a reason for research groups as a means to create vital subject environments, with less splitting of the faculties. Being part of a visible environment made it easier for specialist researchers to stay in touch with the relevant international research.

On management

Although we found that research groups differ in their mandates, the authority they exert and in their actual significance, and although the practitioner governance structure has different characteristics at different universities and colleges, the establishment of formal research groups is understood as part of an institutional transformation characterised by delegation of authority from the formal vertical management structure (institute or faculty) to horizontal forms of influence on academic activities. Management of research groups has therefore become an important part of the faculty.

There has been a growing emphasis on professional management in universities and colleges. International studies show that leadership skills and management

practices can have positive effects on research productivity (Beerkens, 2013; Nagpaul & Gupta, 1989), quality (Goodall, 2009), and creativity (Hemlin, 2006).

Thorough bibliometric and interview studies on issues of management and research at 55 British universities (Goodall, 2006,2009) showed that research strong leaders from research-intensive disciplines, who have active research careers, add both internal and external credibility and help ensure better results. According to Goodall, such strong academic leaders provide expert knowledge and better understanding of organisational needs. They can provide the necessary requirements for academic standards and have a better appreciation of institutional priorities both internally and externally, whether it applies to recruitment, financing, or media. Goodall's investigations show that institutions with solid academic senior management effect improvement of results in the form of more scientific publications and citations. Other studies of factors affecting research show that autonomous and egalitarian scientific communities, with emphasis on the equal distribution of duties between skilled personnel, is a good prerequisite, where a strong cultural ethos will help ensure support for accomplishment as well as individualism.

An efficient university society has a dedicated working environment, a high degree of collegiality and autonomy, joint core values, and high norms and standards of practice – not necessarily simply in the sense of skilled personnel working together as it can emphasise reputation, quality, and results (Edgar & Gear, 2013). A recent Swedish study (Bienenstock, Serger, Benner, & Lidgard, 2014) concluded that for such a professional environment

to achieve excellence, it must be based on trust, from both above and below. This means that education and research must be at the centre of things, and the institution's work must be produced as a result of fruitful cooperation between the education profile and research. Research must also have an independent value. The academic management must have legitimacy, but without having to micromanage, so that the academic communities retain their autonomy.

The role of the group leader

In the survey among the permanent academic staff in universities and colleges, 23% of members in formal research groups were research leaders. This proportion varies between the traditional universities (29%), the new universities and university colleges (21%), and the state colleges (15%).

Of the permanent academic staff in universities and colleges, one-third said they 'strongly agree' and as many agreed 'to some extent' that the leader of the research group plays an important role in promoting the quality of research. Less than a fifth disagreed with this fact. This image largely applies across the various educational institutions. However, there are differing opinions between the group leaders and regular group members. While 80% of managers said they completely or partially agree, this applies to less than 60% of the enlisted members.

At the traditional universities, there are major differences between disciplines regarding the view about the group leader's significance. It is primarily in medicine and health that the leader seems to play an important role. The group leader is accorded least importance in social sciences and humanities. The difference in ratings between group leaders and other members in this question also varies between disciplines. In medicine and health, differences are the least: 58% of managers and 41% of the members 'strongly agree' that the group leader plays an important role in promoting the quality of research. In the natural sciences, 50% of group leaders are of the same opinion compared to 22% of the other members (Kyvik et al., 2015).

The considerably higher assessment of the group leaders' significance in medicine and health cannot be solely explained by a high proportion of group leaders among respondents. Far more regular group members in these disciplines agree that the group leader plays an important role in raising the quality of research, in contrast to other disciplines. This may indicate that research in medicine is based more on hierarchical forms of cooperation (professor or student) compared to other disciplines.

Discussion

In this article, we have considered the establishment of formal research groups in higher education, their reasons for being, and their impact on quality. Research groups

are considered as an organisational measure to increase collaboration between individual researchers; increase the quality of research; create a professional and social environment for permanent employees in academic positions, postdoctoral fellows, and doctoral candidates; and to strengthen work with external financing of research projects. In the natural sciences, medicine, and technology fields, this is largely a formalisation of previous group structure, whereas in the humanities and social science, it increasingly represents new forms of cooperation between individual researchers. This study provides evidence that formalised research groups can have a positive effect on the quality of individual research and that they contribute to more institution-based research, also in subjects and qualifications where the research has primarily been conducted on an individual basis. Research groups can also benefit educational activities.

The research groups vary considerably in terms of the mandate and jurisdiction they are assigned, and consequently also in governance and management functions. It is therefore not possible to give a clear answer regarding the implications of research groups for the governance and management of colleges and universities.

Universities are dependent on legitimacy from the environment (Pfeffer & Salancik, 1978). The ability to acquire and maintain resources is what determines both organisational success and survival – organisations constantly try to find a balance of maintaining autonomy and the environmental constraints and control they have to deal with (Gornitzka, 1999). It can indeed be argued that formal research groups within the current research framework are primarily an important strategic move to legitimise research activities and access resources: typical examples of isomorphism (Dimaggio & Powell, 1983).

This is a matter of research groups having an increasingly responsible role and authority in areas traditionally belonging to university faculties. It is a matter of the academic researcher role constantly changing towards more differentiated forms of membership and identity in higher education and research.

Research groups are funded through the regular budgets of the faculties, and today's academic staff have the role of suppliers, not only of education but also of research. Earlier – particularly in the humanities and social sciences, and also in the era of mass higher education – the individual faculty member had a high degree of personal autonomy. Research was practically seen as a private affair, a right that could be managed in peace, as long as the allotted teaching and guidance was provided. Contemporary research is organised as projects that are largely regulated through funding criteria.

The academic field is seldom static and unchanging. However, it can be difficult to distinguish changes as a result of top-down reforms motivated by authorities at international, national, and institutional levels from the

changes that happen as a result of relationships and developments in the field. For example, is the increase in the production of scientific papers exclusively due to the new financing terms that value publishing in such journals, or is it also a result of processes related to the forefront of knowledge, globalisation, internationalisation, and technological development? Do the possibilities to gather and analyse larger amount of data at a higher level of complexity require increasing collaboration between various areas of specialisation and complementary expertise also at local institutional level? Given a strong tradition of academic autonomy that characterises academic disciplines, and the strong emphasis placed on the realisation of research and higher education policy objectives through financial instruments, change in academic practice in the field can probably best be understood as a complex interaction between more forced, external processes and more organic internal processes.

The changing expectations and demands of central research authorities leave their footprint in the university organisation. Although the trend can be understood in light of theories of legitimisation and miming, the self-reported data from both surveys, personal interviews, and official evaluation reports strongly indicate that research groups have significance not only for quality but also for academic roles, practices, and identity. The structural changes in an organisational context are significant for agency, and it is probable that it happens in a way that interacts with other processes aimed at formalising the organisation and raising the quality of research – such as strategies and incentives for more international cooperation and publishing, allocation of external research funding, etc. A relevant question is: ‘how the new organisational contexts might change the traditional significance of disciplines and basic units at the universities as a basis for identity and research communities?’ This question can be seen in light of the sociology of science positions such as Becher and Kuhn’s theory on the interrelatedness of epistemic structures and social organisation in science (Becher & Trowler, 1989; Kuhn, 1962). We know less about whether the research groups are an integrating or disintegrating force in the academic profession, in general, and the traditional academic and research communities, in particular.

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