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Citation for published version:

Lindvig, K, Lyall, C & Meagher, LR 2017, 'Creating interdisciplinary education within monodisciplinary structures: The art of managing interstitiality', *Studies in Higher Education*, pp. 1-14.
<https://doi.org/10.1080/03075079.2017.1365358>

Digital Object Identifier (DOI):

[10.1080/03075079.2017.1365358](https://doi.org/10.1080/03075079.2017.1365358)

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Peer reviewed version

Published In:

Studies in Higher Education

Publisher Rights Statement:

This is an Accepted Manuscript of an article published by Taylor & Francis in Studies in Higher Education on 21st August 2017, available online: <http://www.tandfonline.com/10.1080/03075079.2017.1365358>

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Creating Interdisciplinary Education within Monodisciplinary Structures: the Art of Managing Interstitiality

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Abstract

The literature on interdisciplinary higher education is influenced by two overall trends: one looks at the institutional level of specially designed interdisciplinary institutions, while the other assesses individual interdisciplinary educational activities. Much less attention is given to the processes of creating interdisciplinary education initiatives within traditional monodisciplinary universities. In this study we thus explore how interdisciplinary education and teaching emerge and develop within universities that have little or no established infrastructure to support interdisciplinarity. Using qualitative data from a multi-part case study, we examine the development of diverse interdisciplinary educational efforts within a traditional faculty-structured university in order to map the ways in which interdisciplinary educational elements have been created, supported, challenged or even strengthened by pre-existing monodisciplinary structures. Drawing on theories from economics, literature studies and sociology of education we conclude that creating interdisciplinary education in such settings demands skills that we define as the ‘art of managing interstitiality’.

Keywords; interdisciplinary activities; faculty-structured university; higher education; managing interstitiality; student pathways

Introduction

‘[A]ny discussion of interdisciplinarity needs to be related to institutional developments in academia’
(Moran, 2010, p. 29)

Ever since the OECD conference in 1972 (Apostel, 1972) identified five drivers for interdisciplinarity, institutional structures in academia have been recognised as crucial in the development of interdisciplinary research and education. The breadth and depth of the academic field of interdisciplinary education reflects increasing interest in the production of graduates who can move between disciplines (Global Research Council, 2016). While the literature touches upon aspects of introducing and implementing interdisciplinarity in single courses, programmes and graduate studies (Davis, 1995; Newell, 1994; Orillion, 2009), when it comes to describing interdisciplinary teaching in an institutional setting, most published literature focuses on universities that were *specifically established* as interdisciplinary institutions e.g. Roskilde University, Arizona State University, as well as on individual centres, honors colleges and undergraduate programmes that were *specifically designed* to be interdisciplinary (Holley, 2009; Mansilla, 2006). So far, little attention has been given to the gradual development and

implementation of interdisciplinary education within traditionally monodisciplinary universities. In this we refer to most European universities dating back more than a hundred years. Though the university as an institution may take many forms, most long-established (European) universities are still structured according to scientific disciplines and organised into ‘faculties’ (groupings of closely related discipline-based departments). The aim of this study is therefore to understand how interdisciplinary education emerges and develops in association with research, in universities with little or no original infrastructure to support interdisciplinarity. The term *Interdisciplinarity* is in this context used in its widest definition to mean any dialogue or interaction between two or more disciplines (Moran, 2010, p. 14). The paper reports primarily on a longitudinal study of the creation and development of interdisciplinary educational efforts at a traditional European university. It draws on a mapping of interdisciplinary provision in UK higher education (Lyll, Meagher, Bandola, & Kettle, 2015) in order to complement these data with a national perspective and thus to provide some broader context regarding the current interdisciplinary landscape.

Through analyses of empirical material collected across five case-projects over the span of three years, we observe the ways in which interdisciplinary activities have developed in the interstices of monodisciplinary structures and how these developments can be interpreted as ways of ‘managing interstitiality’. By way of presenting these findings, we draw on theories from the sociology of education (Bernstein, 2000), literature studies (de Certeau, 1988) and economics (Penrose, 2009). It is our belief that this opportunity to investigate the inter-relationships between the dynamics of creating interdisciplinary provision and the context of traditional structures makes it possible for us to offer insights that may contribute to understanding of interdisciplinary provision in European institutions more broadly.

Background : The field of interdisciplinary education

A growing body of literature focuses on the institutional levels of interdisciplinarity; of newly developed interdisciplinary institutions and reform universities (Weingart & Padberg, 2014) and monodisciplinary institutions being restructured to cater for interdisciplinary research (Townsend, Pisapia, & Razzaq, 2015). This focus is particularly strong in European literature, however, a certain niche of literature describing larger institutional experiments with interdisciplinary research, education and learning is also present in the American literature (Kezar & Elrod, 2012; Kezar & Kinzie, 2006; Luckie, Bellon, & Sweeder, 2012; Mansilla, 2006; Mansilla, Duraisingh, Wolfe, & Haynes, 2009). Areas where the literature from North America takes the lead, are in planning and

structuring interdisciplinary undergraduate programmes (Haynes, 2002; Henry, 2005; Klein, 2005; Newell, 2008) and the development of interdisciplinary curriculum and assessment tools (Barber, King, & Magolda, 2013; Boix Mansilla & Duraisingh, 2007; Mansilla et al., 2009; Nikitina, 2006) as well as specially designed entry courses (Orillion, 2009).

The areas mentioned above encompass a substantial part of the literature, yet the most extensive body of literature focuses on case studies of single courses, often spanning two or more disciplines and crossing the divide between natural and life sciences and social science and humanities (McKendrick & Mooney, 2001; Simmenroth-Nayda, Alt-Epping, & Gágyor, 2011; Stern, Cohen, Bruder, Packer, & Sole, 2008; Tra & Evans, 2010) to name a few. Though the literature on interdisciplinary higher education has grown substantially during the past decades, published empirical studies on local initiatives towards implementing interdisciplinary elements in traditional higher education institutions are still scarce (Jacob, 2015; Spelt, Biemans, Tobi, Luning, & Mulder, 2009; Townsend et al., 2015). This lacuna does not reflect the reality of what is currently happening in the higher education sector. Interdisciplinary education activities are occurring within the walls of even very traditional and monodisciplinary universities and come in all sorts, shapes and sizes, as confirmed by (Lyall et al., 2015). The aim of this study is to add new rich empirical detail to this broad landscape of institutional change.

Methodology

Setting

The University of Copenhagen dates back to 1479 and is the oldest university in Denmark. The university currently has six faculties (Science, Health, Humanities, Social Science, Law and Theology) and has, in line with the aforementioned traditional universities, developed as a research-intensive university with an organisational structure primarily based on disciplines and faculties. Despite mergers with other universities (in 2007), a reorganisation of four faculties into two (in 2011), and continuous movement towards the creation of larger departments, it was not until a new 'Strategy 2016' was launched in 2012 that the university explicitly put interdisciplinarity on the agenda.

As part of this strategy, The University of Copenhagen in 2013 set aside 64 million Euros and created the 'Excellence Programme for Interdisciplinary Research', awarding grants to eighteen internal research projects (hereafter the '2016-projects') spanning across faculties and disciplines and focusing on themes such as obesity, climate change, ageing etc. The 2016-projects

run until the end of 2017 and were all required to create educational elements, such as undergraduate courses, full course programmes or summer schools, based on their research. These activities were to be designed and implemented within the existing structure of a three year bachelor's degree, a two year master's degree and a three year PhD.

With this requirement, the 2016-projects have created a perfect opportunity to follow interdisciplinary education in the making and to explore the processes and negotiations involved in creating interdisciplinary education.

Data collection

In order to follow the actual processes of developing and embedding educational elements, we have tracked the progression of the overall Excellence Programme and the eighteen 2016-projects (see table 1 for details on collected empirical material). Simultaneously, five out of these eighteen projects were selected for an in-depth case study, based on the criteria of the cases representing the broadest diversity possible (Flyvbjerg, 2006; Seawright & Gerring, 2008). The five cases (hereafter 'case-projects') vary in subject, size, departmental affiliation as well as ambition in terms of the volume and amount of educational elements produced.

In all five case-projects the first author was contacted whenever new interdisciplinary educational activities were in the pipeline or taking place and held ongoing meetings and conducted interviews with the faculty and students connected to the case-projects. In studying the emergence and creation of the educational elements, ethnographic methods have been used (Marcus, 1995; Willis, 2000), consisting of participatory observation, focus group interviews with project leaders, PhD- and master's students and educational planners connected to the projects, along with analyses of documents and correspondence (see Table 1 for details).

[Insert Table 1: Collected data from 2016-projects and five case-projects]

The collected documents have provided information on the planning, administration and implementation of each educational activity and were furthermore used to inform and support the development of guides for observations and semi-structured interviews. Observations of teaching and meetings were recorded in logs and the interviews were transcribed verbatim. The rationale for observing the planning meetings, teaching and interviewing planners, teachers as well as students was to not only document the actual activities but also to understand the process and the perceived outcomes of these activities, as seen from the perspectives of the students and faculty.

While all of the data inform our conclusions, data at PhD level is only included when the PhD students have either taught courses or participated in PhD courses and summer schools. The PhD programmes as entire interdisciplinary activities will be discussed in another paper.

As stated above, the five selected case-projects belong to a group of eighteen research projects that were all required under the terms of their funding to develop interdisciplinary educational elements at the University of Copenhagen. To add strength and nuance to our findings, we include a comparison of intended and realised educational elements from all eighteen 2016-projects.

Furthermore, although we believe that the findings from this study mirror the reality of many traditionally monodisciplinary universities (at least in Europe), we recognize that the opportunity we have seized for studying the development and embedding of interdisciplinary educational elements may be distinctive. There may also be limitations to our research design: activities may have been overlooked, details missed and viewpoints of results and barriers are always personal and subjective. In particular, the rather heterogenous nature of our sample – spanning very different research collaborations and a multiplicity of educational activities - made the imposition of a highly systematic data collection process somewhat challenging. Also, as these projects only have a lifespan of three to five years, there are obvious limits in terms of developing educational elements. To complement our findings, we draw on a study of interdisciplinary provision in UK higher education (XX). Besides a literature review of interdisciplinary provision, that study maps the scale and type of current provision that has developed within the UK and identifies obstacles, plans and trends for the future. By drawing on this study, we hope to be able to highlight the findings and conclusions that relate to a broader European higher education context, as well as any that may be distinctively local to the University of Copenhagen or a Danish context.

In the following section, we will provide an overview of the activities of the eighteen 2016-projects and will outline in some detail the educational elements created by the five selected case-projects, before moving on to the discussion.

Findings

The overview in Table 2 is created by comparing the initial funded applications from the eighteen 2016-projects with their midterm evaluations. Though the projects continue to run until the end of 2017, the midterm evaluations provide overviews of the projects, their progress and the anticipated

results of the entire grant period. The first column describes the different activities that have been mentioned in the applications across the projects. The second and third columns describe the number of projects that have planned and realised the various activities. The last two columns describe the total number of activities respectively intended and carried out across the eighteen 2016-projects.

[Insert Table 2: Planned and realised activities from the eighteen 2016-projects]

When comparing the eighteen project applications with their midterm evaluations, there are several things worth noting.

The first column of the table lists all of the activities that were mentioned and described in either the 2016-project applications or evaluations or both. Out of the various activities listed, only a few of the activities were actually planned by more than a few of the 2016-projects. Whereas elective courses, summer schools and PhD courses were frequently planned, other activities at bachelor's level, programmes and in alternative formats (e.g. workshops, online courses and journal clubs) were not. One explanation for this could be the way the university is structured and the way various educational activities are awarded and credited, which impede the creation of activities at bachelor's level:

The Danish bachelor's degree in general is a fixed monodisciplinary package with very few optional elective courses. This fixed structure, contrasts strongly with, for example, the American system with its emphasis on 'liberal arts' but is likely to reflect the nature of many if not most European institutions. A Danish bachelor's degree takes three years of study, with six set modules, finished by an individual written assignment during the third year. Each module consists of courses that in total add up to 30 points in the European Credit Transfer System (ECTS). In order to obtain a bachelor's degree, a total of 180 ECTS points is required.

Following the bachelor's degree, students can choose between various master's degrees, so long as the bachelor's degree is compatible with the requirements for entering the master's programme. A master's degree requires two years of study and a total of 120 ECTS points. These points are obtained partly through elective courses, partly through the master's thesis, written in the final year of study. In contrast to other European countries, an academic bachelor's degree is usually not sufficient to secure a job in Denmark, which means that the large majority (85

%)¹ of Danish University students finish their studies with a master's degree, after a total of five post-secondary years.

This structure leaves the 2016-projects with a limited set of options: elective courses, primarily at master's level, summer schools and PhD courses are easily fitted in to the existing structure. Bachelor's courses are possible to create, however, it is difficult to find a host department for them and they tend to have a smaller target group, thus attracting fewer students. As one Project leader from a case-project puts it:

Where I come from, you do not have elective courses - and in the other programmes I know of, the widest freedom of choice is at the master's level so that is simply where the main 'customer base' is (...) whenever I think of elective courses, I think of elective courses at master's level . (Project Leader, Case 1)

The rather locked structure could be assumed to account for the modest or realistic expectations in the 2016-projects' plans, and could be the reason why the courses at bachelor and the programmes at master's level weren't realised as hoped. Meanwhile, these constraints could also explain the high level of students enrolled in the projects: in the final and total numbers of master's- and PhD students there was an increase of respectively two and four times as many as projected in the research applications. Writing a master's thesis in relation to a large interdisciplinary research project is a way for the students to specialise in an area of interest, despite the locked structures of their study programme. Furthermore, from the perspective of the 2016-projects teams, activities such as courses and summer schools require a lot of planning and time away from the research projects, whereas students at master's and PhD level bring money, workforce and publications hence direct added value to the projects. In light of this, the increased number of students in the projects makes sense.

In addition to the activities mentioned above, there were also activities created that were neither anticipated nor documented formally in the applications and evaluations. These activities included research internships, teaching based research and what one of the case-projects identified as "hang around students", which we describe later. These activities were not reported or documented through any of the official channels, and only became apparent to us through an

¹ Of those completing a bachelor's degree in 2012 at a Danish university, 85 % were enrolled in a master's programme one year later (Danske Universiteter, 2014)

ethnographic study of our five case-projects. As these activities came to our attention through observations and interviews, they were further explored through follow-up interviews with students and faculty involved in the activities. These additional activities were mapped throughout the study, however, with the obvious limitations of activities not being reported by the interviewees, hence not brought to our attention.

In the following section we will elaborate on these findings in addition to the activities cited in the official reports from the five case-projects.

Interdisciplinary educational activities in five selected case-projects

The activities that were not only planned but also realised in the five case-projects can roughly be divided into three categories: elective courses at master's level, elective courses at PhD level, and student driven activities at all levels.

Master's Level Courses

Six elective master's courses were produced by the cases in the period from 2014-2017. Though the course themes varied, the course set-ups were quite similar: all of the courses were intended to be interdisciplinary in content and structure; they all had a mixed group of students, often spanning the faculty but also sometimes including students from other faculties and universities. Finally, the researchers and PhD students connected with the case-projects accounted for most of the teaching.

While there were many overlaps in terms of set up, the motivation behind creating the courses varied. For one of the courses, offered at the Faculty of Humanities, the motivation was to link the interdisciplinary research of the case-project closer to the teaching at the faculty and to the students:

To us it was important that it wasn't a research project completely detached from the teaching at the faculty. We have to integrate the external research more in the teaching than it has previously been done – and of course it being an interdisciplinary project, it made sense to do it through an interdisciplinary course. So this is something we have planned from the beginning. (Interview, Assistant Professor, Case 2)

In other cases, the motivation was for the faculty to teach about something they already conducted research on and at the same time fill in a slot available among the fixed number of elective courses offered at the department:

So we were given permission to set up this course because it was something that was very much related to what we worked with– also it was a great way to get to discuss some of the issues at stake in our research field. So it was a combination of an open slot in the module and us shoving the way in and it has been great. (Interview, PhD-student, Case 3)

A third argument for creating elective courses was to recruit students and thereby make use of the students' skills within the very new research area. One way was to use the courses as a way to create interest among students, in order to encourage some students to subsequently write their master's or bachelor's theses, applying data created in, on and for the case-project. Another way was to use the course itself as a space for generating collaboration across hierarchical divides:

So the idea is for the course to be a place where students and researchers meet and where the students can engage with and join the ongoing research projects but of course also take initiatives (themselves) to set up their own research projects that then the established researchers can join. (Interview, Associate Professor, Case 4)

None of these courses ran more than once in their original design. In one of the cases, the course was intended to be embedded as a recurring course, but was instead cancelled before the second round due to lack of participants. One of the explanations for this was the lack of visibility in the course catalogue, where the course was only visible to students from the section, where it was offered, making it difficult to attract enough students. Another course was, despite great student reviews, only offered once due to lack of qualified staff available to teach. A third course was at first only offered in one subject (but open to students from outside) and became so popular that they decided to change the course and offer it as a new course across the faculty. Yet another course was changed from an elective course spanning 14 weeks during fall, into a two-week summer school, that was then run twice. The reasons for this were partly the administrative barriers in terms of ECTS points, assessment, grading and transfer between faculties, which did not represent the same problems in the summer school format; partly an extra pot of money given to the development of summer schools at the university. Thus, a common influence affecting the course activities lay in the barriers that the monodisciplinary structures create:

It is definitely in the cards that the next time we run something like this, it has to be anchored across the disciplines and this is also something we are discussing with our institutions, to put it that way. We would like them to somehow deal with this, so that we do not meet administrative and other barriers in relation to the course. Because you do meet barriers – not

that you can't get around them, however, you do meet them. (Interview, Associate Professor, Case 4)

PhD-level Activities

All of the five case-projects have produced courses and summer schools aimed at PhD students. Overall, the PhD elective courses and summer schools appear to have run more smoothly than the activities at lower levels. As an example, one of the PhD courses began as a joint collaboration between the Faculty of Law and a local biobank; it ran twice and was then transformed into a European PhD course, a Massive Open Online Course (MOOCs) and a new international master's programme to be launched within the next couple of years. This was not due to the administrative structures but a matter of current supply and demand:

We have here a template for how you could do it. But obviously we can't offer this again. We won't attract any of the students we already had so we have to change it in that sense. And that is what we are going to. (Interview, Associate professor, Case 3)

Some of the case-projects have managed to create and run summer schools repeatedly during the whole project period, using it as a venue for teaching upcoming researchers within their field and presenting their research.

One project has successfully created a new interdisciplinary PhD programme at the faculty level, in order to align with new research entities, with the argument that:

The current PhD school, exclusively based on department programs, is insufficient to meet the demands for interdisciplinary PhD students in the years to come. Substantial consultation with the Faculty has led to a new PhD program in Social Science, which will be operational for the new PhD students to be hired in the embedded research center being established at the Faculty of Social Sciences. (Midterm evaluation, Case 4)

Student-driven Activities

Eventhough activities in this category did not appear in the project applications from the case-projects, it has proven to be a large category. The case-projects have all had bachelor's and master's students assigned to the projects, but, perhaps surprisingly, additional students participated, as well. While a large number of thesis-writing students were anticipated, the large group of students participating despite having no official affiliation to the case-projects (so-called 'hang-around' students) was not. In one of the case-projects, for example, students at bachelor and master's level

have voluntarily used their spare time to join research meetings, develop digital codes and new software:

And then they have just been interested in the project and some of them have then later on become PhD students here and there but you know, not financed by us. And some of them are just – some of them are still master's students, some of them we have tried to pay salary to, but they haven't accepted it, they have just sat and worked – so we have two students that have just been sitting and coding stuff for us. One of them is now writing his master's thesis based on that data. (Interview, Project Leader, Case 4)

Self-motivated students have also added to the research by writing extra assignments about the project in unrelated courses, and have created student collectives working on their own with data from the case-project:

Back then, I was working on my own project, it was my bachelor thesis – then I suddenly realised how much greater it could be, if my data collection could get access to this large project (...) and then this idea really didn't go any further but I think the project manager thought it was a fun idea, and so ever since then I have just been connected to the project (...). (Interview, Master's student, Case 4)

During the project period, the case-projects have also created three and six-months research internships (driven by student demands), where master's students have participated as interns in the case-projects and have gained ECTS credits in return. Prior to the project period, students were only able to take internships and receive ECTS credits outside of the university. To the students interviewed, this has given them something completely different:

And to be part of a place, where you get a connection to something that is just everywhere, cutting edge is for a historian at least, pretty different, I think. If you are dealing with a massive, interdisciplinary research project, then no matter what the subject is it will broaden your horizon and get you closer to the bigger societal challenges. (Interview, Master's student, Case 2)

Discussion and Implications

Comparisons with Interdisciplinary Provision in the UK

From the perspective of pushing towards institutionalisation of more interdisciplinary education, the findings presented above from the Danish case can appear quite discouraging. The activities developed and documented in evaluations and applications only entail a few larger programmes and

are mainly set up as one-off elective courses with no subsequent embedding. The courses are not developed systematically and are very much dependent on the interest and engagement of individual faculty members in addition to volunteering students with no formalised attachment. However, this accords with the findings from our previous study of the UK situation with regard to interdisciplinary learning and teaching provision (XX). Here we found that, although interdisciplinary education is a live topic in the UK, with the majority of survey respondents reporting trends towards more interdisciplinary undergraduate and postgraduate teaching, a significant proportion believed that the level is unchanged and university teachers were more likely to report this increase than university leaders.

There were also different views on what was driving this. While university leaders reported that this increase was in response to the professional needs of graduates seeking employment, university teachers were more likely to attribute it to the individual research interests of academics in alignment with concerns about complex global societal issues (such as climate change, ageing). Individuals who develop interdisciplinary teaching provision were seen as pioneering champions often working against the status quo. Moreover, as with the Danish case, we could discern no evident trends or typologies in terms of the form that this educational provision took: instead we identified a range of sometimes transient activities occurring at different scales – at the level of one-off workshops, single course modules or units or, sometimes, full degree programmes.

Examples ranged from: 'AcrossRCA', a response to student demand in the form of a special week-long extra-curricular programme of cross-disciplinary working in innovative projects at the Royal College of Art, to an undergraduate module first piloted with the 'Edinburgh Living Lab' initiative to combine interdisciplinarity with real-world problem solving and then developed into an approved elective, all the way through to an explicitly interdisciplinary undergraduate degree programme for an Arts and Sciences (BaSc) degree at University College London. Evidence from this study demonstrated the important role of committed 'academic entrepreneurs' and the challenges they faced in navigating typical university structures, even when such innovations were sanctioned by senior institutional leaders. As one interviewee put it:

It takes a long time and we can be conservative as institutions, but it is important to keep listening and put in significant management grind to come up with something that satisfies both students and academics. (Interviewee, Case study 1, XX)

On the one hand our current findings confirm that the dominant mode of knowledge production is still one of disciplines controlling content, pedagogy and the organisation of higher learning (Henry, 2005, p. 4); on the other hand, the findings also point towards what Klein has called the *mission for insurgency* (Klein, 2010, p. 123) where the aim of interdisciplinarity may be precisely to unsettle conventional disciplinary practices. While agreeing with Henry and Klein on this, we do, nonetheless, also consider the findings to be examples of another practice or tendency, which has to do with relations between strong and weak external *framing* (Bernstein, 2000), *strategy* and *tactics* (de Certeau, 1988). We term this practice the ‘art of managing interstitiality’.

External Framing, Strategy and Tactics

In Bernstein's terminology, framing is about *who* controls *what*. Framing can be either internal or external and regulates relations within a context. Furthermore, it refers to relations between transmitters and acquirers of knowledge in an educational context (Bernstein, 2000, p. 14). In our University of Copenhagen-setting, we understand the external framing to be the administrative structures at the university, regulating the various types of educational activities it offers.

The monodisciplinary higher education structures, especially in the Danish setting (with its fixed programmes at bachelor's level and only a few elective options at master's level) are, in Bernstein's terms, defined by a strong external framing. The transmitter (the university administration and management) has explicit control over timetabling, sequence, pacing, and entry criteria for courses and programmes and the acquirer has little say in this. In our study, this is illustrated by the lack of interdisciplinary programmes and courses developed at bachelor's level and by the type of activities developed at master's level. Because the framing is so strong, it is simply not possible for the acquirers (in this case the 2016-projects) to influence or change the overall educational structure in these settings. Nonetheless, our study shows areas with weak framing, in which we identify ‘interstices’, where it is possible to create interdisciplinary activities. With this term we refer to spaces that intervene between closely spaced things, to gaps or breaks in something generally continuous (“‘Interstice.’ Merriam-Webster.com.,” 2017). PhD courses and summer-schools are, for example, made possible because they are located in postgraduate study levels, where the external framing is weaker than at bachelor's level. These activities are not required to fit in a certain module, they can be made to fit the needed ECTS points and they are not limited to students from just one section, discipline or faculty.

According to Bernstein, the European subject-based higher education system in general carries a much stronger framing compared with the American course-based liberal arts tradition (Bernstein, 1975, p. 62). While this strong framing certainly limits the embedding of interdisciplinary courses and programmes, our study is also evidence of ways that the 2016-projects and the students have succeeded in weakening the framings. This is done at various levels: when one of the projects succeeds in setting up a new PhD programme, cutting across the faculty, this is a way of weakening the external framing still further and giving more power to the project and the students involved. If there is an entry to a PhD programme from students from various disciplines, these students do not have to limit their master's thesis to only focus on one discipline, as was previously the case:

S1: (...) you know I am convinced that you almost have to dismantle the faculties and merge the shit because these divides you have created are artificial and there are no reasons for keeping them, you know?

S2: It is so stupid to try and limit us. (Interview, Master's students, Case 3)

One of the elective courses mentioned in the findings was offered at the Faculty of Humanities but open to students from all faculties. While the course received very positive student evaluations, there were issues with the access and assessment of students from the other faculties. The external examiner graded the science students lower, thus making it less attractive for future science students to cross the faculty lines. In the quote above, the students criticize the divides that they call artificial and call for a closer collaboration and connection between the different areas. Despite the problems with assessment and the low supply of interdisciplinary elective courses, the course has encouraged them to take more interdisciplinary courses. Such efforts can themselves set precedents or illustrate for others the feasibility of trying such things. As one of the students puts it:

No matter the subject, no matter how small the selection of courses there is at the master's, I am sure I can tweak it into something that I want – if they won't specialize me, then I sure as hell will go ahead and do it myself. (Interview, Master's student, Case 3)

The way the 2016-projects and the students weaken the administrative and monodisciplinary framing, though they clearly are the ones with the least visible power, points towards differences in strategy and tactics, as described by de Certeau (1988). In his work, he applies the city and the pedestrians as a metaphor for the difference between static and fluid power. The buildings in a city constitute the visible power: they are part of a planning strategy; they control what routes are

possible; they are placed according to the logic of the official city planners; and they are static, thus cannot be overlooked or moved (de Certeau, 1988, p. 37). As the opposite, the pedestrians are not static: they move on territory planned and owned by others and can therefore not apply fixed strategies. They operate in isolated actions, employing tactics and take advantage of opportunities here and now. What they win, they cannot keep. In short, a tactic is the art of the weak (Ibid).

Translated to our study, the university and faculty administration represent the buildings in the city; they create the university infrastructure and they decide on the routes available to the students and the 2016-projects. The 2016-projects take advantage of the opportunities at hand and create courses that may not last in the established structure, though they still form and affect the appearance of the university, just as the pedestrians do in the city:

To us the students are super important. No doubt about it. When we meet in the steering committee, we make fun of it but of course we all know that in reality we are completely dependent on them, well not only are we depending on them, when it comes to the research project, they are the ones deeply entrenched in the practical data work. So in that sense I think we all have a pretty strong idea of them playing the key roles in this. (Interview, Associate Professor, Case 4)

As stated in this quote, the students play a vital role in the case-projects, and in this context they do it through the elective courses they attend. In this way, they have helped push forward recognition of the need for courses like these in the programmes offered by the faculty. As in de Certeau's description of pedestrians in the city, the students change the structures meanwhile creating them (de Certeau, 1988, p. 93). In our study there are also other examples of ways the students change the structures by their 'walking about': in setting up student collectives, participating in projects on a volunteer basis or by taking on research apprenticeships in the case-projects:

In that sense, the project, or the internship has been an eye-opener to this and to the chance of becoming a better researcher, for instance. But also just in your view of the whole world, I think – to get that wider perspective. That thing about meeting someone over at another faculty is really an eye-opener. (Interview, Master's student, Case 2)

The experiences the students get from taking part in these activities affect the future path they choose. Even though the courses are not embedded in the lasting structures, they still add to the students' experiences of the university. As a result, they navigate differently through the interstices,

thereby playing a vital role in creating interdisciplinary activities in structures that were not originally built for it.

Through our findings and discussion, we have attempted to illustrate how interdisciplinary education is created within monodisciplinary university structures. The processes we investigated underscore the difficulties of embedding interdisciplinary education in monodisciplinary structures when the structural framing is strong, and in contrast the power of particular efforts - and not least the students - is weak or at least elusive. In the existing literature this situation is seen to point towards interdisciplinary education being expensive, fragile and easy to cut in times of financial instability (Augsburg & Henry, 2009; Henry, 2005; Klein, 2010). Looking at it from another perspective, it is, however, also possible to see these traits as the exact reasons for protecting or continuing the growth of interdisciplinary education in these structures; as way of making productive use of the interstices in the system:

Essentially the interstices are created because there is a limit on the rate of expansion of every firm, including the larger ones; the nature of the interstices is determined by the kind of activity in which the larger firms find their most profitable opportunities and in which they specialize, leaving other opportunities open (Penrose, 2009, p. 196)

If the established monodisciplinary programmes and the faculty structures are seen as the larger firms in this quote from Penrose, the interstices occur as the momentary gaps in the study programmes, such as the space available for hang-around students in the case-projects and the connections between case-projects and interdisciplinary elective courses. In other words, the interdisciplinary activities created by the case-projects point towards the interstices in the monodisciplinary structures. In our study the interdisciplinary elective courses might not happen more than once, nevertheless, they fill a gap that would otherwise leave the students with fewer opportunities to specialise in novel ways tailored to their interests. Similar to pedestrians creating new paths by crossing streets and grounds where they weren't supposed to travel, thus over time changing the original infrastructure in the city, these one-off courses open the door to other such efforts, by providing precedents, demonstrating possibilities, helping administrators adjust to working with such efforts etc. While the Danish subject-structure has significant reach, there are nonetheless interstices remaining that it is possible to 'manage' (e.g. fill with innovative efforts such as specialised, research-based courses or informal involvement of self-motivated students) in a way that complements existing, more conventional activities.

This leads us to suggest that there are further insights to be gained from this study. The fact that so many activities were left unevaluated – and thus unvalued – by the institution, in contrast to the enthusiasm expressed by both students and project managers, points to a need for further research into the dynamics of creating novel educational activities within structures that from the outset were not made to measure or reward these activities. A starting point for initiating future similar programmes would be to discuss new ways of recognising, documenting, and evaluating educational activities, thus increasing awareness of the full range of different sorts of value that can be added beyond those conventionally anticipated. This could lead to rethinking the definitions of ‘productive’ and ‘efficient’ higher education.

Conclusion

Our study of interdisciplinary educational activities created in a monodisciplinary Danish setting reveals a range of efforts, rather than any one pervasive approach, echoing findings from Lyall et al.’s (2015) UK study. We found that the activities created lie in the interstices between the strong monodisciplinary framings that are set up by the traditional university structure and supported by the Danish subject-based tradition. The interdisciplinary activities thrive at the more flexible upper levels of higher education, where more interstices can be found - as elective courses at master’s level, PhD courses crossing the faculties and as student-run activities in interdisciplinary research projects. These activities are seldom institutionalised but occur where gaps open up in the course programme; whenever a faculty member takes on an entrepreneurial role or whenever students follow their own academic ambitions instead of the official curriculum assigned to them. While these activities are given little space in official reports and learning accreditations, they are nonetheless shaping the university landscape by revealing otherwise hidden interstices and thereby creating stronger connections between research projects, students and teaching structures.

In this perspective, creating interdisciplinary education in monodisciplinary settings is not a case of pitting monodisciplinary against interdisciplinarity; it is about taking advantage of the full landscape, the structures and the spaces between them, in order to increase the total education outcome for the university management and administration, as well as for the researchers and students. In other words, it is the art of managing interstitiality.

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