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Curriculum Restructuring in South African Higher Education: academic identities and policy implementation

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ABSTRACT *South African higher education is currently implementing a curriculum restructuring policy aimed at the development of degree programmes that are ‘coherent and integrated’ and typically ‘trans-, inter- or multidisciplinary’. This requirement presents a considerable challenge for faculties which have allowed students to ‘mix-and-match’ from a wide range of disciplinary offerings particularly the explicit assumption that academics will work in teams to develop, deliver and evaluate these programmes. The policy anticipates significant shifts in the nature of academic practices, academics’ identities, and in the forms of authority used to regulate curriculum decisions. In particular, it anticipates a weakening of the insulations between disciplines, and that academics will participate in collectives which cross disciplinary boundaries, and which are predicated on serving external accountabilities. This article presents a case study of how the science faculties of two universities in South Africa have interpreted the policy in launching their respective programmes in biotechnology. The case study shows how—in spite of a strong, common field of practice as a reference—academics at the two institutions draw on differing legitimating claims to justify curricular choices, demonstrate differing orientations towards disciplinary and institutional identities, and engage in cross-boundary negotiations in fundamentally contrasting ways, giving rise to significantly different curriculum structures and differing social relations between academics. The author concludes by suggesting that what emerges from the case study has implications for those who assume that interdisciplinary collaboration within outcomes-based programmes will unproblematically provide a base for quality assurance practices.*

Policy Intent

Since the transition to democracy in 1994, higher education in South Africa—like other sectors—has been subject to a series of policy papers and bills which seek to reconstruct the field in various ways. A central ambition of the policies has been to enhance levels of state control over the higher education system so as to steer the system more effectively towards the goals of economic development, social reconstruction and equity. The key means by which the state plans to exert this enhanced control is the academic ‘programme’. The Draft White Paper on Higher Education notes that ‘the most significant conceptual change is that the single co-ordinated system will be premised on a programme-based definition of higher education’ (Department of Education [DoE], 1997; para. 2.4). Programmes would thus become the unit by which the system would be planned, governed and funded, enabling a

greater responsiveness 'to present and future social and economic needs, including labour market trends and opportunities, the new relations between education and work, and in particular, the curricular and methodological changes that flow from the information revolution' (DoE, 1997; para. 2.6). Programmes are thus not only a structural device to enable better steering of the system; they are intended to be a vehicle for a qualitatively different form of curriculum.

One of the arguments advanced for curriculum reform is the changing nature of knowledge, and where and how it is produced. Cloete and Bunting note that science has come to depend more on applied knowledge produced at multiple sites and less on dramatically novel knowledge:

Increasingly there is a tendency for knowledge to be produced in the context of application by trans-disciplinary groups, or teams, who are from within and outside of higher education, where the organizational structures and teams are less hierarchical and more heterogeneous, and both quality control and social accountability become more broadly based. (Cloete & Bunting, 2000, p. 39)

The key curriculum policy provision which responds to the growth of applied knowledge, and to the changing conditions of the workplace, is thus a shift away from discipline-based degrees towards more vocationally purposive 'programmes': 'It would also break the grip of the traditional pattern of qualification based on sequential, year-long courses in single disciplines' (DoE, 1997; para. 2.6)—a shift of particular significance for the natural sciences and humanities. A further justification for the shift towards programmes is the argument that curricula need to be *responsive* to the needs of society. This intention motivating the notion of a programme is best reflected in the Report of the National Commission on Higher Education (NCHE) which preceded (and informed) the regulations subsequently issued by the South African Qualifications Authority (SAQA). In the following extract one notes the connection made between a particular notion of educational design and the goal of greater responsiveness to economic and social needs:

The sequential learning activities leading to the award of particular qualifications can be called programmes. These are almost always invariably trans-, inter- or multidisciplinary ... The demands of the future of South Africa as a developing country require that programmes, while necessarily diverse, should be educationally transformative. Thus they should be planned, coherent and integrated; they should be value adding, building contextually on learners' existing frames of reference; they should be learner-centred, experiential and outcomes-oriented; they should develop attitudes of critical enquiry and powers of analysis; and they should prepare students for continued learning in a world of technological and cultural change. (NCHE, quoted in South African University Vice Chancellor Association (SAUVCA), 1999, p. 7)

The logic thus connects the social purpose of South Africa as a 'developing country' with a need for programmes that are 'educationally transformative', with the characteristics of such programmes including the fact that they are 'planned, coherent and integrated'.

A further justification for the emphasis on programmes draws on the discourse of accountability. The NCHE report expresses this theme in terms of 'responsiveness':

It can be described as a shift from a closed to a more open and interactive higher education system, responding to social, cultural, political and economic changes in its environment ... There will also be greater social accountability towards the

taxpayer and the client/consumer regarding the cost-effectiveness, quality and relevance of teaching and research programmes. In essence, increased responsiveness and accountability express the greater impact of the market and civil society on higher education and the consequent need for appropriate forms of regulation.... Overall, greater responsiveness will require new forms of management and assessment of knowledge production and dissemination. It has implications for the content, form and delivery of the curriculum. (NCHE, 1996, pp. 6–7)

The NCHE report is explicit that the consequences of ‘responsiveness’ for academic disciplines are a weakening of the autonomy of disciplines, and a shift of regulative authority toward more negotiated forms:

At an epistemological level, increased responsiveness entails a shift from closed knowledge systems (controlled and driven by canonical norms of traditional disciplines and by collegially recognised authority) to more open knowledge systems (in dynamic interaction with external social interests, consumer of client demand, and other processes of knowledge generation). (NCHE, 1996, p. 6)

The subsequent regulations governing academic programmes issued by SAQA blend the discourses of outcomes-based approaches and accountability. The regulations require a qualification to (amongst other things):

represent a planned combination of learning outcomes which has a defined purpose or purposes, and which is intended to provide qualifying learners with applied competence and a basis for further learning;

and to

incorporate integrated assessment appropriately to ensure that the purpose of the qualification is achieved, and that such assessment shall use a range of formative and summative assessment methods such as portfolios, simulations, workplace assessments, written and oral communication. (SAUVCA, 1999, pp. 19–20)

The ideas of ‘defined purpose’, ‘planned combinations’, ‘applied competence’ and ‘integrated assessment’ are ‘to ensure that the purpose of the qualification is achieved’. While ‘no country has succeeded in including its University qualifications in a national qualification framework’, SAUVCA nevertheless believes that the development of what it calls ‘NQF-alignment features’ would make it ‘feasible for massive improvements in quality to be achieved’ through ‘putting into place the most important requirement of any quality assurance system: clearly defined outcomes against which the quality of student performance and institutional provision can be assessed’ (SAUVCA, 1999, p. 26). Thus, while reserving judgement on the feasibility of the inclusion of university qualifications in a tightly formatted qualifications framework, SAUVCA sees advantages of programmatisation lying in its potential for increasing levels of accountability and (by implication) centralisation of control.

SAUVCA’s handbook is explicit about the implications of the policy; what is required is nothing less than:

a new model of Higher Education practice. For example, academics will now have to make explicit their learning outcomes and assessment criteria and offer these for public scrutiny. When designing curricula, they will be required to work in programme teams rather than as single individuals ... The demand for summative integrated assessment, across specific course outcomes and across modules within a programme will be particularly demanding in relation to design and implemen-

tation, given traditional territorial and individualistic approaches to teaching. (SAUVCA, 1999, pp. 27–28)

The policy of programmatisation was thus anticipating significant shifts in the nature of academic practices, in the professional identities of academics, and in the forms of authority that are invoked to regulate curriculum decisions. In particular, it anticipates a weakening of the insulations between disciplines, and that academics will participate in collectives which cross disciplinary boundaries, and which are predicated on serving external accountabilities. This accountability has at least two dimensions: firstly, a responsiveness to broader social and economic goals, and secondly, an accountability for achieving the cross-cutting learning goals stipulated for academic programmes as a whole (rather than simply discipline-specific ones). Both of these dimensions ask for a weakening of prior insulations between departments or disciplines as academics meet to agree on graduate identities deemed suitable for the contemporary workplace, translate these into overarching outcomes that curricula should achieve, and then (at least) modify disciplinary curricula or (preferably) collaborate in multidisciplinary curricula to achieve these outcomes.

This article reports on a comparative study of the implementation of this curriculum restructuring policy in the science and humanities faculties of two South African universities with a particular interest in the responses of academic staff (see Trowler [1998] for a similar study in a ‘new’ UK university). It aims to explore the programmes’ implementation process, seeking to understand some of the motivations and conditions that have driven the responses to the policy.

Other Studies

In an article which outlines what he calls the ‘slide’ toward ‘performativity’, Barnett notes the multiple forces competing for influence on contemporary curriculum—coming from, amongst others, the state, the labour market, knowledge fields and institutions. He develops a set of hypotheses that aims to predict the broad trajectory of curriculum change in higher education. Drawing on the work of Bernstein, he distinguishes between curricula that are ‘inward-looking, reflecting a project of introjection where they are largely the outcome of academic influence’ and curricula that are ‘outward looking, reflecting a project of projection, where they are subject to external influences’ (Barnett, 2000, p. 263). Barnett predicts that at the macro level (state and institutional policies), change will be in the direction of projection (as is clearly the case in the South African context), and from insulated singulars towards increasingly multi- or interdisciplinary regions. However, he notes that despite the multiple claims from outside the academy, ‘the discipline (or knowledge field) constitutes the largest claim on the identity of academics’ (p. 264), and consequently the micro level of actual curricular changes will reflect *both* the extent to which disciplines within institutions are yielding their insularity, *and* changes within disciplinary fields of inquiry (p. 264). He further predicts that changes will depend on the relative strength of institutions against that of their constituent disciplines, and the positioning of individual institutions within the higher education system. Barnett thus generates a complex picture of how curricular change will come about, predicting—in spite of the drift to projection and performativity—the salience of strongly established disciplinary identities, particularly in situations where institutions are powerfully positioned in the national hierarchy of universities.

Lending credence to Barnett’s predictions is the work of Ensor (1999, 2001). In particular, her (2002) broad study of the calendars of South Africa’s 20-odd universities (and in-depth study of three institutions) reviews how South Africa’s curriculum restructuring

policy has found effect across the country's universities, and confirms Barnett's prediction about the persistence of disciplinary identities. Her study concludes that:

there is little evidence of interdisciplinarity as might be envisaged by what Basil Bernstein (1975) refers to as an integrated-type curriculum.... The credit exchange discourse has pressured faculties of science and humanities to provide a professional or vocational face to their academic provision. It has promoted (although is not necessarily responsible for initiating) the move towards modularisation and the specification of learning outcomes. The disciplinary discourse, however, has re-asserted itself though the restriction of student choice, the tying of modules through pre- and co-requisites and the emphasis on induction into vertical knowledge sequences.... Overall, though, it would seem that curricula have been re-packaged and redesigned ... but remain recognisable in terms of their disciplinary origins. (Ensor, 2002, pp. 15–17)

Generally speaking, Ensor's conclusions confirm the broad pattern emerging in my two-institution study: by and large, in these two universities, insulations between disciplines remain strong, and both curricula and academic identities remain introjected, notwithstanding the rhetoric of projection in some institutional documentation. The issue of identity is thus central to understanding how curriculum is organised in higher education, a link that is clearly articulated by Bernstein (1999). He argues that 'curriculum reform arises out of a struggle between groups to make their bias (and focus) state policy and practice' (1999, p. 17); or, in the case of higher education, to make their bias and focus the dominant regulative discourse shaping university curricula in any particular context. This bias and focus 'is expected to construct in teachers and students a particular moral disposition, motivation and aspiration, embedded in particular performances and practices', or, in other words, to construct 'different pedagogic identities' (Bernstein, 1999, p. 17).

In her review of the dynamics of identity in academia, Henkel (following Bourdieu) notes that the processes of academic identity formation are essentially competitive: 'Competitors have both to distinguish themselves from their predecessors and their rivals and to integrate the work of these groups into a construction that transcends it. The achievement of identity is therefore instrumental to the way in which science works' (Henkel, 2000, p. 18). Bourdieu argues further that the various scientific fields have strongly differentiated power and status, stand in competition with one another, and are 'the locus of competitive struggle' for individual scientists located within the fields: 'What is at stake is the power to impose the definition of science ... best suited to [the individual scientist's] specific interests' (Bourdieu, 1975, p. 23). Henkel then draws on the work of Clark (1983) to argue that academics stand in a matrix 'formed by the cross-cutting imperatives of discipline and enterprise (the university or college)', and that the institutional form of this intersection is the academic department. Academics thus experience 'the complexities and tensions inherent in two major sources of identity, one local, visible and tangible, the other cosmopolitan, largely invisible and disembedded' (Henkel, 2000, p. 19).

Although Bourdieu has emphasised the competitiveness inherent in intellectual communities, Moore and Young remind us that these communities are essential to the production of knowledge. The key process which assures the validity and legitimacy of new knowledge and learning is the tradition of peer review, a process that is competitive, but which is subordinated to the cognitive norms and values of an intellectual community. This finds social form in subject departments and specialist professional and academic organisations, and these networks and their codes of practice are fundamental to the social processes of advancing knowledge and validating curriculum (Moore & Young, 2001). The wellspring

of knowledge production thus rises from the tension between intellectual competition and collegial collaboration within particular epistemic communities.

To summarise: the policy of programmes is potentially exerting considerable pressure for shifts in academic identities and practices. The shifts are at least twofold. Firstly, in pursuit of ‘responsiveness’, academics are asked to shift from an introjected to an outwardly projective orientation, looking to social and economic relevance rather than more intrinsic disciplinary values to justify their disciplines and their jobs. In other words, they are asked to respond to evaluative priorities that come from outside their disciplines and faculties (which have been the traditional loci of evaluation), to respond to priorities set by the state, their institution or other stakeholders in the interests of quality assurance. Secondly, academics are asked to look across departmental boundaries to negotiate curricula with colleagues from other disciplines. In short, in order to achieve the projective orientation, the policy asks academics to form solidarities across disciplinary boundaries, extending their repertoire of allegiances in a move similar to what Bernstein (1975) (following Durkheim) calls a shift from *mechanical solidarities* (based on common disciplinary identities) to *organic solidarities* (across disciplinary boundaries, based on an allegiance to a unifying overarching project or principle).

It is widely acknowledged that disciplines constitute the primary resources for academic identities. In another article (Moore, 2002), looking at a case study in the humanities, I argue that policy or advocacy discourse *alone* is an inadequate basis for the development of an integrated curriculum based on organic solidarities. A compelling and authoritative overarching regulative discourse is required if long-established autonomies and insulations are to be weakened in the interests of a larger project. The new discourse would need sufficient intellectual legitimacy to recruit academics to the project, and hold them there through the vicissitudes of change. I thought the likeliest source for such an authoritative frame of reference for an interdisciplinary projective curriculum would be a newly regionalising field of practice characterised by powerful and lucrative technologies. I thus chose as a case study the biotechnology curricula being developed at the two institutions under study.

Methodology

Compared to some other universities in South Africa, the two chosen for this study are relatively well-established institutions with strongly entrenched traditions of discipline-based departments, and with good research track records. Both institutions number amongst those Muller (1991, 2002) has identified as the small number of elite institutions established in the first phase of South Africa’s higher education development. These institutions were chosen for the study in the knowledge that the assumptions of the policy about weakening of disciplinary identities would be particularly challenging for universities with strong departmental and research cultures, as opposed to institutions who have generally opted for applied programmes in response to industry needs. The goal was thus to conduct a comparative study across two similar, rather than contrasting, institutions.

In 2000, the year of principal data gathering, the two institutions (UniA and UniB) were respectively in their first year and second year of programme implementation, although effectively both were implementing the changes at second-year undergraduate level. Data for the study included some 90 in-depth interviews with academics and managers at all levels who were associated with the programmatisation process in the respective science and humanities faculties. I also collected a wide variety of institutional documentation whenever this was available.

This case study of the biotechnology programmes is based on 12 initial interviews

(loosely structured, usually lasting between 90 minutes and two hours), six at each of the institutions, as well as considerable documentation, including minutes of meetings and copies of e-mail exchanges. The main data-gathering was conducted in the first half of 2000, and was then supplemented with a series of follow-up interviews and telephonic enquiries in the early months of 2001 to confirm themes and trends. These follow-ups were conducted very extensively in the case of UniB because of the sensitivity of the story that was emerging there. An earlier draft of this article was circulated to these respondents to check both the general accuracy of my account, and the anonymity of my informants. The themes presented in this article are amongst the more strongly voiced ones in the data, although space prevents me from illustrating the representivity of the views across respondents, and for brevity's sake I have had to use quotations illustratively. I have, however, tended to draw more heavily from some interviews than others: as is usual, some interviews yield richer data than others, often because the individual has played a leading role in the processes under discussion, or because some colleagues are more articulate about social processes than others.

The Case Study

We have seen above that academics (and their curricula) tend to maintain disciplinary identities, in spite of policy injunctions. However, there also emerges evidence of rare cases where insulations have been weakened in attempts to move towards integrated curricula, usually predicated on regionalising fields of knowledge or practice. The claim of 'weakened insulations' in this case study is based on evidence that several departments have come together to contribute components to wholly new or significantly revised courses within three-year biotechnology undergraduate curricula. However, the fact that these components are then taught by the respective departments shows that the boundaries have by no means disappeared. The respective processes by which these multidisciplinary curricula came about were significantly different, as will become clear, but, in both cases, considerable discussion has occurred across disciplinary boundaries about the content of the curricula. A further important feature of this case study is that in both cases, the curricular negotiations were accompanied by some changes in the organisational base of the disciplines concerned, and *how* this organisational change was achieved is a significant factor in shaping the discussions about curriculum. In the one case (UniA), an internally driven initiative (with support from above) to form an umbrella School of Biological Sciences enabled academic staff to form solidarities across disciplinary boundaries, and laid the ground for constructive negotiations about curriculum. In the other case (UniB), the organisational shift (a merger of two departments) was initiated from the top, received only partial support from within the departments concerned, and was (in the short term) unable to provide the basis for academic staff to transcend claims based on departmental positions. However, the dynamic that unfolded—and continues to unfold—in each case is, I believe, instructive for those of us monitoring curriculum change, and for policy-makers who look to cross-disciplinary collaboration in the interests of responsiveness and quality assurance.

Briefly summarised, the data show two substantially different *social* processes involved in giving effect to the programmes policy, with considerable consequences for the resultant curricula. I shall briefly sketch these two curricula, before exploring in more detail the social processes which gave rise to them, illustrating the key issues of identity and authority which underlie academic practices.

The biotechnology programme at UniA is a tightly structured curriculum with a strong compulsory core and a limited range of specified electives. Interdisciplinary modules in biotechnology are prescribed at second- and third-year level, and these combine contribu-

tions from (in descending order) botany, biochemistry, genetics, microbiology and law. For the compulsory co-requisites, biochemistry is the discipline with the strongest presence, followed by genetics, and (distantly) microbiology. At third-year level, students may opt for one of three streams, either microbial, plant or animal biotechnology. There is a module on entrepreneurship, ethics and law, but this is entirely separate from the science-based modules. My informants at UniA generally expressed satisfaction with the structure of the curriculum.

The biotechnology curriculum at UniB, however, is a relatively unstable construct, and is the subject of considerable contestation. Biotechnology was first listed in the UniB faculty handbook for 2000 as a 'specially constructed curriculum' but in fact ran as a 'specialization field' in 2000, the result of last-minute protests and renegotiations between departments in late 1999 after the handbook had been printed. The central issues under contest (primarily between the departments of Microbiology and Biochemistry) were the 'ownership' of the biotechnology curriculum, the content of 'biotechnology' courses and the required co-requisites. By March 2001, some of these issues still remained unresolved.

It seems, then, that at UniA cross-boundary agreement had been achieved around a new, stable curriculum, while at UniB such cross-boundary consensus has been harder to find, reflected in an unstable contested curriculum. My interest thus lay in exploring the ways in which academics have attempted a shift from relatively autonomous introjected identities towards more collaborative and outward-looking orientations. I look particularly at the conditions under which the new collective social bases needed to support collaborative identities are (or are not) formed, and the frames of reference which may sustain or threaten these.

Biotechnology at UniA

Significantly, the policy of programmatisation arrives at a time when there has been an effort for some five years already (initiated from within the departments) to restructure the biological sciences, bringing together seven departments from across two faculties into a School of Biological Sciences. The role of the school is strategic rather than administrative, and reflects a decision by UniA to prioritise this as an area of growth and niche strength for the university. Prominent academics in this field have been recruited to the institution for this purpose, and my informants make the claim with some confidence that they are arguably now the strongest such grouping in the country. The university has invested in a new building which brings together under one roof the once-dispersed departments of Microbiology, Biochemistry and Genetics.

Although the original impulse to bring these departments together was a pragmatic one, the newly forged unity and strength of these departments reflects changes in the epistemological base. I am struck by how my UniA informants legitimate the new organisational base by means of a clear sense of larger shifts in the field of biological sciences. For example:

Classical Biology is a descriptive, inductive type of science, an observational science, [but now] it is slowly being changed into what Physics is—a theory-based, mathematically-based science ... The old divisions [between disciplines] don't hold anymore. Previously, you studied this group of species, you had animals and plants and bacteria and viruses and whatever [*indicates divisions along a horizontal axis*]. Biology these days works at this level [*indicates divisions up a vertical axis*]—you either study at the level of molecules, at the level of cells, organisms, ecological systems. And that's a much better division. It's a functional division, as well. So it

doesn't depend on which species you have studied, it depends on how you look at them. (AS5, pp. 4, 16)

The shifts in the field of biology are thus from a science of observation and description towards an increasingly experimental and theoretical science, with a greatly increased salience for the molecular and cellular branches of work. This necessitates a more holistic view across the field, which my informants articulate as a shift in their professional identities, where prior disciplinary identities are eventually subordinated to a new overarching identity:

You can only solve a biological problem if you can understand the whole picture.... I think the modern approach is not associated any more with a system like Botany or Zoology or Microbiology. I think the modern trend is we should all call ourselves 'biologists' again, and we should say, 'I'm using a plant but it's part of a system and how does it slot into that whole system? If I change that thing genetically what impact will that have, not on that alone, but on the whole system?' ... Yes of course, we all have our own interest, so you specialise and the further you go with your career path the more specialised you are, but you're still a biologist. (ASI, p. 4)

The epistemological shifts in the field noted by my informants must, in their view, have consequences for how the field is structured locally in institutional terms. The drawing of departments together into the school was a first step, although at least one senior informant would have liked to have seen the prior departmental identities dissolved altogether:

My vision originally, and I was quite alone in this apparently, but I would have liked the school, in the beginning, to be structureless, in the sense that you put everything in one pot and then you stirred the whole pot and then you see what crystallises out, what fits again, with the new Biology.... The structure must actually reflect what is happening academically. (AS5, p. 16)

But, in spite of the convergences in the field, the process of forming the school was not an easy one, and took place against a landscape with all the usual territorialities, especially in a system where student enrolment numbers determine departmental staffing levels. A crucial step in moving towards the new organisational base was to establish a culture of trust within an organisational context inadvertently geared to competitiveness:

Until about five years back, we were totally fragmented as departments. We didn't speak to each other. Zoology and Botany thought we were trying to steal their students and we thought that they were old-fashioned, and there was, in a sense, an imbalance, because all the Botany and Zoology students were in the first year and all the third year students are in Bio-Chemistry, Physiology and Microbiology, so there was a complete shift of students over to the Molecular Sciences.... They thought that we were trying to steal their position, which I don't think was ever in our minds. I think it was just somebody's stupid perceptions, which in the end had no basis, but they can really cause problems. And so there was a huge distrust a few years back, between departments. (AS5, pp. 1-2)

But the process of overcoming the distrust was long (five years) and difficult, and involved a great deal of careful work by senior figures in the biological sciences to overcome 'hostilities' and 'suspicions of empire-building'. It was on this platform of painstakingly built trust, and the loose organisational frame of the newly formed School of Biological Studies that the process of programmatisation was launched. Clearly, some of the territoriality of the participant disciplines had been mitigated in the interests of cross-border solidarities, opening the

way for less defensive negotiations about possible new curricula. The programmes-development process was led in the first instance by the Chair of the new school. He describes how the process was inaugurated by invoking the overarching epistemological principle that unified the biological disciplines:

We had the Chairmen of the departments come together and [asked]: ‘Where is Biology today? How can we reflect Biology without looking strictly on a discipline basis?’ We identified four areas for programmes, and we then went to organise this meeting of the [60-plus academics in the] School and said, ‘These are our four areas, these are the purposes. We need to establish what our goals are in each of these programmes’. And then we asked for nominations for coordinators. And then we said to each department, ‘Which programme would you like to be involved in?’ (AS4, p. 2)

All academics interviewed agreed that UniA’s process was characterised by inclusivity and transparency, resulting in a sense of joint ownership of the new curricula by the various participants. It is important to note that this sense of joint ownership is in contrast with the accounts given by their counterparts at UniB. For example, where my UniA informants are united in their definition of biotechnology as applied *biology*, or industrial *biology*, my UniB informants spent considerable time (and heat) making the case for whether biotechnology was applied *biochemistry* or applied *microbiology*, reflecting the home disciplinary bases from which ‘ownership’ of biotechnology was being contested. This sense of joint ownership amongst UniA colleagues, however, did not mean that the negotiations were always smooth. The convenor of the Biotechnology committee also recalls the process as a tough, but ultimately generative one, that required academics to trust in solidarities that extend beyond disciplinary boundaries:

We had heavy arguments but they were all in good spirit. Some days I walked out of it pretty upset, having just [presented] something, but having been told by my colleagues, ‘Look that’s rubbish; go revisit that’. I think these things were done in a fantastic spirit.... We were eight people on the biotech committee and we wrestled. We had two-weekly meetings for a long period. And we sent people back saying, ‘No, no, no, go rework this; it doesn’t slot in here; Where is this? Where is that?’ ... And some of these things were pretty tough: you were telling people, ‘Look, I don’t care whether you’ve presented that for 15 years, it really doesn’t belong there, it should rather be in Biochemistry’. And they handled that well. Eventually! I mean in the beginning it was like you taking somebody’s lifeline away: he’d been teaching that for 15 years, and now you tell him, ‘Look, it doesn’t belong with you’. I think everybody is now very happy with what we have done. (AS1, pp. 13–14)

One of the main tasks involved eliminating duplications in the various programmes that were the result of the prior strong insulations between departments, where core topics had historically been taught in several departments simultaneously. My informants are unanimous that eliminating this duplication was one of the strongest achievements of the process so far. It is clear that this required an unprecedented degree of trust and generosity, and an appeal to a legitimating principle larger than the interests of individual departments:

I think that it is the nature of the subject, in this specific case, that makes it easy. Dovetailing [of courses] has to do with [seeing] the whole thing, looking at life at the level of molecules first, and then cells, and not beyond that. That makes it easy to

say, 'Okay, this is the whole, this is what we regard as being important, this department will handle that part, this department will handle this part, etc.' So it is not a question of saying, 'I'm going to teach microbiology'. We, as three departments, will teach this core ... and we are going to be responsible for that part and we are going to leave this part to another department. That is quite something. We gave off the whole of molecular biology, which is traditionally a part of biochemistry. So we said, 'Okay, we'll let someone else give that'. That was quite something to decide. So it is that type of give and take. (AS5, p. 12)

An indicator of the extent to which disciplinary insulations were weakened in this process is the fact that even some courses that remained as single-discipline courses, taught from within only one department, were subject to scrutiny and revision from multidisciplinary teams. Significantly though, the Deputy Dean comments that by the time the programme process was under way, some key material fears of what were once considered 'endangered' departments had largely faded away amid strongly stated assurances that no jobs were at risk.

It is clear that the negotiation processes in UniA's Biological Sciences were perceived by my informants as reasonably procedural, transparent and inclusive. It seems that the process of shifting from insulated solidarities to expanded solidarities, and thence to collaborative curriculum development processes, involved establishing a commonly held overarching regulative discourse (a regionalising field of practice) authoritative enough to draw departmental identities into an extended organic solidarity for the purposes of collaborative curriculum development. The social base of the previously negotiated School of Biological Sciences provided a platform of sufficient shared identity and trust for the collegial adjudication of innovative curriculum. Secondly, the local material conditions for these disciplines at UniA (staffing and enrolments, institutional priorities, the procedural integrity of the implementation process) also ensured that these embryonic solidarities were not undermined by contextual insecurities.

However, the spirit of cross-boundary collaboration, and the extended identities that enable this, is still an unstable one in the face of the continuation of disciplinary departments as the *primary* unit of academic organisation. In follow-up interviews conducted a year later (March 2001), informants noted that cross-border discussions were now rare, and that departmentally based dynamics were again dominant. Although multidisciplinary programme structures had been achieved, the *ongoing* planning, monitoring and adjusting of curricula was not happening. Programme committees lacked sufficient power and needed to be staffed by more senior and authoritative academics. However, a review of the role and powers of programme committees *vis-à-vis* departments was under way, and the executive was 'absolutely committed' to resolving the problem.

Biotechnology at UniB

By contrast, the development of the biotechnology curriculum at UniB has been a considerably more contested process, the result of an inability to agree on principles for curriculum structure, which in turn was the result of a lack of extended collegial solidarities based on trust. Tracing the history of the programme negotiations from 1997 to 2000 through interviews, correspondence and faculty documentation, it becomes clear that the curriculum was developed against a backdrop of a history of tension between the departments of Microbiology and Biochemistry at this institution, and that something of a turf war seems to have been conducted between the two over ownership of—and participation in—the biotechnology curriculum. There have been disagreements and debates over content which draw on

issues of territoriality, often finding expression in debates which pitted an argument for in-depth coverage of scientific content on the one hand against an argument for ‘real world skills’ on the other. This also found expression in debates over which disciplines should be compulsory or optional co-requisites. Territorial conflicts may have been harder to resolve because of an insistence at this institution that all course codes be departmental codes (i.e. MIC for Microbiology or BCH for Biochemistry), rather than the interdisciplinary codes (BTC for Biotechnology, GEN for Genes & Development) originally proposed for this curriculum. In this dispensation, the Biotechnology curriculum falls under Microbiology, whilst the Genes and Development curriculum in the same programme is ‘owned’ by Biochemistry.

Further contextual complexities include the fact that while the two key departments (Microbiology and Biochemistry) were negotiating over the curriculum, they were also faced with the possibility of a merger into a single unit. This was initiated from above (the executive and the Dean) rather than from within the two departments. Biochemistry apparently were willing to merge, whilst Microbiology were resistant to the idea. Negotiations around this intensified in 1999 and 2000, and as a result of pressure from the top, the two departments formally merged from the beginning of 2001. The former head of Biochemistry was elected the new head of department, and all course codes thereafter were changed to MCB, after the newly named department of Molecular and Cellular Biology.

The biotechnology curriculum has been contested at two levels: firstly, the degree of participation by Biochemistry in a curriculum ‘owned’ by Microbiology, and secondly, the content of specific courses in the curriculum. With regard to the first issue, Biochemistry argued that the biochemistry content of the biotechnology courses should be strengthened, and that biochemistry should form a greater proportion of the compulsory co-requisites for students taking biotechnology. With regard to the second issue, the debate is over the relative prioritisation of ‘science’ content against ‘skills’ content.

Although staff in UniB would be just as well aware of the epistemological shifts and the regionalising of the field as their counterparts at UniA, none of them invoke these in their interviews as a legitimating base for curriculum construction. Instead, they present discipline-based claims and counter-claims. Whilst the Microbiologists (the administrative ‘owners’ of the biotechnology curriculum) enthusiastically recruited colleagues from the business school, from Law, and from Chemical Engineering, they were considerably more reluctant to work inclusively with colleagues from Biochemistry whose disciplinary territory borders on their own. Part of the competitiveness was contrasting perceptions about which discipline had legitimate ‘ownership’ of the field of biotechnology. A microbiologist comments:

[The Biochemists] keep on imposing their [view]: ‘Biochemistry is the only thing that exists and what we [the Microbiologists] are doing [in the biotechnology curriculum] is applied Biochemistry’. That is the kind of attitude. (BS10, p. 10)

A senior microbiologist notes the response of the biochemists to a Microbiology proposal that all biotechnology students should begin with a first semester in microbiology:

The Biochemists said, ‘No, that is not right because then it looks as if biotechnology is applied microbiology!’ Which in fact it is to a large degree. You use bacteria as your building blocks for virtually everything in biotechnology. (BS12, p. 6)

A biochemist is equally persuaded of the centrality of *his* discipline to the field of biotechnology:

Biotech is not applied microbiology ... In fact every biotech degree I have looked at is heavily dependent on biochemistry courses. (BS14, e-mail 9 November 1999)

As noted earlier, this debate over whether biotechnology is *applied biochemistry* or *applied microbiology* stands in contrast with the collective view at UniA that biotechnology is *applied biology*. This conceptualisation of the field of biotechnology in narrower rather than broader disciplinary terms is further reflected in a sense of a limited departmental ownership (rather than the broader collegial ownership at UniA) of the biotechnology curriculum. Having 'departments' as the dominant frame of reference finds effect in the negotiation strategies adopted. In the comments below, a microbiologist invokes an administrative authority (courses have to be located in departments) to justify 'ownership' of the biotechnology curriculum.

[Biochemistry was attempting] severe intellectual property grabs there and for some reason or other, they were ignoring the process and at the last minute tried to come up with an entirely new curricula—and that happened twice. What we did was to ignore all their suggestions, dump it and go with what we wanted. And it ended up that, in this faculty anyway, curriculum streams actually belong to a department, so biotechnology unequivocally belongs to Microbiology. And there are still renegotiations at a late date now, that we are trying to take little notice of because the vision was developed, everybody had input all the way along, to a point. We did most of the driving because we were the ones who initiated the whole thing and then to have people who have not been particularly involved suddenly suggesting an entirely new curricula—to give their department more of a function—didn't hang too well. (BS13, p. 4–5)

The biochemists saw the negotiation process differently, but they also resort to invoking an administrative authority (the intervention of the Dean):

We kept sitting them down—I've got the correspondence if you want it—trying to get some input and saying, 'Listen, this is an important course, we think it should have the following structure', and we never got any positive response. We very much got the feeling that this is their course and they don't want any interference from us.... It was only really when we wrote to the Dean to say, 'Listen, this is just absurd', that we actually got down to get something together.... We had some very frantic meetings at the end of last year on the structure of it and the way it was going to be done. (BS11, p. 9)

These appeals to *administrative authority* and other defensive strategies stand in contrast to the process followed at UniA, which seemed to be governed by the *collegial authority* of peer adjudication. A microbiologist at UniB comments on his involvement in the negotiations in a climate of residual hostilities:

Firstly I have learnt how to run the meetings. [I arrive] at the meeting with a lot of the issues settled with various people outside of the meeting and basically pre-empting other people's agendas, which we managed to do on about two occasions, knowing that they would arrive with an agenda. We pre-empted them by going around and organising a number of things, put things in place, and when they walked in, we had a new document on the table which they hadn't seen which kept them on the wrong foot most of the time.... It was hugely complicated, very emotional at times. (BS10, p. 10)

One of the consequences of a failure to achieve extended solidarities across disciplinary boundaries has been an inability to reconcile opposing principles for the construction of a biotechnology curriculum. In the account below, we see a discourse of ‘skills’ (asserted by the microbiologists) coming up against an argument from the biochemists for the primacy of in-depth disciplinary knowledge. In justifying the emphasis on skills, a microbiologist involved in the design of the curriculum draws on a discourse of performativity. He critiques the pedagogy of the past from this perspective:

[In the past] I have taken students to industrial concerns to show them what happens in the real world. The first thing the students always ask these people: ‘Are there jobs for us when we graduate as third-years?’ And invariably there aren’t. They would rather have technikon [similar to UK’s erstwhile polytechnics] students—they say it straight out—because they are practically able, and students from UniB aren’t. I see that as a glaring problem. We give them very good academic and theoretical training—but when they get there they don’t know how to carry out basic lab techniques that would be expected of qualified microbiologists. They haven’t a clue. (BS10, p. 17)

By contrast, he emphasises the exchange value and performativity of the new curriculum:

At the end of it, a person has a set of skills and knowledge to market themselves as something to enter a niche in the marketplace—there is no point in having a little bit of this and a little bit of that and then going out there as a jack of all trades—or going out purely as a microbiologist without any business sense whatever. What we have done is—with biotechnology especially—is emphasized the skills for real-world problems—computer skills, communication skills and relevance to real-world issues. (BS10, p. 17)

He describes the first of the four biotechnology courses, ‘Introduction to Biotechnology’, as follows:

Our first semester thing was very exciting—a whole term on teaching them skills, which would be drawing up business plans, how to budget, how to set up a new business, basically how to speak publicly, how to present things from a written report and so on. So they had weekly speeches which culminated in a major speech where they had to present a business plan with their own idea and try and convince the so-called investors why their idea was good and write a report as well, using Powerpoint and spreadsheets etc. (BS10, p. 2)

The focus on performativity, however, has come at a price. Some Microbiology staff acknowledge that it was problematic to focus on ‘skills’ before ‘science’:

Then, of course, in the Biotechnology programme, we relied very heavily on outside people. In fact this is a bit of an experiment which may in fact not have worked. In second year Biotechnology, we started out with marketing and business aspects and the students were a bit ‘Hey? I thought we were being taught science and now suddenly we are being taught by this guy in business management and legal practice’ and all that sort of thing. Two students have actually pulled out. So we may have to rethink that and teach it later. (BS12, pp. 5–6)

This focus on skills meant a watering down of science content:

The bigger challenge was that we were starting off with students who have very little

biotechnology background or even science background. We had to keep it more a conceptual thing rather than in-depth science. So it was more on the level of, say, *Scientific American* or *New Scientist*, popular magazine, lay person-type level rather than the actual [indistinct]. So they came up with all kinds of ideas like socks that stop athlete's foot and that type of thing—things that allow you to lose weight—a whole range of stuff—something that could be marketed. (BS10, p. 2)

However, the biochemists were deeply unhappy about the emphasis on business skills, and a senior biochemist sums up the disquiet expressed by other members of the department:

Our overall thinking would be that they have taken a rather soft approach to it, and that the scientific content should be upped a bit. So one of the big debates ... [is] whether they shouldn't be doing hard-core biotechnology? A big debate is whether they should be doing a full biochemistry second-year course, because you need those fundamentals to really apply biotechnology, and if you don't have a thorough understanding of metabolism, ... how do you manipulate metabolism to the end of biotechnology applications? And it's an ongoing debate we are having with them. (BS11, pp. 4–5)

Finally, in April 2001, the Dean invited the parties to present their arguments at a Faculty Board meeting. So as not to present a divided front in the newly merged department, a biochemist and a microbiologist engaged in a series of meetings with a range of colleagues and eventually arrived at a common position to present to the Faculty. My discussions with informants suggest, however, that there are differing perceptions about what was won and lost in this curriculum negotiation, that resentments about the merger linger, and that prior disciplinary histories remain enduring bases for academic identities and allegiances in this context.

Conclusion

It is important to note that the data presented above represent a brief 'snapshot' in time of two contexts at different points in their respective trajectories of development. In the context of UniA, the process of building organic solidarities around a newly regionalising field of knowledge was begun (albeit tentatively) some five years *before* the curriculum negotiations commenced, and the new allegiances were given organisational form in the new School of Biological Sciences. At UniB, the discussions around curriculum commenced without such groundwork in place, and work on the social solidarities have *followed* these discussions. The respective landscapes will doubtless change with time, but the point is that the nature of the relations between the groupings when the negotiations commenced have influenced how the negotiations have proceeded. Academics are united—or divided—by their sense of identity, the various forms of discursive authority they invoke to legitimate their practices, and the material base for their sense of personal security.

What emerges from the accounts above is a pattern whereby academics articulate differing orientations towards disciplinary and institutional identities, with consequences for collegial relationships, and for curriculum. At UniA we see academics from biological disciplines looking beyond their immediate disciplines towards an overarching disciplinary identity of 'biologist', an identity predicated on a view of the epistemological changes in the field of biological science. Senior academics are (for a while at least) able to appeal to the overarching identity in a way that enables academics in these departments to subordinate disciplinary interests to a larger project, and a new curriculum is negotiated on a principled

basis by means of peer adjudication. Disciplinary identities are by no means lost, and a year later some respondents note that the investment in the extended solidarities has been eroded by the continuing dominance of the academic department as the *de facto* unit of organisation. The erstwhile new unity has so far failed to find a stable social form. But a continuing strength in the biological sciences context at UniA is a sense of alignment between institutional identities and disciplinary ones. The biologists are keenly aware of their ascendant position within the institution, and are heavily invested in the institutional strategy to strengthen their position in the field. The biologists now identify their institutional location as a key element of the strength of their identities when viewed against their peers nationally.

At UniB there emerges instead a picture of academic staff defending the boundaries of their respective disciplines, and engaged in a competitive struggle for influence over—and participation in—this curricular domain. Apart from differing disciplinary claims to the field of biotechnology, academics are divided by conflicting discursive orientations to the curriculum, with one side arguing a market-driven, skills-based regulative discourse while the other asserts a strong disciplinary position. Recent moves to merge the two departments have yet to fully reconcile a legacy of rivalry and distrust. We also see a further disjuncture (although not illustrated in this article), one between staff in disciplines and the broader institution, with staff expressing alienation from some institutional policy and leadership.

Clearly, a key condition for the weakening of insulations between these disciplines and departments has been their shared epistemological base, and the rapidly technologising field of industrial practice. At the outset this process of regionalisation would seem to provide an ideal basis for convergence amongst academics for the purposes of innovative curriculum. However, Michael Young (2001) usefully distinguishes between the *intrinsic logic* of a proposal that is independent of the actual context in which it might be implemented, and the *institutional logic* which refers to the local social, political and institutional context in which such a proposal is implemented. This case study illustrates vividly how local institutional conditions can generate two substantively different curricular responses to a changing field of practice. In this regard, we underestimate the extent to which the identities and solidarities of academics, and the legitimating discourses they invoke to shape their practices, are conditioned by local histories and material contingencies which enable or frustrate the achievement of larger projects. We underestimate also the extent to which new regulative discourses—and the new identities and solidarities they afford—must be painstakingly negotiated and institutionalised if we are to see robust and stable practices sustained in the academy. If we want to seriously consider significant curricular reform, then we must tackle the problem of appropriate institutional social bases from which to negotiate and validate new curricula, and the forms of authority and leadership needed to sustain these. These implications are significant for those who look to interdisciplinary collaboration within outcomes-based programmes as a base for quality assurance.

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