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IMPROVEMENT-ORIENTED EVALUATION OF UNDERGRADUATE SCIENCE PROGRAMMES AND THE QUALITY OF STUDENT LEARNING

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ABSTRACT

The quality of student learning is considered by many as a key area in the study of higher education as student learning gain seems to be one of higher education's critical contributions to society. In this chapter insights gained from the internal evaluation of 17 undergraduate programmes in the sciences conducted by Stellenbosch University during 2007 and 2008 are reported and analysed with a view to the possible impact of these programmes on the enhancement of the quality of student learning. For the purposes of the analysis those improvement plans related to the achievement of student-centred learning and teaching are considered to have the best potential to have an impact on the quality of student learning. The authentic improvement plans devised by lecturers and students in the sciences give an indication of the shift towards student-centred learning and teaching which is gradually taking place. An important conclusion is that the evaluation of formative undergraduate programmes can be an effective instrument to improve student learning, particularly because such evaluations consider the academic activities from the students' perspective, namely the programme, and not the individual modules of different disciplines offered by different departments.

INTRODUCTION

Amongst the expected outcomes of quality assurance (QA) procedures in higher education, the enhancement of the learning experience of students continues to be of prime importance. It is an ongoing concern for role-players in QA to reflect on the question whether the numerous mechanisms and procedures in place do in fact contribute to the realisation of this outcome, and if so, whether the ratio of effort

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and outcome is at acceptable levels (see Morley 2003:132). Depending on their interests and perspectives, different role-players will probably respond differently. QA practitioners, who have a professional interest in the maintenance and development of QA systems, may tend to respond more optimistically than academic staff in higher education institutions who often see QA as an unwelcome but necessary addition to (or even intrusion into) their primary tasks of research and teaching (see Evans 1999:99ff).

QA in higher education usually involves different combinations of external and internal mechanisms and procedures. The same instrument may yield different results when applied by an external QA agency than when applied by an institution (or a unit within an institution) itself. QA mechanisms can include instruments that focus on organisational units at different levels, from a specific academic unit or department, to a school, a faculty, an institution or even a system consisting of a number of institutions at regional or national levels. So, for example, in the South African context, an institutional audit takes an institution as the object for evaluation or assessment. Although the enhancement of student learning may indeed be one of the expected outcomes of an institutional audit, such an effect will probably be more indirect. It is usually expected that an audit that focuses on the QA arrangements of an institution will contribute, further down-stream, to the quality of the student learning experience. QA mechanisms may also include instruments that focus on specific processes or services (e.g. the leadership and management processes within an institution, or the provision of access to academic information, or capital campaigns, or learning and teaching programmes or research programmes). When a learning and teaching programme is taken as the object of evaluation, the impact on student learning is arguably much more direct.

In this chapter a number of aspects related to programme evaluations are discussed in general and insights gained from internal evaluations of the undergraduate programmes in the sciences (17 programmes in total) at Stellenbosch University (SU) are reported and analysed with a view to their possible impact on the enhancement of the quality of student learning. These evaluations (conducted during 2007 and 2008), are interesting for a number of reasons:

▪ The evaluations were conducted internally mainly for improvement purposes and not for the purpose of (external) accreditation. The possibility of compliance and 'telling them what we think they want to hear' has therefore been limited. In fact, this self-evaluation process was purposefully not followed, as is usually the case

in quality assurance, by an external peer review (see *Challenges in the evaluation in formative undergraduate programmes* below for a discussion of the reasons for this).

▪ For many of the academic staff members and students who participated in the 17 different self-evaluation committees this was the first experience of a programme evaluation (although many had previous experience of other forms of evaluation, e.g. of departments or research projects). Different self-evaluation committees were established for the different programmes. In each case colleagues and students from different departments participated, therefore facilitating evaluative and development-oriented discussions across departmental boundaries.

▪ The programme accreditation criteria of the South African Higher Education Quality Committee (see HEQC 2004), were grouped into 11 themes and also reduced and simplified (see Stellenbosch University 2005). Not all the role-players are necessarily sufficiently *au fait* with the terminology used in quality assurance. For many of the academic staff members this was the first exposure to these criteria and to the application of such criteria at programme level, and in particular, at the level of undergraduate programmes in the sciences. What resulted were therefore the actual and authentic responses and insights of academic staff members and students who are intimately involved with the programmes that have been evaluated.

For the purposes of this chapter the notion of 'the quality of student learning' is understood with reference to the official learning and teaching approach of Stellenbosch University, as stated in its Learning and Teaching Policy (Stellenbosch University 2007:). The commitment of the University is

> to actively move towards the creation of a student-centred learning and teaching environment. In other words, learning is central to the teaching process and serves as point of departure for the University's organisation of learning and teaching. Within student-centred university education, the "transferring knowledge" approach makes way for "teaching activities that facilitate learning" and the focus is on the nature, quantity and quality of learning that takes place.

DIMENSIONS OF PROGRAMME EVALUATION

Deciding on the object of evaluation: 'Programme'

In the South African Higher Education Qualifications Framework (HEQF) a qualification is defined as

> the formal recognition and certification of learning achievement awarded by an accredited institution … The format for qualification specification should include the title and purpose of the qualification, its NQF level, credits, rules of combination for its learning components, exit-level outcomes and associated assessment criteria, entry requirements, forms of integrated assessment, and arrangements for the recognition of prior learning and for moderation of assessment (RSA 2007:6).

A programme is defined as

> a purposeful and structured set of learning experiences that leads to a qualification. Programmes may be discipline based, professional, career-focused, trans-, inter- or multi-disciplinary in nature (RSA 2007:6).

Although both definitions are fairly clear it remains a challenge to apply these definitions consistently, especially when the unit for evaluation is to be defined in the context of a programme evaluation process. A so-called nested approach has been developed by the educational authorities in South Africa to explain the different dimensions and levels of specification involved in understanding the relation between qualifications and programmes. The programmes discussed in this chapter can be defined in terms of the 'nested approach' as depicted in Table 10.1.

Considering the designators indicated in this table the difficulty in applying the definitions consistently becomes clear. Both 'science' (BSc) and 'agricultural science' (BScAgric) can be taken as designators in the same layer of the nest, or only 'agricultural' could be taken as being in the same layer which would then render the additional qualifiers to the layer of second qualifiers. In practice, however, the designators 'of Science' (BSc), 'of Agricultural Science' (BScAgric) and 'of Agriculture' (BAgric) are usually seen as being on the same level, especially because these qualifications are often offered in different faculties within a university. The differences become more pertinent when specifications at a deeper level are considered. So, for example, a BSc in Physics can have additional 'streams' or 'focus areas' such as 'Laser Physics' or 'Nuclear Physics', and similarly a BScAgric in Crop Production Systems can include more specific 'streams' or 'focus areas' such as 'Crop Protection and Crop Breeding' and 'Soil and Water

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Management'. And then, of course, sometimes at yet a deeper level of specification in all these programmes the notion of major disciplines of subjects classified different areas in terms of the 'Classification of Educational Subject Matter' categories (CESM categories) for funding purposes has to be catered for.

TABLE 10.1   The 'nested approach' as prescribed by the HEQF

Layers in the 'nest'		Qualifications and programmes evaluated		
NQF level and level descriptor	Level 8			
Qualification type as specified in terms of a qualification descriptor	Degree	Bachelor (B)	Bachelor (B)	Bachelor (B)
	Designator	of Science (Sc)	of Science (Sc)	of Agriculture (Agric)
Qualification specialisation (Usually taken to be equivalent the programmes leading to these qualifications.)	Qualifier	in Physics in Chemistry in Mathematical Sciences in Earth Science in Biodiversity and Ecology in Molecular Biology in Human Life Sciences in Sport Science in Science Education	in Agriculture	in Administration
	Second qualifier		in Animal Production Systems in Agricultural Economics in Wine Production Systems in Crop Production Systems in Forestry in Food Science in Conservation Ecology	

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When a unit for evaluation is to be determined it is therefore not simply a matter of pinning it down at the level of the qualification specialisation as specified by the first qualifier. In the cases discussed above that would mean that nine BSc programmes would be evaluated, but only one BAgricAdmin programme and one BScAgric programme would have been evaluated, whereas the seven learning programmes as named by second qualifiers in the case of the BScAgric programmes are sufficiently different to justify each case to be taken as a separate unit of evaluation. On the other hand, the streams or focus areas within the BSc programmes are not necessarily sufficiently distinct to justify separate units of evaluation. Since programme design is one of the major issues to be considered during an evaluation (see *Academic integrity* below), one of the findings of an evaluation process may well be that inconsistencies in the application of design principles and naming conventions necessitate a reconsideration of existing programmes.

From this discussion it is clear that the decision on the units (or programmes) to be evaluated cannot be taken on a formal basis only. Many considerations are to be taken into account, including the type of evaluation envisaged, the purpose of the evaluation and the institutional context within which programmes have been developed over many years. It is somewhat of a chicken-and-egg situation: a decision on the unit of evaluation has to be made in advance, but the definition and delimitation of the unit itself is also evaluated during the subsequent process.

It has further become clear that it remains a challenge to distinguish between qualifications and programmes and to understand and apply the relationship between qualifications and programmes consistently in different contexts (e.g. different faculties, each with its own history and customs) and for different purposes (e.g. for funding purposes or for quality assurance or accreditation or certification purposes). Although the finalisation of the HEQF in 2007 has contributed significantly to close the policy gap which existed in this regard in South Africa for a decade or more, further research on these issues and subsequent system development will have to take place during the process of the implementation of the HEQF. Much work needs to be done to come to clearer understandings of what constitute a designator and a qualifier and to make clear how they differ. It is expected that the Council on Higher Education (CHE) will play a leading role in this regard since the responsibility for standards setting has been allocated to the CHE in terms of the National Qualifications Framework Act (RSA 2008).

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TYPES AND PURPOSES OF PROGRAMME EVALUATIONS

Evaluation outcomes are used by different role-players for different purposes.

Trow (1994) distinguishes between four types of evaluation, namely internal supportive, internal evaluative, external supportive and external evaluative. Babbie and Mouton (2001) explain that, in social research methods theory, three different purposes and types of programme evaluation are typically distinguished: (a) judgement-oriented evaluations, (b) improvement-oriented evaluations, and (c) knowledge-oriented evaluations. Although in evaluation theory, the term 'programme' is used to mean a 'social intervention', these three distinctions are nevertheless useful and insightful when applied to learning and teaching programmes. It could be argued that learning and teaching programmes are a form of educational intervention. One can therefore distinguish between three types of evaluation for academic programmes:

1. Judgement-oriented evaluations that aim to establish the intrinsic value, merits or outcome of a programme. Normally, the following kinds of questions are asked: To what extent is the programme successful? Has it achieved its goals? To what extent is the programme effective? Has the intended target group been reached? Are the people that benefit from the programme doing so in the most effective and efficient way? The most critical requirement for such a judgement to be made is the criteria that are used for the judgement.

2. Improvement-oriented evaluations typically ask the following questions: What are the strong and weak points of the programme? Has the programme been implemented properly? What constraints are there on the proper implementation of the programme? Do the people who benefit from the programme respond positively to the programme? Formative evaluation that is aimed at identifying weak points in the programme and at identifying unexpected problems needs to occur in time to make suggestions for improving the programme. Thus, evaluations aimed at improving programmes use information systems to monitor the programme, to sustain its implementation, and to provide continuous feedback to the programme managers.

3. Questions regarding the usefulness and suitability of programmes usually relate to programme evaluations aimed at both judging and improving programmes. In both cases, the end result of the evaluation is decision making for follow-up action. However, there is a third reason for conducting programme evaluations; to answer the following kinds of questions: How do programmes work? How do

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people change their mental models and/or behaviour? In the latter case, the generation of knowledge is the purpose of programme evaluation.

The evaluations discussed in this chapter were of an internally evaluative nature with the purpose of improving the programmes and enhancing the quality of the student learning experience.

CHALLENGES IN THE EVALUATION IN FORMATIVE UNDERGRADUATE PROGRAMMES

To understand the context within which the programme evaluations discussed in this chapter were conducted, it is necessary to take note of a number of challenges when formative undergraduate programmes are evaluated.

When the notion of 'a programme-based approach' became prominent in South African Higher Education in the late 1990s, in particular through the vision of White Paper 3: "… meets through well-planned and coordinated teaching and learning programmes" (RSA 1997:par 1.12), it presented a challenge in particular to those faculties offering broad formative programmes (e.g. Arts, Social Sciences, Natural Sciences, Economic and Management Sciences). They had to come to grips with the implications of a 'programme approach' to their undergraduate academic offering and academic structures. In contrast to the faculties offering more tightly structured professional programmes, these faculties usually tend to have a stronger discipline-based approach in their academic offering, also at undergraduate level. Typically, students can choose one or two majors from the range of disciplines located in different departments within these faculties, and add the required minor subjects to meet the requirements of a BA, BSocSc, BSc or BComm qualification. During the initial processes for the recording and interim registration of qualifications through the South African Qualifications Authority (SAQA) in the late 1990s, many institutions redesigned their academic offerings to meet the requirements of a programme-based approach to curriculum/programme design. An issue debated at the time was whether the academic organisational structures of universities should continue to favour academic disciplines as organising principle or whether new organisational forms should be developed (see Naudé 2003:70-82). In many cases the academic organisational structures were not changed to provide the optimal environment for the effective management and delivery of programmes. This was the case at SU, which did not re-organise its academic departments into schools. The organisational units (departments) in these faculties (offering formative programmes) remained based primarily on disciplines. Therefore the governance structures are not easily mapped onto programmes which include

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modules from different disciplines spread across different departments within a faculty and even across different faculties. Furthermore, the boundaries of departments are hardened by the fact that the funding is channelled through departments. Departments do not necessarily always see it as in their best interest to contribute to the success of a programme as a whole, especially if programme requirements, for example, require a department to agree to larger portions of the total credits to be allocated to other departments. It remains a challenge to ensure that departments do not end up competing instead of cooperating in the best interest of a programme, and therefore of the students' learning experience.

To provide for the needs of programme management, a system of programme committees chaired by programme coordinators was created (see University of Stellenbosch 2004a). However, in most cases these coordinators do not have any real power to enforce effective programme management. In many cases departments simply continue to offer their majors without paying sufficient attention to the contribution of their share in the context of the programme as a whole. In some cases in the past, the programme committees hardly functioned. So, when the programmes were evaluated, the programme coordinators and committees had to be revived. This was a positive effect of the evaluations. The committees were expected to think beyond the disciplines and consider the programme as a whole. This in itself brought the process closer to the students' experience, since they generally experience a programme as a whole and not only in its separate parts, as is the case with the lecturers. Therefore, by enforcing a process that requires academic staff to attend to programmes, the University ensured that the students' learning experience came more specifically into focus.

Good quality assurance practice requires a check by external peers (usually in the form of a visit) following the self-evaluation process. In the case of the evaluation of formative undergraduate programmes, this poses a problem (including issues of cost and time). Since many different disciplines are involved in the offering of these programmes it would mean that a large number of peers should be involved. For example, in the 17 undergraduate programmes considered here, 19 different departments are involved, and because many departments house more than one discipline, about 25 different academic disciplines are involved (or even more, depending on how one defines a discipline). It is clear that it will not be feasible to involve such a large team of peer reviewers. Since peer reviewers are always involved when academic departments are evaluated by SU it was decided to limit the programme evaluations to the self-evaluations conducted by the 17 programme committees consisting of academic staff and students of the University itself. This had the obvious limitation that the crucial and

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usually valuable external check and input remained lacking. On the other hand, it had the benefit that the process as a whole was more explicitly focused on improvement. There was not any sense of having to impress or satisfy external reviewers. Furthermore, the process was not linked to a formal accreditation decision to be taken on the basis of the evaluations. While a process without external peer review can be expected to lead to more open and frank discussions and conclusions, a problem could be that the process is not taken as seriously as it would have been if the external peers and a formal accreditation decision were also part of the process. The need for both internal and external dimensions to provide for improvement as well as accountability purposes in quality assurance is well-established good practice in QA, classically expressed by Vroeijenstein (1995) as "navigating between Scylla and Charybdis".

Given the fairly recent arrival of a range of quality assurance procedures in South African higher education, it is a challenge to ensure a satisfactory balance between the efforts and resources invested in evaluations and the gains made. Too many criteria to be attended to, too many documents to be collected and the writing of too extensive reports may defeat the purpose of an evaluation. There is a real danger that a core purpose – improving the quality of students' learning experiences – may get lost in the maze of systems, procedures and jargon. Part of this challenge is to ensure a sensible balance and coherence between different elements of a quality assurance system. At SU, for example, the periodic reviews of academic departments (including the modules taught by a department, the department's research, the department's community engagement activities) and the periodic reviews and (re)accreditation of programmes (undergraduate and postgraduate) by institutions and by professional bodies need to be aligned to avoid duplication (and an even bigger administrative burden). Furthermore, all these QA activities need to be aligned with the periodic comprehensive institutional audits. For example, having been through a thorough and comprehensive institutional audit in 2005 (conducted by the HEQC), the rationale for the evaluation of (formative undergraduate) programmes only a year or two later must be clear. And since many of the departments involved in the teaching of the science programmes discussed here have recently been evaluated as departments, it is even more important to have a clear understanding of the specific purposes of programme evaluations and how they differ from the other QA activities. (See Appendix A for an exposition of the way in which the different elements of the institutional quality assurance management system at SU are aligned and distinguished from one another.)

A final challenge to be mentioned here is the problem of conflating the process of evaluation with the reporting of the results of an evaluation process. Quite often

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evaluation is seen as being identical to report writing and thereby the reflective dimension of evaluation in the context of collegial discussions is lost from sight.

EXPECTATIONS OF THE PROGRAMME EVALUATIONS

Against the background of the challenges discussed in the previous section, a number of specific expectations of the process of programme evaluation were discussed and agreed upon by the programme committees before the evaluations commenced, including that

- it should lead to sustainable quality promotion;
- it is used as an instrument for change;
- it is properly integrated and aligned with other forms of evaluation; in particular departmental reviews;
- the outcomes should justify the effort, time and resources devoted to the evaluations;
- the approach used should be applicable to formative undergraduate programmes;
- the standard methodology used in QA should be adhered to, including a well-planned and executed self-evaluation process based on explicit agreed-upon criteria or standards, the production of a self-evaluation report with evidence to substantiate the findings and claims, and the formulation of specific improvement plans, but excluding a visit by external peers (for the reasons discussed in the previous section); and
- the process should provide a good basis and preparation for formal external programme accreditations which may be required at some stage, and therefore the criteria expected to be used in external accreditation processes should be used as far as possible.

CRITERIA (OR STANDARDS) CLUSTERED IN THEMES AS BASIS FOR EVALUATION AND STRATEGIES FOR IMPROVEMENT

To give effect to expectation that the internal programme evaluation process should be a preparation for possible external accreditation processes in future, the HEQC's programme accreditation criteria were clustered into the following 12 themes: (1) programme rationale; (2) academic integrity; (3) student recruitment, (4) selection and admission; (5) staffing; (6) learning facilitation; (7) assessment; (8) infrastructure and academic information sources; (8) programme coordination; (10) student success and

academic support for student success; (11) service learning and work-based learning; and (12) programme evaluation and development. When postgraduate programmes are evaluated a number of additional criteria specifically related to research and postgraduate supervision are also included.

In the next section a selection of the improvement strategies developed with reference to the criteria in a number of these themes are presented and commented on. A guiding principle for the selection is the relevance of the proposed plans for the improvement of the quality of the students' learning experience. Based on the same principle, not all the themes will be discussed below. For example, although the quality of staffing and infrastructure obviously has a direct impact on the quality of the students' learning experience, these themes are not discussed here, because they are traditionally considered when student learning is under discussion. Some of the other themes are more directly the result of the introduction of formal quality assurance measures, and it may be therefore be more relevant to consider their possible impact on the quality of student learning.

WHAT ARE WE LEARNING FROM PROGRAMME EVALUATIONS?

Programme rationale

Criteria

The programme is consistent with the faculty's mission, planning and resource allocation. The design maintains an appropriate balance of theoretical, practical and experiential knowledge and skills. It has sufficient disciplinary content and theoretical depth at the appropriate level. The programme offers opportunities for community interaction. The design offers learning and career pathways to students with opportunities for articulation with other programmes within and across institutions, where possible.

A selection of improvement plans

Amongst the 17 programmes evaluated, a total of 69 improvement plans were formulated covering all the different criteria. However, the following objectives seem to be more directly related to the improvement of the students' learning experience:

▪ To enhance interaction with stakeholders (subject-specific societies, industry, extraordinary lecturers, alumni) in order to broaden academic and industry-specific networks (*inter alia* through the use of advisory committees);

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- To review and restructure the subject matter covered in the programmes continuously to ensure that module-level outcomes are better aligned with the programme-level specific and generic outcomes, taking into account student feedback and industry input;

- To develop new modules or to redesign existing modules to fill theoretical gaps and to provide for further deepening of theoretical knowledge and better preparation for attractive career paths;

- To communicate the programme outcomes more clearly and more consistently to students in order to contextualise lectures and other learning experiences; to communicate information about administrative and support services to students, staff and stakeholders (including, for example, to advertise student assistantships more effectively);

- To communicate the rationale for the approach followed in the programme during the first year of study, and to maintain a challenging learning environment for students, despite low student numbers (in some programmes) or rapidly increasing student numbers (in other programmes).

Discussion

The realisation that the programme architecture as a whole, specifically the programme outcomes themselves as well as the alignment of module outcomes and programmes outcomes, should be communicated better, is a major step forward in the context of faculties used to work primarily within academic disciplines. This can contribute significantly to the improvement of student learning. This should ideally not only be the responsibility of the programme coordinator, but also that of each lecturer in the context of each module. It is also interesting that there is a realisation in the more applied sciences (agriculture) as well as in the more basic sciences (natural sciences) that improved interaction with and exposure to the 'world outside the classroom' can significantly improve the quality of student learning.

Academic integrity

Criteria

Programme outcomes, learning methods, learning material and expected time of completion cater for the learning needs of the programme's target student intake and other stakeholders and meet international standards. The programme content is academically well-founded and meets international standards. Modules and/or

courses in the programme are coherently planned with regard to content, level, credits, purpose, outcomes, rules of combination, relative weight and delivery.

A selection of improvement plans

Amongst the 17 programmes evaluated, a total of 65 improvement plans were formulated covering all the different criteria. However, the following objectives seem to be more directly related to the improvement of the students' learning experience:

- To increase research and benchmarking opportunities with international scholars to ensure the programme remains at the forefront of new developments, to make better use of the mutual enrichment opportunities offered through the University's emphasis on the teaching and research nexus; and establish new research institutes/ units/centres;

- To review the undergraduate programmes annually more rigorously and in this process specifically attend to the coherence of the modules in terms of content, level of difficulty and credit value, the curriculum, learning materials, learning methods and programme outcomes, and the feedback from external moderators;

- To enhance the collaboration of lecturers in order to improve programme cohesion, expose students as early as possible to the core themes, and balance practice and theory better. This could be done by identifying and removing obstacles inhibiting the use of experiential learning, increasing laboratory time and monitoring the efficacy of the practical parts of modules, by investigating coherent year-long practical modules at second and third-year levels and by reconsidering the module composition and structuring of the programme in order to make provision for a longer period of internship. The collaboration of lecturers could also contribute towards filling in possible theoretical gaps through the development of new and adapted modules and cutting out duplication. It could furthermore ensure the relevance of prescribed modules that are presented by other departments from both within, and external to, the school/faculty; to accept that a four-year degree is the norm (despite the formal minimum study time of three years for a BSc) to plan the curricula accordingly.

Discussion

These improvement plans confirm the deeply (and passionately) held conviction amongst scientists of the benefits of the teaching and research nexus. By being active researchers themselves lecturers are in a much better position to ensure a solid

academic foundation to learning and teaching programmes and the achievement of international standards.

It is significant that through this evaluation process the academic staff came to realise the range of benefits that will emanate from better cooperation amongst themselves, and note that in almost all the aspects listed above the students will benefit. It is interesting that the issue of a proper balance between the theoretical and practical dimensions of learning and teaching programmes featured to prominently when the academic integrity of programmes is considered.

Student recruitment, admission and selection

Criteria

Advertising and promotional materials contain accurate and sufficient information on the programme with regard to admission policies, completion requirements and academic standards. Appropriate policy and procedures are in place for the selection and admission of students. Selection criteria are in line with the institutional priority to promote diversity, and are applied consistently. The quality and number of students take professional needs into account. Student numbers do not exceed the programme's capacity to deliver quality teaching. Bridging programmes are available where necessary.

A selection of improvement plans

Amongst the 17 programmes evaluated a total of 93 improvement plans were formulated covering all the different criteria. However, the following seem to be more directly related to the improvement of the students' learning experience, or, in this case, to provide students with the opportunity to study at a university in the first place:

▪ To monitor and, if necessary, reconsider admission requirements at SU as a possible mechanism to curb the high failure rate (this is possibly also needed for admission to honours programmes) and to prevent over-subscription to the programme, to cap student numbers (given the limited laboratory space available);

▪ To increase the diversity of the student body in terms of South African population groups as well as international students by taking the following actions:

 · to monitor the bridging degree programmes to ensure that they do indeed contribute to the widening of participating and the promotion student diversity;

 · to develop and implement mechanisms (including assessment methods) to broaden access, (e.g. summer school, bridging programmes);

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- to increase the number of undergraduate bursaries, in particular to ensure the continuous improvement of the University's diversity profile;
- to make the bridging programme compulsory for students with a Grade 12 mark of between 50% and 56%;
- to reach out to underprivileged schools in the University's immediate vicinity and to sponsor prizes (e.g. book prizes) for the best Life Sciences student in Grade 12 at a few selected schools;

- To help students to make informed choices at different phases in the programme by taking the following actions:
  - to ensure that admission requirements into the programmes are posted on departmental and faculty web pages and brochures and to improve the administrative implementation of admission criteria;
  - to arrange visits to departments or to the experimental farm for second-year students to enhance informed choices on major subjects;
  - to supply information on programmes at the Expo for Young Scientists and Olympiad candidates, as well as for high school science teachers;
  - to encourage third-years to attend final years' product development presentations;
  - to ensure that the web site inspires students;
  - to promote the need for a Faculty-level Open Day with smaller, but more carefully selected learner groups (e.g. the top 10 learners within a grade with Mathematics as school subject or learners from strong feeder schools) so that departments can participate more effectively;
  - to improve the quality and the distribution of marketing material.

- To implement extended degree programmes (and first-year academy) to benefit students that have to overcome academic backlogs; and

- To increase the number of available bursaries, *inter alia* by investigating the possibilities of increasing industry-funded bursaries.

Discussion

By having to apply their minds to this criterion, the awareness of programme committees of the issues related to student recruitment, admission and selection was undoubtedly raised among staff. Traditionally academic staff members are not directly involved with these issues since they are usually handled elsewhere within an institution. The fact that admission requirements have been treated in the evaluations under consideration the first place as a possible mechanism to keep under-prepared students out and as a possible mechanism for enrolment management is a reflection of the specific context of the programmes that were evaluated. The through-put rate in the undergraduate

programmes in the sciences is the lowest of all programmes. Laboratory facilities are currently used at capacity. The hurdle function of admission requirements therefore seems to be prominent. However, this needs not be a negative observation. It can be very detrimental to the quality of students' learning experiences if they have been admitted to a programme for which they are not adequately prepared and are therefore constantly challenged to perform at unreasonable levels. It serves no purpose to set students up for failure.

It is clear from the improvement plans that the need to increase the number of black and women scientists is widely recognised and supported by faculty members. It is significant that they are not only aware of this need, but that they are proposing creative and practical ways to meet the challenge and that they are themselves prepared to become involved in recruitment efforts.

The range of plans proposed to help students to make informed choices once again underscores the importance of good communication with all students at all levels. This requirement was also pertinent when the design and academic integrity of the programmes were discussed.

Learning facilitation

Criteria

Learning facilitation (lecturing) takes place in accordance with Stellenbosch University's Learning and Teaching Policy. Learning and teaching methods are appropriate for the design and use of learning materials. Learning technology is used appropriately. Guidance is given to students regarding programme outcomes and programme integration. Suitable learning opportunities are provided to facilitate the acquisition of the knowledge and skills specified in the programme outcomes. Opportunities are created specifically for the acquisition of generic skills (in accordance with the SAQA critical outcomes). The effectiveness of learning and teaching interactions is regularly monitored and the results used for improvement

A selection of improvement plans

Amongst the 17 programmes evaluated a total of 70 improvement plans were formulated covering all the different criteria. From these plans, four themes have emerged.

1. Pedagogy (teaching and learning)

   ▪ To gain more clarity on the meaning of student-centred teaching and its implications; to develop a policy on student-centred teaching so that independent, enthusiastic and spontaneous learning takes place consistently; to revisit the problem-based approach particularly with a view towards the improvement of lifelong learning abilities, critical thinking and professional reasoning; to review the links between problems and lectures; to review the problems addressed in lectures and evaluate students' demands over the four years (to ensure proper increments in depth and complexity; to employ a variety of assessment opportunities to enhance student learning;

   ▪ To encourage participation by academic staff in staff development courses focused on student learning and teaching skills;

   ▪ To utilise web-based course management systems more effectively, in particular to communicate effectively with large groups, but not to replace the face-to-face lecturer-student interaction and the use of class notes.

2. Structure of the learning opportunities and the suitability of and access to the learning material

   ▪ To rearrange the curriculum so that assignments, seminars and research projects are better spread over all the years of study; to incorporate fundamental knowledge much more explicitly throughout the curriculum;

   ▪ To make more use of text books and journal publications in the sciences and less use of class notes.

3. Communication and class interaction with students and student feedback

   ▪ To request that lecturers always provide module frameworks which include the goals and outcomes of each module and a list of the literature to be covered in the module (in accordance with the module framework requirements stipulated by Senate);

   ▪ To organise focus group discussions at module and programme levels to gather student feedback; to improve efficiency of the process to gather student feedback; to workshop and act on students' feedback;

   ▪ To investigate ways to make the class experience more stimulating;

   ▪ To adequately communicate the module outcomes to the students annually by the chairperson and via the website;

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- To expose second- and third-year students to the layout and cohesion of the programme once more.

4. Critical skills

    - To review the modules to ensure that they contain learning opportunities for the development of these skills, without unnecessary duplication;

    - To highlight the fact that the ability to work in a team is one of the programme outcomes;

    - To discuss with computer literacy conveners options to allow Mathematical Science students to do fewer but more relevant modules within Computer Literacy

    - To investigate the possibility of introducing opportunities for students to improve and perfect their written and verbal communication skills at early stages in their studies;

    - To develop oral presentation skills for senior students.

Discussion

It is significant that these four themes have emerged from the discussions of Science lecturers and students. It is clear that there is an awareness of the need to move away from one-directional lectures as the dominant form of learning facilitation. It is also significant that the need to make explicit provision for the acquisition and assessment of critical skills is considered to be so important. This indicates that an awareness of the ideals of education policy makers (of the late 1990s) is beginning to filter through to the level of the actual learning interactions provided for in a programme (although it may be largely due to the fact that the evaluation criteria specifically required the self-evaluation panels to attend to this). It is quite clear that this awareness has not yet materialised into sufficient understanding of the notion of student learning and successful practices in the inculcation and assessment of critical skills.

An issue for further research is to design a programme evaluation process more specifically to gauge the achievement of critical skills. It will also make sense to involve external evaluators who concentrate specifically on a programme's success in this regard. If this is the focus of the external evaluators, there would not be a need to have a subject expert in all disciplines provided for in a programme on the external evaluation panel. However, before an evaluation with such a focus can be conducted, it is clear that much more needs to be done to ensure that specific opportunities to learn and assess critical skills are included in the programme.

Assessment

Criteria

Assessment takes place in accordance with the University's Assessment Policy. There are clear and consistent published guidelines/regulations for marking and grading of results, aggregation of marks and grades, progression and final awards, and credit allocation and articulation. Faculty and institutional policy and rules for assessment are communicated to students, as is policy on students' rights and responsibilities in this regard. Policy exists for the secure and reliable recording of assessment results, settling of student disputes regarding assessment results, ensuring the security of the assessment system especially with regard to plagiarism and other misdemeanours, and development of staff competence in assessment. Student progress is monitored. Policy and procedures are in place for assessment and both internal and external moderation. Policy and procedure ensures the validity and reliability of assessment practices (including issues regarding the identification and handling of plagiarism).

A selection of improvement plans

Among the 17 programmes evaluated, a total of 58 improvement plans were formulated covering all the different criteria. The following plans seem to be directly related to the improvement of the quality of the students' learning experience.

- Assessment competence and approaches to assessment
  - To encourage continued assessor training of academic staff;
  - To continuously check that assessment tasks are pitched at the required standards;
  - To analyse all examination questions according to Bloom's taxonomy;
  - To make assessment challenging, in particular to assess problem-solving abilities;
  - To ensure a better balance of formative and summative assessment opportunities;
  - To review the number of assessment activities that contribute to the marks and activities;
  - To give more smaller tests rather than only a few major tests and an exam;
  - To use a range of assessment methods such as a seminar, laboratory, written and oral examinations, including the use of peer reviewing within student/study groups.

- Communication with students and feedback on assessments
  - To improve module frameworks to include all the assessments details (dates, type of assessment as well as expected timeframe for feedback);

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- To clearly communicate the means by which problem-solving abilities will be assessed, i.e. the quality of the questions to be expected, the level of insight that will be required;
- To update the assessment dates and weights on the website;
- To keep yearbooks updated with regulations regarding assessment and moderation at departmental level;
- To communicate the different assessment methods of different modules clearly to the students;
- To provide reasons or motivations for giving a particular mark, especially for essay-type projects and similar essay-type exam questions;
- To change fieldwork rubrics to be more user-friendly and precise (with student input).

- Student support and monitoring
  - To conduct individual interviews with students scoring >30% in a semester test to determine the reasons, and plan for support;
  - To devise an early warning system for students who are struggling (more difficult with larger classes);
  - To monitor individual student progress in terms of the First Year Academy's mechanisms.

- Meeting policy requirements
  - To ensure that all tests and exams are aligned with the principles and requirements of the University's Assessment Policy;
  - To ensure rigorous internal moderation, and external moderation;
  - To handle question papers with care to avoid corruption of the assessment process;
  - To enhance strategies to eradicate plagiarism including the use of the Turn-It-In software package for electronic submission of assignments.

Discussion

The University's Assessment Policy (University of Stellenbosch 2004b:1) states that "assessment forms the essence of an integrated approach to student learning. It is generally accepted that assessment probably constitutes the learning and teaching practice through which the most direct influence may be exerted on student learning". Judged against the background of the improvement strategies that emerged from these programme evaluations, it seems that an awareness of the importance of student learning is beginning to develop. It is interesting that so many of the proposed improvement plans can be listed under the rubric of better communication (as was the case with the improvement of learning facilitation – see the relevant section above). If these improvement plans are read as a kind of mirror of what is lacking in current

practice, it is a concern that, despite the ease and efficiency of modern communication technology, there still seems to be inadequate communication with students about the learning and assessment opportunities. How is it possible that such an obvious requirement for effective student learning still seems to be so frequently overlooked? It is therefore very useful that these programme committees have listed this aspect for specific attention.

Although the evaluation criteria do not include any reference to Bloom's taxonomy, it is referred to in the proposed improvement plans. This is an indication that the staff development courses presented by the University are beginning to make an impact.

It is noteworthy that the proposed improvement plans suggest a balance between innovation in assessment practices (e.g. assessor training) and effective support and monitoring (e.g. the activities of the First Year Academy). Both dimensions are indeed important. The Science faculties offer many so-called service courses (e.g. in Mathematics and Biology) to large numbers of students of different faculties. Yet, the lecturers in the Science faculty are appointed in the first place on the basis of their research competencies and performance. In such a context assessor training is very important. This provides the opportunity to enhance the lecturers' assessment skills and contributes to a change in the whole environment that is more attuned to the provision of a high quality student learning experience.

REFLECTION AND CONCLUSIONS

Given that the themes and criteria for the evaluations were provided to the programme committees in advance, it will be a mistake to assume that the Science lecturers and students who evaluated the programmes would have designed these specific plans if they had not been confronted with the criteria. In this manner the criteria also served as guidelines for good practice. This is indeed the intention, and this is the reason why it was decided to work with 'criteria' and not 'minimum standards'. The mere fact that programme committees had to grapple with these criteria and consider their programmes against the criteria represented an important staff development opportunity. The formulation of all these improvement plans is an important phase in the ongoing process to assure and enhance the quality of the student learning experience. However, it is also clear that the real value of the process depends on whether these improvement plans are actually implemented. The closing of the loop is crucially important in the quality assurance processes.

Since it was decided to work with criteria (which also serve as guidelines for good practice) and not minimum standards, and given the large number of criteria used, it may follow that a programme does not necessarily meet all the criteria, but still be considered of acceptable quality. This can be valid within a developmental context. However, in a strict accountability context (if this was an accreditation process) an interesting question to explore would be whether *each* student should meet *all* the outcomes of a programme and whether the evaluation process is geared to establish that.

In a study of the impact of quality assurance activities in various countries, Stensaker (2003) and Wahlén (2004) found that these activities often serve to facilitate discussion, cooperation and development within and between academic units with regard to quality assurance and improvement. This has perhaps been the most valuable outcome of the evaluation process discussed in this chapter. It seems obvious that the quality of the students' learning experience can best be understood and improved if the academic activities are considered in the manner in which students experience them, namely, *as a programme*, and not as individual modules in different disciplines offered by different departments. Therefore a programme evaluation process could contribute significantly to the improvement of the students' learning experience, especially in the context of formative undergraduate programmes offered by large faculties.

REFERENCES

Babbie E & Mouton J. 2001. *The Practice of Social Research*. Oxford: Oxford University Press.

Evans GR. 1999. *Calling academic to account. Rights and responsibilities*. Buckingham: Society for Research into Higher Education & Open University Press.

Harvey Lee & Knight Peter T. 1996. *Transforming higher education Buckingham*. Buckingham: Society for Research into Higher Education & Open University Press.

HEQC (Higher Education Quality Committee). 2004. Criteria for Programme Accreditation [Online]. Available: http://www.che.ac.za/documents/d000084/ [2009, 1 April].

Morley L. 2003. *Quality and power in Higher Education*. Maidenhead: Society for Research into Higher Education & Open University Press.

Naudé P. 2003. Where has my department gone? Curriculum transformation and academic restructuring. In: P Naudé & N Cloete (eds). *A Tale of Three Countries: Social Sciences Curriculum Transformations in Southern Africa*. Cape Town: Juta. 70-83.

RSA (Republic of South Africa). 1997. Draft Education White Paper 3. *Programme for Higher Education Transformation*. Government Notice No. 712.

RSA (Republic of South Africa). 2007. The Higher Education Qualifications Framework. *Government Gazette,* No. 30353. 5 October. Government Notice No. 928.

Blitzer E (ed.) 2009.Higher Education in South Africa. Stellenbosch: SUN PRESS

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RSA (Republic of South Africa). 2008. *National Qualifications Framework Bill* (As amended by the Select Committee on Education (National Council of Provinces)).

Stensaker B. 2003. 'Trance, Transparency and Transformation: The impact of external quality monitoring on higher education'. *Quality in Higher Education*, 9(2):151-159.

Trow M. 1994. Academic reviews and the culture of excellence. *Kanslersämbetels Skriftserie.* Stockholm.

University of Stellenbosch. 2004a. Duties and responsibilities of Programme Committee Chairs and Programme Coordinators [Online]. Available: www.sun.ac.za/inb [2009, 1 April].

University of Stellenbosch. 2004b. Assessment policy [Online]. Available: http://www.sun. ac.za/Onderrig/index.htm [2009, 1 April].

University of Stellenbosch. 2005. Themes and criteria for the evaluation of departments, programmes and support service units [Online]. Available: www.sun.ac.za/inb [2009, 1 April].

University of Stellenbosch. 2007. Learning and teaching policy [Online]. Available: http:// www.sun.ac.za/Onderrig/index.htm [2009, 1 April].

Vroeijenstein AI. 1995. *Improvement and accountability: Navigating between Scylla and Charybdis: Guide for external quality assessment in higher education*. London: Kingsley.

Wahlén S. 2004. Does National Quality Monitoring Make a Difference? *Quality in Higher Education,* 10(2):139-147.

ANNEXURE 10.1
ALIGNMENT OF EVALUATION ACTIVITIES AT STELLENBOSCH UNIVERSITY

				1	2	3	4
Object of evaluation				Evaluation activity			
				Evaluation of departments	Accreditation of professional programmes	Evaluation of faculties and programmes	Evaluation and audit of the University
				every six years	periodically according to own schedule	every six years	every six years
				by Stellenbosch University	by professional bodies	by Stellenbosch University	by the HEQC
Academic functions	T	Undergraduate modules	Formative	√			
			Professional			√	
		Undergraduate programmes	Formative				√
			Professional			√	
		Postgraduate modules	General	√			
			Professional			√	
		Postgraduate programmes	General	√			
			Professional			√	
		Teaching: management and support at faculty level				√	
		Teaching: management and support at university level					√
	R	Research by individuals					
		Research within departments		√			
		Research at faculty level (management and support)				√	
		Research: management and support at university level					√
	CI	Community interaction by departments		√			
		Community interaction: management and support at faculty level				√	
		Community interaction: management and support at university level					√
Organisa-tional units and functions		Functioning and QA systems of departments		√			
		Functioning and QA systems of faculties				√	
		Functioning and QA systems of support service divisions					√
		Functioning and QA systems of management bodies at institutional level					√
		QA system of the University					√