Central University of Technology

STEPS (Strategic Transformation of Educational Programmes and Structures)

Learnings from the Conference, for the curriculum transformation Workshop

1. Background: the STEPS curriculum transformation process

Vision 2020 sets out how CUT intends to become a distinctive and proficient university. It aims to contribute to the development challenges in our region and country, especially by producing "quality social and technological innovations" (Mthembu[1]). To do so, it will focus on outcomes and impacts, for industry, but also in government and civil society; take advantage of sustained and strategic partnerships; accordingly revisit its curricula and structures; and itself become a flexible, efficient, "new generation-type organization".

This Vision has been powerfully endorsed by the Free State government, whose Director-General states: "I am convinced that your vision is on the right track, viewed through and external lens: [to] focus on results-based methodology, attuning your curricula, programs, research and innovations to the needs of primary users, of which government is one such user." (Nwaila)

In order to apply this Vision to our core activity of teaching and learning, CUT is undertaking the STEPS process (Strategic Transformation of Educational Programmes and Structures). STEPS aims to introduce some new curricula and programmes aligned to the present and future development challenges; mark others for improvement; and consider yet others for possible discontinuation if they no longer have relevance or demand.

As a first "step" in the STEPS process, the support of Senate was secured, and the sequence was considered in a special extended Senate meeting. The second step has been the recent STEPS Conference on curriculum transformation, held on 13-14 May. This was very well-attended, and the assessment indicated that the inputs were appreciated. These inputs from authoritative speakers spanned our Vision; the context and challenges of our province; the role of UoTs in the post-schooling landscape; the contribution of appropriate research; international perspectives; schema for differentiating curricula and graduate attributes; and CUT case-studies. The PowerPoints of these presentations may be found on the CUT intranet.

The third step will be a curriculum-transformation Workshop in early August, which will be somewhat smaller in size. Mindful of insights from the Conference, inter-faculty work groups will identify opportunities for new curricula, programmes and structures, as well as those which need to be reworked for better alignment, or considered for discontinuation.

This document accordingly aims at digesting or recalling key learnings and recommendations from the Conference regarding curriculum transformation, for participants to take into the Workshop, including some critical ones that may not have been specifically mentioned there. It will also be useful for other staff as a reminder. It is arranged, in section 3, under the following five headings, identified for the purpose by the Vice Chancellor:

[1] Names in parentheses refer to the presentations to the STEPS Conference on curriculum transformation at CUT, 13-14 May 2010. These are available on the CUT intranet.

a) A common understanding of the **philosophy** that belies CUT's curriculum and makes it distinctive relative to other UoTs and other universities
b) generic expectations regarding **content and structure** of transformed curricula in which our philosophy is embedded;
c) relevant classroom **methodologies** together with **social, technological** and other classroom **environments**;
d) graduate attributes and outcomes in relation to all of the above and the context.
e) broad intended user-oriented outcomes or impacts of transforming curricula and programmes, in socio-economic development;

2. Differentiating universities of technology (UoTs) from traditional universities

Before turning to the learnings under these headings, we need to address an underlying theme that was tackled by the Director General of the Department of Higher Education and Training (DHET), Professor Mary Metcalfe, but was also touched on in several other presentations in the Conference (e.g. Teichler, Garrod, Gibbon, Nevhutalu): the dimensions by which UoTs are differentiated from so-called traditional universities. Six dimensions may be identified which we need to bear in mind. (There may be yet further aspects by which CUT in particular differentiates itself from other UoTs. These may come up in discussion at Faculties, or at the Workshop.)

One dimension would be the *attributes of our graduates* - who would, for example, be more specifically prepared for the workplace (Volbrecht), and more oriented towards professional competences rather than only being competent in generic critical judgment (Teichler). This is elaborated below. Another differentiator – also elaborated below – is the typical *nature of curricula*, which in a UoT focuses on niches in the labour market (Teichler), has a higher proportion of contextual than conceptual knowledge, and emphasises operational over strategic competencies (Gibbon). This orientation necessitates work-integrated learning for our students A third dimension would be the *nature and intensity of research*, which at a UoT tends to get its leverage though being applied, focussing on development problems, and involving industry-orientated consultancies (Metcalfe, Teichler, Garrod).

Fourthly, there is the *learning environment and the student experience*, which at a UoT often involves a greater use of new learning and teaching methodologies, cooperation in teams, and relevant media (Teichler). There are two other dimensions that were less explicitly referenced at the Conference. One is the *culture of the academic staff*, which at a UoT places a greater emphasis on professional experience, the involvement of part-timers, and partnerships. This necessitates the cultivating of people with dual identities: what Mthembu has called academic entrepreneurs (entrepreneurs and industrialists who are academically oriented) and entrepreneurial academics (academics who venture into and equally thrive in entrepreneurial and industrial spaces). Indeed partnerships may enable a "revolving door" between academics and industrialists, whose career paths span both industry and academia. The other is the *student profile*: at UoTs a much higher proportion of students have the equivalent of what used to be called secondary certificates rather than university exemption. This poses challenges that should be carefully addressed in our methodologies and in the learning environment. As the Minister of Higher Education and Training, Dr Blade Nzimande, quipped at the recent Higher Education Summit, such students are for now the only ones available that Universities can enrol.

When taken separately, none of these dimensions is decisive – in practice, each university strikes some balance between extremes. The challenge for our distinctiveness as a UoT or as CUT will be in

the choices we make about which way that balance is tilted. Whether viewed as broad contrasts or as a spectrum, these dimensions taken in conjunction well differentiate UoTs from TUs. As Vice Chancellor Mthembu has emphasised, "unlike at traditional universities, where aloofness, dispassionateness and distance from government, business and industry are virtues, these to us are vices" (Mthembu). We accordingly expect that these differentiators will - in different ways and different extents - be important in our STEPs review of curricula, and in particular in informing the new offerings that will make CUT distinctive.

With this in hand, we may now turn to some conceptual review, under the four headings identified above, so that at the onset of the Workshop we are already prepared for the more practical undertaking of reviewing curricula and especially identifying possible new areas and offerings.

3. Key learnings and recommendations from the Conference for the Workshop

a) The philosophy that underlies CUT's curriculum and makes it distinctive relative to other UoTs and other universities

A university of technology needs its processes and products to deal with the future as much as the present: "the different key sectors[of our region] do not seem to be strategically positioned to deal with the 21'st century 'unknown' challenges, and we often seem to be quick to fall back to traditional, 'known' approaches and solutions"(Nwaila).

Further there is the impact of the knowledge society through technology: we expect technology to infuse the content of curricula; enrich teaching methodologies, as well as extend coverage and improve quality with e-learning; apply technology to our social and economic issues to "leapfrog" stages of development; and respond to the career and vocational opportunities created by new technologies. In particular, a UoT produces graduates who are technologically savvy (considered further in (d) below). As Nwaila put it "a modern knowledge-based economy demands human resources that are numerically and scientifically literate, technology fluent, and skilled at problem solving, critical analysis and engagement".

However there is also a need to have a deep disciplinary base as well as the broad ability to apply knowledge across situations and the reality of globalization (Volbrecht). In other words, to perform any job in an innovative manner requires a mix of academic and vocational knowledge (Garrod), which Teichler prefers to call "professional relevance" rather than mere "employability". And globalization requires (Metcalf) a more flexible workforce, greater breadth of knowledge, less routine work, rising qualifications, and more generic skills.

In attempting to orient our curricula towards advancing these broad philosophical expectations, certain *themes* will sometimes infuse our general thinking, and at other times be expressed in specific new curricula or even structures. Some themes may be as follows (with selected illustrations mentioned by Maharaswa, Metcalfe, Nevhutalu and Nwaila; and by Kokt, Shale, Vermaak and Makola):

- Innovation, e.g. lowering costs of production chain, nanotechnologies, mecha-tronics
- "Green" issues, e.g. biotech and agroprocessing, environmental education, renewable energy
- Entrepreneurship, e.g. small-scale mining and agriculture, and tourism management
- Management skills e.g. for health institutions, schools, business processing
- Inter-disciplinarity, e.g. cross cutting technologies such as robotics, geospacial technology

- Synergies, e.g. we must achieve better interfaces with FET colleges, to enhance “portability” of qualifications and reduce duplication

These themes and examples, and others, can be considered or generated within the Faculty discussions that are being contemplated prior to the Workshop.

Although this document concentrates on curricula in relation to teaching and learning, we recall the products of a UoT are not only its graduates with their distinctive competencies but also its research outcomes. The latter span not only postgraduates and publications but importantly innovations that arise from its partnerships with industry and civil society. Technical innovations yield patents and social innovations yield processes, as Dr van Rijswijk put it at the 2009 SATN conference.

CUT also emphasizes that the relevant “environment” for the strategic review of curriculum is internal as well as external: what is the interaction between students and lecturers? Is it inhibiting or empowering? Employing enabling methodologies is as important as appropriate content for the production of graduates with the desired attributes. This is touched upon in (c) below.

b) Generic expectations regarding content and structure of transformed curricula at our UoT

A coherent curriculum according to Gibbon addresses five criteria. The first two concern the content and intended output, the next two regard the organization of the material, and the remaining one concerns the intended impact:

1) *Knowledge base*: What is the balance between contextually relevant (which emphasizes operational and technical proficiency) on the one hand and conceptually relevant (which emphasizes disciplinary specialism)? For example, one may conceive a spectrum from tourism management (contextual) through to organic chemistry (conceptual) with mechanical engineering in between.

2) *Intended competencies and skills*: Are these more operational and practical and specific and technical or are they more strategic, theoretical, generic and analytical?

3) *Sequencing*: Does the content have to follow a sequence, or is order unimportant?

4) *Complementarity* with other parts of the curriculum.

5) *Purpose*: Is there a niche, or are there prospects for a niche, in the broader socioeconomic development arena for graduates with this qualification?

There are additional important considerations at the curriculum level. Firstly, curricula capture our distinctiveness as a UoT, ensuring that we remain true to our vision at the very core of our activities. In this way we resist what Garrod called “mimetic isomorphism, i.e. the tendency of UoTs mistakenly to drift toward the mandate of traditional universities and thereby neglect their own distinctive role.

Secondly the UoT mandate almost inevitably requires us to transcend disciplinary and faculty silos. The tackling of real world problems, which is characteristic of the UoT focus, does not respect the disciplinary boundaries characteristic of a traditional University (Teichler).

Thirdly there are clear implications for not only what is taught but how it is taught, as mentioned in the next section.

c) Classroom methodology and environment

The STEPS process is deliberately concentrating on the content of curriculum and program – we will need separate discussion about what really happens in the lecture theatre, laboratory, and work place. For our present purposes, however, we note that responding effectively to our context also has implications for how the curriculum is delivered. As Nwaila notes "the challenges facing us in Africa are unique. They are more complex than challenges faced in the developed world… Rapid technological change, scare resources, and rising organizational interdependencies increase the levels of complexity". It follows that "universities as producers of knowledge and knowledge workers must lead and find *new ways* of doing business".

At the level of teaching and learning, Garrod recalled how UK equivalent of our SATN (South African Technology Network) ensured that a well-specified curriculum must also deal with the several relevant aspects of course design. These are necessary to complement the criteria covered in (b) above. UoTs must devote specific attention to:

- course aims and objective,
- outcomes,
- assessment strategy,
- modes of delivery (including, e.g. enrichment by e-learning, team work)
- entry qualifications,
- facilities,
- staffing (including for academic support)
- industry exposure (e.g. guest lectures, tours etc.) and
- work integrated learning.

The Workshop will rely upon the post-Workshop task teams, which take forward the design of the new curricula and programmes, to take up these important complementary requirements.

d) Graduate attributes and outcomes in relation to context

Graduate attributes are "the qualities, understandings, attitudes, values and abilities that individual universities articulate as the distinguishing features of their graduates" (Volbrecht).

These have been captured in different schema (Garrod, Volbrecht and Teichler, also van Rijswijk) which we can synthesize into four key attributes, as follows, with more specific instances of each. UoT graduates are:

Trained to do something

- Technically competent: Sufficient expertise in the field to be able to be immediately productive in the work environment (employable)
- Computer numerate: Able to use the computer packages used in the specific work environment and sufficient conceptual ability to adapt to new packages
- Business literate: Able to write clear reports and comprehend workplace documents

Trained to question

- Conceptually able: Confident with conceptual material as in the more abstract elements of the syllabus.

- Articulate: Able to test ideas and raise thoughts 'one-on-one' and in groups.
- Problem solving: Able to participate in actual innovation.

Trained to innovate

- Able to plan: planning and project skills.
- Connected: Able to source , assess and apply work-related information, e.g. from the internet.

Trained to interact

- Socialized: Able to work with co-workers and supervisor.
- Articulate: Able to express themselves and offer ideas and opinions in discussion to peers and seniors.
- Able to work both in teams and independently as embodied by the course teaching methodology

A final caution is in order: we must not overestimate the role of our educational interventions in generating graduate competencies; nor underestimate the influence of professional certification and the limitations of our planning information (Teichler).

e) Broad intended outcomes or impacts of transforming curricula and programmes

An "outcome-impact" orientation is a key tenet of Vision 2020. *Inputs* are students, lecturers, materials, equipped laboratories or workshops, etc.; *processes* involve the broad curriculum and its attendant aspects, the policies, procedures and the services; *outputs* are graduates with diplomas or degrees, together with entrepreneurial academics. If the inputs and processes are used more efficiently or relevantly, the graduates will be of better quality and more employable and innovations produced by our students and academics will be more attuned to socio-economic development. Then an important *outcome* may be that more of our students are entrepreneurial in and outside the workplace and more our academics and researchers become embedded in business and industry. The resulting *impacts* may be various: the growth of the regional economy may become more appreciableand efficient through our social and technological innovations; more of our graduates may become entrepreneurs, setting up enterprises, or be employable; there may be a decline in the skills gap and a rise in innovations; and so on.

We learn that the Free State (FS) has been heavily dependent on primary production, agriculture and farming (Moses). The employment share of these sectors has been declining; but in favour of government or community services rather than manufacturing. Given the low educational profile of the workforce, with half having Std 7 or less, there is continuing unemployment and worsening inequality.

To reverse these trends, the FS Growth and Development Strategy (Nwaila) has prioritised economic growth, investment and employment; social and human development; justice, crime prevention and security; and governance and administration. More specifically, it recognises the importance of post-school education for economic growth and development (see also Pillay): especially by improving the throughput of the FET colleges and CUT, and the alignment among institutions urged by the National Skills Development Strategy (Maharaswa). In particular, technical graduates need to rise from 15% to 30% of the higher-educated workforce (Moses). All this in turn urgently demands improved teaching and learning in schools, especially numeracy (Pillay, Shale).

5. Next Steps

- This document is being circulated to all academic and support staff, whether or not they attended the Conference, as background information on the STEPs process, the issues on which it is focussing, and how it will unfold.
- For staff who will be attending the forthcoming Workshop, this document is required reading. It aims to have clarified the basic conceptual issues upon which we need to build, when we turn to the more strategic and practical considerations: especially the challenge of identifying or conceiving appropriate new curricula, programmes and structures relevant to socio-economic development in our region, present and future.
- In preparation for the Workshop, each Dean will be requested to convene – towards the end of July –a pre-Workshop Faculty discussion on the substance of this document and its implications. The aim is to get thinking going on the Faculty's courses and programmes, gaps and opportunities, and potential collaborations with other Faculties. In particular, this discussion should note the themes set out at the bottom of p. 3, and the few illustrative examples; and seek to generate yet other instances to feed into the Workshop.

-oOo-