OCCUPATIONAL COMPETENCE: A CURRICULUM MODEL

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ABSTRACT

This paper clarifies concepts and opportunities in the skills development arena and provides some guidance to the higher education sector on contributing to reducing national scarce skills. This paper is based on experiences in facilitating the implementation of the skills development strategy in South Africa.

1. INTRODUCTION

The South African economy is characterised by acute skills shortages on the one hand and high unemployment rates on the other. Concurrently new government policy decisions have created considerable uncertainty amongst institutions old and new (eg, Sector Education and Training Authorities or SETAs), employers and learners. Older models and practices appear to be out of step with the new requirements, the new institutions and the new delivery options such as learnerships.

The purpose of this paper is to present a curriculum model which clarifies the nature and requirements of learning required for occupational competence.

An analysis of a variety of learning processes designed for the acquisition of occupational or professional competence revealed three primary modes of learning. The curriculum model is a systemic approach to characterising and locating the three modes of learning as part of a skills development programme for achieving occupational competence. This model is not only useful for describing content and activities, but also for managing and assuring the quality of learning processes.

Experience gained from applying the model in a variety of contexts shows that the process of developing programmes can be speeded up considerably. Moreover the model is particularly useful for the reshaping, revision and alignment of existing programmes.

In addition to structuring content and learning activities, the model can also be used as a basis for project management, for developing assessment and quality assurance processes and for the purposes of assessing and recognising prior learning.

The curriculum model is a tool which will enable higher education institutions to engage pro-actively and productively with the world of work (employers, industry and professional associations, SETAs) to structure skills development programmes, thereby contributing to the reduction of skills shortages and the alleviation of unemployment.

What is Skills Development?

Skills development is not the same as vocational education and training. In the skills development world the sun does not orbit around education or training institutions. It orbits around the employed, the self-employed and the unemployed. In South Africa this also includes vulnerable groups that struggle to gain access to or progress within the labour market[1]. This orbit also includes the context in which the skills are applied, ie the places of employment, communities, and government departments where skills are required. None of these can operate effectively to address the challenges of the economy or the social development needs in South Africa without an adequate supply of relevant skills.

Skills development is the learning process leading to occupational competence[2]. Occupational competence requires application in context, ie work experience in a real-life, real-time working environment.

Scarce and critical skills reflect the need for people with the required occupational competence to perform critically important functions in the economy. The lack of such occupational competence results in, for example:

- imbalances in the labour market
- lack of delivery of basic services
- poor quality service and workmanship resulting in high levels of rework
- low levels of productivity.

Quality education is often cited as the answer to these problems but in South Africa it is not managing to achieve this. Large numbers of graduates cannot find employment while the formal labour market seeks to import skills from overseas.

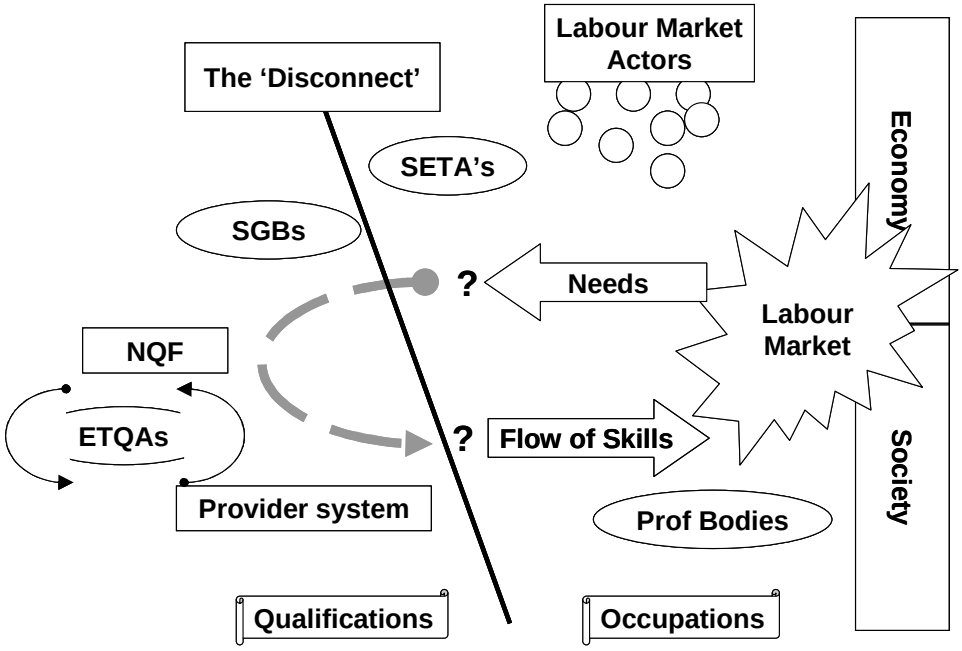
Labour Market and Education Sector Disconnect

There is a systemic disconnect between education institutions and training programmes, on the one hand, and employer expectations or labour market needs on the other (Vorwerk, 2005). The disconnect operates at different levels of the system. There is no systemic feed-forward loop in which labour market needs are collected, collated, and evaluated in order to inform the provider sector. Changing occupational profiles, dying occupations and new or emerging occupations only become apparent in a haphazard and informal way to providers of education and training. Where good relationships exist and where, at a local level education and training institutions have an entrepreneurial flair they may be a fairly quick response to such changes. But, by and large, the education and training system continues to operate without taking such changes into account. This results in many learners being unable to access the labour market or even to acquire the experiential learning required by many occupationally-focused qualifications. The figure below depicts these poor systemic links between the elements of the system to address scarce and critical skills in South Africa.

Figure 1: The Labour Market and NQF Disconnect

[1] When using the term labour market we are referring to something broader than simply labour demand and supply. We are referring the overall range of economic and social development activities both in the formal and in the informal sectors. Hence, the skills required include personal skills, economic and social entrepreneurship, community support skills and a wide range of skills related to emerging occupations.

2 In this paper the term ‘occupations’ also includes trades and professions.



Notes to the figure:
SGBs = Standards Generating Bodies who in terms of the South African Qualifications Authority regulations set standards for qualifications
NQF = National Qualifications Framework, established in terms of the South African Qualifications Authority Act of 1995
ETQAs = Education and Training Quality Assurance Bodies to assure the quality of provision in terms of the South African Qualifications Authority Act of 1995
To reconnect the labour market and the education sector, the following would have to be achieved:

1. Labour market needs are collected and collated and include not only projected numbers but also an indication of skills required
2. This information is captured in a career path framework
3. Qualifications and unit standards are developed to reflect the occupational needs
4. Learning programmes are developed and implemented
5. The outcomes and the impact of education and training interventions are evaluated and assessed.

To collect and structure labour market needs the South African Department of Labour have conceptualised and are in the process of developing an Organising Framework of Occupations and a National Career Path Framework. The discussion of these innovations is beyond the scope of this paper. The curriculum model which will be described in this paper links primarily to Step4. The question that immediately then arises is: why do we need such a curriculum model?

While the education sector needs to become more responsive to labour market needs, the labour market should also accept that it has a role to play. Employers in both the private and public sectors and also other role players do not (or find it difficult to) actively or constructively engage with the education sector in order to influence programmes. In trying to facilitate such processes we have encountered symptoms of the disconnect mentioned above in quite concrete ways.

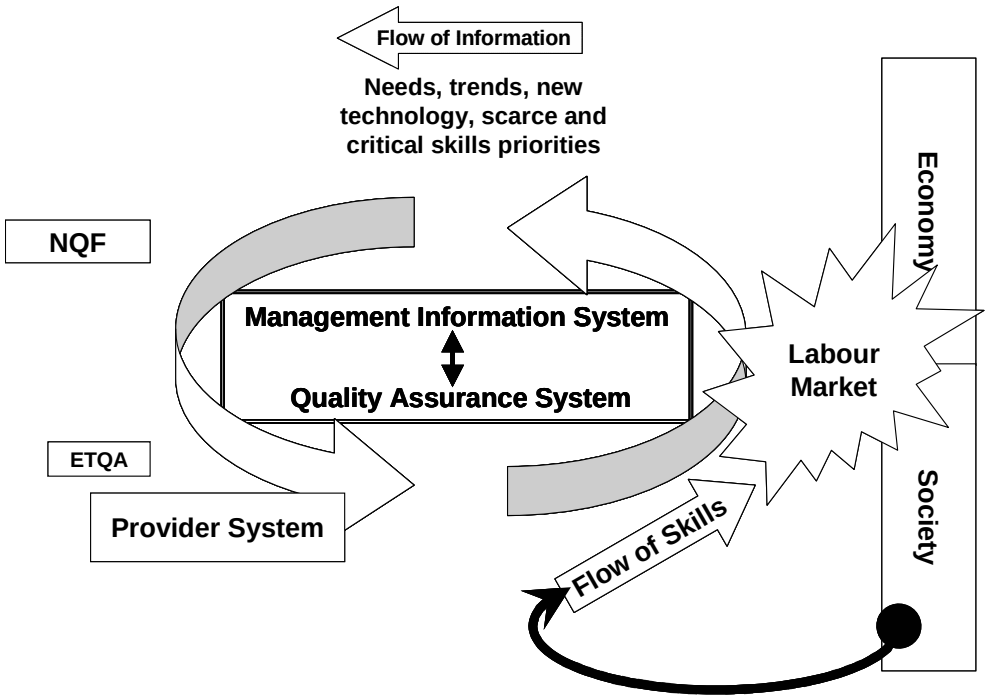
The following summarises the disconnect at the level of the provider. An education provider was describing the difficulties they were experiencing in terms of making their programmes more relevant for industry: "They say that we (the technical universities) must train better, but they don't want to get involved when we ask them how".

Systemic linkages are required between the labour market and further and higher education if we, as a country, want to address the issue of scarce skills and unemployment successfully. The linkages would enable the system to collect and provide information on skills needs, on changes in occupational profiles, and on the requirements of new occupations. The type of information and the nature of the engagement would be different at each level of the system, eg:

- at a strategic level it would be about prioritising scarce and critical skills
- at sectoral level SETAs would structure their incentives in order to encourage and focus stakeholder and provider efforts
- at a local level providers would engage with sites to provide the requisite work experience

The education and training sector would respond by adjusting their programmes and focus. The systemic link is summarised in the following diagram.

Figure 2: The curriculum model forms part of the systemic linkages of an occupational learning system



By ensuring that education and training institutions receive information on changing needs in the labour market, they can ensure that their programmes are aligned with labour market needs and the education and training provision becomes more responsive and relevant to the labour market.

Integrating Education and Training to Address Scarce Skills

Learnerships as a mode of delivery have been identified as a means to address these problems. A learnership is a learning programme which:

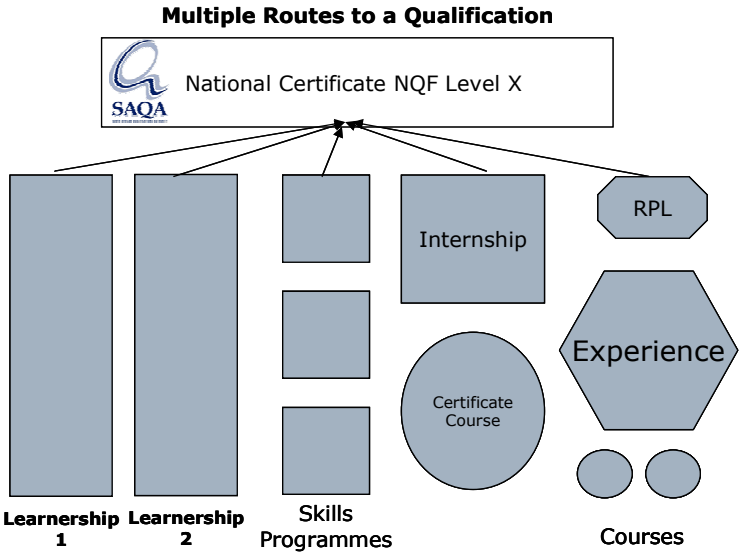
- consists of a structured learning component;
- includes practical work experience of a specified nature and duration; and
- results in a qualification registered by the South African Qualifications Authority, and
- relates to an occupation.

In dealing with the education and training sector we experience a great deal of confusion about learnerships. There is a strong perception that a learnership is a separate qualification. This is

based on the perception that there is only one route to achieving particular kinds of qualifications, eg the only way to achieve a trade qualification is via an apprenticeship.

In an outcomes based system there could be multiple routes to a qualification and multiple learnerships representing different specialisations can be registered against a single qualification. A qualification based on This is summarised in the figure below.

Figure 3: This figure illustrates how various learning programmes can lead to a single qualification



What are Learnerships?

The Skills Development Act stipulates that:

a. *the learnership consists of a structured learning component; the learnership includes practical work experience of a specified nature and duration;*
b. *the learnership would lead to a qualification registered by the South African Qualifications Authority and related to an occupation; and*
c. *the intended learnership is registered with the Director-General in the prescribed manner (RSA 1998)*

A key feature of a learnership is the work experience component. This component must be specified, planned for and assessed.

While an improved flow of information and improved assessment and evaluation processes will strengthen the system described above, this is insufficient to bridge the disconnect at operational levels. At the heart of the disconnect at the operational level lies an implicit theory of provision: if I teach people enough of the right things, they will be able to do these things in context. As a consequence providers view workplace learning (ie workplace experience) as informal, difficult to codify and therefore impossible to direct or evaluate. As a result experiential learning processes typically provide only vague guidelines to employers and learners to acquiring occupational competence. In the worst cases learners are simply dumped in the workplace to complete their *notional hours*[3].

[3] One credit on the National Qualifications Framework is equivalent to 10 notional hours of learning, including work experience. The completion of the notional hours was conceived as fulfilling the requirements of the set standards by making the work experience component simply an expression of the

Another misperception we often find amongst educationalists is that occupational competence achieved through learnerships means an inevitable sacrificing of academic standards. The range and quality of institutional learning should be the same as for any other student aiming for the qualification. The difference lies only in the fact that the learner in a learnership has a place of employment from the outset.

In an outcomes-based system we need to conceptualise and systemise all aspects of the learning process that lead to occupational competence as the end point. Only then can we design, develop, implement, quality assure and evaluate the learning process.

This means structuring education and training interventions differently from the way it has been done in the past. It requires a stronger focus on the transfer of learning from institutional environment to workplace and the development of sufficient workplace experience, including reflective competence. It is not about increased time in the workplace, but about more structured learning processes in the workplace.

To adequately address these issues we need a curriculum model which will integrate education and training to achieve occupational competence. This model should assist the Higher Education (HE) sector to clarify its interventions in the labour market. It should allow the HE to formulate concrete proposals to industry and to assess whether they meet industry's needs - and if not, to provide alternatives.

2. THE CURRICULUM MODEL

The curriculum model for occupational competence (de Jager et al, 2005) was developed to provide:

- integration of education, training and workplace practice
- bridges between formal education, formal training, practical training and workplace experience which lead to integration
- bridges between public education institutions, private education and training providers and workplaces which lead to partnerships
- a common language for the development of learning programmes with an occupational intent which leads to coherence.

The main purpose of the model is thus to facilitate the integration of education and training to achieve occupational competence. In principle the model is based on the belief that there are three modes of learning required for the acquisition of occupational or professional competence. These modes are:

1. Knowledge acquisition (general and contextual)
2. Development of practical skills (general and specific)
3. Workplace experience

In order to ensure that the learning outcomes will result in occupational competence, the curriculum should therefore reflect the organisation of and the relationship between these three learning modes required to achieve occupational competence.

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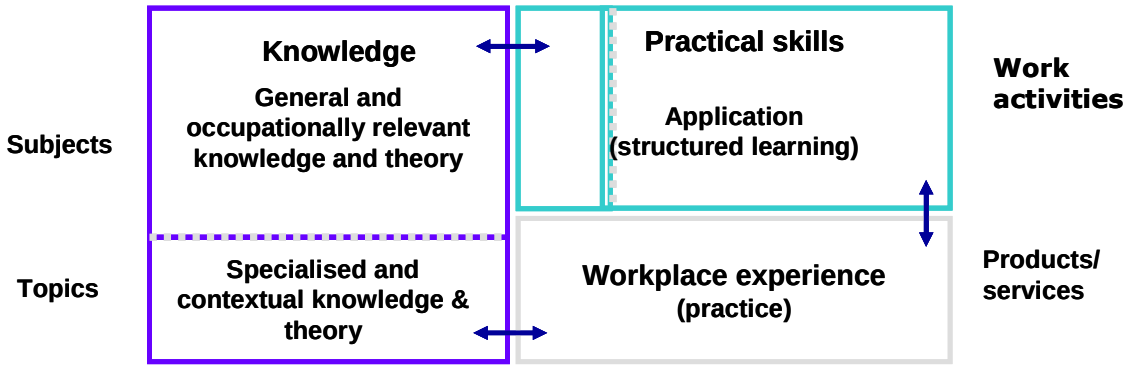
difference between what curriculum developers set for the formal learning processes and the requirements of the standard.

Figure 4 : A graphical depiction of the curriculum model showing how education and training integrates to achieve occupational competence



The *knowledge learning mode* can be subdivided into two components:

- The general and occupationally relevant knowledge and theory that would be applicable to a group of related occupations as organized/structured in the Organsiing Frameowrk of Occupations (OFO), for example, engineering.
- The contextual and specialized knowledge and theory that would be applicable to more specific occupations within that group, for example, civil, electrical and mechanical engineering. The content of this component can be described as subjects.

The content of the knowledge learning component consists of a series of topics that can be clustered into subjects. The knowledge component must support and underpin, and enable the learner to successfully engage in, the practical activities leading to the development of skills.

The development of *practical skills* can similarly also be subdivided into two components:

- the general application or structured learning component that would be applicable to the group of occupations, and
- the specialised application component that would be applicable to the more specific occupations within that group.

The content of the practical skills learning component would be described in modules. The *workplace experience* develops relevant skills applicable to the occupational competence within a specific context and should result in the development or delivery of products or services in the form of assignments.

Structure of the Curriculum Model

This curriculum model is applicable to occupationally-related qualifications and programmes and comprises two parts:

- the development of a curriculum framework for a group of related occupations that share similar general theory, knowledge and basic skills, and
- the development of curricula for each occupation within that group.

Part 1 concentrates on the identification and development of the general and occupationally-relevant knowledge and theory as well as the general application and structured learning components that are applicable to a group of related occupations.

The principle is that these general components should be translated into content. The core content (without any adjustment) would form part of the curriculum for each occupation related to that group.

Since many occupations cut across economic sectors and learning fields, the various parties would have to agree on the responsibility for the selected occupation in terms of the development process and then later in terms of quality assurance and certification (and registration if required). The core content would normally be provided by an institutional provider. It is general and not contextual and provides the learners with the underpinning and supporting knowledge and skills that they require as a platform from which to acquire the specialised and contextual knowledge and skills for a specific occupation.

Part 2 of the development of a curriculum for a specific occupation concentrates on the development of the contextual and specialised knowledge and theory, the contextual and specialised application or structured learning and the workplace experience components required for a specific occupation. The core content developed in Part 1 would form the basis for the specialised and contextual content required in Part 2.

In a learnership context the delivery of the occupationally specific content could be divided between the workplace and the institutional provider. The workplace experience component can only be obtained in the real-life real-work environment.

Applicability of the Model

Learning programmes leading to occupational competence are not a new phenomenon. This particular curriculum model is flexible, and could be adapted to a variety of learning programmes that combine institution-based and workplace-based learning. The model can also be used to create programmes to accommodate learners with varying needs based on prior knowledge or experience.

Benefits of the Model

The major benefit of the model is that the same curriculum framework and the core content thereof can be used for a number of related occupations and as part of different learning programmes. Further benefits would include:

1. Current programmes can be aligned for broader participation in the different learning programmes provided for in the Department of Labours National Skills Development Strategy (NSDS.) 2005-2010
2. Learning programmes and learning material will be more relevant and the same materials and resources can be used in a variety of learning programmes.
3. Greater coherence in occupational learning programmes would facilitate:
    - the development of more flexible learning programmes which would allow the same learning outcomes to be achieved by learners in a variety of different situations.
    - vertical progression between different levels of the National Qualifications Framework (NQF)
    - horizontal movement between different types of learning programmes (i.e. portability)
    - horizontal movement between related occupations (i.e. articulation).
4. The reflection of the learning modes in the curriculum provides a structure for all role players to decide on delivery, funding and quality assurance practises.

This model is not only useful for describing content and activities but also for managing and assuring the quality of learning processes. This aspect will be discussed in greater detail in section 5.

3. APPLICATION OF THE MODEL

The model was initially conceptualised as a way of structuring collaboration in the Further Education and Training sector (FET) in order to implement learnerships.

FET Colleges would provide the general theory and knowledge, private training institutions with the necessary workshop facilities would provide the application, while employers would provide the work experience and specialised and contextual knowledge. Quality assurance would in this situation have to be focused on ensuring that the links between the modes of learning and the integration of the knowledge, application and work experience would be maintained. However, the model has not been fully implemented in the FET context as yet.

The model was successfully used to restructure a can-making apprenticeship into a series of learnerships. Can-making is a manufacturing process producing metal packaging in a variety of designs, shapes and sizes for packaging products such as food, beverages, aerosols, paints and household products. The unit standards which comprised the NQF level 2 qualification (equivalent to phase one of the apprenticeship) were broken down into the smallest possible components, grouped to eliminate duplications and then clustered into meaningful units of learning (ie knowledge required and practical learning activities). The existing apprenticeship trade theory and workshop modules were then linked to the clustered units of learning and categorised horizontally into four columns. The four columns were:

1. General theory and knowledge
2. Practical skills
3. Specialised and contextual knowledge
4. Work experience – ie workplace practice

Finally the topics and modules were grouped vertically into ‘subjects’. Part of the output is shown in the following table.

Table 1: An Illustration of How Topics and Modules were Clustered Using a Four Column Matrix

Subject	*General theory*		*Practical Skills*		*Contextual theory*		*Work experience*	
Materials	Topics		Modules		Topics		WE Module	
Team	Topics		Modules		Topics		WE Module	
Safety, Health, Environment	Topics		Modules		Topics			
Quality and productivity	Topics		Modules		Topics		WE Module	
Production	Topics		Modules		Topics		WE Module	
Production	MF - 1	Introduction to Production	LT8-3	Setting the L & R-Hand Gravity In-feed Guide Assembly	LT8-1	Machine Description LT8 light tester	WE01	Operating Manufacturing Equipment
Production	tbd	Conversion processes	LT8-4	Setting and aligning the in-feed star wheel	LT8-2	General Operation Procedure		
Production	MF 2	Welding processes	LT8-5	Setting and adjusting the inner and outer feed rails	LT8-2b	General setting procedure		
Production	..	..	LT8-6	Setting the in-feed chute and chute rail				
Maths	Topics		Modules		Topics			
Life skills	Topics		Modules		Topics		WE Module	
Engineering	Topics		Modules		Topics			
Communication	Topics		Modules		Topics			
Business	Topics		Modules		Topics			

Working definitions for terms used in the table

Topics: a cluster of related knowledge items

Subjects: a cluster of related topics

Modules: Learning activities in which knowledge and physical activities combine to develop skills

Work experience modules: Specifying work experience requirements and assignments, integrating several subjects

Note: This table is illustrative – it is meant to capture the essence of the process and does not reflect all the detail.

During the above process overlaps, duplications and gaps immediately became apparent. In this particular case study one notable gap was that the trade theory subjects emphasised contextual and specialised knowledge but did not include much general theory and knowledge. Therefore, the major addition to the apprenticeship-based learning materials was the inclusion of general principles traditionally classified as engineering science, fitting trade theory and general manufacturing principles related to other, similar manufacturing and engineering occupations. Other gaps that emerged were non-technical in nature and were dealt with by selecting elements from other typical in-house or external training courses which formed part of the general training of all staff, eg basic principles of business, HIV/AIDs, team work.

The use of the model also proved of value in the following ways:

- The topics under general knowledge and theory and a large number of the modules could be used for virtually any process that manufactured packaging, including glass, plastics and paper products.
- There was no difficulty in integrating all the product variations into the overall curriculum, eg the difference in materials handling and differences in the manufacturing process to manufacture cans of aluminium or tin plate; different welding, seaming and flanging technologies became part of a menu of items individual learners would select for their specific context.
- Once the curriculum was developed it was easy to construct a management system to sequence learning, allocate responsibilities and review or develop materials.

For the work experience component, modules were constructed using the following headings:

1. Title:
2. Purpose/Relevance
3. Duration
4. Outcomes (tasks)
5. Methodology
6. Evidence Required
7. Method of assessment and details of the assessment process
8. List of resources

The workplace experience modules have a dual purpose:

- specifying the practice
- guidance for the collection of evidence for the integrated summative assessment which is against the exit level outcomes of the qualifications

The final work experience module consisted of a project in which the learner was required to gather and analyse information, identify a problem, propose a solution and evaluate the impact of the solution. This was closely tied to the notion of continuous improvement which forms the basis of modern quality management systems such as ISO 9000:2000. This module also integrated all components of the curriculum including maths and communication. While this level of activity seems to be at a higher level than one would normally expect from an NQF level 2 learner[4], this reflects the drive in workplaces to make operators aware of the need for continuous improvement and to empower them to identify and propose such improvements.

[4] NQF level 2 represents one year post general education and training

The work experience modules were one of the biggest factors in terms of getting the model accepted. There had initially been a strong reluctance amongst all levels of employees to switch from apprenticeships (the known) to learnerships (the unknown). The work experience modules provided the assurance that the new system would improve the standard of training and not lower it. The modules clearly indicated to all what the outcomes of the learning processes would be, the role of the manufacturing supervisor, the evidence that would be required to assess competence and how all the elements of the curriculum were related to actual competence in the workplace. They thus provided a bridge between curriculum developers, trainers and line staff.

Lessons for the Higher Education Sector

While the above implementation of the curriculum model was at FET level there are clear lessons for the higher education and training (HE) sector.

1. The curriculum model structures collaborative processes between all components of the delivery system: the curriculum developers, the education and training practitioners, other specialist training providers [5]the employers, professional bodies and even the students.
2. The curriculum model is sufficiently flexible to allow the development of various kinds of programme arrangement, eg learnerships, internships, experiential learning.
3. The curriculum model facilitates the transition from a teacher-led paradigm to a learner-centred, outcomes- and occupational competence- based paradigm.
4. The curriculum model also demonstrates that the quality assurance of the learning process overall still lies with the primary institution. (There seems to be a common fear that there is a loss of control when universities of technology engage in skills development processes)
5. The application of the curriculum will improve the credibility of the programme, and thus the student's ability to enter the occupational context or employment.

Proposed changes to the learnership regulations will make it much easier for universities of technology to register learnerships via Sector Education and Training Authority (SETA) partners. There are four points in the regulations that need to be addressed in any agreement between a university of technology and SETAs. The curriculum model is implicit in these regulations and, if applied, will provide the answers and simplify the registration process as well as the implementation and quality assurance agreements.

4. IMPACT ASSESSMENT

The current National Skills Development Strategy (Department of Labour, 2005) creates much greater emphasis on achieving targets (outcomes) and making an impact (ie real changes in the labour market) particularly for identified vulnerable groups. SETAs, employers and partnering providers will have to start collecting and reporting more information so that the government can start to evaluate and reconfigure policies and incentives where necessary.

In the introduction we indicated that there is a disconnect between the labour market and the education and training delivery system. Nowhere is this more marked than in the conceptualisation of education and training quality assurance which emphasises the quality of programmes and provision.

[5] For example private training centres, Institutes of Sectoral and Occupational Excellence (ISOE), Employment and Skills Development Lead Employer agencies (ESDLE)

The fundamental flaw in this logic is that you can have the highest quality programme and the best teachers but if the purpose of the programme doesn't address the real personal, social and economic needs of the target population or the labour market, then the programme will have little impact.

In order to re-connect the labour market and education and training systems it becomes important to consider the purpose and intent of work-integrated education and training interventions. Quality assurance should be conceptualised systemically to respond to labour market needs and the provision of skills and knowledge. The purpose of this curriculum model is not just to facilitate the development of learning programmes: it is also there to ensure that the purpose, intentions and relevance of such interventions are met. Mouton, a leading researcher in programme evaluation, suggests that there are five reasons for interventions failing. These are:

1. The intervention is inappropriate
    - not addressing the real problem
2. Implementation is poor
    - poor quality delivery
3. Not all members of the target group receive the intervention as planned or do not receive the same intervention
    - inadequate coverage
    - lack of standardisation
4. The intervention is appropriate, implementation is good but implementation is insufficient
    - diluted intervention
    - insufficient dosage
5. The intervention is good, implementation is good and sufficient, but the target group is not receptive
    - lack of minimum necessary conditions for change (Mouton 2003)

The curriculum model links to an overall quality assurance system which allows participants to make decisions about the quality of:

- the programme design
- the implementation strategy
- the programme processes and resources
- the delivery and the learning activities
- the specific needs of each target population.

Quality assurance to achieve occupational competence is thus not just about assuring the programme by considering the content, but is also about the purpose, the relevance, and the impact in the labour market of the programmes. Ultimately, responsiveness becomes a key requirement.

5. CONCLUSION

The curriculum model presented in this paper is a tool which enables higher education institutions to reflect on and, where necessary, restructure current offerings, and to conceptualise or re-conceptualise programmes for the development of practical skills and for the management of workplace experience and practice.

The model will also enable all higher education institutions to engage pro-actively and productively with the world of work (employers, industry and professional associations, SETAs and communities) to structure skills development interventions and programmes.

More importantly the model becomes a tool to re-establish a connection to the labour market to ensure the quality of education and training in and for the workplace, thus linking directly to the National Skills Development Strategy and contributing to the reduction of skills shortages and the alleviation of unemployment.

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