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An Analysis upon Competency-Based Education and Training: The Concept and Implications

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Abstract – Competency-based education could be an exciting and valuable concept. However, in order to be so, educators, policy makers, and the public will have to be willing to entertain some substantial departures from traditional educational assumptions and practices. The following offers a broader view of this concept and some of its important implications for school systems.

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INTRODUCTION

Competency-based education (CBE) ranks as one of the most misused and misapplied concepts in American education today. During the past five years, a major ground swell of policy action has emerged in over 30 states imposing some kind of "competency demonstration" as a condition for student promotion or graduation. In all but a few cases, what has come to be called CBE is no more than a testing and remediation program focused on basic literacy and mathematical skills. It misses the point in terms of the meaning and importance of competency in life role activities, what it means to base a program on competencies, and in what respects the term education extends be- yond the boundaries of student certification alone. In short, competency-based education, if adequately understood and flexibly applied, could be an exciting and valuable concept. However, in order for it to be so, educators, policy makers, and the public will have to be willing to entertain some substantial departures from traditional educational assumptions and practices. The following offers a broader view of this concept and some of its important implications for school systems.

In many education development projects the notion of outcome-based or competence-based education is taken as a starting point. The advantage of the current (comprehensive and holistic) approach is that education and training programs will become more practice-oriented and relevant for finding or creating employment. The question however is what this education philosophy entails and how to go about the development of this kind of education. There are many questions about this approach, and we hope that this contribution will help university leaders, staff of education and examination quality departments, curriculum developers, faculty development staff, chairs of departments and department staff to understand the essence of the approach, see its potential, but also appreciate the complexity of the development and implementation process.

The current critique on competence-based education is that it over-emphasises self-regulation, problem solving, project-based education, portfolio-development and assessment. More emphasis on knowledge is needed. However, these critiques are largely based on implementation practices which are confounded with austerity measures. Various directors of especially vocational and professional education institutes embraced the notion of competence-based education as they believed that this would allow a lower number of teaching hours and less emphasis on educational testing. This resulted in laisser-faire education practices against which students (and parents) protested. This implementation practice of competence-based education however went against principles of comprehensive competence-based education.

Competence-based education however takes competence statements as starting point for the design, revision or innovation of education and training programs. Occupation and competence profiles are the foundation upon which the design of curriculum and instruction is based. Content, job and task analysis are very often the starting point of the development of comprehensive competence-based education.

Competency-based degree programs have enrolled and graduated students for decades, but only recently have they garnered much attention from the national media. In part, competency-based programs have received publicity because they emphasize the explicit demonstration of student learning. Controversial research suggests that many students are not learning much at many colleges and universities. (Arum and Roksa, 2010). In addition, policymakers, researchers and other stakeholders

increasingly realize that large segments of the American population are ill-served by traditional, residential postsecondary education, and that competency-based education may provide a better way to increase college access and completion.

Competency-based education differs from traditional postsecondary education in that it explicitly emphasizes demonstration of knowledge for degree progression, rather than the accumulation of course credits through seat time. The difference between the two approaches is best illustrated by a phrase that proponents of competency-based education use to describe traditional higher education: "Time is fixed, while learning is variable." A student in traditional higher education, say a business major, sits through a variety of courses. Because these are credit-hour-based, the amount of time the student spends on each course is roughly equivalent, as well as fixed (typically one hour in class per week over 15 weeks earns one credit). The amount learned, however, varies from student to student and from course to course. Most important, we are unsure what the student has learned by the end of his or her course of study. For example, with a 3.0 grade point average and a degree in business, we assume a student knows something about business. Exactly how much is unknown, because the grade point average does not tell us. In addition, we have no idea as to the student's knowledge, skills and abilities in specific areas, such as understanding double-entry bookkeeping, or the ability to make a cogent presentation to an audience.

Conversely, when "learning is fixed, while time is variable," what a student has learned during his or her course of study is much easier to discern. In a true competency-based program, students take as much or as little time as they need to learn the material. They make progress toward degree completion only by mastering individual competencies, rather than taking courses and accumulating credit hours. Competency-based programs emphasize mastery of competencies through demonstration, and each degree program is based on a specific list of competencies. Unlike with many traditional degree programs, we are more certain of how much a student has mastered, and in exactly what subject areas.

As with many areas of higher education, the phrase "competency-based" has been used in a variety of ways in the national discourse. Many people are generally referring to one of three types of postsecondary educational approaches when discussing competency-based education.

1) One is a traditional course- and credit-based system, with a focus on alternative assessments such as portfolios instead of examinations. Alverno College is one example of this approach.

2) Another approach is a system where students progress to degree by achieving mastery of competencies, taking as little or as much time as needed. Students achieve mastery by studying the institution's curriculum and are assessed using institutional assessments. Western Governors and the new programs recently begun by Southern New Hampshire and the University of Wisconsin System are examples of this approach, which we focus on in this paper.

3) The third approach involves prior learning assessment, where students take an assessment at college entry, such as an examination or construction of a portfolio, and are granted some sort of recognition for their knowledge that advances them toward degree completion (such as the awarding of course credits or competencies). The College Level Examination Program (CLEP) is probably the best-known example of this approach, although many schools have internal assessments for prior learning.

Some competency-based institutions might object to prior learning assessment being characterized as a form of competency-based education, because many prior learning assessments, such as the CLEP, result in the granting of course credits rather than competencies. Some competency-based programs have explicitly rejected the traditional course-credit system, but in a general sense there is little difference here. Both approaches reject the idea that a student must spend a certain number of hours in the classroom to progress through college, and instead emphasize that demonstration of knowledge and skills is what truly matters.

Competency-based education offers the intriguing possibility of a postsecondary innovation that can increase college access and completion, as well as lower the costs of college for students and the institutions. Breaking the link between learning and time provides the flexibility that many nontraditional students need. Emphasizing the demonstration of learning, rather than the process of learning, allows students to gain recognition of their competencies at entry as well as progress faster through school.

Competency-based education, or CBE, is "broadly defined as a form of higher education in which credit is provided on the basis of student learning rather than credit or clock hours" (Kelchen 2015). CBE emphasizes the mastery of discrete concepts, knowledge, and skills, regardless of howlong it takes to achieve such mastery or where the mastery is achieved. A closely related concept is prior learning assessment (PLA), also known as credit for prior learning, which the American Council on Education defines as "academic credit granted for demonstrated college-level equivalencies gained through learning experiences outside of the college classroom, using one of the well-established methods for assessing extra-institutional learning, including third-party

validation of formal training or individualized assessment, such as portfolios" (Lakin et al. 2015). Two other pedagogical approaches are sometimes confused with CBE or incorrectly used as synonyms: "personalized learning" and "adaptive learning," which rely on automated assessment and feedback systems to guide students through predefined learning pathways by identifying skills and topics that need more or less emphasis for individual learners (Helix Education 2014).

COMPETENCY-BASED EDUCATION (CBE): HISTORICAL BACKGROUND

CBE is an institutional process that moves education from focusing on what academics believe graduates need to know (teacher-focused) to what students need to know and be able to do in varying and complex situations (student and/or workplace focused).

CBE is focused on outcomes (competencies) that are linked to workforce needs, as defined by employers and the profession. CBE's outcomes are increasingly complex in nature, rather than deriving from the addition of multiple low-level objectives. CBE often necessitates more complex assessment, involving portfolios, experiential learning assessment in field experience, demonstration in varying contexts, role play, use of standardized patients or clients, etc.

Large skill sets are broken down into competencies, which may have sequential levels of mastery. Competencies reinforce one another from basic to advance as learning progresses; the impact of increasing competencies is synergistic, and the whole is greater than the sum of the parts.

Competencies within different contexts may require different bundles of skills, knowledge and attitudes. The challenge is to determine which competencies can be bundled together to provide the optimal grouping for performing tasks. Another challenge is designing learning experiences that support students as they practice using and applying these competencies in different contexts. Continual refinement of defined competencies is necessary so that enhanced performance in a variety of contexts can be assessed. In essence, CBE is a process, not a product.

CBE is more than an effort to describe or list educational and behavioral objectives. The early emphasis on behavioral learning objectives was on reliable observation and judgment. To this end, writers of behavioral objectives were encouraged to state outcomes in operational terms, which can be observed using consistent observational processes allowing for no interpretation. In an attempt to achieve this reliability, a behavioral verb from a list of behavioral verbs (eg, state, list, name, recognize, describe, calculate, describe, explain,synthesize, analyze) was required to begin the objective. It is this narrowness that led to the criticism of these approaches then and now; attainment of the multiple behavioral objectives did not equal students' workforce functionality.

Competency may be defined as the ability to do a particular activity to a prescribed standard emphasizing what people can do rather than what they know. As a model for curriculum design and delivery, the approach is typically one, which controls and assesses learning through establishing preset objectives and outcomes, which might relate to skills, attitudes or values. The following diagram provides a model for the development of a competency-basedapproach to curriculum and instruction.

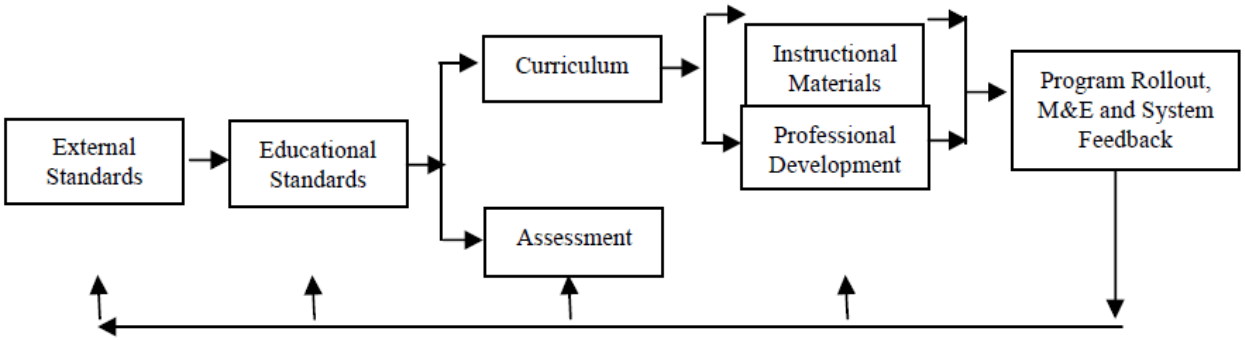

Figure 1 :Model for Competency-Base Education

The technique for constructing a competency-based program involves backwards planning and asks the question, what do students' need to learn to become successful adults. The question is answered by convening meetings of those from the fields of business, politics, social, cultural and environmental sectors to define the criteria for success. These become external standards for success. Educators

then take this information and convert it to learning outcomes or specific statements of behavior that students must perform that demonstrate learning which becomes the educational standards as well as defining when these standards should be mastered from kindergarten through year 12.

Such planning can work backwards starting with students in the final year of school, year 12. If it is known what students need to learn in year 12, then one can define what needs to be learned in year 11, and continue until the entire scope of the standards is determined. Since most schools teach subjects, specific outcomes need to be extracted from the external standards to define curriculum for a specific subject. This is one reason why some educators have supported inter-disciplinary curriculum since it can better align with real world outcomes. The definition of what is to be learned is in the form of statements of demonstrable behaviors.

With the creation of minimum performance standards, that is, standards that indicate the lowest level of performance acceptable, it is then possible to create a curriculum and the means to assess student performance related to the curriculum. Curriculum is defined in various ways. Some define it as the planned subject matter content and skills to be presented to students. Others say that the curriculum is only that which students actually learn. Still others hold the very broad definition that the curriculum is all experiences students encounter in school, learned or unlearned and out of school, taught and untaught.

The minimum standards also provide a framework for creating assessments. Assessment is much broader than testing. Whereas multiple choice tests, true/false, matching and other types of test items may be useful in measuring lower order learning, knowledge and some skills, other types of assessments such as report writing, presentations, debates, group problem solving are useful in determining higher order learning which demonstrates that students know when and how to use knowledge and skills in critical and creative ways to solve problems. What is key here is that assessments are aligned with the curriculum which, in turn, is aligned to the standards, and that they measure learning in terms of how students perform using, as much as possible, a real world situation as possible. This approach is referred to as contextual learning in Indonesia and elsewhere.

To ensure that curriculum and assessment are implemented properly, educators must consider developing appropriate instructional materials to support learning activities including textbooks, workbooks, charts, three-dimensional models, simulations, puzzles, games, and many other items. In addition, teachers will need to be trained in how to use the new materials since the methodology of competency-based curriculum requires shifting from teacher-centered to student-centered approaches.

Thus professional development is a key component in achieving successful implementation. Once all components are completed, the program can be rolled out. If a national program, the rollout needs to be phased since there will not be enough trainers and resources to conduct a rollout nationwide. Also, as a new program, the first phase of the rollout should be a pilot program so the new materials can be tested and modified before final adoption is instituted. Professional development is systemic to the process so that educators can continuously improve in how they implement a quality educational system.

To determine effectiveness and to ensure that the rollout is being implemented properly, an M&E system is needed. Over time, the M&E system is used to provide feedback to different parts of the system so that adjustments can be made, whether changing standards and tests, or revising training modules.

THE CONCEPT OF COMPETENCY

As noted in an earlier paper,I share a viewpoint with many others who have worked with the CBE concept in institutions of higher education that competencies are indicators of successful performance in life-role activities. Framed in a slightly different way,competencies involve the ability to create effective results in one's life. According to Block(1978), this means both succeeding in existing social role structures and having the ability to create new roles for oneself in response to changing social conditions. While there are small differences in the implications of these two definitions,their common elements are most important.

First, they suggest that the focus and context of competencies are real life and the various roles we occupy that require
such a broad range of individual capabilities. To be competent in a life role (such as breadwinner, consumer, mate, parent, or political citizen) is to create the quality of experience and success you seek in that life role. This means that the curricula developed to facilitate competencies must take as their starting points an
assessment of the demands and contingencies associated with major life roles, not the logic and substance of academic subjects. There are, for example, no life roles called language arts, mathematics, or social studies.

Second, life-role success fundamentally re-quires coping with the ever-changing realities of social conditions. The environments, resources, regulations, and individuals that are an integral part of modern day life are often troublesome and continually changing, which suggests that one of the most essential attributes of a generally competent person will be adaptability in the face of difficult and shifting circumstances and demands.

Third, competencies are formed through the highly complex integration and application ofmany discrete capacities. These capacities represent the essential building blocks or foundation on which competencies rest. Some of these capacities are, of course, quite apparent and measurable; others are extremely subtle or even invisible to many people. The essential point, however, is that competency requires tapping this reservoir of individual capacities, integrating them in complex ways, and applying them based on the contingencies present in specific social contexts. Competency rarely involves the simple mechanical application of simple cognitive or manual capacities.

Fourth, the integration and application of capacities that underlie competency clearly reflect both the cognitive and manual skills directly supported in most school instruction and a broad repertory of affective capacities, which may, on balance, actually be the attributes that most facilitate life-role success. That is, while knowledge,skills, and concepts are important components of success in all life roles, they do not ensure it. Successful role performance is at least equally facilitated by the attitudes, values, feelings, expectations, motivation, independence, cooperation, endurance, and intuition people possess.

Affective capacities cannot be left implicit in a life-role oriented program as they now are in so many schools. In many life situations, these affective capacities may be both "the medium" and an essential component of "the message" itself.

Fifth, competencies ultimately require role performance, not just the acquisition of skills or knowledge of appropriate methods. They are, in other words, reflections of both what one is and what one can do. Competency-oriented programs should, therefore, develop assessment tools that focus on the more qualitative aspects of performance as well as the more concrete demonstrations of cognitive and manual skill tapped by conventional measurement devices.

When taken together these implications represent a major departure from the typical capacity building orientations of most school programs.

Social reality and enlightened projections about life in the twenty-first century become our guides to conceptions of life roles, competencies, curricula, appropriate instructional settings and agents,and assessment tools. The role of segmented school subjects taught in the generally sheltered environment of school buildings will have to bealtered substantially if we choose to foster and assess competency outcomes. Capacities must indeed be developed if competencies are to emerge,but the methods, contexts, and timing of their development could alter significantly if life roles were made a more central vehicle in curriculum and instruction.

COMPETENCY-BASED EDUCATION AND TRAINING (CBET)

CBET is an approach to VET, in which skills, knowledge and attitudes are specified in order to define, steer and help to achieve competence standards, mostly within a kind of national qualifications framework. Competence or competency can be understood as “the specification of knowledge and skill and the application of that knowledge and skill to the standard of performance expected in the workplace”.

Consequently, CBET itself may be described as “training which is performance- and standards-based and related to realistic workplace practices. It is focussed on what learners can do rather than on the courses they have done”.

This definition (Misko, 2009) places the focus of CBET on outcomes measured against industry standards rather than on courses based on institutional arrangements (classes in schools, e.g., or apprenticeships) where individual achievements are normally valued against others. Outcome orientation places emphasis on new forms of assessment. “Recognition” or “Accreditation of Prior Learning” (RPL/APL), mainly through work experience, is another essential tool to ensure the relevance and transferability of skills and knowledge as well as to lead people back into learning.

Competency-based curricula consist of workplace-oriented and performance-based modules or units of competence that can be accumulated to a vocational qualification. Delivery of CBET can be designed individually by learners, teachers and trainers, which allows a self-paced mode independent from courses. However, a modular and self-paced approach to curricula and delivery is not necessary, although it is very compatible with CBET.

The Victorian State Training Board (Harris et al., 2005) defined six criteria that describe the typical structure of CBET programs. These criteria specify both the micro structure of CBET, i.e. its learning and assessment dimension, and the macro-structure, i.e. its institutional framework.

CBET aims at preparing learners more effectively for real workplaces, which means that the acquisition of competences takes into account the requirements of companies and industry. Furthermore, CBET should enable employees not only to increase their knowledge and skills at the workplace but also to gain nationally accredited certificates for workplace-based learning. The self-paced and flexible structure of CBET programs should encourage learners to become responsible for their individual learning process. The modular structure allows for individual

combinations of competences limited only by certain "packaging rules" which refer to accredited national vocational qualifications.

The design of CBET programs requires careful planning and continuous monitoring of development steps. The first step is to define competence standards by translating work-based requirements into nationally endorsed industry standards. This requires experts in relevant occupational fields who are able to depict essential work activities, tasks and functions with respect to a specific competence profile. The methods applied can either be DACUM or functional analysis. Furthermore, the forms of delivery and assessment need to be specified in accordance with the respective training provider. Thus, the learning environment of workplaces or training providers must be defined and resources and learning materials obtained. Information on assessment requirements and procedures must be distributed to learners and trainers by registered assessors. The organisation and management of CBET programs has to be efficient to assure the quality of outcomes and learning processes.A model of the planning and developing process of CBET is shown in figure 2.

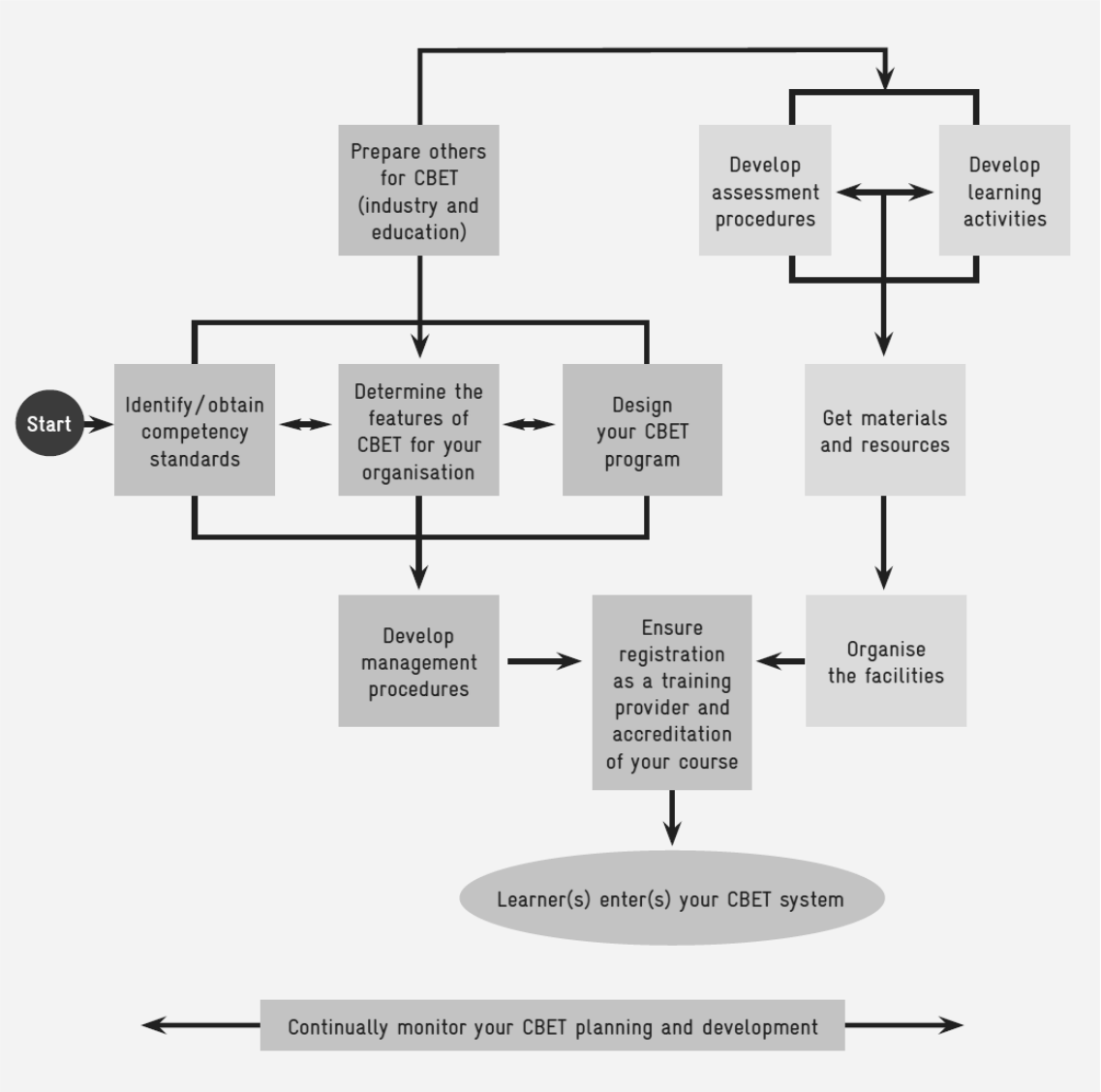

Figure 2: Planning and developing CBET

IMPLEMENTING COMPETENCY-BASED EDUCATION (CBE)

To many of its advocates, imposing new performance requirements for high school graduation is an attempt to re-establish "the credibility of
the high school diploma." Now that over 90 percent of an age cohort stays in school a full twelve years and "social promotion" within an age-graded system is accepted policy, we have a large proportion of "graduates" today who would have not finished school in previous eras. However, a distressing proportion of these graduates are conspicuously deficient in basic literacy skills as well as in more advanced aspects of development and achievement.

What lies at the heart of this dilemma is not the diploma or social promotion; it is the system of teacher-referenced standards that we use along with time as the basis for establishing grades and Carnegie units of "credit." As noted earlier, the combination of individual subjective judgment, mixed criteria, and floating standards leads to a labeling and credit system that is best described as vague-referenced. That is, the letter or numerical grades dispensed by teachers convey far more symbolic value than actual content. Twelve years of vague-referenced symbols provide one with a transcript and diploma, but not necessarily a good education.

The paradox in all of this, of course, is that employers and college admission officers—the people who need to make selection decisions about graduates based on what they know, can do, and are like—are generally staunch opponents of abandoning the Carnegie unit credit system even though it contributes to the problem of applicants with only paper qualifications. They are "getting stuck" with the same evaluation-certification system they continue to perpetuate by using time and letter grades as the primary criteria for graduation.

There are, of course, alternative approaches to setting and defining standards that could be considered, two of which could be made criterion-referenced rather than vague-referenced. They are curriculum-referenced and societal-referenced standards.

Curriculum-referenced standards would apply to the acquisition of specific kinds and levels of subject matter mastery. The content and criteria of the standards would be based on the logic and content of the subject, and would be set by experts in each respective field. We could expect the outcomes in such a system to reflect cognitive and psychomotor capacities.

Societal-referenced standards would reflect the judgments of a broader array of citizens regarding the competencies needed to facilitate success in life roles. In this case, the social, political, and economic demands of life would constitute the frame of reference for both curriculum building and standard setting. Mastery of individual capacities could be included among the array of competency standards selected.

The third major alternative, norm-referenced standards, has been the popular choice of nearly every state that has chosen to implement a standardized testing program. Depending on how measurement is actually done and reported, the advantages of norm-referenced testing may be little better than teacher-referenced. In this system, standards are fundamentally comparative and peer-based, and performance in many different knowledge and skill areas is usually reduced to a single numerical score. While you may know that a student scored at the "eighth-grade level" in reading, you may still not know what the student can and cannot read, or what his or her particular strengths and deficiencies may be.

The use of norm-referenced testing to create an accountability system for students will not solve the problems of educational effectiveness that lie within the instructional system. The basic orientation of accountability approaches is to use some reliable form of student performance data as the basis for making judgments and decisions about either students or staff. This often means reward, placement, or promotion decisions. While remediation for "substandard" performers may be required, that remediation generally consists of providing these students with the content and approaches that have not worked for them in the first place. Nearly every example of current state "CBE" policies either declares or presumes that the existing time-based, age-graded structure of schooling shall remain unchanged.

If the problem was seen as an effectiveness issue, two complex, but more valuable, activities would have to be undertaken. The first is examining and improving the nature of and interrelationship between two major factors that affect instructional effectiveness. One factor is the bearing that school structures—that is, the organizing principles for school activity—have on the techniques, procedures, mechanics, and content affecting student involvement, learning, and performance. The other has to do with the quality and character of expectations and social process that characterize the interaction between staff and students. These factors lie at the heart of school effectiveness and cannot be ignored.

The second activity that needs to be under-taken in order to improve school effectiveness is to create close articulation between student assessment and instruction. This means continual diagnosis, monitoring, feedback, and correction of student progress based on regular contact. This does not mean the once-a-year administration of "the big standardized test" that may not correspond with the curriculum the students have been pursuing. It is not clear what we expect these tests to tell us about the levels of student achievement that the teachers who interact with them on a daily basis do not already know. If this information is missing, it is due to the inadequacies of the classroom assessment system, and <that is what needs to be strengthened. If this information is available but not used effectively to improve student learning, the fault may lie in our typical use of classroom assessment to manage and control students rather than to manage and improve instruction. Also, in most states where such testing programs have been installed, it is the students who are penalized for program weaknesses by having promotion or diplomas withheld.

In a genuine competency-based program, the danger of poor articulation between assessment and instruction would be averted. CBE is built around the close integration of three essential

components: (a) outcome goals; (b) instructional experiences that directly reflect those goals; and (c) assessment devices that represent the operational definition of the goal itself. To build maximum flexibility and responsiveness into such a program, all three need to be explicit (that is, criterion-referenced and clear); be known (that is, public and visible—without secrets and surprises); be agreed upon by all those with a direct interest in the student's progress; allow choice (that is, be framed and developed with several equivalent alternatives to choose from); and be adaptive. Being adaptive means to use student performance data as the basis for modifying and improving four major things: (a) the student's subsequent performance, (b) the content and quality of instruction provided, (c) the assessment tools used to measure goal attainment, and (d) the content and sequencing of goals and curricula.

From this perspective CBE can be funda- mentally geared to improving student opportunities in several ways: (a) by dealing with time and opportunities for meeting goals more flexibly and
realistically; (b) by articulating goals and the purposes of instruction clearly and openly; (c) by giving a specific content referent to assessment, evaluation, certification, and promotion criteria; and (d) by bringing schoolwork closer to the real factors affecting success and fulfillment in life.

CONCLUSION

Preliminary research has shown that the comprehensive competence-based curriculum development process is complex but rewarding. It is complex because of the fact that multiple stakeholders have to advise a curriculum development team about an education plan which does not exist yet, for a society and labour market which is rather dynamic, in a context of education which is bound by regulations and procedures, accreditation processes which are not always transparent, and innovation resources which are limited. It is rewarding since the development process is based on a firm foundation regarding labour market and occupational analysis.

Implementation of CBET requires effort from different actors in the VET system. Concerns are articulated from different perspectives, mainly from vocational teachers and employers. According to a study by Misko (2009), teachers felt not well enough informed and prepared for methodical and didactical innovations associated with CBET. Shifting from learning processes to outcomes often means that educational aspects, including underpinning knowledge and understanding, are disregarded in favour of economic objectives. The clear outcome orientation is also often associated with a decline in training quality.

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