A Review of the Development and Implementation of Competency-Based Education and Training

Introduction

Outcome-based education, the forerunner of competency-based education and training (CBET), has a centuries-long history, dating back to craft guilds, apprenticeship and technical training programs (Nodine 2015). CBET itself, however, is a relatively young field, stemming from the reform of primary and vocational teacher training in the USA in the 1970s, when it was known as performance-based vocational teacher education (Deissinger and Hellwig 2005) and implemented in 23 states. CBET gradually spread internationally and was adapted to fit local contexts (Misbah, Gulikers and Mulder 2019).

In brief, CBET is an approach to outcomes-based vocational education and training that emphasises the competencies needed in the labour market and in so doing can make a substantial direct contribution to the economy (Biemans et al. 2004; Misbah, Gulikers and Mulder 2019). This has made CBET attractive to many governments, international organisations and academics around the world, especially those working in the areas of higher education and technical and vocational education and training (TVET).

This article reviews the development and implementation of CBET. A synthesis of various research studies on curriculum development and implementation is also provided to shed light on the historical roots of CBET-oriented frameworks that could be relevant and applicable in Cambodia.

Conceptualising competence and competency

In order to grasp what CBET involves, it is necessary to first define what is meant by "competence" and "competency". Although these terms are often used interchangeably, they can also carry different meanings.

- *Competence* refers to a person's overall capacity and is defined as a combination of knowledge, skills and attitudes that enable adequate performance in a given field or task.
- *Competency* refers to the specific and observable individual skills needed to perform well (Brownie, Thomas and Bahnisch 2012).

Some studies use only the term "competence" and some use only "competency", and yet others use both terms without any clear distinction (e.g. Biemans et al. 2004; Braun and Mishra 2016; Chapman and O'Neill 2010). For the purpose of this paper, the term "competency" is used.

Competencies usually fall into two categories: discipline-specific, and generic or transferrable. The former are the core skills students are expected to acquire from a particular academic or vocational discipline, and the latter are more flexible and readily transferable from one discipline to another. For example, in an engineering program, the engineering skills are the discipline competencies, and the communication and problem-solving skills are the generic skills and abilities that can be applied to a range of different jobs. As a consequence of rapid professional changes facilitated by fast technological development, there have been huge changes in the labour market. To respond to labour market and employers' needs and requirements, young academic and vocational graduates must be equipped with a broad set of skills and competencies, including both discipline-specific and generic competencies (Braun and Mishra 2016).

Characteristics of competency-based education and training

CBET is mainly used in vocational education and training (VET). It offers a variety of benefits, such as preparing students for the labour market and maintaining student motivation and full course attendance (Deissinger and Hellwig 2005). A main characteristic of CBET is the focus on competencies rather than on subject matter as in the traditional

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method of teaching and learning. Competencies are embedded in competency standards, which are usually carefully and thoroughly established by different groups of experts from academia, business and industry. In this approach, expected outcomes or competencies in the form of knowledge, skills, and attitudes are explicitly stated to ensure alignment of curricular content with endorsed competency standards (Deissinger and Hellwig 2005).

The target competencies of CBET are directly linked to labour market needs. CBET curricula comprise performance-based modules or units of competency, which enable vocational learners to gradually build up the competency directly relevant to the labour market needs. Another important aspect of CBET is the focus on practice-based experiential learning, in which students learn through real-world, simulation and workshop activities (Ordonez 2014). Students are assessed based on their ability to perform a task successfully. In CBET classes, students learn at their own pace in mixed-ability classes, allowing them to manage and shape their own learning pathway according to their own pace and interests, thereby ensuring opportunity for optimal learning.

The competency standards are core elements of CBET and are of critical importance for guiding the selection of materials and experiences for classroom teaching and learning, and later serve as performance evaluation criteria.

Development of competency-based education and training

The development of a CBET program starts with the identification and selection of competencies and the formulation of competency standards (Deissinger and Hellwig 2005). The competency standards are core elements of CBET and are of critical importance for guiding the selection of materials and experiences for classroom teaching and learning, and later serve as performance evaluation criteria. There are three categories of competency standards (Harris et al. 1995 cited in Deissinger and Hellwig 2005):

- *Industry competencies* – those necessary for employees to perform their tasks successfully within a certain industry.
- Cross-industry competencies – the competencies common to more than one industry.
- Enterprise competencies – those that are developed and implemented for a particular organisation or company; these are usually a specification of industry standards.

Two common and useful methods used to develop competency standards are DACUM (Developing a Curriculum) and functional analysis (Deissinger and Hellwig 2005). DACUM involves systematically defining the tasks or competencies associated with certain types of jobs and occupations. Similarly to Taba's (1962) grassroots curriculum model, where objectives are selected based on analysis of the needs of students and teachers, in DACUM occupational analysis, experts in the job being analysed work with a technical advisor to identify the main responsibilities of the job and the tasks constituting those duties (Gonczi, Hager and Oliver 1990).

Functional analysis, on the other hand, as for the Tyler (1949) curriculum development model, is performed by a recognised trade/industry body facilitated by a consultant. In functional analysis, the whole occupational sector is initially considered and then jobs are disaggregated by economic sector, then smaller units in the form of competencies are further disaggregated for each job (Gonczi, Hager and Oliver 1990).

After competency standards have been established, learning activities and assessments are determined before learning materials are selected. Curriculum management to keep track of curriculum implementation is equally important.

Implementation of competency-based training and education

The implementation of a new curriculum often faces resistance, usually arising from concerns about inadequate finance, weak ownership by

those involved, lack of benefits, ineffective administrative support, increased administrative costs, and insecurity caused by sudden changes (Ornstein and Hunkins 2016). To encourage more cooperation, curriculum developers should point out the rewards the new curriculum will bring and the consequences of non-compliance, and indicate how the new curriculum is similar to, though better than, the old one. Enhancing the involvement of teachers and schools in the curriculum development process is also a way to improve cooperation in new curriculum implementation as this can increase a sense of responsibility and ownership.

The implementation of a CBET initiative is not different from the implementation of a general curriculum. CBET program developers, according to Harris et al. (1995 cited in Deissinger and Hellwig 2005), should ask themselves some reflective questions before designing and implementing CBET programs. These questions are related to their knowledge (how well do they know the subject matter and can they explain CBET?), skills (how well can they orient others to CBET, design a CBET program, provide support i.e. learning materials and resources and facilities, and develop procedures for managing CBET?) and attitudes (how enthusiastic, comfortable and open-minded are they towards the philosophy and practice of CBET?). Similar questions should also be asked with respect to CBET instructors: knowledge (how do instructors understand CBET?), skills (how well can they apply teaching practices to effectively deliver CBET?) and attitude (how do they feel about the philosophy and practice?).

Common implementation challenges

In reality, CBET practices in TVET institutions can face many challenges (Beimans et al. 2004). A great deal of care is required to accurately capture the various facets of occupational competencies and complexity of associated duties and tasks. Overreliance on competency standardisation also impinges on the accuracy of competency assessments because standardisation is established by TVET institutions and probably with little relevance to present labour market needs (a literature review would highlight historic needs only).

Matching learning in school with learning in the workplace and improving the approach to matching education and training outcomes with labour market needs are two other key issues that must be addressed. To that end, stakeholders in learning activity design should undertake a careful analysis of these pressing challenges. Further, assessment instruments must be valid, reliable, flexible and fair, and traditional memory-based assessment should be abandoned or dramatically revised to capture the full range of skills and knowledge that students have acquired.

Another challenge stymying the adoption of CBET is the changing learning environment, particularly the changing roles and identities of teachers. In the traditional teaching approach, teacher-centred, lecture-style methods are commonly used, where students listen passively to the lecture with little teacher-student or student-student interaction; only the teacher has an active role. In the new teaching approach, the role of teachers changes from subject-matter experts who transfer knowledge to their students to guides and facilitators of students' learning, encouraging students to take responsibility for and actively engage in their own learning.

Finally, competency-based management needs to be a role model for teachers. At the same time, managers need to encourage an open organisational culture and cooperative mindset so that teachers can take ownership of the management of teaching and learning. The review of challenges encountered in the adoption of CBET should not discourage the implementation of CBET. Rather, the key message from being cognisant of these pitfalls is that managers and teachers of TVET institutions need to be careful when developing CBET curricula and teaching and learning activities, so that benefits can be optimised and disadvantages minimised.

Lessons learned from international experience with CBET

CBET has been practiced internationally and various experiences and results have been observed. A study by Misbah, Gulikers and Mulder (2019) in 11 Indonesian agricultural secondary vocational schools found that the implementation of CBET was successful in skill development and had a motivating effect on both students and teachers, but this skill development came at the cost of knowledge development.

Wang (2015) examined the perspectives of students on CBET from three North American higher education institutions. Students felt that CBET provided two main advantages: the improved labour market relevance of education built their confidence in planning and preparing for their career, and the flexible self-paced learning culture allowed them to master new information and skills properly. The second benefit, however, only applies to self-motivated students who set their own schedules. Inspiring student motivation for learning can be a major challenge for TVET programs in developing countries. In TVET programs (equivalent to grades 10,11 and 12 in upper secondary school) in Cambodia, most students are high school dropouts or have learning difficulties, so their motivation and self-management skills are likely to be limited. This makes it difficult for teachers to allow students flexibility in their learning, as without guidance and motivation from the teachers, there is a chance that they will not be able to shape and maximise their learning.

The lack of flexible and self-directed learning is highlighted in a study of TVET colleges (including TVET teachers, students, employed TVET graduates and job supervisors) in Ethiopia (Solomon 2016). The study found that CBET was not being fully implemented, with some colleges identified as "partially-competence-based" and others as "largely competence-based". The study also revealed that there was a positive relationship between the competitiveness of a TVET program and graduate job performance.

Smith's (2010) "Review of Twenty Years of Competency-Based Training in the Australian Vocational Education and Training System" also highlights the benefits of CBET in enhancing the employment of VET graduates through the improvement of practical, rather than theoretical, labour market relevant skills. Nevertheless, her research also revealed various challenges facing the delivery and assessment of CBET. One is the cost of the significant amount of time and resources needed to develop training packages. And another is lack of teacher capability to apply a pure CBET approach, which involves a high degree of student-centeredness, flexible and self-paced learning, and regular formative and summative assessments.

Conclusion

This review of the barriers to the effective implementation of CBET resonates with the key message in the literature about the challenges and important benefits of CBET. Managers and teachers of TVET institutions need to take extra care when developing CBET curricula and teaching and learning activities, so that maximum benefits can be derived and disadvantages minimised.

The teaching and learning methods that use student-centred and flexible and self-paced approaches can be problematic for developing countries, where teacher-centred approaches reliant on knowledge transmission, rote learning and repetition remain deeply entrenched.

Moreover, the implementation of CBET can be problematic if the new curriculum is not developed and introduced properly. School culture also plays a vitally important role in curriculum implementation, as do teachers, who are the direct implementers of the curriculum. Competency-based management therefore needs to be a role model for teachers. To that end, school managers need to encourage an open culture and cooperation so that teachers can take ownership of the management of teaching and learning.

Curriculum designed by the central body in charge of CBET might be contextualised by schools to accommodate their culture and personalised by individual or groups of teachers. This phenomenon needs to be taken into consideration by curriculum developers when they plan and implement a new curriculum or a major curriculum change.

Teachers need to feel rewarded for their work. Any sudden changes must be understood as necessary and beneficial to both teachers and students and eased by providing administrative, monetary and technical support for teachers.

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