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Competency-Based TVET in Cambodia: Promise and Reality

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Working Paper Series No. 124

December 2020

CDRI Working Paper Series No. 124

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CDRI
Cambodia Development Resource Institute

Phnom Penh, December 2020

ISBN-13: 9789924500216

Citation:

Chea Sathya, Song Sopheak and Hun Seyhakunthy. 2020. *Competency-Based TVET in Cambodia: Promise and Reality.* CDRI Working Paper Series No. 124. Phnom Penh: CDRI.

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Layout and cover design: Men Chanthida
Edited by: Susan E. Watkins
Printed and bound in Cambodia by Go Invent Media (GIM), Phnom Penh

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Summary

Modernisation brings new economic and social challenges around the globe. In this era of the knowledge economy, knowledge and skills have become valuable assets for national development. Many countries have been working out how best to enhance their knowledge and skills pool, especially in the field of technology. Focus has recently turned to competency-based training (CBT), which is believed to enrich students with practical competencies relevant to labour market needs and thus enhance their productivity and, ultimately, national economic growth.

CBT is characterised by a student-centred approach and module-based course with a set of core competencies guiding the selection of course contents and activities, while learning is self-paced and individualised. Although Cambodia developed a CBT initiative at the end of the 1990s, it was not until the early 2010s that the CBT program for TVET certificate-levels 1, 2 and 3 (equivalent to Grades 10, 11 and 12, respectively) was launched. The introduction of CBT in Cambodia has brought many new challenges that need to be addressed by all stakeholders, especially the Ministry of Labour and Vocational Training (MLVT) and development partners. Yet there has been no empirical research how the implementation of the CBT program has been conducted, how effective the implementation has been and what challenges have been encountered during CBT implementation. The current study attempts to fill that knowledge gap by exploring the development and implementation of the CBT program from the perspectives and experiences of three main stakeholder groups: CBT program developers, TVET institution directors, and TVET instructors.

The study was informed by various curriculum development and implementation models, which generally involve three steps: curriculum development (selecting contents and learning experiences), curriculum implementation (teaching and learning approaches), and curriculum evaluation. A good curriculum that is poorly implemented can have negative learning outcomes. Both the development and implementation of a curriculum need to take into consideration the knowledge, skills and attitudes of the stakeholders involved. For effective curriculum implementation, curriculum developers need to involve curriculum implementers in order for them to feel they are a part of the project so that they can experience a sense of ownership and responsibility for the outcomes. Furthermore, implementers need to be made to feel that the new curriculum is personally rewarding as well as advantageous for their students and also need to be assured that the necessary financial, technical and administrative supports are available and sufficient.

The study employed a qualitative approach to explore the development and implementation of Cambodia's CBT program. Specifically, it set out to understand how the CBT program has been conducted, how effective it has been, and what challenges have been encountered, from the perspectives and experiences of three main stakeholders (CBT program developers, TVET institution directors, TVET instructors) actively involved in its development, dissemination and implementation. For data collection purposes, we selected four TVET institutions in Phnom Penh, all of which were actively involved in the development of the CBT program, and five TVET institutions in major provinces. Ten focus group interviews, two with developers and eight with instructors, were conducted, each lasting around 90 minutes. All of these group interviews were audio recorded with the consent of all interviewees. Ten semi-structured interviews with directors and deputy directors of TVET institutions were also conducted, each lasting around 60 minutes. Not all directors and deputy directors agreed to have their interviews audio recorded.

The study obtained many prominent results related to the perspectives and experiences of the three stakeholder groups. Four main themes emerged from the data: knowledge, skills, attitudes, challenges and solutions. Data triangulation improved the validity of the data and provided insights into differences and commonalities in experience across the three stakeholder groups. The results show that knowledge of CBT among the three stakeholders varies considerably. Developers were very well-trained having participated in many training sessions over a long period of time, while instructors had received only two five-day training workshops on CBT. Directors were also provided with training, but because they were provided with different types of training workshops on various topics, not only on CBT, they had difficulty recalling key CBT themes. As a result, they were the least knowledgeable about CBT and also the least involved in CBT implementation.

Development of the CBT program was carefully planned and conducted. Developers, who were experienced teachers and directors from major TVET institutions, were invited by MLVT to establish CBT curricula and competency standards for three major occupations – business, construction and auto-mechanics, each of which was composed of several subcategories. The private sector was invited to participate via sending their expert employees to take part in establishing competency standards. Despite the well laid out and sound planning of the CBT program, actual implementation fell short of expectations. Cohort-based teaching was still employed by teachers. There were two major reasons for this. First there was plainly a paucity of materials and equipment for students to learn by practicing; and second, many teachers lacked sufficient practical technical knowledge to teach in the CBT approach. Nevertheless, teachers made the endeavour as feasible as their ability allowed them to provide students with practice time. Students were assigned to work in groups or pairs on the available materials and equipment. Besides, teachers also used demonstration videos and pictures to supplement their lectures.

A major concern regarding the practice of CBT was the lack of participation from TVET institution directors, who tended to be occupied with the overall management of their institutions rather than the implementation of the CBT program. The consequent lack of guidance, encouragement, motivation and monitoring by TVET management can be obstructive to the implementation of CBT.

Regardless of the challenges encountered during the implementation of CBT, all the stakeholders maintained positive attitudes towards CBT as they understood its benefits. It was reported that students learn better from CBT than in a traditional classroom setting as they have more time to practice and develop their competencies. Second, students were involved in actual practice as they were assigned to undertake their study in real workplaces in the form of internship. Finally, because competencies were established based on thorough examination of labour market needs, students in the CBT program graduated with competencies that were directly relevant to the labour market, which should help close skills gaps.

1. Introduction

Competency-based education and training (CBET) is outcome-based education and training that places considerable emphasis on competency sets relevant to the needs in the labour market, leading to high labour productivity, and thus it is believed to make a direct contribution to the economy (Biemans et al. 2004; Misbah et al. 2019). This method can be traced back to primary and vocational teacher training in the United States in the 1970s, where it was initially known as performance-based vocational teacher education (Deißinger and Hellwig 2005). By 1977, 23 states were implementing this vocational education method, which by the late 1980s had been extended to general vocational education and training (VET). Later, many countries around the globe adopted CBET to reform their VET curriculum, adapting the method to fit local contexts and capacities (Misbah et al. 2019).

With the assistance from the Asian Development Bank (ADB) in a project called Strengthening Technical and Vocation Education and Training (STVET) launched in 2010, Cambodia began to adopt CBET in its vocational education and training with aims to improve its economic development. Although the economy has been improving steadily, the country's development is still dependent on rainfed and largely unmechanised agriculture, low-technology manufacturing (notably in garments), construction and tourism (Un, Chuon and Ngin 2013). To maintain economic momentum and keep pace with countries in the Asia-Pacific region and around the world, Cambodia needs to diversify its economic activities to incorporate high value-added industries (such as automotive parts and electronics). Technological innovation and adaptation is the key to economic diversification in Cambodia. Also to be able to tackle these technological advances, Cambodia needs more skilled labour, especially skilled labourers in such prioritised areas as construction, auto-mechanics, and information technology. This underlines the urgent need for Cambodia to upgrade the skills of its labour force through education, especially through TVET.

Curriculum development and training provision in Cambodia's TVET sector are being shaped by two important instruments: the Cambodia Qualifications Framework (CQF) and CBET competency standards. The transition from traditional teaching methods – characterised by content-based and teacher-centred lectures – to this new CBET approach is being supported by various development partners. To date, however, the Asian Development Bank (ADB) is the only one to have funded a nationwide project to implement CBET in the TVET sector. CBET was introduced into Cambodia's TVET system to improve the quality of education and training and enhance its relevance to the labour market (UNESCO 2013; CDRI 2015). The Ministry of Labour and Vocational Training (MLVT), with assistance from development partners, has so far developed competency-based curricula, standards and assessment materials for over 30 occupations and the four lower level qualifications (level 1 = Vocational certificate and levels 2, 3 and 4 = Technical and vocational certificates, all the three of which are equivalent to the upper secondary education in the general education stream). Although development partners' contributions to TVET curriculum development are commonly governed by the CQF and CBET competency standards, their diverse interests and approaches, with different degrees of influence, stand to have different impacts on Cambodian stakeholders. Questions also arise regarding the understanding of the concepts and philosophy of CBET among development partners, relevant government bodies, and TVET institutions, and the challenges facing CBET adaptation and adoption at the implementation level (school and instructor).

2. Literature review

2.1 Conceptualising competence/competencies

"Competence/competency" constitutes the core of CBET and refers to a person's overall capacity, which includes a combination of knowledge, skills and attitudes that enable students to perform well academically and vocationally (Biemans et al. 2004; Braun and Mishra 2016). "Competency" is a set of specific and observable individual skills required to perform well in academic study and vocational training (Brownie, Thomas and Bahnisch 2012). In practice the two terms are so similar that they are often used interchangeably (e.g. Biemans et al. 2004; Braun and Mishra 2016; Chapman and O'Neill 2010). For convenience, in this paper, only the term "competency" is used.

Nonetheless, defining the term "competency" is not straightforward as it has a confusing nomenclature, while the meaning of the term can be sensitive to contexts and disciplines. "Competency" is considered to be synonymous with words such as "skill", "attribute" or "capability", and is often paired with such descriptors as "core", "key", "employability", "graduate", "generic" and "transferable" (Chapman and O'Neill 2010). Parry (1996) links competencies to job performance; however, Braun and Mishra (2016) claim that competencies go beyond occupational association to incorporate attributes or skills that enable an individual to thrive personally, professionally and socially. In this sense, competencies encompass vocational, cognitive and interpersonal skills as well as a sense of social citizenship. This definition is consistent with the concept of graduate attributes, defined by Bowden et al. (2000, para. 1) to include attributes or skills that "go beyond the disciplinary expertise or technical knowledge that has traditionally formed the core of most university courses. They are qualities that also prepare graduates as agents of social good in an unknown future." Biemans et al. (2004) link vocational education and training to the unceasing development of skills students need to prepare themselves to react to and anticipate future developments in their work. In other words, competencies are associated with lifelong learning skills.

From a lifelong learning perspective, competencies are categorised into discipline-specific competencies and generic/transferrable competencies. Discipline-specific competencies are the technical or hard competencies that are the core skills students are supposed to obtain from studying a particular discipline. Generic competencies are the soft or flexible skills that can be transferred easily from one discipline to another. For example, in an engineering program, the engineering skills are the discipline/hard/technical competencies, while communication and problem-solving skills are generic skills that can be used in the engineering discipline or profession as well as in other disciplines or professions such as teaching, law and medicine. As a consequence of the rapid pace of change in the knowledge economy driven by fast technological development, the nature of jobs and work has been changing rapidly. Education should respond to employer and labour market needs by equipping students with broad sets of skills and competencies, including both discipline-specific and generic competencies (Braun and Mishra 2016).

2.2 Characteristics of competency-based education and training

CBET is an approach to vocational education and training (VET) that focuses on the development of competencies instead of the study of subject areas as in the traditional method of teaching and learning. Competencies are embedded in competency standards, which are carefully and thoroughly established, normally by groups of academic and private sector experts. In this approach, outcomes or competencies in the form of skills, knowledge and

attitudes are explicitly stated from the outset so that curricula are properly designed to align with the competency standards established (Deißinger and Hellwig 2005). The competencies to be acquired are labour market oriented, and CBET curricula are designed in performance-based modules or units of competence, directing students towards accumulating vocational qualifications. Another important aspect of CBET is the focus on experiential learning, in which students learn through real world, simulation, and workshop activities, all of which are practice oriented (Ordonez 2014). The last two prominent aspects of CBET, which distinguish it from the traditional approach to teaching and learning, are assessment and flexible individualised learning (Shapiro 2014). Students are assessed based on their prior learning experience and their actual abilities to successfully perform a task. Students learn at their own pace, meaning that brighter students in a mixed-ability class can move on to the next task without having to wait for other students to catch up.

Table 1: Strengths and weaknesses of CBET programs

Strengths	Weaknesses
Nationally agreed objectives are established by government agencies, employers and employees with one regulative statutory body	Focus on observable outcomes and performance and not on learning processes
National standards ensure transparency of qualifications and employability	Problem of accreditation of underpinning knowledge
Experts define competence standards and the required knowledge, skills and attitudes	Conceptual understanding of a workplace is not achieved due to superficial learning
Relevance of industry and enterprise needs is reflected in the competence standards due to industry-led functional analysis	Fragmentation of training and learning owing to few connections between tasks
Complementary evidence of underpinning knowledge and understanding is required, i.e. knowing what, how and why certain actions are taken	Only minimum standards of performance are to be met
A learner-centred approach allows students to decide when, where and how they learn	Competence standards reflect the requirements of large enterprises, leaving small businesses underrepresented
Self-paced learning enables students to develop competencies they would not develop in a traditional classroom	Working environments change often and unpredictably, making it difficult to identify competence standards that respond in a flexible and effective way to organisational changes and innovations
Students develop greater competence and diverse skills and knowledge	Modules are based on uniform strategies, which are not equally appropriate for all learners
Individual needs are addressed	The validity and reliability of the assessment are questionable: one test at the end of a module does not demonstrate true competence
Modules enable flexibility in timetabling and updating courses	Lack of skilled personnel for providing workplace assessment
Assessment enables learners to repeat a module without having to repeat a whole course or unit	Deficits in training of vocational teachers diminishes motivation to teach according to CBET imperatives
CBET functions as a mechanism for economic survival in times of technological change and increased competition due to globalisation	Danger of misinterpreting standards due to lack of consensus on the standards caused by the use of different resources and materials with different standards

Source: Deißinger and Hellwig 2005

CBET offers an array of benefits. It is thought to enable students to be better prepared for the labour market as it equips them with various work-related competencies. It is also believed to help maintain student motivation and thus lower dropout rates (Deißinger and Hellwig 2005). Table 1 provides a summary of the strengths and weaknesses of CBET derived from various studies (Misko 1999; Mulcahy and James 1999; Billet et al. 1999 cited in Deißinger and Hellwig 2005).

2.3 Development of competency-based education and training

Before elaborating on the development of Cambodia's CBET program, it is necessary to describe the development of a general curriculum. Curriculum development involves three components – planning, implementation and evaluation – each of which involves different processes (Lunenburg 2011). An important feature of effective curriculum development is curriculum modelling.

A prominent curriculum model is Tyler's four-part model, which consists of 1) defining the learning objectives, 2) identifying learning activities to meet the defined objectives, 3) organising learning activities to attain the defined objectives, and 4) evaluation and assessment of learning experiences (Tyler 1949 cited in Denham 2002). This is a modernist, linear, cause-effect framework of curriculum development, where each step should strictly follow the next. It is often used as a top-down approach to curriculum development where a central body sets the learning objectives, contents and experiences (Ornstein and Hunkins 2016).

Taba, a colleague of Tyler, developed a seven-step model for curriculum development based on modernist-scientific tradition (Taba 1969 cited in Hunkins and Hammill 1994). This model is inductive and nonlinear, which allows curriculum developers to enter the curriculum model at various points, reverse the order, or work on various curriculum components concurrently (Lunenburg 2011). The seven steps are 1) diagnosis of needs, 2) formulation of objectives, 3) selection of content, 4) organisation of content, 5) selection of learning experiences, 6) organisation of learning experiences, and 7) evaluation and means of evaluation. This model is considered a grassroots model, where teachers are actively engaged in setting the objectives, learning contents and experiences in the curriculum.

Many different curriculum models were developed later by subsequent curriculum researchers. However, given space constraints, this paper focuses on the two models developed by Tyler and Taba. Due to their workability and reasonableness, these models remain popular among curriculum developers and have been highly influential for curriculum development in schools and universities regardless of context or philosophical orientation (Ornstein and Hunkins 2016).

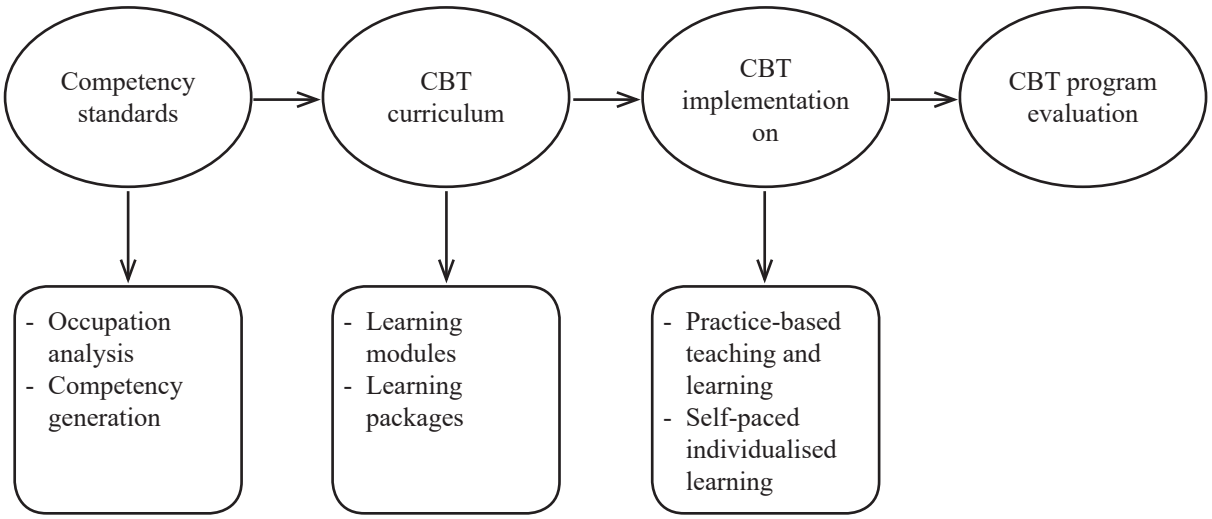
Further, Tyler's and Taba's curriculum models can be used as a basis for analysing existing CBET programs or establishing new ones. Sturing et al. (2011) established 10 CBET development principles, as follows.

1. CBET programs are based on vocational tasks and competencies.
2. Complex vocational problems are the foci of learning and assessment activities.
3. Learning activities are conducted in different but meaningful vocational contexts.
4. Target competencies, knowledge, skills and attitudes are the main foci in teaching, learning and assessment.
5. Students' learning and competency development is monitored progressively.
6. Students are encouraged to reflect on their own learning.
7. Students can steer their own learning, which is facilitated by CBET program structures.

8. CBET programs are flexible, allowing students to learn and improve at their own pace.
9. Teachers act as guides to facilitate learning activities and this guidance is adapted to students' learning needs.
10. CBET programs explicitly state and emphasise learning, career and citizenship competencies.

The procedure for developing a CBET program starts with identifying and selecting competencies and formulating competency standards. These components are equivalent to the development of learning objectives in Tyler's and Taba's curriculum models. Competency standards, which constitute the core feature of CBET development (Deißinger and Hellwig 2005), then become vitally important tools to guide the selection of materials and experiences for teaching and learning in the classroom and to serve as evaluation criteria against which student performance is judged. Competency standards can be categorised into three types: industry standards, cross-industry standards, and enterprise standards (Harris et al. 1995 cited in Deißinger and Hellwig 2005). Industry standards consist of competencies necessary for employees to perform their tasks successfully within a certain industry. Cross-industry standards comprise competencies that can be employed in more than one industry because of their common characteristics that make transferability of the competencies across industries possible. Enterprise industry standards are composed of competencies that are developed and implemented specifically for a particular organisation or company. These competencies are usually a specification of industry standards.

Figure 1: CBT program development and implementation framework



Two common and useful techniques in developing competency standards are DACUM (Develop a Curriculum) and functional analysis (Deißinger and Hellwig 2005). DACUM involves systematically defining the tasks or competencies associated with a certain type of workplace. Similarly to the concept of Taba's grassroots curriculum model, where objectives are selected based on analysis of the needs of students and teachers, in DACUM, competencies are identified and selected based on group discussion, moderated by a skilled facilitator, among experts in a particular occupation (Gonczi, Hager and Oliver 1990). These experts can be educators and workers who have a profound knowledge of the occupation under analysis. In contrast, similarly to Tyler's curriculum development model, functional analysis is conducted by a leading body in an industry and usually facilitated by a consultant. In functional analysis, the whole occupational sector is initially considered and then disaggregated into jobs, after which each job is disaggregated into competencies (Gonczi, Hager and Oliver 1990).

After competency standards have been established, learning activities and assessment are determined before the learning materials are selected. Equally importantly, curriculum management should also be considered to track implementation of the curriculum.

2.4 Implementation of competency-based training and education

Implementing an educational initiative can be complicated, especially when it involves a change from one version of an educational program to another. As quoted in Fullan (1982 cited in Atencio and Ratnam-Lim 2016, 154), "Good ideas with no ideas on how to implement them, are wasted ideas." Most curriculum change that has been directly imposed in a mechanistic manner on schools without regard for the complex nature of the school context and culture has foundered (Hoban 2002; Ornstein and Hunkins 2016). Sarason (1990 cited in Ornstein and Hunkins 2016) notes two basic understandings regarding curriculum implementation: how information and ideas fit into a real-world context, where the structure of the school, its traditions and its power relationships are to be understood; and an understanding of the relationship between curricula and the social-institutional contexts in which they are to be implemented. Yet, advocates of the mechanistic imposition of curricula on schools believe in the concept of "teacher proofing", which assumes that "with content so engaging that it would make students want to learn and lesson plans so clear that no teacher, however dull or incompetent, could fail to conduct an interesting class" (Evans 1996, 5). However, Evans also argued that curriculum changes in a mechanistic approach often miscarried, rather than successfully materialised, for "they [the changes] didn't get at fundamental, underlying, systemic features of school life: they didn't change the behaviours, norms, and beliefs of practitioners … Dull and incompetent teachers taught the new content dully and incompetently" (Evans 1996, 5).

The implementation of a new curriculum is usually met with some initial resistance. Lack of financial support, weak involvement and no sense of ownership, non-obvious benefits, lack of administrative support, increased workload, insecurity and sudden wholesale change usually underlie such resistance (Ornstein and Hunkins 2016). To encourage more cooperation, curriculum developers should 1) show that the new curriculum will bring about some reward, 2) point out the consequences of non-compliance, 3) indicate how the new curriculum is similar to the old one, and 4) tout the new curriculum as being superior to the old one. Enhancing the involvement of teachers and schools in the curriculum development stage is also a way to improve cooperation in new curriculum implementation as this increases a sense of ownership and thus responsibility among teachers and schools, while also ensuring that the new change is feasible with the provision of sufficient administrative, financial and technical support (Ornstein and Hunkins 2016).

According to Harris et al. (1995 cited in Deißinger and Hellwig 2005), before implementing CBET, curriculum developers should ask themselves some reflective questions. Specifically, questions related to their knowledge (how knowledgeable are they about CBET and can they explain CBET properly?), skills (how well can they orient others to CBET, design a CBET program, provide support in the form of learning materials, 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?). To further expand on this, CBET instructors should also be asked similar questions: knowledge (how well do they understand CBET?), skills (how well can they apply teaching practices to effectively deliver CBET?), and attitude (what is their attitude towards the philosophy and practice of CBET?).

In reality, implementation pitfalls are common and actual CBET practices can face many challenges. Beimans et al. (2004) identified seven possible pitfalls regarding the application of CBET in VET.

1. First, as mentioned earlier, the term "competency" has a large nomenclature, which makes it difficult to accurately capture the meaning of the concept. Also, there are differences in perspectives on the concept of competency between researchers, contexts, disciplines and vocations.
2. The second pitfall is overreliance on competency standardisation, which could be inaccurate given that it is established by VET institutions and therefore probably has little relevance to actual labour market needs. Further, the standardisation process may have drawn on factors identified in the literature, which by nature can only reliably identify past rather than present and future labour market needs.
3. The third pitfall is related to the challenge of matching learning in schools with learning in workplaces. These two learning systems are difficult to align.
4. Fourth, learning activities must be designed to match the outcome-based and labour market-oriented approach of CBET; stakeholders in learning activity design need to be careful and aware of this.
5. Assessment of competencies is the fifth pitfall. Assessment instruments must be valid, reliable, flexible and fair. Traditional memory-based assessment should be abandoned or dramatically revised to tap into elements of cognitive learning and skills that students have acquired.
6. The sixth pitfall of CBET concerns the changing roles and identity of teachers. In the traditional teaching approach, teacher-centred, lecture-style teaching methods are used, where students listen passively to the teacher's lecture with very little active engagement on their side. Teachers are more active in teaching and learning in this case. In the new teaching approach, the role of teachers changes from subject experts who transfer their knowledge to students to guides and facilitators of students' learning, encouraging students to take responsibility for and actively engage in their own learning.
7. The seventh pitfall is adoption of competency-based management, where management is practiced and assessed via clearly laid-out criteria or competencies, rather than via theory. The management needs to serve as a role model for teachers and encourage an open culture of cooperation so that teachers can take ownership of the management of teaching and learning.

Despite the limitations, these pitfalls should not make the implementation of CBET impossible. The key message here is that the managers and teachers of VET institutions need to be well prepared and properly resourced to tackle these challenges when developing CBET curricula and teaching and learning activities, so that the maximum benefits can be derived and drawbacks minimised.

CBET has been practiced in different countries around the world, and there have been both successes and failures. The literature suggests that the extent of CBET implementation should be rated on a range of levels (e.g. high, medium, low) instead of a dichotomous scale (e.g. CBET, no CBET). This is reflected in a study by Misbah et al. (2019), which was conducted in Indonesia. Using the 10 principles of CBET (Sturing et al. 2011) as criteria to measure the implementation of CBET in 41 Indonesian vocational agricultural secondary schools, the study found that the level of CBET implementation varied, with some schools at the lower end of the principles and some at the higher end. Another study by Misbah, Gulikers and Mulder (2019)

in 11 Indonesian vocational agricultural secondary 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 student perspectives of CBET in three North American higher education institutions. Students felt that CBET provided two main advantages: they thought CBET to be superior to the traditional teaching program in that CBET enhances the relevance of education to labour market needs, thus building their confidence in their career preparation; and they valued its hallmark benefit of flexible and self-paced learning. However, this second benefit accrues only to self-motivated students who prefer setting their own schedules. This poses a major challenge for some TVET programs in developing countries such as Cambodia. Most of the certificate-level (equivalent to grades 10,11 and 12 in upper secondary school) TVET students in Cambodia dropped out of school or have learning challenges, so they do not necessarily have the self-motivation and self-management skills needed. This makes it difficult for teachers to reinforce flexibility in the delivery and timing of learning, as without guidance and motivation from teachers, these students would not learn properly.

The lack of flexible and self-directed learning was also found in a study that investigated the realisation of competence-based education in TVET colleges in Ethiopia (Solomon 2016). The study, which involved TVET teachers, TVET students, employed TVET graduates, and job supervisors, found that CBET was not implemented completely, with some colleges described as having achieved "partially competence-based" and others "largely competence-based" levels of realisation. The study also found a positive relationship between TVET program competitiveness and graduates' job performance.

A literature review of 20 years of implementing CBET programs in Australian vocational training also supports the benefits of CBET in enhancing the employment opportunities of VET graduates through the improvement of practical, rather than theoretical, labour market relevant skills (Smith 2010). Nevertheless, the research also found challenges related to the delivery and assessment of CBET; the development of training packages, which takes a great deal of time and requires a huge amount of resources; and teachers' lack of CBET teaching capability leading to less likelihood of there being a pure CBET approach, which demands a vast amount of student-centeredness, flexible and self-paced learning, and regular formative and summative assessment.

A review by Burnette (2016) provides several suggestions for good practices to ensure the smooth development and implementation of CBET programs. While support from the leadership of relevant institutions is important for the development and implementation of CBET programs, teaching staff should also be involved early in the planning stage, so that they are aware of the strategies that will be implemented to promote student success. Moreover, business leaders should also be involved in the development of CBET programs in order to promote broad awareness of the program and to align the program with labour market needs. Finally, to ensure the quality of teaching and learning, CBET programs should incorporate active learning strategies, promote consistent and timely mentor feedback, and provide students with opportunities to practice what they have learned.

A broader picture of the implementation of CBET is provided in a review by Godfrey (2018) of several countries that offer education of outstanding quality. The review shows that in Finland, investment in teacher preparedness and professionalism has resulted in successful CBET implementation. Teachers are adequately prepared and able to produce their own CBET

curricula and provide frequent and extensive assessment (both formative and summative) of their students based on diverse evidence of progress in different areas, including work skills and behaviour. In Scotland, students learn in a learning-based environment, where teachers employ crosscutting pedagogical strategies and attempt to move away from summative assessment by putting more emphasis on formative assessment. In the UK, the CBET program focuses on managing information, situation and citizenship to meet education needs for the new century, and is shown to have increased students' motivation and enjoyment.

2.5 Technical and vocational education and training and competency-based training in Cambodia

Formal TVET in Cambodia is provided at four levels: 1) certificate (short courses from a few weeks to less than a year), 2) diploma (post grade 9 trade training in provincial and vocational training centres), 3) higher diploma (post grade 12 entry plus two years of study), and 4) bachelor degree (post grade 12 plus four years of study or higher diploma plus two years). Non-formal TVET and in-service TVET are also provided by provincial training centres, NGOs, private training providers, and business institutions. The vision of Cambodia's National Technical Vocational Education and Training Policy 2017–2025 is "to improve people's livelihood and dignity and to enhance Cambodia's human resources with knowledge, competency, skills, working attitudes, professional ethics, productivity, and competitiveness for lifelong employability" (MLVT 2017, 4). To achieve this vision, the policy sets four goals:

- Improve TVET quality to meet national and international market demands
- Increase equitable access to TVET for employment generation
- Promote public-private partnerships and aggregate resources from stakeholders to support for sustainable development of TVET system
- Improve the governance of the TVET system.

Upgrading the quality of TVET has been a major priority of the Cambodian government and its development partners. The ADB introduced the Strengthening Technical and Vocational Education and Training project in 2009 and the project was effective from February 2010 to July 2015 (ADB 2016). "The expected outcome was an expanded, enterprise-endorsed, public training system better aligned with the basic and mid-level skills requirements of the formal and informal economies in three industrial sectors (mechanics, construction, and business services and information and communication technology [ICT]) by 2015" (ADB 2016, 1). This project has pushed the establishment and improvement of the once dormant TVET certificate levels C1, C2 and C3, which are equivalent to grades 10, 11 and 12, respectively, in the general education stream. Another prominent feature of the project was the launch and strengthening of CBET with the establishment of competency-based curricula (CBC) for three major occupation categories – construction, mechanics and business. CBET was introduced into Cambodia's TVET program in the name of competency-based training (CBT) only. Beginning in 2010, the Directorate General of TVET, MLVT concentrated on establishing CBT curriculum framework, competency standards, training package, and assessment materials and piloting them. Only in 2017 did MLVT instruct all TVET providers to train students based on the approved materials. However, due to the lack of training resources required, not many TVET providers could adopt the new training approach. Consequently, for practicality and convenience, CBT is used in place of CBET for the remainder of the paper.

A report by UNESCO (2013) provides the following assessment of the new curriculum reform. The new curricula are academically oriented, but with inadequate innovative teaching and

pedagogical approaches. Implementation of the curricula has been problematic as there is little evidence that the new curricula had been piloted before being introduced to TVET institutions or that proper impact assessments had been carried out. Just like many countries that implement CBT, Cambodia has encountered problems in implementing CBT curricula. Pitfalls include limited overall management capacity, curriculum planning without considering affordability and sustainability, paucity of capacity and expertise to support the upgrading of CBT curricula for TVET, a lack of commitment and involvement from teachers and trainers, and limitations in self-assessment and accreditation to ensure quality control.

The issues identified by UNESCO (2013) have stymied efforts to enhance the quality of teaching and learning in Cambodia's TVET sector. Outdated materials and irrelevant learning content that do not match labour market needs also affect the quality of teaching and learning in TVET. CBC is considered a solution to this challenge (UNESCO 2013). TVET instructors have been trained to use the new curriculum, in which a variety of teaching and learning approaches are to be employed, including student-centred, problem-based learning approach and in-company training approaches. Even so, despite concerted efforts to reform both the curriculum and teacher training for the CBT program, inappropriate pedagogy is still a challenge in Cambodian TVET (UNESCO 2013; CDRI 2015). The development and implementation of CBT has encountered many obstacles, but there has been limited empirical research to examine these. Most importantly, there has been no investigation of the perspectives and experiences regarding development and implementation processes among TVET instructors, who are key actors in the implementation of CBT programs. Instructors' perspectives and experiences are also important because they affect teaching quality and the appropriateness of learning activities. If instructors' perspectives are not consistent with the expected outcomes set by CBT program developers or if instructors are not satisfied with the CBT curriculum and the expected outcomes laid out for them, they will not perform well in their teaching. This will ultimately affect students' perceptions of their learning as well as their learning outcomes.

This study therefore primarily aimed to explore the perspectives and teaching experiences of TVET instructors regarding the development and implementation of the CBT program in three technical disciplines (construction, auto-mechanics, information technology), which have been prioritised by the government. TVET institution directors, who were supposed to play a major role in coordinating and facilitating the implementation of the CBT program, are another group of key actors that influence the implementation of CBT and the experiences of TVET instructors. Institution directors also served a role in seeking support and aid from other stakeholders, for example, development partners and the private sector, to assist in upgrading instructors' knowledge of CBT and the teaching skills and appropriate pedagogies in teaching CBT in order to facilitate the implementation of the CBT program. Those involved in the development of the CBT program constitute the third group of key actors. They set the expected teaching approaches and learning outcomes, and supported the implementation of the CBT program. This group is normally composed of TVET instructors, who possess significant knowledge about pedagogies and teaching experience in TVET institutions.

The perceptions of the three main groups of stakeholders in CBT development and implementation were triangulated to identify the successes and failures in CBT program implementation. The results of this study are of great significance as they can inform TVET policymakers and CBT program developers of how the CBT program was perceived and implemented by TVET institutions and instructors. Besides, successful experiences of CBT program implementation can be used as lessons for TVET institutions that have not yet implemented CBT or have failed

to implement the CBT program completely. Implementation failures can serve as cautionary lessons for all TVET stakeholders to take proper measures to tackle these challenges and seek appropriate solutions. The study addressed three main research questions:

1. What successes and challenges did CBT curriculum developers encounter during the development and implementation of the CBT program? How did they deal with them?
2. What successes and challenges did TVET institution directors encounter during the implementation of the CBT program? How did they deal with them?
3. What successes and challenges did TVET institution instructors encounter during the implementation of the CBT program? How did they deal with them?

3. Methods

To address the three research questions, a qualitative approach was adopted to collect data from three main stakeholder groups: CBT curriculum developers, TVET institution directors, and TVET instructors. This is a form of data source triangulation. "Data source triangulation involves the collection of data from different types of people, including individuals, groups, families, and communities, to gain multiple perspectives and validation of data" (Carter et al. 2014, 1). Such triangulation was conducted to crosscheck the validity and reliability of the data obtained and also to enhance researchers' confidence in interpreting that data (Bekhet and Zauszniewski 2012).

The study used a combination of convenience sampling and purposive sampling. Ten TVET institutes and centres were selected based on the fact that they have been implementing CBT and were readily accessible to researchers. The sample comprised four prominent TVET institutes in Phnom Penh, three prominent institutes in provincial cities known for their tourist attractions, and three small institutes and centres in small provincial towns. The data was collected from January to mid-March 2020. Care was taken to select sample institutes and centres in a variety of locations in order to ensure the validity and reliability of the data collected.

Teachers and teacher developers (referred to as developers) from the selected institutes and centres were invited to a focus group interview, which was semi-structured in nature and lasted for around 90 minutes (see the Appendix for the interview protocol). Nine focus group interviews were conducted with four to six participants in each, in which the total number of female teachers were only five, which reflects women's representation in technical majors in Cambodia. All the interviews with teachers and developers were voice-recorded with their consent. A member of the management team from each institute or centre, the director or deputy-director, was also invited for a one-to-one semi-structured interview of around 60 minutes (see the Appendix for the interview protocol). Not all of these participants agreed to have their interview voice recorded. The voice-recorded interviews were transcribed by trained research assistants.

Researchers also conducted fact-finding research by interviewing two officials – one from ADB, who was the main actor in initiating CBT certificate levels (C1, C2, C3) at TVET institutes and centres in Cambodia, and the other from the Department of Standards and Curriculum of MLVT, who coordinated the development and implementation of the CBT program. These fact-finding interviews were mainly conducted to familiarise researchers with the background to the CBT program in order to strengthen the research problem and purpose as well as to inform the formulation of interview questions for data collection.

Data analysis was based on Braun and Clarke's (2006) six-step guidelines, or phases of thematic analysis: getting familiarised with the data, creating initial codes, getting immersed in the data through reading throughout each transcript, reviewing themes, defining and naming themes, and writing the report. The main researcher then reviewed the interview transcripts and notes and began the coding process, selecting meaningful and relevant texts related to the research purpose and questions to produce codes. These codes were then merged into a few general themes, again in line with the research purpose and questions. The codes and themes were then passed to other members of the research team to check. After reaching consensus on the codes and themes, the researchers compared the data across each stakeholder group to triangulate information from all three main stakeholder groups (i.e. teachers, developers, managers) in CBT program development and implementation.

4. Results

4.1 Competency-based training program development and dissemination process

The CBT program was developed and implemented following the steps summarised below (also see Figure 2).

Establishment of competency standards: Experienced TVET instructors and directors from prominent TVET institutions were invited by MLVT to participate in the establishment of the competency standards for three main occupations: business, construction and auto-mechanics. These participants received training from foreign consultants hired by MLVT under a project sponsored by ADB. Then experts from the private sector were also invited to join. With coordination from MLVT, these two groups of academics and private sector experts met to conduct occupation analysis, after which competency standards and competency-based curricula were developed for each occupation.

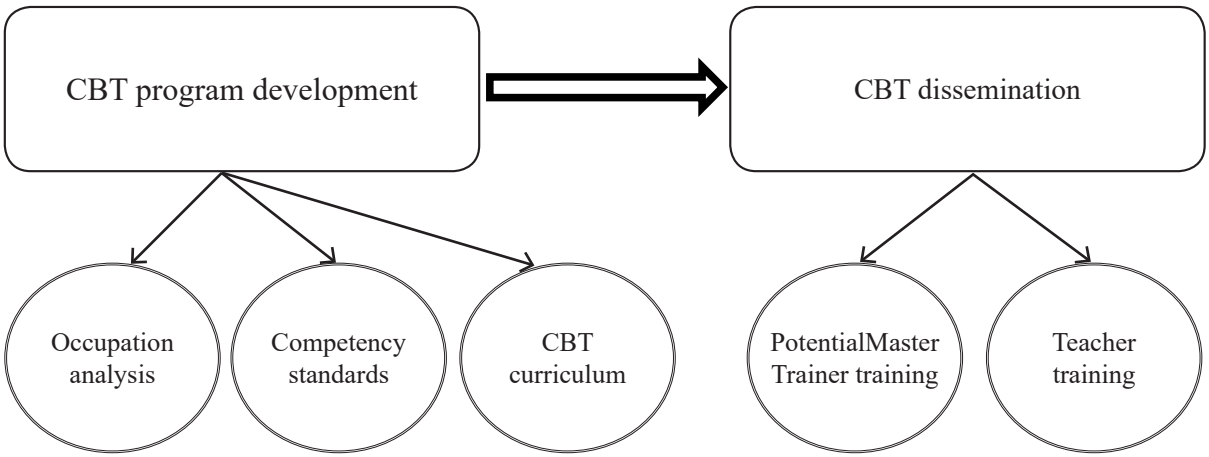
Dissemination of CBT: First, some experienced teachers from major TVET institutions from all over the country were selected to join Potential Master Trainer training. These potential master trainers were taught the core concepts of CBT and how to teach and create modules for the CBT program. CBT training workshops were then provided to TVET instructors all over the country by potential master trainers. The training was delivered in two phases, each of which lasted five days. To complement these CBT workshops, Return to Industry training was also provided to TVET instructors, aiming to upgrade their practical technical knowledge so that they are well-prepared to teach in the CBT program. Likewise, this training was conducted in two phases, each of which also lasted five days. TVET leaders were also invited to CBT training, but this type of training was embedded in the training for TVET management in general, not exclusively for CBT.

4.2 Key stakeholders' perspectives

The current research aimed to elicit the perspectives and experiences of developers, TVET institution directors, and instructors on the CBT program development and implementation. To address the research purpose, four main themes were established from the data analysis, after thorough immersion in the data. The first three themes were consistent with the concept of developing and implementing an education program suggested by Harris et al. (1995 cited in Deißinger and Hellwig 2005). In order to develop and implement an educational program, developers and implementers need to possess three basic elements of the program: knowledge (how knowledgeable are they about the CBT program and well can they explain it?), skills (how well can they develop and teach in the CBT program?), and attitudes (how enthusiastic,

comfortable and open-minded are they towards the philosophy and practice of CBET?). The fourth theme that emerged during data analysis was challenges to the implementation of the CBT program and solutions to those challenges. This section categorises each theme based on the three main stakeholders: developers, TVET institution directors, and instructors.

Figure 2: Competency-based training program development and dissemination process



4.2.1 CBT program developers

4.2.1.1 Knowledge

Research question one aimed to examine the perspectives and experiences of CBT program developers. Before doing so, developers' knowledge of CBT was elicited first as this affects how well they can work to develop the CBT program. CBT program developers demonstrated excellent knowledge of the concept of CBT as reflected in their answers when asked to define CBT and compare it with the traditional teaching and learning approach. All the key features of CBT were mentioned and explained in detail. One developer from a prominent TVET institute in Phnom Penh explained the difference between CBT and the traditional teaching approach,

The traditional teaching method focuses heavily on the instructors explaining and writing information on the board thoroughly based on the lesson plan, while CBT requires the instructors to generate the whole learning package for one occupation so that students can learn at their own pace. This demands that instructors be very highly qualified and knowledgeable. It's not necessary for students in the CBT program to study the same things as their classmates. They can work on different tasks or modules. When they read the learning materials, they can ask the instructors to clarify what they misunderstand, so the instructors are recognised as facilitators.

Another developer from another famous TVET institute in Phnom Penh also elaborated on the difference in emphasis on learning activities between CBT and the traditional teaching approach,

> In contrast to the competency-based curriculum (CBC), the traditional curriculum is based on theory-based instruction with limited practice in class, meaning that the teacher provides a great deal of explanation. CBC means teachers expend less effort instructing students, instead organising a variety of activities, one of which is distributing modules to students to study and practice themselves. It is more performance-based learning, but only if sufficient materials are available, which means we focus more on practice than on learning theory.

Yet another developer emphasised the core nature of learning in the CBT program, particularly the aspect of self-paced, flexible individualised learning.

> The teacher uses only 10 or 15 minutes of the session to explain, and the students are given enough time to focus on practice. Besides, we are not strict about attendance; they can read the book at a time and place, either at home or a café, convenient to them. We value the outputs.

It is not surprising that these developers are well equipped with knowledge of all the core features of CBT considering the amount of time allocated to furnish them with intensive training on the concepts of CBT and the real-world experience they gained from establishing competency standards facilitated by MLVT.

4.2.1.2 Skills

Admittedly, in order to gain clear knowledge of how skilled the developers are in developing and teaching the CBT program, their activities should have been observed directly, but time and resource constraints meant this was not feasible. Therefore, instead, researchers elicited their skills from the focus group interviews. Obviously, knowledge and skills are related. Although knowledge does not directly translate into skilful practice, knowledge serves as the best foundation for skills. These groups of developers displayed good knowledge of the CBT program and confidence in the development and teaching of the CBT program, showing no reluctance when asked about its features, development and implementation. Again, this was probably because of the intensive training provided by MLVT for TVET instructors in the certificate levels.

A developer narrated his experience in developing the CBT program.

> While the consultants were training us on CBT, we were also working on the development. We developed the standards ourselves, which were later converted to learning packages, but the first stage was not done carefully enough for we could identify the weak points in our standards. However, with attention to detail, we can develop a better version of the national standards.

Developers received training from technical experts hired by MLVT under the project funded by the ADB, but these experts may have been able to help only with the concept and structures of CBT during program development, while the actual competency standards had to be determined by local experts. Another developer spoke of when he was developing the competency standards.

> First of all, the developers draft the standards and invite private sector experts to evaluate the draft, whether or not it responds to occupational demands. This involves a variety of pre-implementation stages. The steps include drafting the competency profiles, conducting consultation workshops, discussing them with the sub-National Training Board, and finally submitting the draft to the National Training Board for approval.

Another developer added,

> We undertake the task/job analysis by having experts from the private sector contribute to the analysis. We select companies with enough resources. Usually, we direct our attention to large enterprises, depending on our connections and

networks. By discussing specific topics with experts, we can draft the occupational profiles based on their expertise and experience and start narrowing those profiles into competency units.

CBT program development processes were clearly complex and time and effort consuming. They also involved various stakeholders: consultants sponsored by the ADB, officials from the Curriculum and Standards Department of MLVT, TVET instructors and directors, and experts from the private sector. Developers amply demonstrated their knowledge and skills in the process of CBT program development through their fluent and knowledgeable responses during the focus group interviews.

4.2.1.3 Attitudes

CBT program developers generally showed positive attitudes towards CBT. Most of them mentioned the advantages of CBT for students' learning, noting that students learned better in this program than in the traditional approach as there is a stronger emphasis on practice rather than lecture-based learning, and for Cambodia's economic development given that the CBT program equips students with labour market relevant skills. Below are the responses from two different developers regarding the benefits of CBT.

> Qualified workers are in high demand in our country. The recommendation from the ministry, as well as from the government, is to continue improving human resources capacity to meet industries' needs. Therefore, to achieve what has been planned means reinforcing the implementation of the CBT program. As long as we have enough equipment and tools, the students will be competent. The equipment must be technologically advanced to align with the tools used in industry.

> In my opinion, CBC can be taught faster and students achieve better results. The teacher uses only 10 or 15 minutes of the session to explain, and students are given enough time to focus on practice. CBC is very efficient and cost-effective, as students can complete their certificate within a short period provided that they pass the evaluation.

However, they also felt that CBT cannot be fully implemented yet.

> To implement CBT requires workshops, compulsory materials and tools, and assessment/evaluation centres. We are at the lobbying stage. I'm confident to say this because I've been deeply involved. Teachers and assessors are required. This is what the ministry is doing. We don't have any resources, even though we've put CBT into practice.

> In addition to these factors, we should discuss tools and materials; if appliances and materials were insufficient, CBC would not be implemented. Currently, to address the issues, we teach students based on a mixed approach by combining traditional methods and CBC, for we are not able to make a total change. What we can do is gradually adjust the situation depending on the resources at our disposal.

Although they acknowledged some challenges posed by CBT, developers felt that it was time for Cambodia to practice CBT and address any implementation drawbacks throughout the process. This means that developers thought of CBT implementation as a cycle of implementation, feedback and revision.

4.2.1.4 Challenges and solutions

Despite holding positive views of CBT, developers also described a few challenges that TVET institutions and instructors encountered during the implementation of the program. One of the main problems was the lack of physical resources in the form of materials and equipment available for students to practice while learning in the CBT approach. They also mentioned funding packages from MLVT and ADB but that these packages were not sufficient as materials and equipment would be exhausted after use and could not be reused.

> Still, my concern is the lack of materials owing to the fact that materials can't be reused and can't be bought either because they are too expensive. Even if the ministry provides the materials, it is not clear whether the school has enough financial resources to purchase them. The institute spends too much money each year on buying materials for students. As a consequence, CBC costs more than the traditional program.

Knowledge and skills of instructors was the second main challenge. The developers conceded that many of the instructors, who themselves studied in a traditional approach through rote learning and memorization, lacked practical technical experience and knowledge. To address this challenge, MLVT, with financial assistance from ADB, arranged special in-service training for TVET instructors in the form of Return to Industry training. As part of this training, instructors had the opportunity to work at a particular worksite where they could polish, upgrade and modernise their technical skills.

> The challenge we are currently dealing with is a shortage of technical instructors to implement the CBT program effectively and efficiently, and this issue has commonly and widely occurred within TVET centres. In addition, it is obvious that certain instructors have problems adapting from traditional teaching methods to competency-based training. New instructors do not have sufficient practical experience in technical fieldwork because they graduated with a bachelor's degree, and consequently their teaching approach takes the form of theory-based instruction.

> We have materials and tools, but they are highly restricted. I acknowledge that training on CBT remains limited to instructors. However, the department encourages teachers to engage in Return to Industry training. This is what we are currently working on.

Lack of full cooperation from the private sector was the third challenge raised. Upon being requested to send experts to participate in competency standards development and occupational analysis, some private companies sent experts and some did not. This may have been because those companies did not see the significance or benefits from this tiring work. The following is an excerpt from an interview with a TVET institution director who participated in CBT program development.

> As for the development of standards, we have experts to lead the write-up stage and we have received support from various sources. However, eliciting active engagement and contributions from the private sector remains a challenge, undermining the quality of standard development. We reached out to the private sector for assistance and aimed to get them to evaluate the standards package; some companies refused to participate in the meeting, while some agreed. Although we

had proposed that they designate suitable technical resource persons, contrary to expectations, their representatives had very limited industry-related knowledge. Worse still, some companies appointed administrative officers to join the meeting, and consequently their contribution to standard development was also very limited.

4.2.2 TVET institution directors

4.2.2.1 Knowledge

Research question 2 sought to examine how TVET institution management teams coordinate and facilitate implementation of the CBT program. TVET institution directors are the second main stakeholder group in CBT implementation. They played a key role in facilitating the dissemination of information about CBT, training CBT instructors, and implementing the CBT program in their institutions. Even so, most of the directors displayed little interest in and scant knowledge of CBT. In fact, the conversations with directors mostly covered the challenges encountered by TVET institutions in general, rather than the CBT program. These challenges are elaborated further in Section 4.2.2.4 on challenges and solutions. The only knowledge of CBT that many directors demonstrated was the fact that CBT focuses more on practice, in comparison with the traditional teaching approach.

> As I've mentioned, following the CBT program, students have the chance to practice often. Like practicing in the workforce. The students have modern materials and new technologies to work with.

According to the information obtained from the fact-finding interview with an ADB official, TVET institution directors were invited to participate in a variety of training workshops under the project sponsored by ADB with the aim of upgrading the quality of TVET in Cambodia.

> They have participated in numerous training courses. Even if CBT management is not the focal point of the training, the objectives were designed to ensure that the management team is able to oversee and monitor the results in general. If each institute forms an initiative-oriented group, they can apply the knowledge gained from the training in different contexts. Therefore, it is not necessary to focus entirely on CBT.

Many training workshops were organised, including one on CBT. Many directors claimed that they received no training on CBT, and some also admitted that they were too busy with other institutional commitments to attend all of the workshops. When asked whether he had attended a workshop on CBT, one director replied, "No, directors only know the name of that [CBT], but they [MLVT] provide training only for instructors." Another director responded, "No, the management team knew about it [CBT] via an orientation workshop."

MLVT disseminated information about CBT directly to instructors through training workshops. In stark contrast, directors did not play a significant role in sharing information or facilitating the implementation of CBT. Some directors spoke of the training on CBT provided to instructors. One director explained, "The ministry selects teachers from schools to join training workshops. The first and second training phases are workshop-based. The third phase involves two stints of experience in the workplace or at a particular company."

TVET institution directors' scant knowledge of CBT can obstruct their ability to monitor and facilitate the practice of CBT in their institution. Then there was the question whether CBT was implemented at all or implemented properly at their institutions. One director conceded,

"When the leader doesn't deeply understand, even if the implementation level were far below the expected CBT standard, they wouldn't really know."

4.2.2.2 Skills

Skills here refers to the ability of directors to manage the implementation of CBT. As mentioned earlier, directors demonstrated little knowledge and interest in CBT in general. They merely assigned their deputy, a department head or instructor to oversee CBT implementation in their institution and instead focused on the overall management of their institution. All interviews with directors revealed that the first priority of TVET institutions was to recruit students for the three certificate levels as required by MLVT. Most of the directors mentioned their earnest endeavours to recruit and retain certificate-level students. As one director described,

> Here we focus on students who have dropped out of school. Most of them prefer going to work. We also face the problem of student retention because most of them are not really interested in studying. We usually try to create some events for them in order to attract and keep them interested in studying. For instance, we celebrate *Sangkran*, organise study-tours, trips to Kirrirom, study-tours to parliament and so forth. Otherwise, there would be a high dropout rate. Recruiting students is very challenging. We therefore also go to students' houses to introduce and explain more about the importance of studying in the certificate levels.

Whether institution and centre directors have the necessary skills to monitor and facilitate the implementation of CBT is questionable. Besides, they have other priorities, especially the recruitment of certificate-level students and the management of the whole institution. Monitoring of teachers' teaching was based mainly on student evaluation, which provided an assessment of general aspects of teaching, not specifically of the teaching in the CBT program. One director said he did not know whether or not his teachers were implementing CBT. Another said, "For this matter [evaluation of curriculum quality], we have inspection from MLVT. They are in charge of observing and evaluating annually. In school, we have forms for students to evaluate teachers." This can constitute a problem in the evaluation of the CBT program, and is further elaborated in Section 4.2.2.4 on challenges.

4.2.2.3 Attitudes

Even though directors have barely been involved in the implementation of CBT, most of them recognised the benefits of the CBT program for student learning and national economic development. Nevertheless, their answers revealed a distinct lack of enthusiasm and lack of in-depth understanding. One director answered, "According to their [MLVT's] study, it [CBT] is good for improving student performance, but they [MLVT] do not provide enough materials for students to practice so they only study theory." Another said, "It's good if CBT can run well, but we need study materials for the teaching of that technical major. We need engines if we are to teach auto-mechanics. Currently, because we cannot meet enrolment targets the school accepted even bad students. So, in the future should we continue to focus on enrolment numbers?"

From the directors' responses, it is clear that they have been more focused on teaching and learning materials and enrolment rates, rather than the advantages or actual implementation of CBT. Another director recognised the flexibility of class attendance, which is an important aspect of CBT, but he had a somewhat negative view of this.

> According to CBT principles, students can learn by themselves and student attendance is not that important. However, we cannot allow Cambodian students to do so as they lack self-motivation and self-learning ability. Look, they don't even have proper self-management regarding sleeping. We even need to be strict with them about the time they go to bed.

Compared to developers, directors tend to hold a neutral view about the implementation of CBT. This could be because they were barely involved in the development, training and implementation of CBT, mainly due to being overwhelmed with institutional management and administrative affairs, where major problems such as lack of technical materials and equipment and low enrolment rates for the certificate programs have always plagued them. The directors who had been involved in the development process and who had attended training workshops on CBT tended to hold more positive views about CBT. One deputy director, who was recently promoted to his current position and who had attended CBT training often while he was a regularteacher, expressed his relatively positive view of the benefits of CBT.

> Generally speaking, our country needs more skilled workers, and these skilled workers need to possess specific competencies related to a particular occupation. Therefore, we must mobilise the CBT teaching approach.

4.2.2.4 Challenges and solutions

The main challenges the directors mentioned were consistent with those mentioned by the developers, that is, the shortage of materials and equipment and the lack of instructors' practical technical experience. Some directors encouraged dissemination within their institution of information and knowledge about CBT acquired by their instructors who had undergone the training provided by MLVT and ADB, though some directors did not do so.

The paucity of materials and equipment for students' technical practice was raised by the directors. This was considered one of the most important problems that TVET institutions have encountered in implementing CBT.

> My personal understanding is that they pick a teacher to train about CBT, but they should also make sure they have sufficient materials so when teachers finish the training, they can practice it. And I am concerned that teachers go and study but when they come back, they don't have anything to do with that.

> I am certain that our institute implements at least 70 percent of the CBT program, but it is obvious that materials and resources are still the greatest issue that needs to be addressed. By giving students an internship, they can acquire more knowledge of technological advancement and benefit from the experience of using expensive tools.

Directors are clearly aware that the lack of proper materials and equipment has hindered the proper implementation of CBT; however, they use internship as a replacement. Students are sent to worksites to practice doing the job with real materials and equipment. Finding internship opportunities for students is not difficult. Directors can easily find companies, usually local ones, that are willing to provide internship placements for students; and these companies also allow instructors to go to the worksites to supervise and assess the interns. One director stated, "There's no problem finding internship places for students. We just need to submit a formal letter to companies." In the same vein, after mentioning the problem of lack of materials and equipment, one director also suggested a way to deal with this problem by proposing a financial aid package from MLVT.

> According to their [MLVT] study, it [the CBT program] has been successful in improving student performance, but the thing is that the ministry does not provide enough materials for students' practice so they study theory only. Students will work with actual materials and equipment after they graduate, so they can only work based on their understanding of the tasks [rather than based on practical experience]. Let me tell you until now they [the government] we don't have the money to buy the materials and equipment for the students to practice with, so technical study is in name only – we are still using whiteboards and markers. So, in actuality, 70 percent of the CBT learning is not actually CBT [because of the lack of actual practice on materials and equipment]. We receive money only in the second semester; so, in the first semester, there's little practice. The money package comes once a year. The Ministry of Economy and Finance has been here talking about the quality of CBT, but the quality comes from human resources, materials and curriculum. So, if we don't have all of these, how can we ensure quality?

This is quite contradictory to what the ADB official said during the fact-finding interview. He said that ADB had provided sufficient funding for materials, equipment, buildings and workshops to all TVET institutions as long as they submitted a proper request.

Another prominent challenge that directors mentioned was the recruitment and retention of certificate-level students. Students do not value TVET at the certificate level, and would prefer to study in the general education stream. Most of those who choose to enrol in the certificate levels dropped out of school prematurely or are poor performers. Below are some interesting excerpts from the interviews with directors with regard to this issue.

> The main challenge of having very few students applying for a technical certificate stems from Cambodians' perspectives. They think that such occupations are extremely tiring, and besides, TVET has a low perceived social status. For example, not many students enrolled for the C level in construction engineering in first generation.

> Here we focus on students who dropped out of school. Most of them prefer to go to work. We also have difficulties with the remaining students because they are not really interested in studying. We usually try to organise some events in order to attract and keep them interested in studying.

> Household issues and family hardship are the persistent issues that prevent us from attracting students, particularly vulnerable groups, to enrol in C-level courses, because their families depend on them to work. In addition, students tend to underestimate the value of technical skills as they intend to study higher education.

Considering that prospective C-level students have sufficient capability, they are more likely to find work rather than enrol in a TVET course because they need to support their family financially. Further, earning a TVET certificate does not guarantee higher pay than going straight into work without qualifications. The same is true for short course and certificate level 1 graduates. Opportunities in the labour market seem more attractive to them than the next level of further education.

> As far as I know, there's barely any difference in the wage for different levels of certification. After finishing a four-month course, the wage is about 300 dollars; 2 or 3 months or at most a year later, they might get 400 or 500 dollars. After they complete certificate level, the wage barely changes. Some students therefore start

work after they finish the first year. After that they continue to study. But some manage to get a job after completing C1; they can earn around 700 dollars per month, so they do not go back to school.

There are also challenges with teachers that have been perturbing TVET institution management. First, teacher shortages are a problem for TVET institutions, especially those in the provinces. This is an interesting observation as it highlights apparent inconsistency in strategy. Even as TVET institutions raised the issue of the lack of teaching staff, MLVT ceased recruiting teachers for government posts at TVET institutions. Second, from the interviews with TVET institution directors, it was learned that teachers appointed to government posts in the provinces would remain in those positions for a few years only and then request a transfer to the capital, usually to take up a non-teaching position. This has led to a third problem. Some teachers who requested a transfer had undergone the CBT training provided by MLVT, so they took away with them the knowledge needed to teach the CBT program. New teachers who were recruited later to replace them did not have the chance to participate in the CBT training.

> The factor that contributes to the deficiency of teaching staff is that our instructors are permitted to transfer from a teaching position to a ministry administration job. My suggestion to the government and related ministries is to adopt a preclusion policy to stop the possible transfer from a teaching position to an administrative position. This can result in a lack of instructors teaching at TVET institutes.

The absence of real program evaluation is the last and perhaps most remarkable problem. Evaluation of an education program is a vitally important stage in curriculum development as this stage provides developers with useful feedback necessary for the revision and betterment of the curriculum. Directors did not have any formal mechanisms to evaluate the implementation of CBT, while some directors mentioned that they did not even know whether their teachers were implementing CBT or not. The only evaluation that was conducted was the evaluation of teachers' teaching through students' rating of their teachers. The following conversation is a key piece of evidence that clearly supports the claim that program evaluation has been lacking.

> Q: How about the evaluation of teaching? Is there regular evaluation in school?
> A: No.
> Q: That means there is uncertainty whether CBT is being implemented.
> A: We don't know.
> Q: How about measuring the quality of the curriculum as well as teaching and learning; how do you measure?
> A: For this matter, there is inspection from the ministry. They are in charge of observing and evaluating annually. In school, we have forms for students to evaluate teachers.
> Q: During the inspection, how do they evaluate?
> A: As far as I know, one thing they do is make direct observations at school. Second, they evaluate materials or equipment, lesson plans and so forth. And the inspectors provide training courses for the teachers as well.
> Q: During the inspection, do the inspectors inspect CBT implementation specifically?
> A: I'm not sure. I don't think they focus on CBT. For inspection, the inspectors focus on whether or not teachers prepare lesson plans, outlines or certain agenda for teaching. They also conduct interviews with students and teachers.

That there was no emphasis on the implementation of CBT during inspection is somewhat surprising because it was the MLVT itself that stipulated all TVET institutions under its jurisdiction must implement CBT. This suggests inconsistencies or miscommunication between different departments of MLVT regarding the implementation and evaluation of CBT. Here we have provided just one excerpt from a conversation between the researchers and one director. However, during our interviews, all the directors provided similar information concerning the lack of evaluation of CBT program implementation in their institutions.

4.2.3 Instructors

4.2.3.1 Knowledge

Regarding knowledge about CBT, there is a complicated problem here. As mentioned earlier, there was little coordination from the TVET institution directors. Instead, teachers and MLVT communicated directly with each other through training workshops, which comprised two training courses: CBT training, aiming to equip trainees with the concept of CBT and the ability to produce learning modules based on the established competency standards; and Return to Industry training, aiming to allow teachers to upgrade and modernise their technical skills. Training was done in two phases. The first phase involved the training of potential master trainers (PMTs), who would later train regular teachers in the second phase. Some teachers who had attended the training were quite knowledgeable about CBT, though they were not as knowledgeable as PMTs and developers. Most of them knew that CBT involved a student-centred teaching approach, in which students learned from doing practical work rather than listening to lectures, but they did not seem to have a grasp of other key features of CBT, such as self-paced individualised learning, recognition of prior learning, or module-based learning. In contrast, developers reeled off information about these key features fluently with no need for prompting questions from the researchers. A relatively well-trained and experienced teacher explained,

> A teacher-centred approach is used for teaching the traditional curriculum. However, now that we have implemented CBT, it [teaching and learning] tends to be more student-centred. Students can practice based on the module we provide them. The difference between these two approaches lies in how we instruct the students. The teacher-centred approach focuses more on the teacher's role in instructing the students, whereas the student-centred approach gives students more freedom to practice the activities with guidance and assistance from the instructors.

However, surprising as it was, some teachers did not even know what CBT was even though their management claimed that their institution was one of the pioneers of CBT implementation. The following excerpt from an interview with two teachers proves this point.

> Interviewer: The topic is about teaching students the curriculum based on their ability, which is known as 'CBT'. Have you ever heard of CBT?
> Interviewee 1: Never.
> Interviewee 2: I have heard from my female friend, but I haven't been involved yet
> Interviewer: They have a few training courses, too. So, you all haven't participated yet?
> Interviewee: No.
> Interviewer: Probably, there are too many lecturers.
> Interviewee: We are also busy.

The teachers being interviewed were new teachers who had not had any training on CBT. Yet, they were in charge of teaching the CBT program at certificate level. It seems counterintuitive that this problem should exist in TVET institutions which claimed to be implementing CBT. Of course, training has been provided through the joint endeavour between MLVT and ADB on CBT, but the training is probably not inclusive enough yet. In addition, as mentioned in the previous section on challenges and solutions, some teachers who had undergone CBT training had been transferred to non-teaching posts, so the TVET institutions had to recruit new teachers who did not have the chance to participate in the training. The pace of the delivery of training courses is also open to question as the project has been implemented since 2015, but some teachers have still not received the full training.

> I have joined two phases. The first phase of the training guided the participants to examine and analyse the standard package. In addition to the first phase, I was provided the second phase, mainly focusing on assessment, yet the assessment training was not as detailed as the first one, for I heard there would be a third phase.

This teacher had gone through two phases of training, but the interviews revealed that some had not had any training at all while others had received only the first phase of training. The lack of clear guidance and follow up after the training exacerbated the problem. One developer said, "It [selecting teachers for training] relies on school – usually three [teachers] are selected. They [teachers] are not responsible for disseminating [information about CBT] to their colleagues because all 800 instructors will be invited to attend the training." With no encouragement from trainers for trainees to share their knowledge with colleagues, it fell to individual management teams to take action on whether or not the teachers who returned from training were required to share what they had learned. From our interviews, some institutions encouraged information sharing, while some did not.

TVET teachers' knowledge of CBT is still an area for improvement and all stakeholders should work together to accelerate the training so that more, if not all, teachers have a clear understanding of the concept of CBT and the teaching approach in the CBT program to teach properly.

4.2.3.2 Skills

Many instructors seemed confident in their ability to teach the CBT program, despite their limited knowledge of CBT features. There are guidelines on how to teach the CBT program, pre-service training at the National Technical Training Institute (NTTI), and in-service training for instructors on CBT features. Instructors' responses to the questions on how to teach in the CBT program suggested they had an adequate understanding of the core concepts of CBT and the skills required to teach in this program. Even so, the CBT program has not been fully implemented mainly because of the lack of materials and equipment for students to practice, a problem mentioned in earlier sections. Below are some interesting quotes from a few teachers about their actual teaching in the CBT program.

> We started the CBT in 2015, but it is not yet fully operational because our instructors are not well aware of the CBT teaching methodology, and additionally, our equipment remains limited. To implement CBT effectively, instructors must be well equipped with the CBT teaching methodology and equipment must be available. Currently, we are only implementing CBT based on the resources at our disposal; our approaches tend to be traditional in the areas where we lack resources.

> Our institute has been implementing CBT in a flexible manner depending on the availability of the resources.

Here the teacher has directly explained that he had to combine CBT and traditional teaching approaches due to material and equipment constraints. This combined teaching approach was mentioned in all the institutions we visited. Some institutions can afford their own facilities, so their students had the opportunity to practice on campus.

> I have the data for the auto-mechanic program because I'm teaching this program. However, I don't have the report for other programs. We have a garage available for the public to get their cars serviced here. This gives our students opportunities to practice since the existing equipment is not modern enough to respond to technological advancement. Therefore, if I see that students are doing better in class, I assign them to work in the garage immediately to gain practical knowledge and experience.

Not all institutions can afford a facility such as an auto service station, however. Another way that all institutions deal with this problem is to arrange internships, which give students the chance to acquire practical technical knowledge and skills. In the meantime, students are assigned to work in pairs or groups to work using the limited resources available.

> As mentioned, their knowledge and experience need sharpening and strengthening through internship to gain practical experience; depending only on learning from school, the students cannot make as much progress. We try to practice CBT, but we have more students than equipment. So, we have to divide students into groups and ask them to work as an intern if possible in order to compensate for the shortcomings our school encounters.

> The students are practicing while I am demonstrating the lesson through video presentation. In each session, I facilitate the class by separating them into two groups. The first group focus on fixing the computer, and the other group concentrate on the lecture. I split them into groups of five. Only 15 students can practice in any one session, and the rest of the class watch the video presentation. I consider examining how this works in practice because some students are illiterate, so they are not interested in reading. Instructing the students through media, role play and presentation demonstration are the components of the CBT teaching methodology. To resolve the problem, I've downloaded all the information-related computer contents for students who have not had the opportunity to practice.

For now, teachers and institutions are trying to find ways to maximise the implementation of CBT. However, from our interviews, it would appear that the work has been individual, so the institutions that receive more resources and aid from donors have been more successful. More coordination at the national or subnational levels for institutions to help each other would both help ameliorate the problem and motivate all institutions and teachers to implement CBT in the long run. Teachers raised several problems regarding the implementation of CBT, which are discussed in detail in Section 4.2.3.4.

4.2.3.3 Attitudes

Just like developers, instructors demonstrated enthusiasm and positive attitudes towards the benefits of CBT for student learning and its greater relevance to the labour market. Instructors felt that, compared to the traditional approach, CBT enabled students to learn skills faster

because they were able to do more practical work. Furthermore, the competencies which students were equipped with were more relevant to the labour market as these competencies were chosen carefully at the beginning through the establishment of competency standards, which were aligned with occupations and competencies found in the labour market. Below are two quotes from two teachers on the benefits of CBT.

> For example, if students are enrolled in a course to learn how to paint a car, they will be taught only this occupation. Once they are competent enough, they can start work immediately. This is how CBT works. It provides students the opportunity to acquire competencies in a short period of time and they can start work immediately after graduation.

> For me, I can see that we can't meet labour market needs because of employees' lack of competencies. Therefore, CBT is beneficial as it can help employees learn technical competencies that are relevant to the labour market.

Instructors also felt Cambodia should start to implement CBT to match the country's labour force with that in the region, though they admitted that there were many challenges that would need to be addressed along the way.

> Q: Do you think we are ready to implement CBT given that we don't have enough tools and equipment?
> A: It's better to start now. As a result, we can keep up with the developments in more developed countries.

This indicates that teachers are already well prepared to engage in this endeavour to boost the country's labour force, despite the difficulties they are facing. So far, they have devised sensible solutions to the challenges they have encountered.

4.2.3.4 Challenges and solutions

Just like the two main stakeholders mentioned in earlier sections, instructors also mentioned the lack of materials and equipment for students to practice technical skills. They have resorted to adapting the resources they have at their disposal to maximise the practice of CBT in their classes. As mentioned earlier, instructors commonly combine the traditional teacher- and lecture-centred approach with the more student-centred and practice-oriented CBT approach. Teachers also gave demonstrations and used videos they found on the internet to help students learn the practical side of their lessons. Further, they split students into pairs or groups for practical work, making the best use of the limited resources available. Assigning students to worksite internships was an alternative to learning in class as students could learn though actual practice at genuine worksites. This was done to supplement the shortage of practice during class time due to the dearth of technical materials and equipment. However, not all institutions organise internship opportunities for certificate-level students.

> Unlike the auto-mechanics department, my department does not provide any internships for certificate-level students. Internships are arranged for associate degree students only, possibly because their course lasts longer. For associate degree students, we search for internship opportunities for them in the second year through construction sites, factories and certain industries in our network. We think that CBT students study for a shorter time than degree students. That is why we do not arrange internships for them.

This indicates that there is no systematic practice for offering internship opportunities, and internship initiatives are arranged by individual departments or even teachers Again, there is little facilitation or coordination by the institution management of CBT practice at certificate level. Stakeholders should be mindful of this problem and should work together to create mechanisms, guidelines and/or any form of help to support TVET institutions so that they can provide internship opportunities for certificate-level students.

Another main challenge is the lack of teaching and learning packages. Developers stated that they could provide the competency standards only and that they could not develop teaching and learning packages for instructors. They contended that instructors should have sufficient ability to design their own teaching and learning materials. Below is a quote from the ADB official about the reason why developers had not designed a learning package for teachers.

> It can't be very detailed. It is the responsibility of the instructors to develop the content. Based on our framework, we train them to do lesson planning. This aims to get our instructors to research and add more practical experiences to design lessons. Inability to develop the content is very problematic. Questions arise when we don't develop the entire textbook. I believe it's not hard to create a textbook, but it would not be so cost-effective because it takes a longer time. We can acknowledge that not developing the manual for instructors can be deemed as our shortcoming. However, we intend to encourage the instructors to research for information coupled with his practical experience to teach the students. It is interesting to note that some instructors are able to design lessons themselves.

This argument seemed convincing, but some instructors had their own reason to disagree. Actually, the majority of the instructors we interviewed, some developers and directors would like to have ready-made learning packages, just like the competency standards. They stated that the teaching burden was also heavy enough for them, so they could not spare time and effort to develop learning materials. Some resorted to the internet to search for materials, most of which were in English and had to be translated and which added extra workload. A key objection to the developers' argument is the fact that some instructors did not receive any training on CBT at all while others were new and inexperienced teachers. These types of instructors could not design learning materials. Even if they could, the materials would not be of a good quality given their obvious lack of experience in teaching CBT.

> During my observations and monitoring, I acknowledged that the ability to generate modules remains constrained. But the instructors are consistently trying to implement CBT, for they stress the importance of practice in class, and the students actively engage in the class activities.
>
> I taught and trained the instructors how to design each module; however, it depends on practical experience. Without practical experience, instructors would only be able to design a theory-oriented module.
>
> Teaching is not a problem. What prevents us from implementing CBT effectively is a lack of equipment and tools and learning materials. The ministry provides the course objectives only, leaving us to design and develop the content ourselves. Sometimes I have to seek support and assistance from my colleagues. This makes our teaching even more difficult and challenging. It is a good idea to have a standard textbook that is used nationwide.

> I have witnessed a few instructors, particularly new instructors without any practical experience. We've shared our resources with different institutes through our online platforms. I've been designing the modules with Siem Reap, Kampong Thom, Battambang, and NIIB. It's not a formal process, yet we have Teacher Hao Mengheang, a country specialist, to help coordinate and facilitate the process.

As mentioned in the last quote, some instructors suggested that there should be cooperation among different TVET institutions in the region or help from better off and more experienced TVET institutions, especially those in Phnom Penh, to design and share the learning packages. In so doing, there would be double benefits: first, this could help new teachers and teachers who have not received CBT training; and second, this can ensure more consistency in teaching and learning among TVET institutions in Cambodia.

The last main problem is the lack of practical technical experience among TVET teachers who were teaching CBT at certificate level. Normally, teachers go through a bachelor or associate degree program, both of which are taught using the traditional lecture-based approach, not the CBT practice-oriented approach.

> I studied my bachelor's degree at NTTI, but I've never had any practical experience relevant to my degree. After six months of completing my bachelor's degree, I applied for the entrance examination as a pedagogical trainee from 2018–2019 during the 16th generation. I only had practical experience in the field apart from my three-month internship to fulfil the requirement of my pedagogy.

During our interviews, we did not hear of any initiative from TVET institutions to help their teachers who lacked practical technical experience. Again, this could suggest a lack of interest in and attention to the implementation of CBT at certificate level as TVET institutions also deliver many other programs, which do not require the implementation of CBT. It is also interesting to note that CBT might be difficult to implement as some teachers even mentioned that some of the colleagues just felt "scared" when they heard about "CBT". This may have been because of the extra workload and challenges that came along the implementation of CBT.

5. Discussion and triangulation of the information provided by the three main stakeholder groups

The development of the CBT program was very well conducted. Developers were thoroughly trained over many months, so they were well equipped with the concept of CBT. In line with the CBT development model stated in Deißinger and Hellwig (2005), the CBT program commenced with the establishment of competency standards for three prioritised occupations: business, construction and auto-mechanics. The process was coordinated by MLVT and the key stakeholders involved were consultants from ADB, seasoned instructors and directors from major TVET institutions in the country, and experienced workers from the private sector. There was a problem here, however, as some private companies sent administrative or human resource staff in lieu of employees with technical expertise to attend the meetings for competency standards establishment. The MLVT should encourage the private sector to be more cooperative when the next set of competency standards for other occupations are being established or when the existing competency standards need revising and updating.

However, the dissemination of the CBT program has much room for improvement. The introduction of the CBT program was conducted through training workshops provided directly

to teachers. Experienced teachers were selected from key TVET institutions across the country to be trained as potential master trainers (PMTs), who would later train regular teachers. The interviews revealed that these PMTs were also very knowledgeable about CBT, compared to the developers. Nevertheless, despite the claims made by some developers and PMTs that teachers learned much from the training, regular teachers displayed far less knowledge of CBT than PMTs and developers. Undoubtedly, limited knowledge led to limited implementation of CBT. There are three main reasons for this problem. First, the training was too short; two five-day training workshops, compared to the 18 month pre-service training program at NTTI for teachers of the CBT program. Second the quality of the training was questionable. Most importantly, there was no clear assessment of the trainees at the end of the training; the survey conducted at the end of the training to check the understanding of the trainees was not enough to serve as a valid and reliable assessment tool. Proper assessment at the end of the training would make trainees think that the training is important and would motivate them to put what they have learned into practice (Tannenbaum and Yukl 1992). The teachers showed less interest in CBT training than in Return to Industry technical training. It seems they thought that technical training was more important and useful than training in CBT concepts. Perhaps they mistakenly believed that the pedagogical training received before they became teachers along with their many years of teaching experience had built up a firm foundation for teaching. And the fact that there was no formal assessment of the training could have rationalised this false belief reasoning. In the interviews, some teachers mentioned that their colleagues were somewhat alarmed when they heard the term "CBT", possibly because of the increased workload that it might bring. This suggests that those teachers may have been discouraged from learning about CBT. The third problem is that some teachers who had received training moved to non-teaching positions and most new teachers with three years or less of teaching experience did not receive any training at all. This points to the need for MLVT to accelerate the training phases so that more teachers, especially new ones, can receive training on CBT as well as practical technical knowledge.

Table 2: Comparison of perspectives and experiences regarding the development and implementation of the CBT program

Developers	Directors	Teachers
A great knowledge of CBT	Little knowledge and pay scant attention to CBT	Moderate knowledge of CBT
Skilful in the implementation of CBT and very confident in teaching the CBT program	Prioritise overall management of their individual TVET institutions, rather than CBT	Confident in their teaching of CBT
Positive and enthusiastic about CBT	Positive about CBT	Discouraged by the workload brought about by CBT but positive about CBT due to its advantages
Concern about lack of materials and equipment for students to practice	Concern about lack of materials and equipment for students to practice	Concern about lack of materials and equipment for students to practice
Split opinion on developing learning packages	Preference for ready-made learning packages	Preference for ready-made learning packages to lessen their burden and help new teachers
CBT training and Return to Industry training are very helpful	Little knowledge of the training provided	Appreciated Return to Industry training more than CBT training

TVET institution directors' lack of involvement in and coordination of CBT training did little to help promote the dissemination of CBT. Encouraging directors' greater involvement in the new CBT program should enhance their sense of ownership and responsibility, which in turn would help ensure the feasibility of the new program (Ornstein and Hunkins 2016). However, it was apparent from our interviews that directors were barely involved. The main reason was that the training for directors, organised under the ADB-funded Strengthening Technical and Vocational Education and Training project, included many aspects of the current endeavours to improve TVET and did not focus exclusively on CBT. Further, the directors were probably more focused on recruiting certificate-level students, as to them this seemed a more important and urgent problem than overseeing the teaching in CBT. Directors were also burdened with the supervision of all the work at all levels in their institutions, not just the implementation of CBT at certificate level. They therefore could not play a role in facilitating the dissemination and implementation of CBT in their institution. This is consistent with one of the pitfalls identified by Beimans et al. (2004), regarding the failure of the management in promoting an open culture and cooperation among teachers, so that teachers can participate well in teaching and learning processes.

The real teaching of the CBT program was conducted well in spite of the limited knowledge of CBT among teachers. Two main features of CBT were implemented. Teachers used the competency standards established by MLVT as guidelines for their teaching. They also tried to find time for students to practice, rather than learning from listening to lectures. However, they did not have sufficient ability to deal with self-paced individualised learning as all students were still required to attend classes and all the students studied the same module at the same time. Recognition of prior learning and assessment centres were still non-existent, but they are being arranged based on the plan of MLVT.

The ability to implement only some features of CBT is by no means confined to Cambodia. Other countries have had similar experiences in implementing this approach. Empirical research has shown that the practice of CBT should be considered along a continuum. Misbah et al. (2019), for example, reported that the implementation of CBT in 41 Indonesian agricultural vocational secondary schools varied, with some schools at the lower end of the CBT principles and some at the higher end. In a similar study, Solomon (2016) rated the level of realisation of CBT in selected Ethiopian TVET colleges as ranging from "partially competence-based" to "largely competence-based".

All three stakeholder groups raised major challenges that could seriously impede the implementation of CBT. The most common problem was the paucity of materials and equipment for students to use when they practice. This is not surprising given the low perceived status of TVET and the l budget allocated to TVET institutions. Despite the funding provided by the ADB-sponsored project for materials and equipment, materials are non-reusable and have to be re-purchased. TVET institutions and teachers have done their best to accommodate this shortage and save on materials by assigning students to work in groups or pairs when they practice. Ornstein and Hunkins (2016) also mentioned the importance of various types of support, one of which is materials, to the success of a new curriculum change.

Lack of a sense of ownership can hinder the implementation of CBT. During our interviews, we noticed that directors and teachers were implementing CBT because it was required by MLVT. Hoban (2002) cautioned that a new curriculum that is imposed in a mechanistic manner on schools tends to founder. Therefore, it would seem prudent for MLVT to consider encouraging greater participation from directors and teachers by providing opportunities

for them to voice their concerns about CBT implementation. Directors should be especially encouraged and supported to be more involved in the management, monitoring and evaluation of CBT teaching at certificate level as they have been the least involved in CBT development and implementation.

The lack of proper management, monitoring and evaluation of CBT implementation is also a major problem, as revealed in the interviews. Curriculum development is a process and a vitally important stage is evaluation because this can provide feedback to curriculum developers to revise and improve the curriculum (Ornstein and Hunkins 2016).

Despite the challenges, all three stakeholder groups acknowledged the benefits of CBT and agreed that all TVET providers should start CBT now. They all agreed that CBT can better prepare students for the labour market than the traditional approach due to 1) the establishment of competency standards based on thorough study by experts of labour market needs in Cambodia, and 2) the focus on learning through practice rather than listening to lectures. This finding is consistent with a study conducted in North America (Wang 2015) and another conducted in Australia (Smith 2010). All three stakeholder groups also agreed that it was time for Cambodia to embark on the CBT approach, notwithstanding the challenges as so far TVET institutions and teachers have dealt with these challenges rather well, so that Cambodia can develop a trained workforce with the right skills that satisfy labour market needs and and thus enhance its regional standing.

6. Conclusion

The implementation of CBT is challenging, and the challenges are especially felt in resource-limited developing countries such as Cambodia.

Paucity of materials and equipment due to lack of financial resources contributes to ineffective teaching and learning practices. Because of the need for students to share materials and equipment, instructors have resorted to group work even though this is not as effective as individual work as each student needs individual practice to become competent. Another solution is the use of internship opportunities to provide students with practical experience at specific worksites. However, this can be problematic in that students are placed in in group internships and instructors cannot directly observe students as frequently as when they practice in class.

Lack of technical experience among TVET instructors is the second main problem. Instructors are habituated to the traditional teaching and learning methods used when they were students. This has made it difficult for some instructors to gain practical technical experience. In response, in-service training workshops have been organised to equip instructors with practical technical experience and upgrade their skills. These workshops have been supported by ADB-sponsored projects. This means that MLVT must be prepared to continue this endeavour after the projects expire. All three stakeholder groups, especially TVET institution management teams, should be encouraged to participate in the endeavour to implement CBT through the sharing of training experience and accelerating the pace of training so that more teachers can receive training.

Lack of CBT program evaluation is the third main issue. Evaluation is an important tool that can be mobilised to pinpoint the strengths and weaknesses of the CBT program. However, there was no unit in charge of such an important task. There was only assessment of TVET institutes' and instructors' overall performance by TVET institutions themselves through

student evaluation of teachers and MLVT observations of teaching practices. This type of assessment did not focus on the implementation of CBT specifically.

We would like to offer three major recommendations for MLVT, development partners and other stakeholders in TVET certificate levels to consider.

1. Because of the apparent lack of practical technical knowledge among TVET instructors, more focus should be given to training TVET instructors to upgrade their technical knowledge and skills. Return to Industry training has been somewhat successful. But the training has been rolled out too slowly as many instructors had not received such training even though they were already teaching in the CBT program. Because the CBT approach depends very heavily on the technical knowledge and skills of the instructors, Return to Industry training should be accelerated and more inclusive.

2. The obvious lack of materials and equipment for students to learn through practice is a major obstacle to the successful implementation of the CBT program. Assigning students to work in groups and in pairs to work on the limited number of materials and tools at their disposal has been one of the best solutions. However, in addition to that, as some instructors have been doing, more practice-based learning in the form of internship should be encouraged. So far internship opportunities have been found by individual teachers, though mainly for undergraduate students on degree courses, not certificate-level students. MLVT should encourage TVET institutions to strengthen collaboration with enterprise and industry so that internship opportunities for certificate-level students can be widened. At the same time, MLVT could develop simulation-based training tools or virtual reality tools considered to be useful in enhancing learning and teaching.

3. As TVET institute directors are so overburdened with the management tasks of all the training levels at their institutes that they do not have adequate time and energy to focus on the CBT implementation in the C levels, a working group should be established and delegated with the tasks to oversee the implementation of CBT in classes, the further training of necessary CBT features to teachers, and evaluation of the CBT implementation. In so doing, mechanisms are created to ensure that the training, implementation, and evaluation of the CBT program are paid attention to and are not taken for granted.

4. A separate evaluation of the implementation of the CBT program should be conducted by TVET institutions and/or MLVT. At the institution level, there should be a different student evaluation form for certificate-level students in the CBT program. TVET instructors could also be asked about their opinions and experiences in implementing the CBT program. TVET institutions have already done a great job in tracking their students after graduation and we assume they should be able to do the same for certificate-level students. At the ministry level, the Department of Curriculum and Standards should work with the Department of Quality Assurance to establish a separate section for the evaluation of the CBT program, and evaluation could be conducted during the regular inspection of TVET institutions.

Further research should look at the effectiveness of teaching and learning in the CBT program. Actual teaching and learning practices should be directly observed to build a picture of teachers' and students' experiences of school life. Students' opinions should also be elicited in order to gauge their motivation and engagement in CBT course work. The effectiveness of CBT should also be investigated by examining the learning achievements of students or the effectiveness of new graduates when they start work.

Acknowledgements

This study is part of CDRI's 3.5-year research project on TVET in Cambodia. The authors would like to express sincere gratitude to Swiss Agency for Development and Cooperation (SDC) for the financial support (Grant Number: 7F-09066.01.04). The views expressed in this paper are solely those of the authors and do not necessarily represent those of CDRI and SDC.

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Appendix

Interview protocol

CBC developers

1. Why was CBC introduced?
2. How was CBC disseminated?
3. What do competencies mean? Examples of core competencies?
4. How were competencies selected?
5. How did institutions and instructors get involved and prepared for CBC implementation?
6. What types of support has been provided to institutions and instructors in teaching CBC? (Support: pedagogical and technical skills training? Materials? Facilities? Administrative?)
7. How is CBC evaluated?
8. What success has been achieved?
9. What has not been achieved yet? Why? What are the challenges? What will be done later to deal with these challenges?

School principals

1. Why was CBC introduced?
2. How was CBC disseminated?
3. Do the skills selected match the skills taught in your school? Why or why not?
4. How did your institutions and instructors get involved and prepared for CBC implementation?
5. What types of support, from the national, subnational, and school levels, has been provided to instructors in implementing CBC? (Support: pedagogical and technical skills training? Materials? Facilities? Administrative?)
6. What success has been achieved?
7. What has not been achieved yet? Why? What are the challenges? What will be done later to deal with these challenges?
8. Overall, how do you feel about CBC?

Instructors

1. Why was CBC introduced?
2. How was CBC disseminated to you?
3. Do the skills selected match the skills taught in your school? Why or why not?
4. How did you and your institutions get involved and prepared for CBC development and implementation?
5. What types of support, from the national, subnational, and school levels, have you received in implementing CBC? (Support: pedagogical and technical skills training? Materials? Facilities? Administrative?)
6. What elements of CBC have you achieved in your teaching?
7. What elements have not been achieved yet? Why not? What are the challenges? What will be done later to deal with these challenges?
8. Overall, how do you feel about CBC?

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