PLUMBING CURRICULUM
(LEVEL -1 / G-III)

British Council “Skills for Employability Project”

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Definition of Terms

Assessment Criteria

The specification of the expected performance demonstrated by the student or earner at the conclusion of the learning experiences in a particular module or course. It is used to assess the necessary knowledge, skills and attitudes, reflecting the performance standard in the relevant industry or competency standards.

Assessment method

Assessment methods may include observation, simulation, questioning, presentation/ demonstration and written assessment. The various methods or techniques used to gather evidence of sufficiency and quality in which to make a sound judgment on the competency student or learner

Basic Competency

Basic competency is a cluster of related skills, knowledge and attitudes that is simple and fundamental in most jobs, occupation or responsibility in the same level of qualifications and that is expected of the individual in the world of work. For instance, all skilled workers are expected to “perform mensuration and calculation” or to “observe safety rules and practices”; or similarly, a technician is expected to “lead a team” or “prepare the scope of work” responsibilities

Certification of Competency

This is the culmination of the CBT process in which the student or trainee is awarded a certificate on the level of competency that is usually based on a National Qualification Standard. For instance, after completion of a CBT course and the corresponding assessment conducted by a duly accredited assessor or assessment agency, a National or Federal Certificate of the student’s or candidate’s competency (e.g.: Electrician – Federal Certificate II) is awarded if has the competency of a skilled Electrician.

Common Competency

Common competency is a cluster of related skills, knowledge and attitudes that is similarly done across a cluster of jobs in a particular trade or occupation in the same level of qualifications that is expected of the individual in the world of work. While a basic competency is similarly required in most jobs, a common competency is usually restricted in one cluster of occupations. For instance, common competencies in measurements in the area of construction are essentially different from that of mechanical trades, or electronics.

Competency

Competency is a cluster of related skills, knowledge and attitudes that forms part of one's job or occupation that correlates with and measured by the performance standards set by industry, and that can be developed and improved through training and development. Competency is based on performance of tasks identified by experts in the given occupation.

Competency-Based Curriculum (CBC)

A competency-based curriculum is a framework or guide in the form of a ***course design*** for a particular field or occupation and a series of **modules** of instruction that are based on competency standards, with corresponding learning outcomes, assessment criteria, contents, conditions and methodologies of instruction, and assessment method. The competency-based curriculum specifies outcomes, which are consistent with the requirements of the workplace as agreed through the industry or community consultations. *Where competency standard do not exist, curriculum developers need to clearly identify workplace standards and requirements as a basis to identify the outcomes of the competency-based curriculum.*

Competency-Based Training (CBT)

A training system that organizes instruction based on competency standards and evaluates how well the student performs after instruction according to a set of performance standard. It refers to a systematic approach to organizing instruction that focuses on defining in measurable terms what students are to learn and then evaluating how well they can perform designated tasks after instruction.

Competency-based Technical Education and Vocational Training (CBTVET)

CBTVET or the application of CBT in TVET is a systematic approach in organizing and providing instruction in measurable terms what the student has to learn in a particular technical or professional skill, trade or occupation, and then evaluating how well the student perform/demonstrate the knowledge or skills that were taught. Performance in terms of technical knowledge and skills by various means is made to determine the mastery or level of competency.

Competency Standard

The description of what individuals do in the workplace at various levels and the standard set by the workplace or the industry; defines or specifies how well the worker or trainee should perform a job or function. Likewise, it identifies the characteristics possessed by people that enable them to be either assessed or judged competent in a particular job or occupation.

Course design

This is a major element of the CBC that defines the title of the course and its description, qualification level and units of competency, course outcomes, course structure and competency analysis, assessment and instructional delivery, and the list of resources and qualifications of instructors.

Course Title

This refers to the title or name of the course design of a particular technology, industry, or occupation, reflecting employment needs as outlined in the competency standard.

Core Competency

Core competencies are the main group of skills, knowledge and attitudes that are unique for a particular trade, occupation or technology. These are competencies that are used only on a particular trade, occupation or technology; or allied trades using similar material, such as wood technology or metal technology.

Curriculum

In general, curriculum is a set of courses organized and offered by an educational institution with the purpose of attaining a set of learning objectives or goals or learning a set of knowledge, skills, and attitudes within a specified period. For instance, a TVET curriculum is a course or set of courses on a particular technical field, trade or occupation (e.g. automotive technology; civil or construction technology; electrical technology, or mechanical technology) for the purpose of preparing an individual for employment or promotion on the job.

Curriculum Development Team

This is a group of people representing industry, curriculum developers and teachers or trainers experienced in the field/industry organized to develop a curriculum. The team may work as a group or assign each member a part to accomplish at their own phase and time until the curriculum is completed.

DACUM

It simply means developing a curriculum. A method of occupational (or task) analysis, where occupational experts in a particular trade or technology come to a workshop led by a trained facilitator, to provide input on the specific tasks, knowledge and skills required to perform them.

Entry Requirements

This is a list of requirements that the student must possess to be allowed to participate or attend the teaching-learning session of a particular module of instruction. It is distinct form the institutional requirements that are require of the student upon admission to the school.

Industry

In this Manual, the term industry is used generally to include all the sectors of the economy or the community such as manufacturing firms, service shops, business establishments, government agencies, and NGOs that employs the mid-level technical

manpower that are trained by TVET institutions as well as colleges and universities and other training institutions.

Learning Conditions

The requirements under which the teaching-learning process and assessment will be performed These may include a list of tools, equipment and materials, training facilities, learning resources such as books, manuals, multi-media and other resources. It also specifies the scope or range of the equipment and facilities to be assessed.

Learning Outcomes

These are competencies (technical knowledge, skills and attitudes) learned or acquired by the student or trainee on a particular module, course, or curriculum. They are expected competencies developed under a particular unit or module of instruction.

Module Contents

These are specific knowledge, skills and attitudes or learning experiences that are covered to be address expected learning outcomes.

Module Description

This is a statement that describes what the module is all about, its scope and delimitation.

Module Duration

This refers to the estimated or suggested length of time (in hours) spent teaching learning a particular module.

Module (of Training)

Also known as *module of instruction*, it refers to the other element of the CBC that defines how the competency or elements of the competency is organized for instructional purposes based on a set of competency standards.

Module Title

This refers to the competency or elements of the competency that is developed into a module or unit of instruction or training.

National Qualification Framework

A structure of well defined and nationally accredited or recognized qualifications which are awarded in predetermined levels. It also refers to the structure or path through which formal, non-formal and informal education and training are all recognized and credited towards a particular qualification.

Qualification

A set or package of standards considered to be worthy of recognition in a certificate issued by a duly recognized institution. It also refers to the possession or accomplishment of acquiring certain skills, knowledge and attitudes or experiences that are considered worthy and essential for entry, promotion or upgrading on the job.

Semi-Skilled

This refers to the basic level of competency that are mostly routine, predictable, and uncomplicated tasks. Because of his basic level competency, the semi-skilled person usually needs somebody to oversee and direct his work activities. With diligence, hard-work and willingness to learn on-the-job, a semi-skilled person especially a graduate of at least one-year TVET program, can easily advance to the level of a skilled person.

Skilled

This is the term for a highly trained or experienced person whose competency in a particular occupation or trade is carried out in a significant and broad scope in various context. A skilled person performs some tasks that are complex or that has some autonomy and individual responsibility and that often requires cooperation with other people in the work environment.

Competency-Based TVET System

A. Definition of the Competency Based TVET System

As defined earlier, Competency-Based TVET or the application of CBT in TVET sector is a systematic approach in organizing and providing instruction to develop technical knowledge, skills and attitudes based on industry or competency standards, and then evaluating how well the student demonstrate the knowledge or skills that were taught. The student's ability to demonstrate the technical knowledge and skills determines the mastery or level of competency.

As a system, Competency-based TVET (CBTVET) is a complex undertaking from National policy-making to the institutional level implementation of training, assessment, and awarding of appropriate National-level certification of competency. The system starts with the formulation of a National policy to standardized technical qualifications, and correspondingly based from a national standard of competency in various technological occupation. With the on set of globalization and the fast emerging knowledge-based economy coming-up, the competency-based TVET system has become a powerful training strategy for the country.

B. The Elements of a Competency Based TVET System

The CBTVET system includes six (6) major elements, and each of these elements has to be undertaken and established to serve as the framework of implementation. These elements include the following:

a) Establishing National Qualification Framework (NQF) for TVET;

b) Developing competency standards;

c) Developing competency-based curriculum;

d) Developing modules of instruction;

e) Implementing CBT in TVET institutions;

f) Assessing the learning outcome, and

g) Awarding appropriate level of Certification.

The first three elements are ideally undertaken at the National level since they serve as the bases for the country's policy on the classification and leveling of technical qualifications in the country. The technical or professional qualifications are standardized at the national level to ensure uniformity, stability and integrity of the standard. Likewise, national competency standard is imperative for all technical and professional qualifications to ensure the same characteristics and quality assurance in the country.

Similarly, the development of the CBT curriculum is undertaken at the National level to insure uniformity and common standard of coverage and quality assurance. Together with the curriculum are training regulations in the form of required hours of training; admission standards; instructional facilities required; suggested approach and methodology of instruction; assessment and certification.

Figure 1 above is a conceptual framework that illustrates the competency-based TVET system.

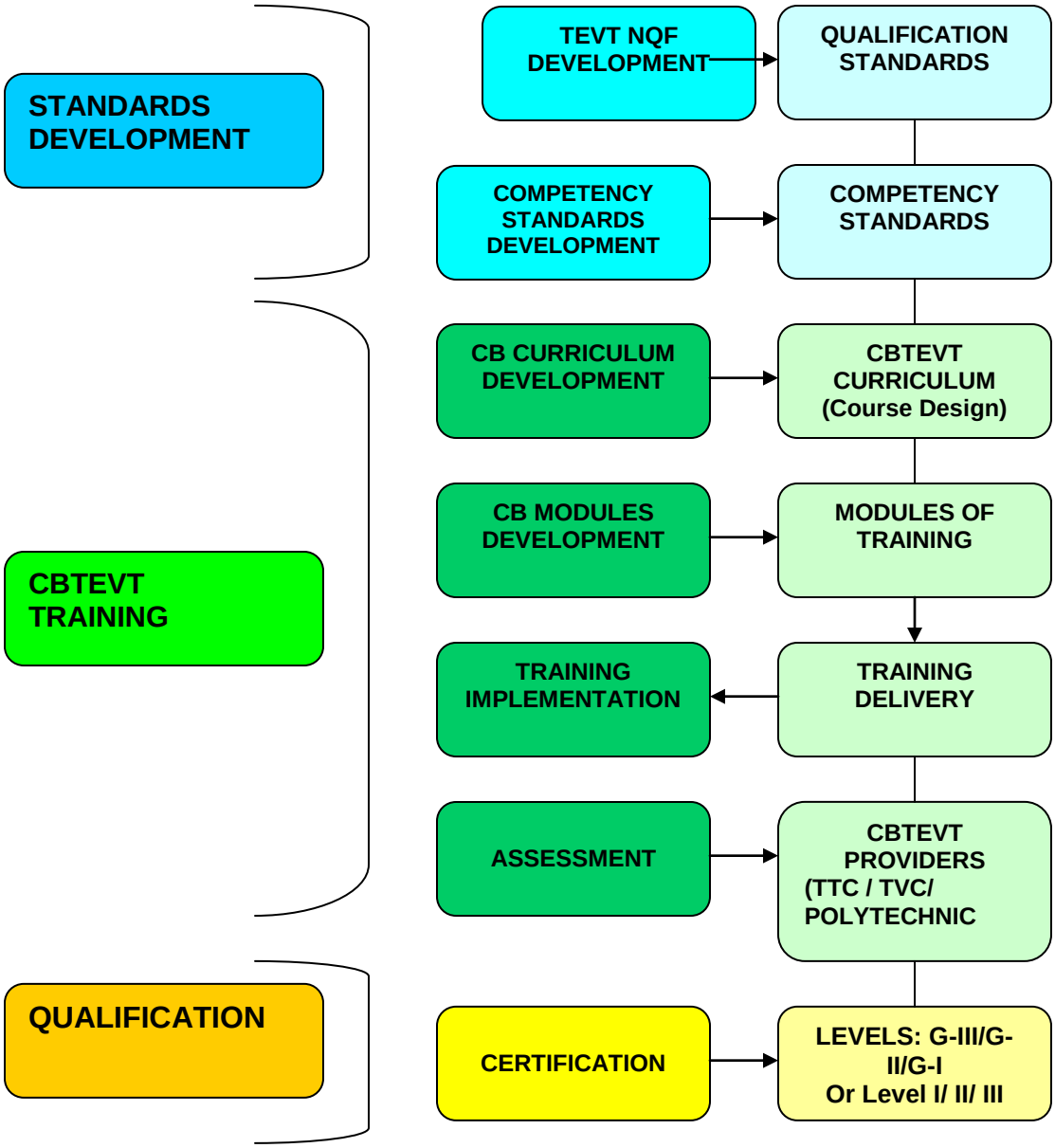

Figure 1. Conceptual Framework of Competency-Based TVET System

Simultaneously considered at this time is the organizational arrangement at the national and regional or provincial levels with respect to the management and control of implementation. The ideal organizational set-up is to organize a new body to carry out the planning and implementation of CBTVET. But since the provision for TVET has been in place long before the introduction of CBTVET system, it is often more practical to restructure and strengthen the existing National and Regional or provincial organizational structure.

The three other elements are undertaken after the establishment of the National policy on qualification and competency standards mostly at the local and institutional level implementation of the system.

1.1 Structure and Levels of Competency in U.K.

As cited in an ILO document, the Levels of Competency as defined in the United Kingdom are as follows:

- Level 1.

"Competency in the performance of a broad scope of labour activities, mostly routine and predictable ones".

- Level 2

"Competency in a significant and broad scope of Labour activities, carried out in different context. Some of the activities are complex or not routine tasks and there is some autonomy and individual responsibility. It may often require the cooperation with other people, being part of a group or doing team work".

- Level 3

"Competency in a broad scope of different labour activities developed in a great variety of contexts which are mostly complex and not routine like. There is great responsibility and autonomy and it often requires controlling and provi9ding guidance to other people".

- Level 4

"Competencies in a broad scope of professional and technically complex labour activities, carried out in a great variety of context and with substantial degree of autonomy and personal responsibility. It may often require being responsible for the work of others and the distribution of resource".

- Level 5

"Competency which involves applying an important scope of fundamental principles and complex techniques in a broad and sometimes unpredictable variety of contexts. It requires a high degree of personal autonomy and frequently great responsibility regarding the work of others and the distribution of substantial resources. Furthermore, it requires personal responsibility regarding analyses, diagnosis, designing, planning, and implementation and assessment tasks".

1.2 Structure and Levels of Competency in the Philippines

In the Philippines, the Technical Education and Skills Development Authority (TESDA), under the Office of the President, was mandated by law to "formulate a comprehensive development plan for middle-level manpower; …to ingrate, coordinate and monitor skills development program; and to restructure efforts to promote and develop middle-level manpower, among others. As part of this mandate, TESDA came up with four (4) levels of competencies for the determination of qualification and certification of technical workers. The four levels of competencies which also serve as National Certificate levels (better known as NC-1, NC-II, NC-III and NC-IV), are operationally defined as follows:

- National Certificate Level I:

    ◊ A worker at this level performs routine and predictable tasks involving little latitude for judgment;

- ◊ Adherence to appropriate standards or specifications are usually involved;
- ◊ Assignments are usually made by supervisors or a worker at a higher level who gives simple instructions and make clarifications or suggestions when necessary.

- National Certificate Level II:

  - ◊ A worker at this level performs a prescribed range of functions involving known routines and procedures where clearly identified choices and limited complexities apply;
  - ◊ Work involves some accountability for the quality of outputs;
  - ◊ Applications at this level may involve individual responsibility or autonomy, or working with others as part of a team or group.

- National Certificate Level III:

  - ◊ A worker at this level performs a wide range of skilled operations at a high level competence involving known routines and procedures. The work context involves some complexity in the extent and choice of options available;
  - ◊ Work involves understanding the work process, contributing to problem solving, and making decisions to determine the processes, equipment and materials to be used;
  - ◊ Applications at this level may involve individual responsibility or autonomy and/or may involve some responsibility for others. Participation in teams including team group coordination may be involved.

- National Certificate Level IV:

  - ◊ A worker at this level performs a wide range of applications in a variety of contexts most of which are complex and nonroutine;
  - ◊ Work involves some leadership and guidance when organizing activities of self and others as well as contributing to technical solutions of a non-routine or contingency nature. Work at this level also requires evaluation and analysis of current practices and the development of new criteria and procedures;
  - ◊ Applications involve responsibility for the organization and performance of others.

1.3 Structure and Levels of Competency in New Zealand

The New Zealand Qualifications Authority website presented the following "level descriptors" of competencies adopted in the country's National Qualifications Framework. The Website described the Level Descriptors as follows: "There are 10 levels involved in the qualification – 1 is the least complex and 10 the most. Levels depend on the complexity of learning. They do not equate to years spent learning, but reflect the content of the qualification".

LEVEL	PROCESS	LEARNING DEMAND	RESPONSIBILITY
1	***Carry out processes that:*** • are limited in range • are repetitive and familiar	***Employing:*** • recall • a narrow range of knowledge and cognitive skills	***Applied:*** • in directed activity • under close supervision

	• are employed within closely defined contexts	• no generation of new ideas	• with no responsibility for the work or learning of others
2	*Carry out processes that:* • are moderate in range • are established and familiar • offer a clear choice of routine responses	*Employing:* • basic operational knowledge • readily available information • known solutions to familiar problems • little generation of new ideas	*Applied:* • in directed activity • under general supervision and quality control • with some responsibility for quantity and quality • with possible responsibility for guiding others
3	*Carry out processes that:* • require a range of well developed skills • offer a significant choice of procedures • are employed within a range of familiar contexts. • in directed activity with some autonomy	*Employing:* • some relevant theoretical knowledge • interpretation of available information • discretion and judgment • a range of known responses to familiar problems	*Applied:* • under general supervision and quality checking • with significant responsibility for the quantity and quality of output • with possible responsibility for the output of others
4	*Carry out processes that:* • require a wide range of technical or scholastic skills • offer a considerable choice of procedures	*Employing:* • a broad knowledge base incorporating some theoretical concepts • analytical interpretation of	*Applied:* • with complete responsibility for quantity and quality of output • with possible responsibility for
LEVEL	**PROCESS**	**LEARNING DEMAND**	**RESPONSIBILITY**
	• are employed in a variety of familiar and unfamiliar contexts • in self-directed activity • under broad guidance and evaluation.	information • informed judgment • a range of sometimes innovative responses to concrete but often unfamiliar problems	the quantity and quality of the output of others
5	*Carry out processes that:* • require a wide range of specialized technical or scholastic skills • involve a wide choice of standard and nonstandard procedures • are employed in a variety of routine and non-routine contexts	*Employing:* • a broad knowledge base with substantial depth in some areas • analytical interpretation of a wide range of data • the determination of appropriate methods and procedures in response to a range of concrete problems with some theoretical elements	*Applied:* • in self-directed and sometimes directive activity • within broad general guidelines or functions • with full responsibility for the nature, quantity and quality of outcomes • with possible responsibility for the achievement of group outcome.
6	*Carry out processes that:* • require a command of wide-ranging highly specialized technical or scholastic skills • involve a wide choice of	*Employing:* • specialized knowledge with depth in more than one area	*Applied:* • in managing processes • within broad parameters for defined activities • with complete accountability

	standard and nonstandard procedures, often in non-standard combinations • are employed in highly variable routine and non routine contexts	• the analysis, reformatting and evaluation of a wide range of information • the formulation of appropriate responses to resolve both concrete and abstract problems	for determining and achieving personal and/or group outcomes
7	*Carry out processes that:* • require a command of highly specialized technical or scholastic and basic research skills across a major discipline • involve the full range of procedures in a major discipline • are applied in complex, variable and specialized contexts	*Requiring:* • knowledge of a major discipline with areas of specialization in depth • the analysis, transformation and evaluation of abstract data and concepts • the creation of appropriate responses to resolve given or contextual abstract problems	*Applied:* • in planning, resourcing and managing processes • within broad parameters and functions • with complete accountability for determining, achieving and evaluating personal and/or group outcomes
8	*Involves skills and knowledge that enable a learner to:* • provide a systematic and coherent account of the key principles of a subject area; and • undertake self-directed study, research and scholarship in a subject area, demonstrating intellectual independence, analytic rigour and sound communication		
9	*Involves knowledge and skills that enable a learner to:* • demonstrate mastery of a subject area; and • plan and carry out - to internationally recognized standards - an original scholarship or research		

LEVEL	PROCESS	LEARNING DEMAND	RESPONSIBILITY
	Project. • The completion of a substantial research paper, dissertation or in some cases a series of papers.		
10	*Involves knowledge and skills that enable a learner to:* • Provide an original contribution to knowledge through research or scholarship, as judged by independent experts, applying international standards.		

1.4 Levels of Competency in Pakistan

In Pakistan, the TVET sector has been using a three-level occupational skill standard for technical workers that is known simply as G-III, G-II, and G-I as the apex level. Developed by the National Training Board in the 1980s, the three-level occupational skills standard for Pakistan is described as follows:

- The Basic Level (Grade-III)

"The Basic level relates to the level of knowledge and skills expected from craftsmen who have undergone training in this trade conducted by a training institution or for those who already have to their credit at least four (4) years of recognized on the job experience".

- The Intermediate Level (G-II)

"The Intermediate level falls approximately mid-way between the advance level and the basic level".

- The Advance Level (G-I)

"The Advance level is based on the highest level of knowledge and skills expected from a craftsman in this trade".

Analyzing the description of this occupational skill standard, it can be noted that the bases of the skill standard (G-III) are the "knowledge and skills expected from craftsmen" and the training provided; or experience in industry for at least four (4) years. The two more advanced levels are described in even more generic terms. In other words, there is a very critical need to review these skill standards in the light of the on-going modernization of the country, and in concert with the on-going restructuring of TVET System. There is a critical need for the skill standards to be operationally defined in terms of competencies that the workers at various levels should be able to perform or demonstrate.

B. Developing a Competency Standard

1. Competency: Types and Elements

Competency. As defined earlier, competency is a cluster of related skills, knowledge and attitudes that form part of one's occupation or trade that correlates with and measured by the performance standards set by industry, and that can be developed and improved through training and development. Competencies are tasks performed by workers in industry or world of work in a particular job or occupation. The competency of a person involves his possession and the ability to apply knowledge, skills and attitudes in performing work according to the standard set by industry.

1.1 Types of Competency

Competency experts observe that competencies can be classified into three (3) types, such as basic, common, and core.

Basic competencies are related skills, knowledge and attitudes that are simple and fundamental in most jobs, occupation or responsibility in the same level of qualifications. For instance, all G-II craftsmen are expected to "perform simple calculation" or to "prepare all the materials needed for a job".

Similarly, a G-I worker is expected to “lead a team” or “prepare the scope of work” responsibilities.

Common competencies are clusters of related skills, knowledge and attitudes that are similarly performed across a cluster of jobs in a particular trade or occupation and in the same level of qualifications that is expected of the individual in the world of work. While a basic competency is similarly required in most jobs, a common competency is usually restricted in one cluster of occupations. For instance, common competencies in measurements in the area of construction are essentially different from that of mechanical trades, or electronics.

Core competencies are the major component of skills, knowledge and attitudes that are mostly applicable for a particular trade, occupation or technology. These are competencies that are applicable only on a particular trade, occupation or technology; or allied trades that are utilizing similar materials.

For CBTVET purposes, the competencies required for a particular technology or occupation and level of qualification are identified and classified into what is termed as **“unit of competencies”**. For each technology, trade or occupation, the unit of competencies are identified and listed under basic, common, and core competencies and each are further analyzed for their major **“elements”.**

1.2 The Elements of Competency

The elements of competency are further analyzed to determine the **“performance criteria”** which are useful in the assessment of learning outcomes. The four elements of a competency are as follows:

- **Task skill**. The element of competency that requires performance of the task(s) to the level of standard as prescribed in the unit of competency and expected on the job. In assessing the learning outcome, there is a need to gather evidence that the trainee or student can perform the specific as well as the whole task;

- **Task management skill**. This element captures the skills needed to plan and integrate a number of different tasks to achieve a complete work output. The trainee or student should provide evidence that he can work efficiently to meet deadlines, handle a interrelated tasks, and move on smoothly to complete the whole task;

- **Contingency management skill**. The element of competency that deals with irregularities and breakdowns on the job. The trainee or student must show evidence of managing with contingencies like: breakdowns, irregularities, imperfections, and other unexpected situations;

- **Job environment skills**. The element that deals with the challenges, responsibilities and expectations of the work environment. The trainee or student must demonstrate the ability to work with others and adapt to various situations at the workplace.

Competency-Based TVET Curriculum for a Plumber Level 1 / G-III (Skilled Worker)

Course Title **PLUMBING**

Qualification Level **Level 1/ G-III (Basic Level)**

Course Duration **One School Year:**

(32 Weeks or 224 Days x 5 hours/day = 1120 Hours)[1]

1.COURSE DESCRIPTION

This course, Plumbing, is a basic level program of instruction that is designed to prepare a Semi-Skilled Plumber and Sanitary worker needed in various plumbing industries including building construction and other civil woks.

This course is intended to prepare people to become semi skilled fitters who are competent in meeting the manpower demands of industry, particularly the construction sector. The course covers basic competencies in safety, communication, and good housekeeping; common competencies on caring and servicing of hand tools, reading plumbing symbols and diagrams and drawing, interpreting plumbing; and core competencies such as performing work on domestic and commercial building plumbing's, protective systems, and installation and maintenance of water meters, Hot and cool water fittings , minor construction works and other plumbing related maintenance jobs and trouble shooting.

The course is highlighted with ***on-the-job training*** of students in industry to provide actual experience in industry and to enhance their competencies and chances to enter the world of work

2. COURSE OUTCOMES

Upon completion of the course, the students or trainees must be able to:

1. Participate in workplace communication
2. Work in team environment
3. Practice career professionalism
4. Practice occupational health and safety procedures
5. Prepare Construction Materials, tools and Equipment

6. Observe Procedures, Specifications and Manual of Instruction
7. Perform Mensuration and calculations
8. Prepare pipes for installation
9. Make piping joints and connections
10. Perform minor construction works
11. Perform single unit installation and assemblies
12. Perform plumbing repair and maintenance works
13. Conduct pipe leak testing

ENTRY REQUIREMENTS

1. Matriculation Class 10 (Preferably Science)
2. 16 years old and above
3. Good moral character
4. Can communicate efficiently in Urdu

COURSE STRUCTURE (CONTENTS)

The following course structure is composed of competencies that are transformed into modules of instruction for training delivery. The module contents are also listed from which module developers may refer and/or add other that will enrich the content that are consistent with the competency standard.

Basic Competencies

S.No	Competency Statement	Time Allocation(Hrs)(65)
1	Practice in Workplace Communication	15
2	Work with others	15
3	Demonstrate Work Ethics	15
4	Practice House Keeping Procedures	20

Common Competencies

S.No	Competency Statement	Time Allocation(Hrs)(90)
5	Prepare Construction Materials, tools and Equipment	30

6	Observe Procedures, Specifications and Manual of Instruction	30
7	Perform Mensuration and calculations	30

Core Competencies

S.No	Competency Statement	Time Allocation(Hrs)660
8	Prepare Pipes for Installation	150
9	Install Different Plumbing and Sanitary Fittings	200
10	Perform Single Unit Pluming Installation assembly	200
11	Undertake leakage Test	10
12	Undertake Routine Maintenance Work	80
13	Perform Minor Construction Work	20

Units of Competency	Module Title (Elements of Competency)	Module Contents	Time (hrs)
BASIC COMPETENCIES			
1. Participate in workplace communication		1.1.1 Obtain , follow and convey workplace information(Written and speaking) 1.1.2 Perform work duties following written notices and Participate in workplace meeting and discussion 1.1.3 Complete work related documents	15
2.Work with others	2,1 Working in team environment	2.1.1 Develop Effective Workplace relationship 2.1.2 Contribute to group work Activities	15
3.Demonstrate Work Ethics	3.1 Perform Work within all ethical bounds	3.1.1 Define purpose of the work 3.1.2 Apply Work Values/ ethics 3.1.3 Deal With ethical Problems 3.1.4 Maintain integrity of conduction in the work place	15
4.Practice Housekeeping Procedures	4.1 Observe Clean and neat environment. 4.2 Maintain Instruments properly	4.1.1Sort and Remove un-necessary items 4.1..2 Arrange items 4.1.3 Arrange work areas, tools and equipment 4.1.4 Follow standardize work processes and procedures 4.1.5. Perform work spontaneously. 4.2.1. Check conditions of Tools& Equipment 4.2.2. Perform Basic Preventive Measures. 4.2..3 Sharpen edge and tooth Cutting tools	30
5. Observe Occupational Health and Safety measures(OHS)	5.1 Identify hazard and risks 5.2.Evaluate Hazard and Risks 5.3Contol hazards and Risks 5.4 Maintain OHS awareness	5.1.1 knowledge about safety regulations, hazards and risk and contingency measures 5.1.2 tolerable limits of hazards and their effects 5.3.1 Occupational Health and Safety (OHS) procedures for controlling hazards/risks in workplace 5.3.2 Procedures for dealing with workplace accidents, fire and emergencies in accordance with organization OHS policies 5.3.3 ***Use of Personal protective equipment (PPE)*** is correctly in accordance with organization OHS procedures and practices 5.3.4 Appropriate assistance in the event of a workplace emergency in accordance with established organization protocol 5.4 Drills , publications and trainings	

Units of Competency	Module Title (Elements of Competency)	Module Contents	Time (hrs)
		COMMON COMPETENCIES	
5.Prepare Construction Materials and Tools	1.1.Identify Relevant Construction/ plumbing Material	1.1.1 Identify Materials, Different Piping Materials 1.1.2 Identify Valves, Faucets and Meters 1.1.3 Requisition Materials 1.1.4 Receive and Inspect Materials	30
6. Observe Procedure, specifications and Manuals of Instruction	6.1.Identify and Access Specification Manuals	6.Identify and access specification Manual 6.1.2 Read, interpret and translate specifications, 6.1.3 Follow and practice procedures for use and installation	30
7. Perform Mensuration and Calculation	7.1. Use basic Scale and measuring tools 7.2 Perform Basic Numeracy	7.1.1Read rule rapidly and accurately to the nearest 1/16 inches 7.1.2 Read different temperature & pressure scales 7.1.3.Measure different angles 7.1.4 Select different measuring instruments 7.2.1. Add and subtract fractions and whole numbers 7.2.2.Calculate areas and volumes	20
Units of Competency	**Module Title (Elements of Competency)**	**Module Contents**	
		CORE COMPETENCIES	
		Contents	
8. Prepare Pipe for Installation	8.1Cut and Bend Pipes	7.2.1 Observe basic principles/ methods of cutting of different types of pipes 7.2.2 Indentify and select materials, tools and equipment 7.2.3 Cut pipes with hand saw and powered saw. 7.2.4 Pipes are cut uniformly and smoothly reamed as per standard procedures 7.2.5 Bend pipes with manual and powered bending machines. 7.2.6 Take and set/layout Angular measurement	50
	8.2 Thread Pipes	8.2.1 Observe basic principles methods of threading. 8.2.2 Undertake Internal and External Threading with Moss/tip, thread cutting dies and thread cutting machines. 8.2.3 Threading is done allowing one complete thread to protrude the face of threading dies and is in accordance with piping tables and specifications and/or standard taper pipe thread 8.2.4 Taking and setting angular measurement 8.2.5 Bending pipes with manual and powered bending machines.	50
	8.3. Make different Pipe Joints and Connections	8.3.1 Take Pipe measurements 8.3.2.Taking different types of offset with pipe 8.3.3. Fit-up joint and fittings for G.I & PVC pipe 8.3.4. Perform different threaded types of Pipe Joints 8..3.5. Ermito Pipe Jointing 8.3.6 Undertake Caulk Pipe Jointing	50

		8.3.7 Demonstrate pipe sealing Methods	
Units of Competency	**Module Title (Elements of Competency)**	**Module Contents**	
		CORE COMPETENCIES	
9.0 Install Different Plumbing sanitary Fixtures	9.1. Install Kitchen Sink , Lavatory, Water Closets, Bidet , Bath Tubs and shower stalls	9.1.1Install Kitchen sink with water supply & Plumbing connections 9.1.2 Install Faucets, accessories and valve. 9.1.3 Install Lavatory on stand with faucets and other accessories. 9.1.4 Install Lavatory on Pedestal with faucets and other accessories. 9.1.5. Install Lavatory on vanity with faucets and other accessories. 9.1.6 Install Oriental Water closed on Elbows 9.1.6.1.Install Flush Tank(Siphon) 9.1.6.2. Install Hose and Valves 9.1.7Install European Water Closet according to Catalogue/Manual 9.1.7.1Install European Water Closet on Elbow 90 9.1.7.2. Fixing Flushing hose and its valve 9.1.8. Install Bidets with valves and supply with water. 9.1.9.Position the Bath-tub with proper marking. 9.1.9.1. Install Bath along with plumbing Unit, Valves and accessories.	120
	9.2. Install Water Heater& Meters	9.2.1 Observe safety requirements for Gas/ Electric water Heaters 9.2.2 Install Electrical Water Heater 9.2.3. Install Gas Water Heater. 9.2.4 Install Solar Water heater 9.2.4.Perform leakage test for gas connections 9.2.5 Meter Installation 9.2.5.1. Marking Position for Meter Installation 9.2..5.2 Install Disc Meters 9.2.5.3 Install Rotor Meters 9.2.5.4 Install Compound Meters	80
10. Perform Single Unit Installation and assemblies.	10.4.1 Prepare for plumbing Work	10.4.1.1Work instructions/plans are read and interpreted in accordance with the job requirements. 10.4.2. Materials, ***tools and equipment*** are selected and prepared according to job requirements. 10.4.3. Appropriate ***PPE*** are selected according to job requirements	
	10.4.2. Install Pipes and Fittings	10.4.2.1 Install pipe & fittings with desired slope 10.4.2.2 Drainage/sewer/vent piping system alignment with water supply and provided with clean-outs in the required	

		locations prescribed in the approved work plan. 10.4.2.3 Approved fittings are used in installing drainage/sewer piping 10.4.2.4 Correct usage of tools and equipment is observed according to manufacturer's specifications 10.4.2.5 Appropriate PPE are used in accordance with the job requirements	
	10.4.3 Install Hot and Cold Water Supply	10.4.3.1. Correct specifications of pipes and joints are used in accordance with the job requirements/ Specifications. 10.4.3.2 Installation techniques for Hot and cold water supply according to the approved working plan and materials Specifications. 10.4.3.3 Water supply assembled is leak free/free from contamination and aligned with drainage/vent/ Waste piping. 10.4.3.3 Listed Standard are observed	
	4.4. Install/ Assemble plumbing Fixtures	4.4.1 Standard & specifications for pipe and joints and standard jointing techniques 4.4.2 Sewers and water supply pipes at standard location 4.4.3 Correct use of tools and equipments 4.4.4 OHSA provisions for the specific job	
11. Undertake Leakage Test	11.1 Prepare for conduct Pipe leakage Test	11.1.1 Equipment and tools for water pressure& Air pressure Test 11.1.2. Procedures for water/ air pressure tests. 11.1.3 OHSA regarding leakage test	10
	11.2 Perform pipe leakage test	11.2.1 Basic Indicator for leakage from pipes	10
11. Undertake Routine Maintenance work	11.1.Read and Interpret Drawings	11.1.1. Understand different symbols used in the drawing 11.1.2 Define Control Locations 11.1.3 Diameter of main pipes on drawing	5
	11.2 Control water Sources	11.2.1 Locate main supply Valve & Operation to the building 11.2.2. Indicate places of water leakage and defects 11.2.3 Cleaning Breaking Locations and mark defective portions 11.2.4.Ensure safety of ladders and scaffold	5
	11.3.Maintain Fixtures	11.3.1 Lock up water sources & cleaning work sites 11.3.2. Locate type and place of defects to be fixed 11.3.3.Fixing of defective fixtures	20
	11.4. Stop Clearings & Explore Leakages.	11.4.1 Locate defects and stoppages 11.4.2. Use manual/ electric machines for clearing stoppages 11.4.3. Replace defectives parts and accessories 11.4.4. Clean Inspection chamber 11.4.5. Use different leakage detectors	15
	11.5 Maintain Faucets and Valve	11.5.1 Identify and fix defective faucets and valve 11.5.2. Understand Maintenance techniques	20

	11.6Maintain Tools and Machinery	11.6.1 Clean tools regularly 11.6..2 Clean equipment regularly 11.6.3. Filling Techniques for holes 11.6.4 Undertake regular supervision and inspection visits for fault detection	15
12. Perform Minor Construction Work	12.1.1Perform Pipe layout	12.1.1 Types of roughing in for layout 12.1.2 Layout according to rough-in measurement and plan 12.1.2 Tools and equipment for roughing-in	10
	12.2 Cut pipes through walls and floors	12.2.1 Cutting methods through walls and floors 12.2.2 Safety provisions for other adjacent installation 12.2.3 Refilling back the roughened surfaces to original position	10

METHODOLOGY OF COURSE DELIVERY

1. Modular approach. The course contains a series of competency modules of instruction that requires a combination of student-focused and teacher-centered approaches, and that culminates with assessment of learning outcomes.

2. Demonstration method. New skills lessons must be demonstrated to show the right way or procedure of doing things that will be followed by repeated practice to develop mastery of the skills.

3. Lecture method. Lecture method combined with open questioning and discussion will be used in teaching the theories and principles or the technical knowledge portion of each module.

4. Discussion method. The method of lecture delivery should extensively allow discussion to develop the ability to articulate one's ideas and to explain theories and principles clearly.

5. Project method. Learning by projects will be employed to develop mastery of skills by giving assignment to students, involving knowledge and skills from many interrelated topics, to make a useful project that will require the execution of practical lessons and problem solving.

6. Assignment method. This will be used to give opportunity for students to carry out additional study at the Learning Resource Center, and through on-line search and back at home to browse personal resources to undertake assignments.

7. On-site practice. Whenever possible, students will be assigned to work on-site to develop competency on domestic or industrial wiring installation.

8. Industry visit. Industrial visit will be used also to give students the opportunity to see and have a feel of the actual work place environment.

ASSESSMENT METHOD

1 Written examination. A written test will be administered at the end of every module and at the end of the course, to evaluate learning outcomes on the theoretical aspects of the course.

2. Demonstration of practical skills. This assessment method will be used to determine whether or not the student can perform the competencies according to industry standards. This will be used also to check if remedial or additional inputs are required for the student to develop a mastery of the lesson taught.

3. Direct observation. Observation is an important approach in assessing the attitude of the students toward work, observance of safety rules and regulations, and how they interact and relate with other students and teachers.

4. Interview. Interview may be also used to verify their knowledge of principles and theories; or to check if they could explain the working principles of some job processes or equipment or machines.

QUALIFICATION OF INSTRUCTORS

- Must have completed a Trainers Training/ Teaching Methodology Course or its equivalent
- Must be a holder of Plumbing National Certificate- II
- Must be physically and mentally fit
- *Minimum of 2 years industry experience

TRAINING RESOURCES: . LIST OF TOOLS, EQUIPMENT AND MATERIALS

QTY	UNIT	NAME/DESCRIPTION of Tools
10	Pcs	cold chisel, 6 “
10	Pcs	cold chisel, 8”
10	Pcs	Oiler
10	Pcs	Claw hammer, 16 oz.
10	Pcs	Ball peen hammer, 16 oz.
10	Pcs	Cross peen hammer, 16 oz.
10	Pcs	Hack saw
10	Pcs	Hand saw, 25” long
10	Pcs	C-clamp, 12”
10	Pcs	C-clamp, 6”
10	Pcs	Pull & push rule
10	Pcs	Steel rule,1 meter
10	Pcs	Try square
6	Pcs	Tin snip
10	Pcs	Steel square
10	Pcs	Phillips screw driver
10	Pcs	Flat screw driver
6	Pcs	Adjustable wrench, 8”
10	Pcs	Adjustable wrench, 14”
10	Pcs	Straight pipe wrench, 8”
10	Pcs	Straight pipe wrench, 12”
10	Pcs	Straight pipe wrench, 18”
10	Pcs	Spud wrench, 8 “
12	Pcs	Spud wrench,12 “
12	Pcs	Pipe threader, drop head
10	Pcs	Pipe vise, 4” capacity
10	Pcs	Pipe reamer, 2” capacity

10	Pcs	Pipe cutter, 2" capacity
50	Pcs	Gloves
50	Pcs	Hard hat
50	Pcs	Safety shoes
50	Pcs	Goggles
50	Pcs	Welding mask
50	Pcs	Ear Muff
2	Pcs	Flaring tools
2	Pcs	Strap wrench, 8"
1	Pcs	Strap wrench, 12"
2	Pcs	Chain wrench
2	Pcs	Telescopic basin, 8"
2	Pcs	Telescopic basin, 14"
1	Pcs	Crow bar
Plumbing Equipments		
2	Unit	Welding machine
2	Unit	Threading machine
2	Unit	Proving pump
2	Unit	Air compressor
2	Unit	Electric drill
2	Unit	Portable grinder
2	Unit	Threading machine
2	Unit	Welding machine
2	Unit	Oxy-acetylene cutting outfit
10	Unit	Fire extinguishers
Materials for Plumbing		
PVC Pipes and Fittings		
2	Pcs	Soapstone
2	Pcs	Concrete cutter
2	Pcs	Cut-off disc
30	Pcs. (15 Pcs each)	elbow 90^{O}, 2" dia.
30	Pcs (15 Pcs each)	elbow 90^{O}, 3" dia.
30	Pcs	elbow 90^{O}, 4" dia.
30	Pcs	elbow 45^{O}, 2" dia.
30	Pcs	elbow 45^{O}, 3" dia.
30	Pcs	elbow 45^{O}, 4" dia.
30	Pcs	tee branch, 2"
30	Pcs	tee branch, 3"

30	Pcs	tee branch, 4”
30	Pcs	wye branch, 2”
30	Pcs	coupling, 2”
30	Pcs	coupling, 3”
10	Pcs	coupling, 4”
5	Pcs	clean-out ferrule, 2”
5	Pcs	clean-out ferrule, 3”
5	Pcs	clean-out ferrule, 4”
5	Pcs	tap tee, 2”
10	Pcs	p-trap assembly, 2” dia.
10	Pcs	wye branch reducer, 3”X2”
10	Pcs	wye branch reducer, 4”X2”
10	Pcs	tee branch reducer, 3”X2”
10	Pcs	tee branch reducer, 4”X2”
20	Pcs	PVC pipe, 50mm
10	Pcs	PVC pipe, 76mm
10	Pcs	PVC pipe, 101mm
10	Pcs	coupling, 4”
G.I Pipes		
10	Pcs	elbow 90^{O} , 2” dia.
10	Pcs	elbow 90^{O} , 3” dia.
10	Pcs	elbow 90^{O} , 4” dia.
10	Pcs	elbow 45^{O} , 2” dia.
10	Pcs	elbow 45^{O} , 3” dia.
10	Pcs	elbow 45^{O} , 4” dia.
20	Pcs	tee branch, 2”
20	Pcs	tee branch, 3”
20	Pcs	tee branch, 4”
20	Pcs	coupling, 2”
20	Pcs	coupling, 3”
20	Pcs	coupling, 4”
10	Pcs	clean-out ferrule, 2”
10	Pcs	clean-out ferrule, 3”
10	Pcs	clean-out ferrule, 4”
20	Pcs	tap tee, 2”
20	Pcs	p-trap assembly, 2” dia.
30	Pcs	*straight elbow 13mmX90^{O}*
30	Pcs	*straight elbow 13mmX90^{O}*
30	Pcs	*coupling, 13mm*
30	Pcs	straight elbow 13mmX45^{O}
30	Pcs	straight tee, 13mm

30	Pcs	tee reducer , ¾"X13mm
30	Pcs	straight bushing, 13mm
30	Pcs	bushing reducer, 19mmX13mm
30	Pcs	bushing reducer, 25mmX13mm
30	Pcs	bushing reducer, 13mmX9mm

MEMBERS OF THE REVIEW COMMITTEE

Grateful acknowledgement is hereby extended to the following members of the Committee of Experts constituted by the Skills For Employability SFE Project, for transforming GCT Nowshera into Centre of Vocational Excellence & Restructuring of Technical Education and Vocational Training Systems, Ministry of Industries, Labor and Manpower, Government of K.P.K.. The member reviewed and suggested improvements of the contents (competency elements) of this Model CBT curriculum for Plumbing Level-1(G-3) during a Project held at the Government College of Technology Nowshera, K.P.K. Pakistan:

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