THE REPUBLIC OF UGANDA
Ministry of Education and Sports

Business, Technical, Vocational Education and Training [BTVET] Subsector Reform

Qualification Level: 1

Occupational Cluster: Information Communication Technology

January 2022

Developed by:

Qualifications Standards Department
Directorate of Industrial Training

Funded by:

Government of Uganda

DIRECTORATE OF INDUSTRIAL TRAINING

Plot 97/99 Jinja Road/Corner 3rdStreet,
P.O Box 20050, Lugogo, Kampala, Uganda
Tel: 256-414-251256; 256-414-259412;
E-mail: uvqf.dit@gmail.com

Under BTVET Act, 2008 the functions of the Directorate of Industrial Training are:

(a) To identify the needs of the labour market for occupational competencies that fall under the UVQF;
(b) To regulate apprenticeship schemes;
(c) To foster and promote entrepreneurial values and skills, as an integral part of the UVQF;
(d) To secure adequate and sustainable financing for the efficient operations of the Directorate;
(e) To accredit training institutions or companies as assessment centers;
(f) To determine fees payable under the Act;
(g) To develop, apply, expand and improve the purposeful application of Uganda Vocational Qualifications defined in the UVQF;
(h) To assess and award Uganda Vocational Qualifications;
(i) To promote on-the-job training in industry for apprenticeship, traineeship and indenture training and for other training such as further skills training and upgrading; and
(j) To prescribe the procedure for the making of training schemes

Further to the above provisions, there is an established Uganda Vocational Qualifications Framework (UVQF), under part V of the BTVET Act, 2008. It is stated that:

The purpose of the UVQF is to define:
(a) Occupational standards in the world of work;
(b) Assessment standards;
(c) Vocational qualifications of learners who meet the set standards of different studies;
(d) Provide guidelines for modular training.

The UVQF shall follow principles of Competence Based Education and Training (CBET) which include:
(a) Flexible training or learning modules;
(b) Positive assessment and Certification;
(c) Assessment of Prior Learning;
(d) Recognition of formal and non-formal training;
(e) Self-paced or individual learning; and
(f) Work place learning

For award and recognition of certificates, the BTVET Act, 2008 provides that:

(1) The Directorate and other examination boards established under the Act shall award certificates and diplomas for Business, Technical or Vocational education and training under the UVQF;

(2) The Certificates and Diplomas to be awarded shall be in the form prescribed by the Minister on the recommendation of the Industrial Training Council;

(3) The Certificates and Diplomas awarded under the Act shall be recognized in the Uganda education system and by the labor market.

Under the TVET Implementation Standards 2020, the proposed new mandate of the Directorate of Industrial Training shall be restricted to promoting the highest standards in the quality and efficiency of industrial training in the country and ensuring an adequate supply of properly trained manpower at all levels in the industry and the world of work.

The functions shall include:

a) Regulating Industrial training and trainers,
b) Developing industrial training curricula,
c) Harmonizing curricula and certificates of competence,
d) Assessing industrial training,
e) Development of occupational standards and Assessment and Training Packages (ATPs) for Trade Testing for the industry and world of work and
f) Awarding certificates in that respect.

At operational level in the Directorate, the Qualification Standards Department performs development tasks related to concepts, procedures and instruments for establishment of the UVQF in close collaboration with both public and private stakeholders in vocational training.

In particular, the Department organizes and coordinates the development of Assessment and Training Packages for use in competence-based vocational training as well as standards-based assessment and certification.

The Directorate has therefore produced this Assessment and Training Package for use in implementing Competence-Based Education and Training mechanisms.

TABLE OF CONTENTS

Word from Permanent Secretary

The Ministry of Education and Sports (MoES) through the Directorate of Industrial Training Conducts Competence Based Assessment.

The foreseen advantages of CBA include improved access, equity and relevance of skills development, reduced unit costs of training, and recognition of Prior Learning (or on-the-job-training), among others.

As the Ministry executes its obligation of ensuring quality in training standards, the public-private partnership is being strengthened to improve occupational competence of the country's workforce without gender bias.

To achieve the set-out targets, the Directorate embarked on the anticipated UVQF design and development piloting its instruments and mechanisms in order to effectively enhance Competence-Based Assessment (CBA) in Uganda.

To date, the Qualifications Standards Department of DIT has produced Assessment and Training Packages (ATP) for various occupations. Each ATP contains 3 parts namely:

1. Occupational/job Profile
2. Training modules and
3. Assessment instruments Banks

The ATP can be used by any training provider and/or those who wish to present themselves for Occupational Assessment and Certification.

Herewith, the Directorate of Industrial Training presents the "Assessment & Training Package (ATP)" for training, assessment and certification of **WEB APPLICATION DEVELOPER – QUALIFICATION LEVEL 1**.

Finally, I thank all individuals, organizations and development partners who have contributed and/or participated in the development of this noble document.

Ketty Lamaro

Permanent Secretary

Executive Summary

This Assessment and Training Package is a Competence-Based Education and Training (CBET) tool and consists of three major parts:

0.1 **PART I: The "Occupational Profile" (OP) of a WEB APPLICATION DEVELOPER.** This Occupational Profile which was developed by Web application developers practicing in the world of work mirrors the duties and tasks Web application developers are expected to perform in the world of work.

0.2 **PART II: "Training Modules"** in the form of guidelines to train **Web application developers** both on the job as well as in training centers (or combinations of both venues of learning). The Training Modules herein have been developed basing on the Occupational Profile and hence are directly relevant for employment.

0.3 **PART III: "Assessment Instruments"** in the form of performance (Practical) and written (theory) test items that can and should be used to assess whether a person complies with the requirements of employment as a **Web application developer**. These assessment instruments were developed jointly by job practitioners (Web application developer) and teachers based on the occupational profile and training modules[1].

0.4 While the Occupational Profile (OP) contained in PART I of this document provides the information on **WHAT a person is expected to do** competently in the world of work, the test items, -including performance criteria- of PART III qualify the **HOW and/or HOW WELL a person must do the job**.

In combination, both parts -the OP and the test items- constitute the relevant 'Assessment STANDARDS' for competence-based assessment and certification for acquiring a credible Qualification for – Web application developer Qualification Level 1.

0.5 The modular format of the curriculum (PART II) allows learners to acquire job specific skills and knowledge (i.e. competencies) module by module. A single module can be accomplished within a relatively short duration of time allowing flexibility for learners to move directly into an entry level job, go for further modules or advance to higher levels of training. Modular courses allow more learners to access the training system because training centers as well as companies can accommodate more students in a given period of time.

0.6 In addition to improved access, equity and relevance of BTVET, the UVQF will also enable people who are convinced to have acquired competencies laid down in this ATP through prior training and on-the-job experience to access assessment and certification directly; be it on the basis of a single module, a group of modules or all

[1] *In this document, only sample test items for assessing (practical) performance and occupational knowledge (theory) are included. A larger selection of test items can be obtained from an electronic Test Item Bank at Directorate of Industrial Training*

modules pertaining to the occupation at once. This achievement will facilitate Recognition of Prior Learning (RPL).

0.7 The parts of this Assessment and Training Package were sequentially developed as follows:

i Part 1: Occupational Profile: ***January 2022***
ii Part 2: Training Modules: ***January 2022***
iii Part 3: Assessment Instruments (initial bank): ***January 2022***

This ATP (or parts of it) may be periodically revised to match the dynamic trends in the occupation and hence issued in different versions.

Patrick Byakatonda
Ag Director

Acknowledgement

The Qualifications Standards Department of DIT wishes to sincerely acknowledge the valuable contributions to the development of this Assessment and Training Package by the following persons, Institutions and organizations:

- Members of the DIT Industrial Training Council;
- The Director and staff of DIT,
- Ministry of Education and Sports;
- The practitioners from the world of work;
- Teachers of Agriculture in various Secondary schools;
- Agriculture Curriculum Specialists from NCDC;
- Examination Specialist from UNEB;
- The facilitators involved in guiding the practitioners in their activities;
- The Government of Uganda for financing the development of this ATP;

Abbreviations and Acronyms

A&C	Assessment & Certification
ATP	Assessment & Training Packages
BTVET	Business, Technical and Vocational Education and Training
CBET	Competency Based Education and Training
DIT	Directorate of Industrial Training
ITC	Industrial Training Council
GoU	Government of Uganda
LWA	Learning-working Assignment
MC	Modular Curriculum
MoES	Ministry of Education and Sports
OP	Occupational Profile
PEX	Practical Exercise
PTI	Performance (Practical) Test Item
QS	Qualification Standards
RPL	Recognition of Prior Learning
TIB	Test Item Bank
TVET	Technical, Vocational, Education and Training
UVQ	Uganda Vocational Qualification
UVQF	Uganda Vocational Qualifications Framework
WTI	Written (Theory) Test Item

Key Definitions

Assessment Assessment is the means by which evidence is gathered and judged to decide if an individual has met the stipulated assessment standards or not. Testing is a form of formal assessment.

Certification Certification is a formal procedure to issue a certificate (qualification) to an individual that has demonstrated during formal assessment that he/she is competent to perform the tasks specified in the occupational profile.

Competence Integration of skills, knowledge, attitudes, attributes and expertise in doing /performing tasks in the world of work to a set standard.

Competency (Occupational) competency is understood as the ability to perform tasks common to an occupation to a set standard.

CBET Competence-based education and training means that programmes:

1. have content directly related to work
2. focus is on 'doing something well'
3. assessment is based upon industry work standards, and
4. curricula are developed in modular form

Duty A Duty describes a large area of work in performance terms. A duty serves as a title for a cluster of related Tasks (see also: TASK).

Learning-Working Assignment (LWA) LWA are simulated or real job situations / assignments that are suitable for learning in a training environment (e.g. "small projects"). In a working environment LWAs are real work situations /assignments.

Modules Modules are part(s) of a curriculum. Modules can be considered as "self-contained" partial qualifications which are described by learning outcomes or competencies and which can be assessed and certified individually.

Occupational Profile (OP) An Occupational Profile is an overview of the duties and tasks a job incumbent is expected to perform competently in employment.
Occupational Profiles developed by practitioners from the world of work enhance the relevance of training and learning to the requirements of the world of work.

Occupational Profiles define WHAT a person is supposed to do in performance terms. It also contains generic information regarding related knowledge and skills, attitudes/behavior, tools, materials and equipment required to perform as well as trends/ concerns in the occupation.

Occupational profiles are the reference points for developing modular curricular and assessment standards

Qualification A qualification is a formal recognition for demonstrating competence, based on formal assessment against set standards. A qualification is provided to the individual in form of a certificate specifying the nature of the competence.

Task Job TASKS represent the smallest unit of job activities with a meaningful outcome. Tasks result in a product, service, or decision. They represent an assignable unit of work and have a definite beginning and ending point. Tasks can be observed and measured. *(see also: Duty)*

1.0 ATP-PART I

Occupational Profile for a WEB APPLICATION DEVELOPER

1.1 The OCCUPATIONAL PROFILE (OP) for "Web application developer" below defines the ***Duties*** and ***Tasks*** a competent Web application developer is expected to perform in the world of work (on the job) in Uganda and the East African region today.

1.2 Since it reflects the skill requirements of work life, the Occupational Profile is the reference document for the subsequent development of training modules and assessment instruments (test items) which are directly relevant to employment in Ugandan and the East African businesses and industries.

1.3 To ensure that the Occupational Profile is relevant for employment in Uganda and East Africa, the DIT used the method of "occupational/job profiling.[1]

This approach involves the brainstorming of a panel of 8 to 12 competent job practitioners guided by trained and experienced facilitators. During a two-day workshop the panelists define the duties and tasks performed in employment, as well as the prerequisite skills, knowledge, attitudes, tools and equipment, and the future trends and concerns in the occupation/job.

1.4 The panelists, facilitators and coordinators who participated in developing this Occupational Profile for a WEB **APPLICATION DEVELOPER** are listed on the following page.

The DACUM-method was used. DACUM is an acronym for 'Develop A Curriculum'

Job Expert Panel
Tuhame Moses
NCDC

Murangira Bruce
Kisubi Mapeera SS

Barugahare Jimmy
Mbarara High School

Musisi Henry
Kings college Buddo

Wabbi Bendicto
Mengo SS

Kusasira Joshua
Andela Uganda

Kibiye Dennis
IP links consults

Ssendi Samuel
MUBs

Ssemakula Martin
DIT

Co-ordinator
Mukyala E. Ruth
Directorate of Industrial Training

Facilitators
Nyakamadi Janet
Directorate of Industrial Training

Tusiime Edward
Directorate of Industrial Training

Funded by
The Government of Uganda

THE REPUBLIC OF UGANDA
Ministry of Education and Sports

Business, Technical and Vocational Education and Training (BTVET) Sub sector Reform

Occupational Profile
For a
"WEB APPLICATION DEVELOPER"

Developed by: Qualifications Standards Department of the Directorate of Industrial Training

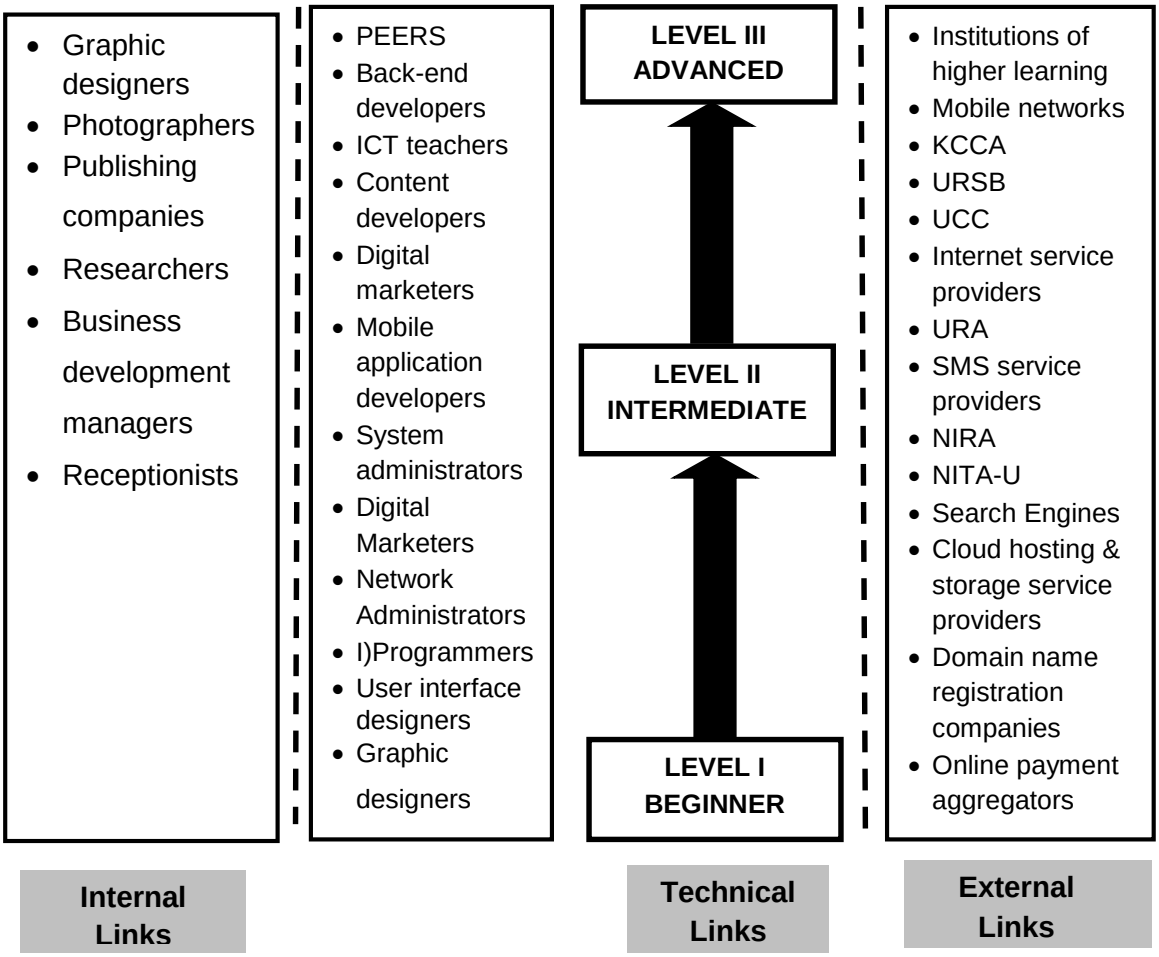
Date of workshop:10th –14th January, 2022

NOMENCLATURE FOR THE OCCUPATION OF A WEB APPLICATION DEVELOPER

Definition of a Web application developer

This is a person who develops and designs web applications.

JOB ORGANISATION CHART FOR A WEB APPLICATION DEVELOPER



UVQ Level I (Beginner) WEB APPLICATION Developer;

A person who develops a simple web application with a front-end graphical user interface.

UVQ Level II (Intermediate) WEB APPLICATION Developer;

A person who develops a web application with a front-end graphical user interface connected to a database.

UVQ Level III (Advanced) WEB APPLICATION Developer;

A person who develops a dynamic web application with a front-end & back-end graphical user interface all connected to a database

Duties and Tasks

A. Perform needs assessment	**A1** Review existing system	**A2** Highlight gaps	**A3** Identify scope
	A4 Carryout feasibility study	**A5** Propose Solutions	**A6** Review Solutions
	A7 Identify solution	**A8** Write needs Assessment Report	

B. Design Web Application	**B1** Gather requirements	**B2** Analyze requirements	**B3** Identify relationships
	B4 Create entity relationship diagram	**B5** Design database	**B6** Create data flow diagram

C. Develop web Application	**C1** Create user interface	**C2** Create database	**C3** Link interface to database
	C4 Test application	**C5** Fix bugs	**C6** Run application

D. Implement Web Application	**D1** Propose deployment techniques	**D2** Review deployment techniques	**D3** Select deployment technique
	D4 Install prerequisite software	**D5** Set up Web application environment	**D6** Install the Web application
	D7 Install database	**D8** Test Web application	**D9** Train users

E. Maintain Web application	**E1** Create user manual	**E2** Monitor storage utilization	**E3** Upgrade Web application
	E4 Trouble shoot Web application	**E5** Carryout research	**E6** Optimise application
	E7 Perform regular network speed tests	**E8** Performe backups	**E9** Create FAQ guide

F. Perform administrative tasks	**F1** Create user accounts	**F2** Assign user roles	**F3** Mentor users
	F4 Create web application performance log	**F5** Create user statistics log	**F6** Provide technical support
	F7 Draft budget		

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G. Perform Occupational health, safety and Environmental Protection Practices	**G1** Hazard detection	**G2** Hazard assessment	**G3** Manage waste
	G4 Setup fire codes	**G5** Manage emergencies	**G6** Setup building codes
	G 7 Install firefighting equipment	**G8** Conduct regular inspection	**G9** Risk assessment
	G10 Administer first aid	**G11** Observe green computing guidelines	**G12** Display safety signs

Additional Information

Generic Knowledge & Skills

1. ICT literacy
2. Computer programming
3. Computer databases
4. Computer networking
5. Server management
6. Program testing and debugging
7. Remote troubleshooting
8. Programming language
9. Web browser
10. Numeracy skills
11. Planning
12. Web technologies
13. Software installation
14. Search engine optimization
15. Back-end knowledge
16. Virtual machine management
17. Content management
18. OS installation
19. Communication skills
20. Data backup
21. Marketing
22. Graphics designing
23. Computer policies and regulations
24. Computer laws and ethics
25. Problem solving
26. Creativity
27. Budgeting
28. Entrepreneurial
29. Analytical skills
30. Programing languages

Tools, Materials and Equipment

1. Computers
2. Servers
3. Internet cables
4. Internet
5. RJ45 connectors
6. Crimping tools
7. OS installation CDs
8. Switch
9. Routers
10. Web developing tools
11. Air conditioners
12. Access points
13. Portable storage media
14. Scanners
15. Camera
16. Projectors
17. Projector screens
18. Phones
19. Digital tablets
20. Markers
21. White boards
22. Network cable tester
23. Search engines
24. Printers
25. Gateway

Attitudes/ Traits/ Behavior	Future Trends and Concerns
1. God fearing	1. Use of technology
2. Innovative	2. Pandemics
3. Punctual	3. Emerging technologies
4. Organized	4. Cyber crime
5. Trust worthy	5. Internet of things
6. Trainable	6. Digital literacy
7. Hard working	7. Unfavorable government policies
8. Team player	8. Ergonomics
9. Creative	9. Cyber crimes
10. Good planner	10. Internet of things
11. Empathetic	
12. Result oriented	
13. Tolerant	
14. Honest and transparent	
15. Realistic	
16. Proactive	
17. Fast learner	
18. Good listener	
19. Ability to meet deadlines	
20. Open minded	
21. Flexible	
22. Collaborative	
23. Problem solver	

2.0 ATP – PART II
Training Modules for WEB APPLICATION DEVELOPER

2.1 A curriculum is a “guide /plan for teaching and learning” which provides a guide to teachers, instructors and learners. In the envisaged system of competence-based or outcome-oriented education and training (CBET), Curricula are no longer the benchmark against which assessment is conducted. It is rather the Occupational Profile that provides the benchmark for Curriculum development as well as assessment.

2.2 This modular format of the curriculum allows learners of Web application developer to acquire job specific skills and knowledge (i.e. competencies) module by module. A single module can be accomplished within a relatively short duration of time allowing learners to move directly into an entry level job, do further modules and advance to higher levels of training. Modular courses allow more learners to access the training system because training centers, as well as companies can accommodate more students in a given period of time.

2.3 The modules were developed jointly by both instructors and job practitioners. They were developed using the Occupational Profile as a reference point and taking into account the specifications of training and learning outcomes.

2.4 The modules contain “Learning-Working Assignments” (LWAs) and related “Practical Exercises” (PEXs) as key elements.

LWAs are simulated or real job situations/assignments that are suitable for learning in a training environment (e.g. “small projects”). In a working environment, LWAs are real work situations.

PEXs are therefore sub-sets of a LWA.

2.5 In principle, and following the philosophy of Competence-Based Education and Training (CBET), the modules can be used as a guide for learning in a training Centre, at the workplace; or a combination of both.

WHO IS A WEB APPLICATION DEVELOPER QUALIFICATION LEVEL 1

Is a person who develops simple web applications with front-end graphical user interface.

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TRAINING MODULES FOR WEB APPLICATION DEVELOPER UVQ LEVEL 1

Code	Module Title	Average duration	
		Contact hours	Weeks
UE/CF/M1.1	Establish web application development plan	320	8
UE/CF/M1.2	Develop web application design	160	4
UE/CF/M1.3	Develop web application front end user interface	400	10
UE/CF/M1.4	Install web application	120	3
UE/CF/M1.5	Perform Entrepreneurship tasks	120	3
Summary	**5 training modules**	**1120**	**31**

Note: Average duration is contact time but NOT calendar duration

It is assumed that:

- 1 day is equivalent to 8 hours of nominal learning and
- 1 month is equivalent to 160hours of nominal learning

Information given on the average duration of training should be understood as a guideline. Quick learners may need less time than indicated or vice versa.

At completion of a module, the learner should be able to satisfactorily perform the included Learning Working Assignments, their Practical exercises and attached theoretical instructions, as the minimum exposure.

Prior to summative assessment by recognized Agencies, the users of these Modules Guides are encouraged to carefully consider continuous assessment using samples of (or similar) performance (practical) and written test items available in part 3 of this ATP for **Web application developer**.

Code	UE/CF/M1.1
Module title	**M1.1: Establish web application development plan**
Related Qualification	Part of: Uganda Vocational Qualification (WEB APPLICATION DEVELOPER_UVQ1)
Qualification Level	1
Module purpose	By the end of the of this module, the trainee will be able to develop a web application plan.
Learning-Working Assignments (LWAs)	**LWA1/1: Gather Requirements** **LWA1/2: Analyze requirements** **LWA1/3: Sketch Web application** ***LWA1/4:*** **Perform Occupational Health and Environmental Protection Practices** **Note:** 1. *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2. *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA1/1: Gather Requirements** PEX 1.1: Plan data collection PEX 1.2: Design questionnaire PEX 1.3: Design online data collection form PEX 1.4: Conduct interview
	LWA1/2: Analyze requirements PEX 2.1: Sort data PEX 2.2: Merge data PEX 2.3: Write user stories PEX 2.4: Compile requirements document
	LWA1/3: Sketch Web application PEX 3.1: Design pages' layout PEX 3.2: Draw links between Web pages'
	LWA 1/4: Perform Occupational Health and Environmental Protection Practices PEX 4.1 Administer first aid PEX 4.2 Maintain personal hygiene PEX 4.3 Manage wastes PEX 4.4 Display safety signs PEX 4.5 Perform fire fighting PEX 4.8 Wear protective gear
Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection, included in the related knowledge listings as well as in test items should be observed and demonstrated during LWAs and PEXs.

Pre-requisite modules	None
Related knowledge/ theory	*For Occupational theory suggested for instruction/ demonstration, the Trainer is not limited to the outline below. In any case, related knowledge/ theory may be obtained from various recognized reference materials as appropriate:* • Methods of requirement gathering • Data collection techniques • Analytical skills • Communication skills • Data management • How to conduct interviews • How to design onlin0e data collection form • Data analysis • How to compile requirements document • Data collection tools
Average duration of learning	320 hours (40 days) of nominal learning suggested to include: • *15 days of occupational theory and* • *25 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills, knowledge, attitudes) described in this module may take place at a training centre or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item bank
Minimum required tools/ equipment/ implements or equivalent	Computers, projectors, white board, projector screens, printers, scanners, storage media
Minimum required materials and consumables or equivalent	Note books, pens, paper, markers, internet, tonner, textbooks,
Special notes	The theory must be integrated into the practice during delivery.

Code	**UE/CF/M1.2**
Module title	**M1.2: Develop web application design**
Related Qualification	Part of: Uganda Vocational Qualification (WEB APPLICATION DEVELOPER UVQ1)
Qualification Level	1
Module purpose	By the end of this module, the trainee will be able to develop a web application design.
Learning-Working Assignments (LWAs)	**LWA1/1: Map data elements** **LWA2/2: Design web application data flow diagram** **LWA2/3: Perform Occupational Health and Environmental Protection Practices** **Note:** 1. *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2. *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA1/1: Map data elements** PEX 1.1: Identify objects PEX 1.2: Link objects PEX 1.3: Create wireframes
	LWA2/2: Design web application data flow diagram PEX 2.1: Identify processes PEX 2.2: Identify data flows PEX 2.3: Identify external entities PEX 2.4: Identify data stores PEX 2.5: Identify objects PEX 2.6: Create data flow diagram
Occupational health and safety	**LWA2/3: Perform Occupational Health and Environmental Protection Practices** PEX 3.1 Administer first aid PEX 3.2 Maintain personal hygiene PEX 3.3 Manage wastes PEX 3.4 Display safety signs PEX 3.5 Perform fire fighting PEX 3.6 Wear protective gear
	Precautions, rules and regulations on occupational health, safety and environmental protection, included in the related knowledge listings as well as in test items should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	M1.2: Develop web application design

Related knowledge/ theory	*For Occupational theory suggested for instruction/ demonstration, the Trainer is not limited to the outline below. In any case, related knowledge/ theory may be obtained from various recognized reference materials as appropriate:* • *Data linking technique* • *Data flow diagrams* • *Programming language* • *Web browser* • *Internet protocols*
Average duration of learning	160 hours (20 days) of nominal learning suggested to include: • *05 days of occupational theory and* • *15 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (Skills-Knowledge, attitudes) described in this module may take place at a training centre or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item bank
Minimum required tools/ equipment/ implements or equivalent	Computers, projectors, white board, projector screens, printers, scanners, storage media.
Minimum required materials and consumables or equivalent	Note books, pens, paper, markers, internet, tonner, textbooks,
Special notes	The theory must be integrated into the practice during delivery.

Code	UE/CF/M1.3
Module title	**M1.3: Develop web application front end user interface**
Related Qualification	Part of: Uganda Vocational Qualification (WEB APPLICATION DEVELOPER UVQ)
Qualification Level	1
Module purpose	By the end of this module, the trainee will be able to design a web application front end user interface.
Learning-Working Assignments (LWAs)	**LWA3/1: Setup development environment** **LWA3/2: Develop web application** **LWA3/3: Style web application** **LWA3/4: Perform Occupational Health and Environmental Protection Practices** **Note:** 1. *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2. *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA3/1: Setup development environment** PEX 1.1: Install development tool PEX 1.2: Configure development tool PEX 1.3: Test development tool
	LWA3/2: Develop web application PEX 2.1: Build webpage elements PEX 2.2: Optimize webpage content PEX 2.3: Create web pages PEX 2.3: Insert content PEX 2.4: Link web pages PEX 2.5: Run web application PEX 2.6: Fix bugs
	LWA3/3: Style web application PEX 3.1: Apply color scheme PEX 3.2: Apply font PEX 3.3: Create layouts
	LWA3/4: Perform Occupational Health and Environmental Protection Practices PEX 4.1 Administer first aid PEX 4.2 Maintain personal hygiene PEX 4.3 Manage wastes PEX 4.4 Display safety signs PEX 4.5 Perform fire fighting PEX 4.6 Wear protective gear

Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection included in the listed related knowledge should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	None
Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outline below. In any case, related knowledge/ theory may be obtained from various recognized reference materials as appropriate:* • Computer Programing languages • Web development tools • Art and design • Internet protocol • Web browser • ICT literacy • Web technologies • Data backup • Graphics design
Average duration of learning	400 hours (50 days) of nominal learning suggested to include • *20days of occupational theory and* • *30 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills. Knowledge, attitudes) described in this module may take place at a training centre or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item bank
Minimum required tools/ equipment/ implements or equivalent	Computers, projectors, white board, projector screens, printers, scanners, storage media
Minimum required materials and consumables or equivalent	Note books, pens, paper, markers, internet, tonner, textbooks,
Special notes	The theory must be integrated into the practice during delivery.

Code	UE/CF/M1.4
Module title	**M1.4: Install web application**
Related Qualification	Part of: Uganda Vocational Qualification (WEB APPLICATION DEVELOPER UVQ1)
Qualification Level	1
Module purpose	By the end of this module, the trainee will be able to install a web application.
Learning-Working Assignments (LWAs)	**LWA 4/1: Prepare environment** **LWA 4/2: Upload web application files** **LWA 4/3: Test web application** **LWA 4/4: Perform Occupational Health and Environmental Protection Practices** ***Note:*** 1 *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2 *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA4/1: Prepare environment** PEX 1.1: Download pre-requisite software PEX 1.2: Install pre-requisite software PEX 1.3: Configure hosting environment PEX 1.3:Test hosting environment
	LWA4/2: Upload web application files PEX 2.1: Create folder PEX 2.2: Apply permissions PEX 2.3: Transfer files
	LWA4/3: Test web application PEX 3.2 Test functionality PEX 3.2 Test user roles PEX 3.3 Test bulky data PEX 3.4 Perform web application speed test PEX 3.5 Develop test report
	LWA4/4: Perform Occupational Health and Environmental Protection Practices PEX 4.1 Administer first aid PEX 4.2 Sanitize tools and equipment PEX 4.3 Maintain personal hygiene PEX 4.5 Manage wastes PEX 4.6 Display safety signs PEX 4.7 Perform fire fighting PEX 4.8 Wear protective gear

Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection included in the listed related knowledge should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	None
Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outline below. In any case, related knowledge/ theory may be obtained from various recognized reference materials as appropriate:* • Usage of tools and materials • Computer programming • Development environment • Art and design • Internet protocol • Web browser • ICT literacy • Web technologies • Data backup • Graphics design • Linux operating system • Database management systems • CMS
Average duration of learning	120 hours (15 days) of nominal learning suggested to include • *05days of occupational theory and* • *10 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills. Knowledge, attitudes) described in this module may take place at a training centre/ farm or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item bank
Minimum required tools/ equipment/ implements or equivalent	Computers, projectors, white board, projector screens, printers, scanners, storage media
Minimum required materials and consumables or equivalent	Note books, pens, paper, markers, internet, tonner, textbooks,
Special notes	The theory must be integrated into the practice during delivery.

Code	UE/CF/M1.5
Module title	**M1.5: Perform Entrepreneurship tasks**
Related Qualification	Part of: Uganda Vocational Qualification (WEB APPLICATION developer UVQ1)
Qualification Level	1
Module purpose	By the end of this module, the trainee will be able to establish a web application enterprise
Learning-Working Assignments (LWAs)	**LWA5/1: Carryout marketing** **LWA5/2: Perform administrative tasks** **LWA5/3: Perform Occupational Health and Environmental Protection Practices** ***Note:*** 1. *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2. *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA 5/1 Carryout marketing** PEX 1.1: Branding PEX 1.2: Prepare marketing materials PEX 1.3: Carryout advertising
	LWA5/2: Perform administrative tasks PEX 2.3: Prepare a budget PEX 2.4: Keep records PEX 2.5: Legalize business
	LWA5/3: Perform Occupational Health and Environmental Protection Practices PEX 4.1 Administer first aid PEX 4.2 Sanitize tools and equipment PEX 4.3 Maintain personal hygiene PEX 4.5 Manage wastes PEX 4.6 Display safety signs PEX 4.7 Perform fire fighting PEX 4.8 Wear protective gear
Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection included in the listed related knowledge should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	None

Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outline below. In any case, related knowledge/ theory may be obtained from various recognized reference materials as appropriate:* • Planning • Human resources • Procurement • Financial management • Record keeping • Usage of tools, materials and equipment • Computer literacy • First aid • Safety and health precautions • Marketing • Networking • Mathematics • ICT
Average duration of learning	120 hours (15 days) of nominal learning suggested to include; • *09 days of occupational theory and* • *06 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills. Knowledge, attitudes) described in this module may take place at a training centre or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item bank
Minimum required tools/ equipment/ implements or equivalent	Laptop, desktop Computer, storage Medium, Printer, scanners, Furniture.
Minimum required materials and consumables or equivalent	Notebooks, receipt books, invoice books, record books, pens, internet, pen.
Special notes	

3.0 ATP- PART III

Assessment Instruments for WEB APPLICATION DEVELOPER

3.1 **Assessment** of occupational competence is the procedure by which evidence is gathered and judged to decide if an individual (candidate) has met the stipulated assessment standards.

3.2 Assessment of occupational competence should comprise of both practical (performance) testing and written (theory/knowledge) testing.

3.3 Based on the Occupational Profile and Training Modules, a combined panel of job practitioners and Instructors developed a substantial number of test items for assessing (practical) performance as well as items for assessing occupational knowledge (theory) all stored in an electronic Test Item Bank (TIB) at the Directorate of Industrial Training.

3.4 Performance (Practical) Test Items (PTI)are closely related to typical work situations in Ugandan business enterprises. They comprise of a test assignment for candidates and assessment criteria and/or scoring guides for assessors' use.

3.5 Written Test items (WTI) for written testing of occupational theory, (knowledge) are presented in different forms which include:

- Short answer test items.
- Multiple choice test items
- Matching test items,

These WTIs herein focus on functional understanding as well as trouble-shooting typically synonymous with the world of work.

3.6 Composition of assessment/test papers will always require good choices of different types of WTI in order to ensure the assessment of relevant occupational knowledge required of candidates to exhibit competence.

3.7 The test items contained in the Test Item Bank may be used for continuous/formative assessment during the process of training as well as for summative assessment of candidates who have acquired their competences non-formally or informally.

3.8 In this document, samples of test items for assessing both performance (practical) and occupational knowledge (theory) of a **WEB APPLICATION DEVELOPER** are included.

3.2 Overview of Test Item Samples Included

No.	Type of Test Item	Numbers included
1	Written (Theory)- Short Answer	2
2.	Written (Theory)- Multiple Choice	2
3.	Written (Theory)- Matching item- (Cause-effect)	1
4.	Written (Theory)- Matching item (Work sequence)	1
5.	Performance (Practical) Test Items	1
	Total	**7**

WRITTEN TEST ITEMS (SAMPLES)

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 1
Occupational Title:	WEB APPLICATION Developer
Competence level:	1
Code no.	
Test Item type:	Short answer: √ Multiple choice: Matching item: Generic / Cause- Effect / Work-sequence
Complexity level:	C1
Date of OP:	January, 2022
Related module:	M1.3
Time allocation:	2 minutes

Test Item	List 4 computer programming languages used to develop a web page.
Answer spaces	a) …… b) …….... c) ……. d) ……..
Expected key (answers)	a) HTML b) XML c) PHP d) JavaScript e) Python f) SCALA g) JAVA h) KOTLIN i) PERL

<table>
<tr><th>DIT/ QS</th><th colspan="4">Test Item Database
Written (Theory) Test Item- No. 2</th></tr>
<tr><td>Occupational Title:</td><td colspan="4">WEB APPLICATION Developer</td></tr>
<tr><td>Competence level:</td><td colspan="4">1</td></tr>
<tr><td>Code no.</td><td colspan="4"></td></tr>
<tr><td>Test Item type:</td><td colspan="4"><table>
<tr><td>Short answer</td><td colspan="3">√</td></tr>
<tr><td>Multiple choice</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Matching item</td><td>Generic</td><td>Cause- Effect</td><td>Work-sequence</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Complexity level:</td><td colspan="4">C1</td></tr>
<tr><td>Date of OP:</td><td colspan="4">January, 2022</td></tr>
<tr><td>Related module:</td><td colspan="4">M1.2.3.4</td></tr>
<tr><td>Time allocation:</td><td colspan="4">2 minutes</td></tr>
</table>

Test Item	State any four web browsers one can use to access a web page?
Answer spaces	a) …… b) …….. c) …….. d) ……...
Key (answer)	a) Chrome b) Firefox c) Opera d) Brave e) Safari f) Microsoft edge/Internet explorer g) Phoenix

<table>
<tr><th>DIT/ QS</th><th colspan="4">Test Item Database
Written (Theory) Test Item- No. 3</th></tr>
<tr><td>Occupational Title:</td><td colspan="4">WEB APPLICATION Developer</td></tr>
<tr><td>Competence level:</td><td colspan="4">1</td></tr>
<tr><td>Code no.</td><td colspan="4"></td></tr>
<tr><td>Test Item type:</td><td colspan="4"><table>
<tr><td>Short answer</td><td colspan="3"></td></tr>
<tr><td>Multiple choice</td><td colspan="3">√</td></tr>
<tr><td rowspan="2">Matching item</td><td>Generic</td><td>Cause- Effect</td><td>Work-sequence</td></tr>
<tr><td></td><td></td><td></td></tr>
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<tr><td>Complexity level:</td><td colspan="4">C2</td></tr>
<tr><td>Date of OP:</td><td colspan="4">January, 2022</td></tr>
<tr><td>Related module:</td><td colspan="4">M1.3.4</td></tr>
<tr><td>Time allocation:</td><td colspan="4">2 minutes</td></tr>
</table>

Test Item	Which of the following can be used as a DBMS in web app development?
Answer spaces	a) SQL b) MySQL c) PHP d) Microsoft excel

Key (answer)	B

<table>
<tr><td>DIT/ QS</td><td colspan="4">Test Item Database
Written (Theory) Test Item- No. 4</td></tr>
<tr><td>Occupational Title:</td><td colspan="4">WEB APPLICATION Developer</td></tr>
<tr><td>Competence level:</td><td colspan="4">1</td></tr>
<tr><td>Code no.</td><td colspan="4"></td></tr>
<tr><td>Test Item type:</td><td colspan="4"><table>
<tr><td>Short answer</td><td colspan="3"></td></tr>
<tr><td>Multiple choice</td><td colspan="3">√</td></tr>
<tr><td rowspan="2">Matching item</td><td>Generic</td><td>Cause- Effect</td><td>Work-sequence</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Complexity level:</td><td colspan="4">C2</td></tr>
<tr><td>Date of OP:</td><td colspan="4">January, 2022</td></tr>
<tr><td>Related module:</td><td colspan="4">M1.3</td></tr>
<tr><td>Time allocation:</td><td colspan="4">2 minutes</td></tr>
</table>

Test Item	Which of the following can be used as a web server in web app development?
Answer spaces	a) Linux server b) Windows server c) Apache server d) Internet server

Key (answer)	C

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 5
Occupational Title:	WEB APPLICATION developer
Competence level	1
Code no.	
Test Item type:	Short answer Multiple choice Matching item (Generic: ; Cause- Effect: √ ; Work-sequence:)
Complexity level:	C2
Date of OP:	January, 2022
Related module:	M1.5
Time allocation:	6 minutes

Test item	Match the following challenges and their impact during web application development.

Column A (diseases)	
1.	Out-dated software
2.	Unlicensed software
3.	Slow internet speed
4.	Changing user requirements

Column B (causes)	
A.	Slow system design
B.	System breakdown
C.	Beeping sound
D.	Limited functionality
E.	Computer crash
F.	Limited access

Key (answer)	1:B, 2:D, 3:F, 4:A

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 6
Occupational Title:	WEB APLICATION developer
Competence level:	1
Code no.	
Test Item type:	Short answer Multiple choice Matching item (Generic / Cause- Effect / Work-sequence: √)
Complexity level:	C3
Date of OP:	January, 2022
Related modules:	M1.1.2.3.4
Time allocation:	8 minutes

Test Item	Arrange the steps below in correct order as followed in web application development.

Column A (chronology)	**Column B (work steps) in wrong chronology order.**	
1.	A	Testing
2.	B	Maintenance
3.	C	Designing
4.	D	Coding
5.	E	Planning
6.	F	Deploying
7.	G	Defining requirements

Key (answer)	1:E, 2:G, 3:C, 4:D, 5:A, 6:F, 7:B

PERFORMANCE TEST ITEMS (SAMPLES)

DIT/ QS	Test Item Database Performance Test Item- No. 7
Occupational Title:	WEB APPLICATION developer
Competence level:	P3
Code no.	
Test Item:	Develop a Web application data flow diagram and its corresponding front-end user interface.
Complexity level:	P2
Date of OP:	January, 2022
Related modules:	M1.4
Related skills and knowledge:	Programming skills, computer literacy and system design.
Required tools, Materials and Equipment:	Pens, Paper, Pencil, computers, Drawing board, Internet, tables, electricity, generator.
Time allocation:	6 hours.
Preferred venue:	Computer Lab.
Remarks for candidates	Download and install all necessary software before beginning.
Remarks for assessors	Provide all required tools and equipment before students begin.

#	Assessment criteria	Scoring guide	Max. Score	
			Process	Result
1	Preparation for work	Observed computer ergonomics		2
		Powered Computer	2	2
		Searched for content	2	1
2.	Developed data flow diagram	Identified external entities		2
		Linked external entities		4
		Identified processes		2
		Linked processes		4
		Identified data flows		2
		Linked data flows		4
		Identified data stores		2
		Linked data stores		4
3.	Design GUI	Built webpage elements	2	2
		Optimized web content	2	2
		Created webpages	1	2
		Inserted content		3
		Style webpages	1	2
		Applied colour scheme		2
		Applied font		2
		Created layouts		2
4	Develop GUI	Launched developing tool		2
		Linked webpages	2	2
		Run web application	1	2
		Fix bugs	2	2
		Error free web observed		4
		Cleaned work area	2	2
	TOTAL	$\frac{X}{Y} x\ 100$	**17**	**60**
	MAXIMUM SCORE (Y)		**77**	

4.0 ATP- PART IV

INFORMATION ON DEVELOMENT PROCESS

4.1 Occupational Profile Development (January 2022)

The Assessment and Training Package was exclusively developed by job practitioners of the Web application developer occupation, Secondary School Teachers who double as examiners of Agriculture with the Uganda National Examinations Board (UNEB) and Curriculum Development Specialists working with the National Curriculum Development Centre (NCDC).

The job expert panel, guided by UVQF Facilitators developed duties and tasks performed and provided additional generic information regarding the occupation.

4.2 Training Module Development (January 2022)

Based on the developed Occupational Profile for Web application developer of January 2022, Training Modules were developed by job practitioners, guided by UVQF Facilitators.

4.3 Test Item Development (January 2022)

Based on the developed Occupational Profile for Web application developer of January 2022, and Training Modules of January 2022, Test Items were developed by combined panels of Teachers and job practitioners, guided by UVQF Facilitators.

4.4 Methodology

The rationale for the Assessment and Training Package development was to link Vocational Education and Training to the real world of work by bridging Occupational Standards to Training Standards through industry-led Standards-Based Assessment.

Active participation of both teachers and job practitioners' panels consolidated the development philosophy.

The panelists worked as teams in workshop settings complemented by off-workshop field research and literature review activities including international benchmarking.

4.5 Development Panels

The participating panel of Job Practitioners required for different stages of the assessment training package i.e., occupational profile, training modules, assessment instruments were constituted by members from the following organizations;

No.	Name	Institution/ Organization
1.	Mr. Tuhame Moses	NCDC
2.	Mr. Kibiye Dennis	IP Links Consults
3.	Mr. Kusasira Joshua	Andela Uganda
4.	Mr. Murangira Bruce	Kisubi Mapeera SS, Wakiso
5.	Mr. Barugahare Jimmy	Mbarara High School
6.	Dr. Musisi Henry	St. Mary's College Kisubi
7.	Mr. Wabbi Benicto	Mengo Senior School
8.	Mr. Ssendi Samuel	Makerere University Business School
9.	Mr. Ssemakula Martin	Directorate of Industrial Training (DIT)

4.6 Facilitator team

This Assessment and Training Package was developed by a Facilitator team listed below:

1. **Team Leader** – Ms. Mukyala Ruth, Ag Deputy Director, DIT
2. **Facilitators (Occupational Profile Development) -** Ms. Nyakamadi Janet, Mr. Tusiime Edward.
3. **Facilitators (Training Modules Development) -** Ms. Nyakamadi Janet, Mr. Tusiime Edward.
4. **Facilitators (Test Item Development) -** Ms. Nyakamadi Janet, Mr. Tusiime Edward.
5. **Coordinated by** – Mr. Byakatonda Patrick, Ag. Director, DIT; and Ms. Mukyala Ruth Ag. DD Qualification Standards Dept. DIT

4.7 Reference time:

The Assessment and Training Package was compiled in January 2022 and may be periodically revised to match the dynamic trends in the occupation and hence issued in different versions.

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3. Jennifer Niederst Robbins (2001). Learning Web Design. A Beginner's Guide To Html, Css, Javascript, And Web Graphics. Fifth Edition. O'Reilly. Second Edition. Beijing. Cabridge, Famham, Koln, Sebastopol, Tokyo

4. Jeremy Osborn, Jennifer Smith, and the AGI Training Team (2011). Web Design with HTML and CSS Digital Classroom. Wiley Publishing, Inc. 10475 Cross point Boulevard Indianapolis, IN 46256. ISBN: 978-0-470-58360-9