SECTION A:	***QUALIFICATION DETAILS***																
QUALIFICATION DEVELOPER (S)	*University of Botswana* *Department of Industrial Design and Technology*																
TITLE	*Bachelor of Design and Technology Education*													***NCQF LEVEL***	*7*		
FIELD	*Manufacturing, Engineering and Technology*		***SUB-FIELD***		*Design & Technology Education*									***CREDIT VALUE***	*480*		
New Qualification		✓	*Review of Existing Qualification*														
SUB-FRAMEWORK	*General Education*		*TVET*										*Higher Education*	✓			
QUALIFICATION TYPE	*Certificate*	*I*		*II*		*III*		*IV*		*V*		*Diploma*		*Bachelor*	✓		
	Bachelor Honours			*Post Graduate Certificate*								*Post Graduate Diploma*					
	Masters					*Doctorate/ PhD*											

RATIONALE AND PURPOSE OF THE QUALIFICATION

The qualification has been designed to respond to the social and economic needs of Botswana and that of the region, especially in areas that deal with design, technology, creativity, innovation and education to provide the society with innovators and design teachers. It is also aligned to the key strategic sectors of creative industries; research, innovation, science and technology; and manufacturing as identified by the Human Resource Development Council which requires a high demand of manpower to transform Botswana into a creative and knowledge-based economy. The qualification's core mandate is to train secondary school leavers to be entrepreneurs and/or teachers of Design and Technology in Botswana's secondary schools. It also upgrades teachers who hold a Diploma in Design and Technology or related qualifications to a degree level. The qualification is in congruence with the Faculty of Engineering and Technology's vision of being the leading centre of excellence in engineering, design and the built environment in the world. The Bachelor of Design (Design and Technology Education) qualification has been developed in line with the outcome-based learning principles. The development of the qualification has been informed by the accreditation requirements of the Institution of Engineering Designers in the United Kingdom. The qualification contributes towards the strategic

role of meeting the country's development needs through advancing human resource development and developing research and innovation capacity (Towards a Knowledge Society: Tertiary Education Policy, 2010; Revised National Policy of Education 1994; National Human Resource Development Plan, 2009-2022, Education and Training Sector Strategic Plan, 2015, National Development Plan 11, 2017 and HRDC, 2019 top occupations priority area: STEM). Furthermore, this qualification is considered to be commensurate with three of the pillars of Vision 2036 of producing 'sustainable economic development, human and social development and sustainable environment', as well as two key future imperatives of 'innovation and sustainability'.

PURPOSE:

The purpose of this qualification is to produce graduates with skills to:

- Design and manufacture products to solve real-life problems using a variety of advanced manufacturing processes.
- Apply Specialized knowledge and skills of Design and Technology to entrepreneurial solutions.
- Teach the secondary education design and technology content, including planning instructional activities.
- Develop and implement various assessment activities for a variety of instructional tasks of a practical nature including design portfolios.
- Efficiently coordinate / manage a Design and Technology Workshop including procuring materials and carrying out minor maintenance works.

ENTRY REQUIREMENTS (including access and inclusion)

The normal requirements for entrance to the Bachelor of Industrial Design Degree qualification shall be:

- Certificate IV, NCQF Level 4 (BGCSE or equivalent).
- Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) shall be considered for wider access and inclusion.
- RPL and CAT shall apply as per the provider policies in line with the applicable national policies

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1.1 Solve complex design and technology education problems.	1.1.1 Use the appropriate Mathematical, Science and Engineering principles to a given design task/problem. 1.1.2 apply research methodologies and techniques relevant to design and technology education to solve complex problems.
1.2 Apply engineering analysis in solving design and technology problems	1.2.1 **C**onduct research, select, evaluate, manipulate and manage information relevant to the analysis and synthesis of design and technology solutions. 1.2.2 Apply analytical skills in relation to designed objects against their context. 1.2.3 Undertake visual analysis 1.2.4 Use a systematic approach to problem-solving using appropriate design tools and techniques.
1.3 Apply design practice principles in practising design and technology education	1.3.1 Create new processes or products through a synthesis of ideas-based material selection principles. 1.3.2 Practise collaborative and independent work to realise a range of practical, creative and theoretical projects. 1.3.3 Initiate projects, meet deadlines, liaise with industrial collaborators, and make presentations. 1.3.4 Conduct research and synthesize information, produce reports and evaluate designs. 1.3.5 Analyse problems of a creative nature and provide appropriate solutions. 1.3.6 Apply for intellectual property rights (IPR) including patent search and principles of copyright and design registration. 1.3.7 Use engineering design codes of practice and industry standards, with some knowledge of design factors and requirements for safe operation. 1.3.8 Demonstrate awareness of management and quality assurance issues in product design.

	1.3.9 Work effectively as part of a group with respect for the dignity, rights and needs of others. 1.3.10 Manage time and projects in professional practice. 1.3.11 Use information and communication technology (digital skills) in data collection. 1.3.12 Evaluate technical risks and address risk in design methodology. 1.3.13 Write design reports and present design ideas.
1.4 Demonstrate knowledge and understanding of economic, social and environmental context in the practice of design and technology education.	1.4.1 Manage the design process. 1.4.2 Demonstrate an awareness of financial, economic, social legislative and environmental factors of relevance to design and technology education. 1.4.3 Use sustainable design principles in solving problems.
1.5 Design products, services and systems as per the user needs.	1.5.1 Evaluate design solutions against relevant constraints and criteria. 1.5.2 Address human needs using research, anthropometric data and ergonomic principles. 1.5. 3 Provide design solutions according to customer and user requirements. 1.5.4 Generate product design specifications. 1.5.5 Use product design cost drivers and appreciate the cost implications of different production volumes. 1.5.6 Generate a wide range of design ideas, concepts and proposals independently and in teams in response to set or self-generated design briefs. 1.5.7 Select and test materials and manufacturing processes in the synthesis of product design solutions. 1.5.8 Create logical and innovative design solutions. 1.5.9 Select and use the appropriate manual drawing/construction/CAD, communication and technological media in the realisation of design ideas. 1.5.10 Use visual literacy and drawing ability appropriate to the practice of product design. 1.5.11 develop concepts to provide manufacturing instructions and specifications. 1.5.12 design through computer modelling and visualisation. 1.5.13 integrate form, texture and colour in computer modelling.

1.6 Demonstrate proficiency in professional and technical communication, and the use of digital skills in complex problem-solving	1.6.1 present academic, professional ideas orally, visually and textually to a range of audiences. 1.6.2 offer creative insights, rigorous interpretations and solutions to problems and issues appropriate to the context. 1.6.3 research, analyse, organize data, and retrieve information using ICT /digital skills. 1.6.4 use sound sketching, drawing and computer-aided and computer-aided manufacturing skills in designing products, services and systems. 1.6.5 manage and present information in a variety of formats using ICT/digital skills.
1.7 Practise teaching and design professionalism.	1.7.1 take full responsibility for their work, decision-making and use of resources, and full accountability for their decisions and actions of others where appropriate. 1.7.2 uphold the teaching profession, and design and technology ethics.
1.8 Engage in Continuous Professional Development activities to enhance their performance and practice.	1.8.1 develop a personal Professional Development Plan (PDP) in the field of Design and Technology Education. 1.8.2 Identify accredited education and training providers to be considered in relation to their own PDP. 1.8.3 initiate arrangements for supporting the implementation of the PDP. 1.8.4 evaluate own actions or performance and make judgements about what to do in order to improve. 1.8.5 initiate ideas and seek support to improve performance.

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SECTION C		***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***				***Total (Per** Subject/ Course/ Module/ Units)*
		Level [5]	***Level [6]***	***Level [7]***	***Level [8]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Geometrical Optics & Mechanics, Vibrations Waves	12				12
	Design Mathematics	18				18
	Computer Skills Fundamentals	12				12
	Introduction to Communication & Academic Literacy Skills	9				9
	Electricity, Magnetism & Elements of Modern Physics	12				12
	Academic and Professional Communication	9				9
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Design Fundamentals		9			9
	Elements & Principles of Design		9			9
	Design Materials & Processes		9			9
	Graphical Communication		9			9

	Design for Sustainability		9			9
	History of Art & Design		9			9
	Product Design Studio: Electronics		9			9
	Foundations of Development Psychology		9			9
	Graphical Communication & Multimedia		9			9
	Product Styling		9			9
	Physical Ergonomics		9			9
	Design Studio: Structures & Mechanisms		9			9
	Historical, Philosophical & Sociological Foundations of Education		9			9
	Industrial Design Attachment		12			12
	Computer-Aided Design Fundamentals			9		9
	Design Research			9		9
	Product Design & Analysis			9		9
	Occupational Health and Safety in Design			9		9
	Teaching Design & Technology			9		9

	Introduction to Educational Psychology			9		9
	Computer-Aided Design & Manufacture			9		9
	Design Control Technology			9		9
	Design Studio: Cognitive Ergonomics			9		9
	Service Design for Sustainability			9		9
	Curriculum Studies			9		9
	School Teaching Practice			9		9
	Design Studio: Teamwork Projects			12		12
	Classroom Assessment			9		9
	Educational Technology Basics			9		9
	Design Studio: Design for All			12		12
	Introduction to Educational Research			9		9
	Contemporary Issues in Design and Technology			9		9
	School Teaching Practice			9		9
	Major Design Project I:				18	18

	Research & Conceptualisation					
	Research Essay in D&T Education				12	12
	Major Design Project II: Prototyping				18	18
	School Management				9	9
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	Design for Print Media			9		9
	Microcomputer Controls for Designers			9		9
	Advanced Computer-Aided Design			9		9
	Branding & Packaging Design			9		9
	System Design for Sustainability			9		9
	Interactive Design			9		9
	D&T Curriculum Innovations			9		9
	Motion Design			9		9
	Guidance and Counselling			9		9
	Philosophical Analysis of Educational Concepts and Policies			9		9
	Measurement & Evaluation			9		9

Please note: At Level 7, learners are required to opt for 3 electives/optional components and at Level 8, learners choose 2 electives/optional components to satisfy the qualification requirements.

Further note that learners go for industrial attachment at Level II = 12 credits and Teaching Practice at Levels III and IV = 18 credits.

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
NCQF Level 5	***72***
NCQF Level 6	***129***
NCQF Level 7	***222***
NCQF Level 8	***57***
TOTAL CREDITS	***480***

Rules of Combination:

(Please Indicate combinations for the different constituent components of the qualification)

Fundamentals Level 5 modules: 72 credits

Core Level 6 modules: 129 credits

Core Level 7 modules: 177 credits

Core Level 8 modules: 57 credits

Electives Level 7: 45 credits (Learners opt for 3 elective components at Level 7 and another 2 at Level 8 to satisfy the qualification requirements).

Total credits: 480 credits

ASSESSMENT ARRANGEMENTS

All assessments, formative and summative, leading/contributing to the award of credits or qualification should be based on learning outcomes and/or sub-outcomes.

Formative assessment

Formative assessment will contribute 60% towards the award of the final mark.

Summative assessment

Summative assessment will contribute 40% to the final mark.

MODERATION ARRANGEMENTS

The qualification shall have internal and external moderation following applicable policies and regulations for quality assurance to ensure fairness, validity, reliability and consistency of assessments. The moderators shall be registered and accredited by the Botswana Qualifications Authority.

RECOGNITION OF PRIOR LEARNING

Learners may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of credits towards the qualification in accordance with applicable RPL policy, credit accumulation and transfer system and relevant national-level policy and legislative framework.

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulation and Transfer shall be applicable in this qualification as per the regulations and policies of individual providers in line with national policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Articulation related qualifications of a similar level (NCQF Level 7) that graduates may progress to:

Bachelor of Science in Design and Technology
Bachelor of Secondary Education in Technology and Design
Bachelor of Education in Design and Technology Education
Bachelor of Science in Technology Education

Vertical Articulation (NCQF Level 8)

Bachelor of Science (Hons) Design and Technology;
Bachelor of Science (Hons)Secondary Design and Technology
Bachelor of Education (Hon) (Secondary) in Technology and Design;
Bachelor of Education (Hons) Design and Technology Education;
Bachelor of Science (Hons) Technology Education.

Employment:

Teacher of Design & Technology;

Technological Researcher;
Product designer;
Systems and services entrepreneur
Technology education trainers;
Development practitioners
Curriculum specialists
Educational researcher.

QUALIFICATION AWARD AND CERTIFICATION

Minimum standards of achievement for the award of the qualification

To be awarded a Bachelor of Design and Technology Education, a learner should have satisfied all exit learning outcomes, met the minimum credit requirements (480 credits) which is made up of fundamental/core/elective components as indicated in the qualification structure.

Certification

For a leaner to be awarded a Bachelor of Design and Technology Education qualification, he/she should have achieved a minimum of 480 credits. After satisfying all the requirements, a learner will be awarded a certificate of a Bachelor of Design and Technology Education.

REGIONAL AND INTERNATIONAL COMPARABILITY

A comparability matrix of the current qualification was conducted against the regional qualifications at the Durban University of Technology (https://www.dut.ac.za/) and University of Pretoria (https://www.up.ac.za/) in South Africa and internationally at University of London (https://london.ac.uk/) - UK and La Trobe University (https://www.latrobe.edu.au/) in Australia. The qualification under review was compared with qualifications from the above-mentioned universities**.**

Durban University of Technology (South Africa) offers a Bachelor of Education in Technology Education (NQF Level 7: 480 Credits).

The exit learning outcomes include:

- demonstrate a sound knowledge base and critical understanding of education and in technology education;
- analyse and evaluate knowledge in technology education and contribute to systematic and disciplined thinking about educational matters;
- conduct an independent inquiry in the field of technology education training and development; and
- act as academic leaders and experts in the field of technology education, training and development.

The domain covered include: Educator's expertise in technology education and research capacity in the methodology and techniques of technology education.

Assessment strategies include portfolios, work-place assessments, written examinations, oral examinations, peer assessment, research report, etc.

The qualification is awarded to candidates who have achieved the learning outcomes and satisfied the assessment criteria as well as passing an external examined research project.

The employment pathways include being educators of technology education and researchers in the same field.

University of Pretoria (South Africa) offers a Bachelor of Education: Technology Education (NQF Level 7: 480 Credits).

The exit learning outcomes are to:

- plan and facilitate of learning in the field of technology education;
- use a variety of teaching strategies appropriate to the teaching of technology education;
- identify and solve problems in the field of teaching and training.

The domain covered include: Educator's expertise in technology education and research capacity in the methodology and techniques of technology education.

Assessment strategies include: portfolios, work-place assessments, written examinations, oral examinations, peer assessment, research report, etc.

The qualification will be awarded to candidates who have achieved the learning outcomes and the assessment criteria.

The employment pathways include expert technology education teachers, Technology trainers, Development practitioners, Curriculum specialists and System managers and educational researchers.

University of London offers a 3-year Bachelor of Arts Design qualification (FHEQ level 6), 480 Credits and a 1-year Post-Graduate Certificate in Education (Secondary) (Level 7), and the total number of credits is not stated.

The BA Design develops knowledge, skills and attitudes for learners to become professional designers. The Post-Graduate Certificate in Education qualification are to:

- develop knowledge, skills and understanding needed by learners to become responsible qualified professional teachers.

BA Design qualification covers these domains: Studio practice, contextual studies, technical studies, methods and processes and professional practice.

The PGCE qualification domains include Subject studies, professional issues and research in education and school experience.

Assessment involves the submission of reports, essays, tests, presentations, prototypes, portfolio, etc.

Graduates from these qualifications become designers in various fields and secondary school teachers of design and technology.

La Trobe University (Australia) offers a Bachelor of Technology Education qualification, (AQF, Level 7, 480 credits).

The exit learning outcomes include the following:

- to translate industry expertise to an education setting; literacy and numeracy skills as well as methods of teaching technology across different Technical and Further Education (TAFE) and secondary school levels, and planning and delivering effective lessons.

The domain covers technology education and professional practice and application in technology.

Assessment methods used: Tests and course work; professional experience placement and curriculum and assessment.

The minimum standards for the award of the qualification include satisfying the outlined learning outcomes and completion of professional placements.

The employment pathways comprise secondary school teaching; teaching/training in community and working in private organisations.

Similarities:

The main similarities observed include:

- teaching design and technology/technology education in the education context,
- prepare candidates for the following: teaching at the secondary school level, professional industry practice, working in community projects and becoming board members.
- The assessment criteria cover a wide array, from tests and examinations to teaching practice and industrial placement.

Differences:

- There are no major differences between the proposed University of Botswana qualification with those of South African universities, United Kingdom and Australian universities.
- The University of Pretoria is the only institute which uses oral examination from the benchmarked universities.
- The University of London does not offer a combined degree of Design and Technology and Education but learners have to study BA Design and then spend an extra year doing a post-graduate certificate in education.

The proposed qualification is quite comparable to the examined qualifications. It is tailored made to prepare candidates to be teachers of Design and Technology at the secondary school level, but with added skillsets which would allow the candidates to practice and work as researchers in the technology education environment. The assessment criteria are similar to the other aforementioned qualifications. The proposed qualification has an added advantage that it equips graduates with skills to venture into entrepreneurship. During the learners ' study period, there are allowed to go to internship to design industry and teaching practice. Therefore, the qualification builds a holistic, and versatile graduates.

REVIEW PERIOD

The qualification will be reviewed every five years

Submitted by: Dr Yaone Rapitsenyane  18/02/2021