



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



Guidelines for Blended Learning & Assessment for Vocational Education, Training and Skill Ecosystem

12th April, 2022

**National Council for Vocational Education and
Training (NCVET)**

**Ministry of Skill Development & Entrepreneurship
Government of India**

Blended Learning & Assessment for **Vocational Education, Training and Skill Ecosystem**

Contents

1. What is Blended Learning	3
2. “Digital First” for Digital Generation	3
3. Benefits of Blended Learning	4
4. Scope.....	6
5. Complementing Vocational Education with Blended Education	6
6. Models of Blended Learning	6
7. Blended Learning in Vocational Education and Skilling Ecosystem	7
8. Indian Language Content for Blended Learning	15
9. Components of Effective Blended Learning Systems	15
10. Guidelines for Assessment Process	18
11. Additions in the Guidelines for Creating NSQF & UCF Aligned Course	21
12. Summary & Conclusion.....	23
Annexure A: The key features and functionality that should be part of any modern Learning Management System (LMS).....	24
Annexure B: Key Features of Assessment Engine	25
Annexure C: Explanatory notes for the terms used in the above section.	26

1. What is Blended Learning

1.1 The world is changing with a very fast pace and the education domain is no exception, with need for learning becoming a continuous process. This next generation learning should be adaptive and progressive to meet the needs of students and be more effective & efficient. Blended learning or “hybrid learning” can be one such tool.

1.2 NEP 2020 is built on the foundational pillars of **Access, Equity, Quality, Affordability and Accountability**. This policy is aligned to the 2030 Agenda for Sustainable Development and aims to transform India into a vibrant knowledge society and global knowledge superpower. Blended learning is one approach to achieve this goal.

1.3 Blended learning, also called “flipped classroom”, “hybrid learning” or “mixed learning,” is an approach that mixes instructor-led classroom training with online content, which could be in the form of on-demand videos that learners review outside of class. The live instruction can be face-to-face or online (via a live virtual classroom or even two-way video), or there might be no live lecture at all.

1.4 Blended learning represents a learning model that combines both formal (traditional classroom) and non-formal (online) methodologies. Blended learning is the term given to the educational practice of combining digital learning platforms with the traditional classroom face to face teaching. During the technology-mediated components of these learning experiences, students are not required to be physically together in one place but may be connected digitally through online communities. Blending learning may use “**synchronous**” and “**asynchronous**” mode of delivery.

1.5 In today’s environment, where many support resources are available for online learning, and newer technologies evolving for its enablement, blended education not only provides flexibility of learning process, but it also provides a way to navigate through the available knowledge on the subject, which helps the student with process of “Continuous/Continued Education”.

1.6 For effective transformation in vocational education, training and skilling to take place, it’s not sufficient having only a ‘bolt-on’ strategy to existing training practices (‘typically social and mobile’), but rather “a full-on, meaningful re-conception’ of what it means to support all ways of learning in the modern digital workplace”.

‘Blended learning is thus the future’, and if utilized properly it can add to the exponential growth of industry by providing the quality manpower. However, we need to prepare ourselves as well as the ecosystem for taking full advantage of the same.

2. “Digital First” for Digital Generation

In today’s environment, Vocational Education & Assessment is mostly carried out in physical & off-line mode as it requires training and learning in mostly hands-skill. But with availability of newer and affordable technology tools for effective delivery of education, training and skilling a combination of offline & online teaching and learning is fast emerging as a new norm which may be used to enable anywhere, anytime and by anyone learning.

Different generations interact with technology differently. Today’s generation is a **Digital Generation**, mostly encompassing people who were born into or raised in the digital era, with wide-spread access to modern-age technology such as internet, computers, tablets, and smartphones, with access to digital information on the internet. Digital Simulators & Digital Twins

have further changed the process of learning. Technology is ever-evolving and each digital generations namely Millennials (born between 1980–1995), Gen Z (born between 1995–2010) and Gen Alpha (born 2010 to the present day) adapts to these advancements at their ownpace. For this digital generation which has witnessed the benefit of online classrooms and courses during the pandemic in the last two years, the blended learning has been established as a new normal.

Digital First is a communication theory which states that publishers should release content into new media channels (i.e., web, mobile, social media, etc.) in preference to page oriented print channels. Digital First, as a strategy focuses on customer, the “learner” in this case, and also the educator needs, helping them in becoming future ready by enabling them with process of **“Learning to Learn”**. “Digital First” today is need of the hour not only in basic education & continued education over the job roles but is also required for changing requirements of the industry. It is also the most effective way to move towards **Personalized Education** and to provide **“Continued & Consistent Positive Experience”** of education across a large country like India.

The concept of Digital First will help reimagining the education via Blending Learning, especially the Vocational Education and training paradigm, which is still done mainly in off-line mode in classrooms, laboratories, and workshops. The Digital-First education is being encouraged on all the educational platforms, with trust on reaching technology & mediated education to all students, irrespective of the urban-rural divide or income divides. The Government of India’s National Education Policy 2020 (NEP 2020) also aims to improve quality education delivery for all learners, including digital learning. Both in school & higher education and on-the job continued education, “Student/Learner” is in the centre of information, with secure cloud providing the content, and emerging technologies providing continuous innovation for learning.

3. Benefits of Blended Learning

The advantages of blended learning for students include increased learning skills, greater access to information, improved satisfaction and learning outcomes. Recent research identifies the following key benefits of blended learning:

3.1 **Blended Learning is more affordable, and saves time, and teaching is less expensive to deliver.**

3.2 **Blended learning is highly modular, scalable** and offers opportunity for just-in-time learning as well.

3.3 **Students/ learners can learn at their own pace in their own time, which** is the first step for personalized education.

Online learning resources will especially facilitate the PwD learners to watch the lecture/ training sessions multiple times which otherwise may be subject to taking notes in a classroom learning situation.

3.4 **Engagement, learning and retention:** Different people learn different things in different ways. Using multiple modalities dramatically reinforces engagement, learning and better retention.

3.5 **Increased flexibility:** Blended learning offers flexibility in terms of availability. Technology-enabled learning allows for learning anytime and anywhere, letting students learn without the barriers of time and location, and with the possible support of in-person engagement while enjoying the benefits of face-to-face support and instruction.

3.6 **Opportunity for learning better Communication and Collaboration at a**

distance: Individual students work together virtually in an intellectual endeavour as a learning practice.

The students/ learners can have opportunities to learn from the world's best professionals through their lectures. They can study and learn from success stories and real life experiences given by actual participants. Through digital means the students/ learners can access the world's best libraries and research work.

3.7 Increased Interaction: Blended learning offers a platform to facilitate greater interactivity between students, as well as between students and teachers.

3.8 Enhanced Learning: Additional types of learning activities improve engagement and can help students achieve higher and more meaningful levels of learning.

3.9 Learning to be the Virtual Citizens ready for the Future: Learners practice the ability to project themselves socially and academically in global online communities. Digital learning skills are becoming essential to be a lifelong learner, and blended courses help learners master the skills for using a variety of technologies.

3.10 Blended Learning is more inclusive and provides a level playing learning environment (barring, internet access and devices) as far as quality of content This can be very helpful for the especially abled and marginalized learners and can also help in providing content on diverse contexts and in different languages.

The virtual solutions are expected to help divyang/ disabled students to overcome many of the challenges which they have been experiencing while accessing education on account of constraints arising from physical infrastructure challenges (being non accessible).

Students with need of 'reasonable accommodations' will also be able to benefit from increased engagement with Disability Experts in one to one interactions with their trainers through the blended learning tools/ model.

3.11 Easy Adoption of Best Practices: With a blended learning approach, it is easy to incorporate global & local best practices in training for upskilling and processes.

3.12 Blended Learning offers a multitude of real-world skills, that directly translate into life skills, from:

- a. Self-learning & Self-engagement,
- b. Peer-to-Peer Review/Learning,
- c. ICT and Communication Skills,
- d. Randomised Assessments by Peers,
- e. Teamwork and Collaboration in Virtual World
- f. Online Research and Information Skills,
- g. Helps to develop a 'Self-Driving Force',
- h. Better decision making and
- i. Offers a larger sense of responsibility

3.13 For a domain where the concept and the application of technology is equally important, a highly interactive e-learning modules will allow the students to go through the fundamentals of the different technologies whereas a training lab with world class training equipment will facilitate students in development of different skills needed for the right application of automation technology.

4. Scope

The lack of an adequate number of superior educational institutes, quality of faculty, distance, high costs and many more reasons limit options for aspiring students/learners. These challenges and the need to integrate education with the knowledge economy has motivated education systems to pay attention to the reforms required in the way we impart education and go Digital. There is already a commitment to creation of “Digital University” in the budget speech for year 2022-2023.

Scope of these guidelines is for enabling effective and efficient blending learning & assessment for different type of qualifications:

4.1 By providing basic norms for different types of digital resources, tools and methodologies which can be blended.

4.2 By recommending the extent/ mix/ flexibility of each type of digital resources, tools and methodology.

These guidelines also bring out various learning methodologies, both Synchronous & Asynchronous, which may be used for learning together with assessment blend including that of formative & summative types.

Trainers are a very important component of successful learning process. This document also attempts to bring out some of the must of have skills for Trainers to make blended learning process successful.

5. Complementing Vocational Education with Blended Education

Education and training are no longer separated from work and life; rather, they are combined through the learning process. Blended learning when complimented with vocational education needs to be combination of online and offline learning environments. Based on the type of Vocational Skill, the percentage of on-line (or equivalent) content may change.

6. Models of Blended Learning

There are four models seen as per the research references on Blended Learning. Based on the qualification and the expected learning outcomes, a combination of these models may be used.

6.1 The first model, blended presentation, and interaction, has classroom engagement as its primary component, with support from out-of-class, online exercises. The **flipped classroom** or flipped curriculum approach is a common example of this model, with students viewing podcasts or other online resources independently, followed by classroom-based tutorials or seminars for group learning based upon these resources.

6.2 The second is the blended block model (sometimes called a programme flow model), in which a sequence of activities, or “blocks,” is structured to incorporate both face-to-face learning and online study, usually with consideration **for both pedagogical goals and practical constraints.**

For example, a course for geographically distributed learners or working professionals may have limited opportunities for classroom-based learning and therefore begin with a block of intensive face-to-face sessions, followed by blocks of online study and collaboration through online tutorials, possibly followed by a further block of face-to-face learning or group presentations.

This type of model is also called **Blended Face-to Face Class** in some of the reference material. This model allows students and faculty to share more high-value instructional

time because class time is used for higher-order learning activities such as discussions and group projects.

6.3 The third model is fully online but may still be considered blended if it incorporates both synchronous learning (for example, online tutorials) and asynchronous activities (for example, discussion forums).

This model is also called **Blended Online class** model, sometimes referred to as the “Online Driver Model” and is the inverse of the blended face-to-face class. The class is mostly conducted online, but there are some required in-person activities such as lectures or labs.

6.4 The Self-Blend Model (completely student centric): Learners using this model are enrolled in a school (or at work) but take online courses in addition to their traditional face-to-face courses or work.

They are not directed by a faculty member and choose which courses they will take online and which they will take in person. The student may also choose to rotate between various modalities of course, such as classroom, laboratory, industry, one of which is online learning, in a customised schedule.

Implementation of above will also require not only design and development of the required digital content, but also the professionally trained trainers who can effectively and efficiently steer these blended learning programs.

7. Blended Learning in Vocational Education and Skilling Ecosystem

7.1 This section proposes possible Resources & Methodologies that may be used in the subcategories for learning & evaluation. Learning process of most of the Vocational qualifications may be divided into the 7 subcategories, which are further detailed in this section.

7.2 Different types of Digital Resources, Tools and Methodologies which can be Blended Learning

7.2.1 Theory/ Lectures/ Trade Theory: Imparting theoretical and conceptual knowledge

- a. Physical classroom teaching
- b. Delivery of Lectures through TV Broadcast
- c. **Online Digital learning: Mode of learning:** Audio/ Audio-video / podcast
Lectures through Internet Web Channel
 - (i) Non-interactive- One-way communication
 - (ii) Interactive - Two-way communication- One-to-Many, Many-to-Many
 - (iii) Online curated self-learning
- d. **Online Digital learning: Components**
 - (i) Text, Presentations
 - (ii) Audio/ Audio-Video – Instructional
 - (iii) Illustration/ Graphic/ GIF, Instructional Photographic Images, Animation
 - (iv) Simulators - 3D and 4D, Virtual Labs

- (v) Digital twins
- (vi) AR/VR based learning
- (vii) Metaverse- immersive learning
- (viii) Reference Material

e. Online Digital learning: Place of learning

- (i) Student/ Learner in a classroom with a teacher: Instructor/ teacher led learning
- (ii) Student/ Learner in a classroom, No teacher: AI/ Robot Led learning
- (iii) Student/ Learner anywhere without a teacher

f. Gamification for effective learning (ref Appendix C for definition)

g. LMS based Proctored content delivery with in-build continuous/ formative assessment to check **learning outcomes**

7.2.2 Imparting Soft Skills (SS) and Life Skills (LS)/ Employability Skills (ES)

a. Components of SS/LS/ES

- (i) 21st century Skills
- (ii) Communication & Language Skills including foreign language skills
- (iii) Digital Literacy, IT, Collaboration
- (iv) Financial & legal literacy
- (v) Customer Service Skills
- (vi) Sales and Marketing Skills
- (vii) Collaboration, Social Media & Presentation Skills together with skills to Facing Interviews
- (viii) Sensitivity to gender, SEDG, PWD
- (ix) Safety & Risk Management Skills
- (x) Organizational Behaviour
- (xi) Greening/Environmental Sustainability
- (xii) Constitutional values/ Citizenship/ Nation building

b. Can be learned in Physical classroom mode

c. Online interactive mode (two-way) - Instructor/ teacher led

d. Online interactive mode (two-way) – AI/ Robot Led

e. Group Discussions (GD): Simulated online Discussion/ GD room

- (i) Physical mode
- (ii) Online interactive mode (two-way) - Instructor/ teacher led
- (iii) Simulated online Discussion/ GD room

f. Mentorship to learners

- (i) Physical One-to-One, One-to-Many
- (ii) Online, One-to-One, One-to-Many

These skills also needed to be evaluated with check for body language.

7.2.3 Laboratory Experiments, Demonstration, Practical Demonstration, Experiential Learning

- a. Physical Laboratory
- b. Workshop and Training Material, Physical Shop floor/ Actual Project site
- c. Video-Audio's, demonstrations, Actual Plant/ process videos recorded in the real workplace along with narrations.
- d. AR/VR based experience. However, in some of use cases in various sectors XR may be the most effective solution with a physical prop (in cyber-physical interaction mode).
- e. Digital twins
- f. Metaverse- immersive experience

7.2.4 Imparting Practical Skills, Skills for working with Hands, Drills and Practices

- a. Physical product is created as part of skilling:
 - (i). In the Laboratory class/Field Days/Farmer Field School
 - (ii). Actual workshop/ shopfloor /Farm Demonstration Area at physical site
 - (iii). At home or own place of learner (cooking, stitching)
- b. Simulator based workshops and laboratory such as flight simulator, welding, games, firearms practice etc.
- c. Use of cobots (AI led) – especially for role play practice in job roles like customer service, sales, etc Mostly can be used for practical practice sessions
- d. Software development and assessment in a simulated / sand boxed environment using Software as a Service (SaaS)
- e. Platform as a service (PaaS), Infrastructure as a service (IaaS) and Everything as a Service (XaaS) in a simulated / sand boxed environment
- f. AR/VR 2D, 3D and 4D, based practical experience, for example, high altitude mountaineering, deep sea diving, difficult surgeries (Some Demonstrations can be made on 2D rather than 3D to have better cost efficiency. Use of 3D and above only for experiential practice in place of physical practical)
- g. Digital twins which is more detailed than AR/VR, for example, factory control, critical surgeries such as Robotic Surgeries, etc.
- h. Metaverse based immersive experience in 3D and 4D which are more detailed and sophisticated, for example, autonomous vehicles

7.2.5 Tutorials and Assignments (based on subject)

- a. Physical Mode - classroom
- b. Online Interactive mode (two-way) - Instructor/ teacher led
- c. Online interactive mode (two-way) – AI/ Robot Led
- d. Simulated Online Discussion/ Group Discussion room

- e. Online, Proctored, One-to-One or One-to-Many tutorials
- f. Assignment: Activities or lesson plans designed to enable students to learn skills and knowledge:
 - (i) Offline assignment, submission, and assessment
 - (ii) Online assignment, and submission, and Offline assessment
 - (iii) Online assignment, submission, and assessment

7.2.6 Assessment, Evaluation, Final Examination and Evaluation tools:

- a. Offline assessments and examination,
- b. Assessments of learning are usually grade-based, and may include class tests, quiz, written exams, viva-voce, portfolios, final projects, and standardized tests, confirmative assessment.
- c. LMS based Proctored content delivery with in-built continuous/formative/summative assessment to check learning outcomes. It is suggested to use Open source LMS product, with creation of SCORM compliant content for interoperability.
- d. Online Question Bank: multiple-choice, pictographic inferential, matching, sequence hotspot, True/false, fill-in-the-blanks, file upload and essay
- e. Group Examinations
- f. On-demand Examinations: Offer examination on demand to offer more flexibility and student centricity
- g. Assessment tools with built-in controls used for checking students' attention, understanding and assimilation of the subject
- h. Assessment Engine with facility to check for learning outcomes
- i. Proctored Open book examination: offline or online
- j. Minor / Major project work execution and evaluation
- k. Viva-Voce: offline, online
- l. Evaluation Interviews: offline, online
- m. Proctored Online with built-in controls, biometrics, security, evaluation etc
- n. Examination with built-in controls, biometrics, security, evaluation etc.
- o. AR/VR may also be used for assessments

7.2.7 On the job training (OJT), Internship, Apprenticeship

- a. Structure of OJT/Apprenticeship to ensure the learning outcomes
- b. Offline: OJT, Internship, Apprenticeship at actual workplace/ project sight
- c. Online training: For all jobs which are to be delivered/ performed online or in a remote mode OJT, Internship, Apprenticeship
- d. Simulation training in the near actual job environment
- e. Proctored Online with built-in controls, biometrics, security, evaluation of the quality and efficiency of output
- f. Digital mode of Apprenticeship may be used for tech courses or where Digital

Twins can be used

7.2.8 Other learning Resources

- a. Books in English, Hindi and other Indian languages
- b. Voiceover commentary in English, Hindi and other Indian languages
- c. Curated and Proctored Quality Digital e-content with in-built formative assessment with backend LMS to store progress of learning outcomes by student
- d. Online curated self-learning
- e. From the perspective of adoption and implementation, NOS based blended learning modules approach may be used.

7.2.9 Special Resources required for PwD learners

- a. To build an inclusive society in which equal opportunities are provided for the growth and development of Persons with Disabilities so that they can lead productive, safe and dignified lives is one of the important guiding principles of blended learning.
- b. From PwD Perspective we may add features on accessibility like promotion of the use of Indian Sign Language as educational mode for deaf students (ISL Window), short and precise frozen captioning.
- c. The blended learning content should be compliant with the Web Content Accessibility Guidelines (WCAG)13, technical standards that explain how to make web content more accessible to people with disabilities. The industry standard guidelines for web content accessibility are organized around four principles: Perceivable, Operable, Understandable, and Robust (or POUR).
- d. To ensure **Digital Accessibility**, the accessibility shouldn't be an after-thought. Make sure you consider accessibility throughout each part of a project and don't leave it until the last moment. The other important steps may be use personas of people with situational, temporary and permanent disabilities, simplify language, colour contrast, provide descriptions, provide subtitles for video, use native html etc.
- e. The blind people use screen readers, a type of assistive technology, to access web content which allows blind web users to "read" the content of a page with either a speech synthesizer or braille display.
- f. Along with being disability friendly, LMS must also have voice command feature so that learners may be able to access content without major readability issues.
- g. We may need few additions from accessibility perspective in order to make the content ready for the Training of PwD in line with the standard process that we follow at our end.
- h. The institutions implementing such training will increasingly need to use frameworks such as Universal Design of Learning to create flexible and fulfilling learning environments.
- i. IT literacy may also be thoroughly required for the special education teachers

/ skill trainers as well as students.

- j. A World Class National Skill Academy/ University for “Professional Learning”– create a new expression in lieu of “Skill” that communicates a career path, is aspirational, contemporary, relevant and respectful, and can promote demand for employable workforce, sustainable and aspirational careers, and entrepreneurship opportunities.

7.2.10 Implementation Challenges

- a. One challenge may be of the budget required for the IT Infrastructure required for blended Training Delivery as acquiring Software technology and hardware may be costly specially in the Disability Sector. Creating such infrastructure is challenging and needs significant financial assistance.
- b. There is a big gap in terms of understanding the Blended Learning system which transcends to improper usage in implementation by Skilling Partners and in learning by learners, especially the Millennials & Gen Z for whom traditional ways are like the natural first.
- c. Qualified and Skilled Industrial Trainer: The competency of trainers in blended learning modules will be key to effective delivery of training. A framework in the guideline on this may add value.
- d. With regards to online Assessments, it has been observed that young learners are also smart enough to find creative ways to beat the systems, which need to be checked.
- e. Capacity building: The other big uphill task for blended learning is the availability and creation of the content. There is a dearth of people with appropriate skill sets like Academic/Skill-based Content Writers, Instructional Designers, etc.
- f. Therefore, there is an immediate need to build the capacity of Content Creators, Content Writers, Instructional Designers, etc. We need to bridge the gap between SMEs (Trainers & Assessors) understanding and adoption of blended learning. We need to train young and existing learners on 'How to learn through blended learning mediums and make the most of it'.
- g. In asynchronous learning content it would be a big challenge to set the equivalent offline hours. For example, a 30-hour offline content may be delivered in self-learning mode in less number of hours.
- h. Similarly, for simulation based practical, we may have to map the number of hours of training. This may be one area of challenge when we need to benchmark the number of hours of training. Currently when we define hours in a curriculum, it is based on a physical offline format only. We may need to bench mark it and start defining it for a blended learning model when we have one.

7.3 Components of Vocational Education, Training and Skill Ecosystem

	Theory/ Lectures Imparting theoretical and conceptual knowledge	Imparting Soft Skills and Life Skills/ Employability Skills Mentorship to learners	Showing Demonstrations to the learners	Imparting Practical Skills for working with Hands Lab Work	Tutorial, Assignments, Drill and Practice	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	On the job training (OJT), Internship, Apprenticeship Training
<ul style="list-style-type: none"> • Major Activities covered under this component 	<ul style="list-style-type: none"> • Delivery of the content on theory/ conceptual knowledge: <ul style="list-style-type: none"> ○ One-to-Many ○ One-to-one ○ Many-to-Many • Online curated self-learning 	<ul style="list-style-type: none"> • 21st century Skills • Communication Skills • English Skills • Digital Literacy, IT, Collaboration • Financial & legal literacy • Customer Service • Sales and marketing • Facing Interviews • Sensitivity to gender, SEDG, PWD 	<ul style="list-style-type: none"> • Self-Explanatory video demonstrations of processes for better understanding. • Physical site visits- for actual touch and feel • Practical demonstration of activity in the lab/ shop floor 	<ul style="list-style-type: none"> • Learning hand & other skills • Practicing & sharpening the hand skills. • Doing practical in the Laboratory, Virtual Labs • Simulation • Gamification • Digital Twins • Animation 	<ul style="list-style-type: none"> • Physical mode - classroom • Class tutorials for clearing doubts • Assignments: Activities or lesson plans designed to enable students to learn skills and knowledge. 	<ul style="list-style-type: none"> • Assessment • Continuous Assessment • Class tests, quiz, written exams, viva-voce, portfolios, final projects and standardized tests • Examinations 	<ul style="list-style-type: none"> • On the Job training will enable the student to do learning by doing • Structure of OJT to ensure the learning outcomes • Case Studies
<ul style="list-style-type: none"> • Face-to-Face teaching and learning 	<ul style="list-style-type: none"> • Classroom: Actual Physical learning with a teacher/ instructor • Classroom: Robot Led learning • Classroom: Broadcasted/ podcasted lecture 	<ul style="list-style-type: none"> • Presentations • Group Discussions • Case Studies • Social Training • On-line Quiz 	<ul style="list-style-type: none"> • Videos • Social Training • Case Studies 	<ul style="list-style-type: none"> • Physical product is created as part of skilling in Lab/ Workshop/ Shopfloor • At home or own place of learner Simulation 	<ul style="list-style-type: none"> • Classroom Tutorials • Offline assignment, submission, and assessment • Online assignment, submission, and offline assessment • Classroom/ home assignments • Minor/ major projects 	<ul style="list-style-type: none"> • Class tests, Quiz • Viva-voce • Interviews • Minor/ Major projects • Semester Examination • Competitions 	<ul style="list-style-type: none"> • OJT, Internship, Apprenticeship at actual work place/ project sight • Combination of Simulator and on-job training
<ul style="list-style-type: none"> • Online Course/ Online Course Module • Methodology of on-line Training 	<ul style="list-style-type: none"> • Lectures through Broadcast/ TV Channels • Video Modules (Recorded) • Web eLearning • Online curated self-learning • Presentations • Micro Learning (Consisting of Micro Nuggets) • Mobile Learning • The metaverse 	<ul style="list-style-type: none"> • Via eLearning resources • Practicing simultaneously using online assessment tools. • Presentation • Case Study • Social Networking Tool- 	<ul style="list-style-type: none"> • Video – Instructional. • Actual Plant/ process videos. • AR/VR • Illustration/ Graphic/ GIF: • Photographic Image – Instructional • Case Study: 	<ul style="list-style-type: none"> • Virtual Labs • Gamification • Digital Twins • Animation • Development Tool • Workshop and Training Material development. • Simulation based Drill and Practice 	<ul style="list-style-type: none"> • Online interactive mode (two-way) - Instructor/ teacher led • Online interactive mode (two-way) – AI/ Robot Led • Simulated online Discussion/ GD room 	<ul style="list-style-type: none"> • Online Assessment Tools • Quiz/ Test. • E-Portfolio: • Proctored Online assessment with built-in controls, biometrics, security, evaluation of the quality and efficiency of output 	<ul style="list-style-type: none"> • For all jobs which are to be performed online or in a remote mode • Simulation training in the near actual job environment • Proctored Online OJT with built-in controls, biometrics, security, evaluation

				<ul style="list-style-type: none"> • 3D printing at home/ other places 	<ul style="list-style-type: none"> • Online, proctored, one-to-one or one-to-many tutorials • Online assignment, submission, and assessment 		<ul style="list-style-type: none"> • of the quality and efficiency of output • Digital Twins • Metaverse
<ul style="list-style-type: none"> • The ratios of learning hours between online/ offline • Specific Sectors may recommend higher percentages of offline components as per needs. 	<ul style="list-style-type: none"> • Proctored online content delivery with in-built formative assessment with full backend LMS to capture student details on learning time, assessment setc: Can be up to 80% to 100% online. • Without use of appropriate tech tools 80% Offline & only upto 20% online otherwise. • Usage of Broadcast/ Web/ TV Channel: Up to 40% online • Online Instructor led teaching, can be one-to-one or one to many or many-to-many: up to 80% to 100% online • Case d: Metaverse components: can be 100% online 	<ul style="list-style-type: none"> • Simulated online Discussion/ GD room with students available: upto 50% to 70% • Without use of appropriate tech tools, 80% Offline & only upto 20% online otherwise. • Check for body language with the soft skills: 20% online • Assessment tools with built-in controls for checking students' attention & ensuring no frauds during the process: 50% to 80% on-line depending upon sectors/ qualifications 	<ul style="list-style-type: none"> • For all skills, where a physical product is created, at least 50% shall be on practical demonstrations & site visits • Can be up to 100% online for all online technology products and services depending upon sectors/ qualifications. 	<ul style="list-style-type: none"> • 100% offline without the use of any technology tools. • For most skill qualifications this shall not be more than 30% Depending upon sectors/ qualifications unless higher online part could be justified. • In case of Simulation, upto 50% online based on area (e.g. aviation) • Can be 50-80% online in case of virtual labs. • In case of purely IT/ software based qualifications resulting in online jobs, 80 to 100% online. • Digital twins components 60-80% online 	<ul style="list-style-type: none"> • 70% offline & upto 30% online where a physical product is created as part of skilling • Can be 80% online for Proctored one-to-one or one-to-many tutorial depending upon sectors/ qualifications • Can be up to 100% online for of purely IT/ software technology depending upon sectors/ qualifications 	<ul style="list-style-type: none"> • For cases where a physical product is created, this can be in ratio of 40:60, where 60% is the time to be spent on product/ job creation by student. This may further be monitored by an expert physically or in a remote way Realtime or as a video. • Upto 100% online, with availability of fully technology based proctored assessments platform and tools with biometrics, security and anti-fraud features. 	<ul style="list-style-type: none"> • For all shop-floor based job roles, Job roles requiring physical presence: 100% offline. • In case of Simulation, upto 50% online based on area. • For on online/ remote job roles: 60% to 80% online. • Can be up to 90% online in case of usage of Digital Twins. • With Metaverse becoming reality, the online usage may be relooked at
<ul style="list-style-type: none"> • Material Type 	<ul style="list-style-type: none"> • Qualification/ Syllabus • Books/ e-books • E-Content/ • Curated digital content • Video Content • Presentations • Collection • Open Journal – Article • Open Textbook • Reference Material 	<ul style="list-style-type: none"> • Video Content • Presentations • AR/VR Content • Two-way video platforms • E-Content/ • Curated digital content 	<ul style="list-style-type: none"> • Simulators • Digital Twins • Resources to create a physical product 	<ul style="list-style-type: none"> • Simulation Engines to simulate the almost real like situations. • Digital Twins • Resources to create a product 	<ul style="list-style-type: none"> • Simulation Engines to simulate the almost real like situations. • Digital Twins • Resources to create a product 	<ul style="list-style-type: none"> • Online Question Bank: multiple-choice, fill-in-the-blanks, file upload and essay Assessment Engine with facility to check for learning outcomes 	<ul style="list-style-type: none"> • Structure of OJT to ensure the learning outcomes

8. Indian Language Content for Blended Learning:

To ensure inclusivity, Access, Equity, and Affordability the Vocational Education and Training students/ Trainees need to be taught and trained through instructions and teaching material, digital content (including Qualifications and Curricula) in the Indian Language concerned, which is the local vernacular language of that area. The NCVET Council has already mandated as follows:

- 8.1 All the Awarding/ Submitting Bodies to develop the qualification in English and Hindi as per the NSQF alignment process and submit the same for approval of NSQC.
- 8.2 The Awarding/ Submitting Bodies shall also ensure the availability of these qualifications, and related curricula, training resources in the Hindi and other Indian Language of the State where the Vocational Education and Training courses are envisioned to be conducted.
- 8.3 For adoption of these Qualifications by any other Awarding Bodies for conducting the training in any part of the country, such adopting Awarding Bodies may be mandated to convert the Qualifications in the Indian Language of the State concerned where the adopted Qualifications are intended to be used for Vocational Education and Training.

Therefore, all the digital and non-digital content for blended learning including voice over for the video/ audio contents also must conform to the above mandate given by the NCVET Council.

However, Relevance and feasibility of developing content in the local language for technology domains like Industrial automation, cyber security, IIoT, Robotics etc. should be evaluated keeping effectiveness of training in mind. Skilled manpower on these technologies are globally in demand and students learning in local language may be at a disadvantage compared to others.

9. Components of Effective Blended Learning Systems

Continuous feedback and support are essential for effective learning. Apart from face-to-face feedback, online technologies and methods can be used to provide feedback to support learning. Instructors can use audio and video inputs, written texts or in-text comments to provide feedback. Maximum feedback for all student work would help in encouraging learners to achieve learning outcomes. The following basic rules may be used to make Blended Learning more effective.

9.1 A Comprehensive Learning Management System with well-Defined Course/ Qualification Outline

A comprehensive Learning Management System (LMS) is a prerequisite for creating an immersive learning environment. As a central repository of information, course material, assignments, related resources, etc., it should offer flexibility to simulate the models of Blended learning, ease of use, and unhindered accessibility. The course outline should include course resources, learning outcomes, assignment details, assessments, and their grading percentage.

Educators must also plan suitable assessment strategies to create a holistic blended learning program. Determining the optimal strategy to test learning outcomes and tracking course progress is essential. The online assessments in LMS may be supplemented with option of conducting in-class objective or subjective assignments, classroom discussions etc.

9.2 Clear Learning Objectives & Outcomes

Teachers must identify and define clear learning objectives & outcomes to help students

understand what they can expect from a course. An effective blended learning classroom mandates a definite understanding of course goals before educators start creating content. There should be adequate clarity in establishing how to 'blend' online with the established methods of teaching and usage of various training tools.

9.3 Consistent Aesthetics & Good Communication together with Feedback Mechanism

Consistent aesthetics is imperative to bringing about focus and concentration in students. This goes on to boost the overall readability and student engagement. Effective communication between the teacher/educator and students needs to be established to achieve improved learning outcomes in a blended learning program. There should be an adequate exchange of queries and feedback with regular classroom discussions. Toward the end of a course, they can also engage learners in live or online surveys, evaluations, and opinions on the quality of the course and its delivery.

Providing regular and constructive feedback is an important element of effective communication. By opening lines of communication, teachers can indicate the availability of a perennial support system. A blended learning course necessitates the proper teacher training to facilitate optimal learning. Since blended classrooms may be difficult or new to plan and manage, teachers must also be trained in management strategies tailored for such classrooms. Not only the student's needs, but they must also be well-versed with the technology required to execute blended learning.

9.4 The Blended Learning must include learning objectives

9.4.1 Develop learning objectives that are SMART (Specific, Measurable, Achievable, Relevant, and Time-bound).

9.4.2 Match learning objectives with Qualification NOSs.

9.4.3 Select educational/ Skilling/ learning methods and strategies that support learning objectives. And match them with competencies and performance criteria.

9.5 The Blended Learning shall ensure that content is accurate and relevant

9.5.1 Use content that meets the needs of the learners and the qualification/ NOSs, limiting the unnecessary content. Content also needs to be aligned to PCs.

9.5.2 Provide content in the Indian languages of the State along with English and Hindi versions for Inclusivity, Access, Equity, and Affordability

9.5.3 Conduct a subject matter expert (SME) review and update or remove content in a timely manner. The SME should ensure that content is up-to-date, appropriate, and accurate and unbiased (e.g., conflicts of interest disclosed). Content should also include global best practices and even journal reviews, if required

9.5.4 Use visuals/ videos/ simulations/ animations that support and are appropriate for content (i.e., relevant and necessary) and learners (i.e., culturally appropriate). Content may also include real-world examples which are contextual.

9.5.5 Review content for a recurring training on a periodic basis to ensure accuracy and relevance. Review may include evidence- based practice.

9.6 The Blended Learning must ensure opportunities for learner engagement

9.6.1 Design training that is interactive or engaging (e.g., knowledge checks, case studies, question & answer sessions, or exercises), as appropriate for learners' needs and training goals.

9.6.2 Use adult learning principles for adult learners as far as possible and special content

for the millennials.

9.6.3 Include experiential or practice-based learning as much as possible.

9.6.4 Provide opportunity for learners to receive feedback at regular intervals during the learning process. Also provide opportunity for learners to share experiences and learn from others' experiences. These may include peer learning and interdisciplinary opportunities for practice.

Learning material should include photographs, charts, tables, graphs, animations etc for better grasp and capture interest of learner.

9.7 The Blended Learning is designed for usability and accessibility

9.7.1 Use conversational style that is appropriate for learners (i.e., active voice, present tense, and second person). Make content culturally and linguistically appropriate for learners

9.7.2 Use language, fonts, colours, and tone that meets learners' reading levels.

9.7.3 Select media and interface that facilitate learning. Use high quality (e.g., clear, clean, and crisp) audio and visual aids to clarify concepts when appropriate

9.7.4 Design for user experience.

- a. Develop easy and user-friendly navigation or materials.
- b. Ensure that navigation or materials are meaningful and work for most users and learning styles.
- c. Organize concepts in logical sections.

9.7.5 Use technology that is current and easy to access with functional links and the required technical support.

9.8 The Blended Learning Continuous Assessment and Evaluation informs improvement

9.8.1 Develop and implement a training evaluation plan that guides formative and summative evaluation.

9.8.2 Conduct a formative evaluation as part of development. Use a simple or complex approach that, depending on the situation, can include peer review, quality checklist assessment (e.g., using this checklist), pilot testing,

9.8.3 Plan to use process evaluation data and learner feedback for ongoing quality improvement. Include opportunity for learners to provide feedback on training (include open-ended feedback, if possible).

9.8.4 Conduct a follow-up evaluation after learners have left the "classroom" to determine impact on performance, program, or training goal.

9.9 The Blended Learning must provide opportunity for learner's continuous assessment

9.9.1 Conduct outcome evaluation through learner assessment (e.g., post-test, knowledge check, exercise, observed practice, question & answer session, or problem solving).

9.9.2 Construct assessment questions that relate directly to learning objectives. Using a variety of question formats such as multiple choice, matching, listing, reordering, and sorting.

9.9.3 It is suggested to restrict the usage of online assessment based on the course, expected outcomes and the modes of learning & demonstrations suggested in above

sections.

9.9.4 Provide learners with feedback on their responses to support learning.

9.9.5 Use scenarios in which learners can apply what they have learned.

9.9.6 Recognize learner completion through a certificate or other notification.

9.10 The Blended Learning includes follow-up support for the learner

9.10.1 Provide opportunities to learners for continued learning after the training that reinforce content delivered during training.

9.10.2 Use a complex or a simple approach that includes at least one resource for post training support.

9.10.3 Simple approaches include providing contact information for help, tip sheets and other resources for more information, access to communities of practice from the training.

9.10.4 Complex approaches include conference calls, webcasts, coaching, and retention reminders such as e-mails and quizzes provided some time after the training

9.11 Resources for Implementation of Blended Learning

9.11.1 Create Content that is SCORM compatible and is interoperable.

9.11.2 Prepare the trainers who can help in preparing content and help the students to steer through the process of learning. The trainers may also be trained in Digital, language, communication, presentation, and social media skills to enable connect with students.

9.11.2 For Assessment purposes, even one common platform can solve the problem and be used by all the concerned parties. The creation of multiple systems is not only unproductive and a waste of resources, but creates options where it is not required. A common platform can be adopted by all awarding bodies, with a dedicated dashboard, for carrying out assessments in a defined manner.

9.11.2 Similarly, in case of LMS also, a common platform with a dedicated interface with all features of curated content creation, management, delivery, formative assessment and other monitoring features as explained in this document can save time and also create an easy user interface and learning experience. There can be dedicated dashboards for each concerned Awarding Body.

The *usage of different type of content & assessment in a course will depend upon a sector, job requirements, qualification details and expected outcome. No one guiding principal can be created for it. However, wherever possible “Digital First” may be used as a strategy for course creation & assessment.*

Some of the desired product features for an LMS are outlined in Annexure A.

10. Guidelines for Assessment Process

From the process of formal written examinations with “assessment while you learn” to “on demand examinations”, the assessment process is total getting redefined. The new emerging technologies can help in fairness of on-line examinations. From examinations in a single go and collectively, advent of new methods which are technology based and blending of teaching-learning and examinations in new form, it would be a good approach to offer examination on demand to offer more flexibility and student centricity.

10.1 Assessment broadly can be classified into the following types:

10.1.1 Diagnostic assessments: Diagnostic assessments are intended to help teachers identify what students know and can do in different domains to support their students' learning. These help teachers determine strengths of students in various areas to better address their specific needs.

10.1.2 Formative assessments: Formative assessment refers to a wide variety of methods that teachers use to conduct in-process evaluations of student comprehension, learning needs, and academic progress during a lesson, unit, or course. Formative assessments help teachers identify concepts that students are struggling to understand, skills they are having difficulty acquiring, or learning standards they have not yet achieved so that adjustments can be made to lessons, instructional techniques, and academic support.

10.1.3 Summative assessments: Summative assessment is an assessment administered at the end of an instructional unit in a course. These assessments are intended to evaluate student learning by comparing performance to a standard or benchmark.

10.1.4 Ipsative assessments: Ipsative assessment involves comparisons between past and current work to identify a learner's growth over time, rather than progress toward an external set of criteria. Therefore, Ipsative assessment is an internal or self-referenced assessment.

10.1.5 Norm-referenced assessments: Norm-referenced tests report whether test takers performed better or worse than a hypothetical average student, which is determined by comparing scores against the performance results of a statistically selected group of test takers, typically of the same age or grade level, who have already taken the exam.

10.1.6 Criterion-referenced assessments: Criterion-Reference tests measure the performance of test takers against the criteria covered in the curriculum.

10.1.7 Peer-to-Peer randomised Assessments: Peers will be able to provide assessment in this case

10.1.8 Industry Validation of Effectiveness: In the Vocation Education, Industry validation of effectiveness of training is very important.

10.1.9 Self-assessments: To evaluate how much the learner has grasped by self-learning.

10.2 Other Assessment Methods: Conducting an assessment takes time, thought, attention, planning, and often collaboration. Each assessment tool, whether a short survey or detailed rubric, will be useful only insofar as it both addresses the outcomes well and is feasible to use.

10.2.1 Rubrics: For assessing qualitative student work such as essays, projects, reports, or presentations. Rubrics serve well to clearly denote the specific expectations for an assignment, for collecting data for assessment of student learning outcomes. and for student performance. Rubrics can be used for grading, for providing feedback to students, and for informing and encouraging students to think about their own learning.

10.2.2 Portfolios & E-Portfolio: Portfolios can provide a window into the process of student learning across a semester-long project that can be assessed (usually by using a rubric). Curriculum Mapping: A good curriculum map can serve to focus assessment, and the improvements that follow, where it will be most useful, informative, or effective.

10.2.3 Structured Interviews: While time-consuming, structured interviews are useful when specific questions need to be asked. It also leaves room for unplanned topics or ideas to emerge.

10.2.4 Student Experience Surveys: Student experience in research universities (SERU), including administration of on-line census SERU Undergraduate and Graduate Surveys, can yield important information about student perceptions and experiences.

Assessment of most qualifications of Vocational Skills is a combination of on-line /paper-based assessment together with a practical exam, where a trainee's professional skills are also assessed. This may require access to the tools/machines to be able to successfully carry out the assessments.

For the Summative Evaluation, Open book examination strategy may also be used based on the qualification, where student may be allowed access to all available resources. It will also facilitate better understanding and application of the knowledge with a better potential for its positive impact.

10.3 Testing of Learning Outcomes as part of Assessment Process:

Based on the listed learning outcomes in the qualification, the assessment process should be able to ensure learning of concepts at various stages of learning and also at completion. Based on the type of course and the associated job profile, a combination of above methodologies may be used for assessment.

10.4 Guidelines of Standard Operating Process (SOP) for Assessment Process

Based on learning outcomes defines, the Assessment process may use a combination of following tools/processes for the Assessment.

10.4.1 Written Work, which could be off-line or on-line. AI as technology can be used for many more assessments like, attention levels, speed of learning, level of learning etc. The exam can be open book or closed book. Desirable features of an Assessment Engine are given in Annexure B.

10.4.2 Portfolios of student work covering assignments, experience and challenges faced during the process of working on these assignments, overall approach, attitude, philosophy towards life as a learner and his/her academic resume

10.4.3 Audio Visual recording of presentations or performances with self, peer, and or instructor

10.4.4 Field or service-learning projects/Apprenticeship

10.4.5 Performance on in-class tests (or portion of a larger exam), assuming they are valid, reliable, and objective

10.4.6 Presentations/Group Discussion/Role Play

10.4.7 Group examinations even for conventional theory papers: Such an approach is followed some time for project and laboratory assessments. But for theory type examinations it is generally not followed.

10.4.8 Spoken/ Speaking examinations: These types different approached can be introduced now with the support of new generation of technologies. They can make examination faster and easier and can be helpful to students with different abilities.

10.4.9 Demonstration/Practical: This is a very important part of testing for most Vocational Skills, which also may be done using Simulation or Digital Twins

Based on the type of Vocational skill, a combination of above methodologies may be chosen. For Example, for assessing soft skills, Presentation & Group Discussions as a methodology may be chosen, whereas for testing Welding as a skill, Demonstration/Practical exam may be chosen. Emerging technologies can be used to ensure Governance in the process of assessment.

As one moves towards usage of Blending learning, it is also very important the systems used for all stages of learning & assessment maintaining “Digital Records” of students’ progress & assessment rather than paper records. These records may be maintained for a period of 7 to maximum of 10 years.

11. Additions in the Guidelines for Creating NSQF & UCF Aligned Course

11.1 As per the Unified Credit Framework (UCF) guidelines, the unified levels of qualifications are proposed. Each level corresponds to certain credits and credit points that can be further utilized by the candidate as per the requirements of learner. As per UCF, each credit corresponds to approximately 30 hours of learning and with minimum 1200 hours of learning in a year which is to 40 credits covered in one year. The UCF, however, does not mention the credit assignment based on the delivery pattern of the course. Hence, irrespective of the type of delivery method the overall credit assignment shall remain same as mentioned above.

11.2 As part of the blended learning process, the trainer/learner may use support material, for example videos on factory tour, or warehouse tour etc., which may consume some hours and may or may not be directly part of 30 hours of learning process for one credit course. This information may be provided by the trainer/course creator of the course.

11.3 As an addition, based on the area and the usage of tools required to orchestrate the course, the qualification submitting body/ experts may also specify the ratio of offline and online content/process for all the 7 stages of vocational education.

11.4 The proposed blending ratio of different types of content & assessment in a qualification may depend various factors such as the sector, job requirements, qualification details, notional hours, assessment types, and expected outcome. Besides these, the availability and affordability of technology access, connectivity, quality and cost of content, etc could be other deciding factors. Thus, no one guiding principle can be created for the same. However, wherever possible “Digital First” may be used as a strategy for course creation & assessment’.

11.5 The final blending ratio, of course, would be as approved by the NSQC after considering the proposal taking into account the above factors / any other factors in totality.

11.6 The current templates for courses may be modified to include this.

S. NO.	Components of Vocational Education, Training and Skilling Ecosystem	Ratio of Offline: Online	Tools to be used
1	Theory/ Lectures Imparting theoretical and conceptual knowledge		
2	Imparting Soft Skills, Life Skills and Employability Skills Mentorship to learners		
3	Showing Practical Demonstrations to the learners		
4	Imparting Practical hands-on Skills; Skills for working with Hands; Lab Work/ workshop/ shop floor training		

5	Tutorials, Assignments, Drill and Practice		
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations		
7	On the Job Training (OJT); Internship, Apprenticeship Training		

11.7 For Long Term courses the following initial recommendations have been proposed by the Director General Training (DGT), MSDE, subject to the approval of National Skills Qualification Committee (NSQC) for each qualification as and when submitted before the committee. This table may change over the period of time with changes and availability of technologies and based on the courses being offered by the Director General Training (DGT):

S. NO.	Components of Vocational Education, Training and Skilling Ecosystem	For Long Term courses: Ratio of Offline: Online	Tools to be used
1	Theory/ Lectures Imparting theoretical and conceptual knowledge	60:40	<ul style="list-style-type: none"> • Books/e-books • Presentations • Reference Material • Audio/Video Modules with 2D/3D animation
2	Imparting Soft Skills, Life Skills, and Employability Skills Mentorship to learners	50:50	<ul style="list-style-type: none"> • Self-learning Videos • Broadcasts • Mobile Learning • Curated Digital content
3	Showing Practical Demonstrations to the learners	60:40	<ul style="list-style-type: none"> • Simulators • Video Content • E-Resource Library
4	Imparting Practical hands-on Skills Skills for working with Hands Lab Work/ workshop/ shop floor training	80:20	<ul style="list-style-type: none"> • Simulators • Digital Twins • Metaverse • Video Play • Presentations
5	Tutorials, Assignments, Drill and Practice	70:30	<ul style="list-style-type: none"> • Online Question Bank • Mobile Quick test app • MCQ based tests
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	30:70	<ul style="list-style-type: none"> • Assessment engine for Essays • Unloadable file examinations • Mock test session
7	On the Job Training (OJT), Internship, Apprenticeship Training	90:10	<ul style="list-style-type: none"> • Simulators • Proctored Online test • Offline Assessments

11.8 Some of Features expected as part of LMS are documented in Annexure A and the list of desired features for an Assessment Engine are listed in Annexure B.

12. Summary & Conclusion

With **Digital First** as a strategy, it is desirable to go with Blended learning in the VET and skill Courses to improve its reach and helping learners to learn at their own pace. To the *extent possible*, the course and its assessment may be made available in the on-line way, with the trainees trained to look & use

the available resources at their convenience.

For every sector and every qualification/ course, the percentage of blend of different components & flexibility may vary based on the practical hands-on skills involved in each of these and its expected outcomes.

For some of the courses for Vocation Education, training and Skills, it is necessary to have a laboratory/ workshop/ shop floor experience, with hands-on experience to build and integrate. These guidelines are flexible enough to incorporate the changing technology landscape and also look at the requirement of student teacher interaction and need for “hand skills”. Based on the skill to be imparted, the course designer and the course instructor can have the flexibility to use different tools in different components of learning & assessment process.

Since UCF does not mention the credit assignment based on the delivery pattern of the course, overall credit assignment is expected to remain in line with the UCF guidelines. This will provide the learner flexibility of learning without making any compromise with the Unified Credit framework

DRAFT

Annexure A: The key features and functionality that should be part of any modern Learning Management System (LMS):

- (a) **Learner-Centric Experience:** The purpose of deploying an LMS is to ultimately train students, learners, employees, external users, channel partners, etc. LMS should be configurable and tailor the learning experience to each user or user group and provide a Brand for creating a learner-centric experience.
- (b) **Intuitive User Experience:** LMS should be easy to navigate and highlights the important information users want to see front and centre. The interface should be clean and modern and offer basic customizations to suit the needs of your team. When navigation is hard and users can't easily find what they need, that can have a negative impact on training completion.
- (c) **Mobile Capabilities:** The shift to mobile isn't a new trend, therefore the LMS should at least be mobile-responsive, resizing appropriately based on screen size, have native mobile apps to make training on-the-go even easier. One of the biggest benefits to these mobile apps is the offline sync feature that can save information and coursework even when a user isn't connected to a network.
- (d) **Built-in Reporting:** LMS reports will help you prove training ROI to stakeholders and executives. Run demos, and ask each vendor questions about how reports are run, what information can be shown, how deep the reports go, etc. Comprehensive reporting will make it easier to measure specific training metrics gauge effectiveness.
- (e) **Native Integrations:** A great LMS will easily integrate with most training systems to make data syncing easier. This becomes increasingly important for Awarding Bodies and Assessment Agencies who enforce specific training deadlines as a prerequisite for assessments. These integrations can come as out-of-the-box integrations or be custom built.
- (f) **Surveys, Feedback and Pre/Post Training Assessment:** Taking advantage of survey tools to administer pre-training assessments, post-training evaluations, and gain training feedback which can help significantly improve training effectiveness. In a modern LMS, this survey tool should be integrated into the system, and administrators should be able to quickly create reports based on the collected data.
- (g) **Blended Learning Capabilities:** Online training makes up the majority of what happens in an LMS, but VET & Skilling still need a more blended learning approach that incorporates instructor-led and on-the-job training for which the LMS must track online registrations for in-person trainings, send email and SMS reminders, print sign-in sheets, and more.
- (h) **Technology Features:**
 - i. **Industry Compliance:** LMS must also conform to the industry standards. Ideally it should be SCORM or xAPI.
 - ii. It should also be possible to follow the National Digital Education Architecture (NDEAR) guidelines and create the desired integration points to "Digital Ecosystem for Skilling & Livelihood" (DESH) portal
 - iii. System should be able to give information in a secure way and also adhere to the data privacy guidelines, laid by the GOI
 - iv. The LMS should be flexible enough to create NOS based qualifications and provide information based on NOS based compliance
 - v. Product should have the basis built-in governance for role management.
 - vi. Ideally, platform for LMS should be scalable and also provide for Platform as a Service (PaaS)

Annexure B: Key Features of Assessment Engine

This Annexure lists out the desired features in an Assessment engine used for VET.

1. Product Features:

- a) Should support Multi-lingual Solution both for product & Question Bank
- b) Should allow the following features in Questions
 - i. Questions Randomization & NOS based question
 - ii. Possibility to create questions of different difficulty levels
 - iii. Ability to use Images/Media/Map in the questions
 - iv. Facility to Create Multi-Skilling, Cross-Function Skilling Assessment
 - v. Ability to add Case Studies (Scenario based questions) & Ability to include Descriptive Question/Answers
- c) Usage of AI for face recognition and expression recognition during exam
- d) Robust Concurrency, Integration, if possible, to Simulation/Gamification tools, and off-line assessments

2. Desirable Accessibility (Product for PWD) Features

- a) Ability to Convert Questions to voice and vice Versa, as required
- b) Learning Disabilities (LD): Questions and Answers in Text format, Questions and Answers in Audio format, Questions and Answers in Video & Image format, Screen Zoom, Word Zoom & Image Zoom functionality
- c) Low vision (LV) or visually impaired (VI) candidates: Questions and Answers in Audio format, Screen Zoom & Word Zoom functionality
- d) Intellectual disability (ID)-Questions and Answers in Text format, Questions and Answers in Video & Image format, Screen Zoom, Word Zoom & Image Zoom functionality
- e) Speech and Hearing-Impaired people (SHI): Questions and Answers in Text format, Questions and Answers in Video with text caption & Image format, Screen Zoom, Word Zoom & Image Zoom functionality
- f) Product cleared via Accessibility framework tests

3. Analytics: The product should also support the desired analytics providing details at the level of students', examiners and question, NOS wise and qualification.

4. Desirable Certifications: ISO 27001, ISO 17024(2012)

5. Data Security & Privacy Guidelines

- a) Data Encryption as required in transmission & storage
- b) Certification of Penetration testing/Ethical Hacking
- c) Encryption in transit with SSL/TLS protection for data transmitted between candidate and Mobile application
- d) Secure APIs
- e) Product should conform to the Data Privacy guidelines of GOI. Guidelines for storage of data such as UID, students' behaviour and related data must be followed

6. Governance:

- a) Timed Application & Detailed Audit Logs together with log of browser activities
- b) Multiple Log-in Restriction/Simultaneous Login Attempts together with blocking of multiple Log-in attempts
- c) Copy Paste Restrictions
- d) Assessment is restricted with IP based authentication and authorization
- e) Random Photo Snap Capture & Realtime Audio/Video feed
- f) Geo location with time stamp tracking
- g) Face Authentication & Multiple Face Detection during assessment time using AI
- h) Product should be user friendly and support the difficulties faced at remote locations

7. Usage of Bloom Taxonomy for Creation of Question Bank may be done and the product should also be built with Browser & device tolerance

Annexure C: Explanatory notes for the terms used in the above section.

- 1. Learning Management System (LMS):** A Learning Management System (LMS) is an online system or software which is used to plan, execute, and assess a specific learning process including the administration, personalized delivery, documentation, tracking, reporting, automation, and delivery of educational courses, training programs, continuous/ formative assessment to check learning outcomes and learning and development programs. LMS is a digital learning environment that manages all aspects of learning efforts. It also manages user information for including their user profile, job roles and preferences. The LMS is used to support learning by providing a space where materials can be stored and organised, assessments can be given, and students and teachers can interact using blogs, forums, and so on. LMS solution should be Learner-Centric Experience, Intuitive User Experience, Mobile Capabilities, Built-in Reporting, Native Integrations, Surveys, Blended Learning Capabilities, Regular Updates etc.
- 2. Presentation:** Teaching materials (text and multimedia) that are used to present curriculum and concepts to learners Virtual Classroom/ Online instructor assisted learning in interactive mode
- 3. Video – Instructional:** A recording of moving visual images that show real people, places and things that enable students to learn skills or knowledge.
- 4. Illustration/ Graphic/ GIF:** Visual concepts, models, and/or processes (that are not photographic images) that visually present concepts, models, and/or processes that enable students to learn skills or knowledge. These can be diagrams, illustrations, graphics, or infographics in any file format including Photoshop, Illustrator and other similar file types.
- 5. Photographic Image – Instructional:** Photos or images of real people, places or things that visually presents concepts, processes and/or phenomena that enable students to learn skills or knowledge. These can be photographs, images, or stock photography.
- 6. Animation:** The animations visually and dynamically present the concepts, models, processes, and/or phenomena in space or time.
- 7. Gamification:** Gamification is a tool for learning which uses a concept of “Enjoy while you Learn”, to capture interest of learner. Additionally, it can provide immediate feedback and help in reflecting on personalized performance, achievements, strengths & weakness, leading to higher engagement levels of learner.
- 8. Development Tool:** Software development applications platforms for authoring technology-based resources (e.g. web sites, learning objects, apps.).
- 9. Hybrid/ Blended Course:** The organization and presentation of course curriculum required to deliver a complete course that blends online and face-to-face teaching and learning activities.
- 10. Learning Object Repository:** A searchable database of at least 100 online resources that is available on the Internet and whose search result displays an ordered hit list of items with a minimum of title metadata. A webpage with a list of links is not a learning object repository.
- 11. Online Course:** The organization and presentation of course curriculum required to deliver a complete course fully online. **Online Course Module:** A component or section of a course curriculum that can be presented fully online and independent from the complete course.
- 12. Simulator:** A simulator is a program or machine that simulates a real-life situation, meaning that it creates a virtual version of it, often for the purpose of instruction or experiment, such as a flight simulator. Simulator approximates a real or imaginary experience where users' actions affect the outcomes of tasks they have to complete. Users determine and input initial conditions that generate output that is different from and changed by the initial conditions. An example of a simulation is a fire drill. In this situation, a fire drill is used to prepare people for an anticipated event. During fire drills, the fire alarm is activated in the absence of a real fire, and people are instructed to react as they would if the scenario were real.
- 13. Digital Twin:** A digital twin is a virtual representation of an object or system that spans its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision-making.
- 14. Metaverse:** The metaverse is a virtual reality world where users can interact, game and experience things as they would in the real world. Using current AR and VR tech, they can immerse into this world and interact with overlaying objects and people in the visual projected in front of them. The metaverse can be defined as a simulated digital environment that uses augmented reality (AR), virtual reality (VR), and blockchain, along with concepts from social media, to create spaces for rich user interaction mimicking the real world.

15. **Virtual labs:** Virtual labs are interactive, digital simulations of activities that typically take place in physical laboratory settings. Virtual labs simulate the tools, equipment, tests, and procedures used in chemistry, biochemistry, physics, biology, and other disciplines. A virtual laboratory is an on-screen simulator or calculator that helps test ideas and observe results. Learners use advanced technology to perform a series of experiments that yield authentic results. Virtual training labs are cloud-based training environments that emphasize an online, hands-on learning experience over a passive classroom-based one.
16. **Tutorial:** Learners navigate through a set of scaffolded learning activities designed to meet stated learning outcomes, structured to impart specific concepts or skills, and organized sequentially to integrate conceptual presentation, demonstration, practice and testing. Feedback on learner performance is an essential component of a tutorial.
17. **Drill and Practice:** Requires users to respond repeatedly to questions or stimuli presented in a variety of sequences. Users practice on their own, at their own pace, to develop their ability to reliably perform and demonstrate the target knowledge and skills. Practicing the theoretical knowledge for validating the concepts & sharpening the hand skills.
18. **Case Study:** A narrative resource describing a complex interaction of real-life factors to help illustrate the impact and/or interactions of concepts and factors in depth.
19. **Question Bank:** A Question Bank is an online place to centrally store and manage all your quiz, assessment and examination questions, organized by category. Any type of question can be added to the bank including, multiple-choice, fill-in-the-blanks, file upload and essay.
20. **Quiz/ Test:** Any assessment device intended to evaluate the knowledge and/or skills of learners.
21. **Proctored Assessment, Exam:** A “proctor” is a supervisor, or a person who monitors students during an examination. A proctored exam is an exam given when someone is watching you. Online video proctoring means that a test-taker’s entire proctoring session is either being streamed live or being recorded by the system automatically, using a webcam. The exam administrator closely monitors video details to examine suspicious activities during an online exam. A proctored exam is a supervised test. An instructor or an approved proctor monitor the student during the test. The proctor ensures that the rules and requirements of the exam are followed. Remote proctoring is a service that emulates the role of an on-site proctor – confirming the identity of the test-taker and safeguarding the integrity of the exam – using an internet-delivered or phone-delivered assessment monitored by our offsite proctor.
22. **E-Portfolio:** A collection of electronic materials assembled and managed by a learner. These may include text, electronic files, images, multimedia, blog entries, and links etc. An e-portfolio - a type of learning record that provides actual evidence of achievement.
23. **Social Networking Tool-** self-identified user groups for the purpose of sharing information, calls for actions, and reactions.
24. **Reference material**
- a) **Qualification/ Syllabus:** A document or website that outlines the requirements and expectations for completing a course of study. Course Outlines would also be included in this.
 - b) **Reference Material:** Subject specific directories to other sites, texts, or general information are examples.
 - c) **Collection:** A meaningful organization of learning resources such as web sites, documents, apps, etc. that provides users an easier way to discover the materials.
 - d) **Open Journal – Article:** A journal or article in a journal that is free of cost from the end user and has a Creative Commons, public domain, or other acceptable use license agreement.
 - e) **Open Textbook:** An online textbook offered by its author(s) with Creative Commons, public domain, or other acceptable use license agreement allowing use of the e-book at no additional cost