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**National Council for Vocational Education and Training,**
**Ministry of Skill Development and Entrepreneurship,**
**Government of India**
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# Guidelines for Blended Learning for Vocational Education, Training & Skilling

# 13th JULY 2022

# National Council for Vocational Education and Training (NCVET)

File No. 42001/01/2022/NCVET        Dated: 13 July 2022

**Subject: Guidelines on Blended Learning for Vocational Education & Training and Skilling developed by NCVET**

1.    The NEP 2020, integrating general and vocational education is designed on the foundational pillars of Access, Equity, Quality, Affordability and Accountability. These Blended Learning Guidelines on Vocational Education & Training and Skilling are an important approach to achieving this goal by making optimum use of technology.

2.    To leverage the advantage of technology in teaching, NCVET has developed these Guidelines for Blended Learning for vocational education, training and skilling after detailed consultations with all stakeholders including Sector Skill Councils, DGT, and other Awarding Bodies. It integrates technology and digital media based learning with traditional instructor-led classroom teaching and learning, as well as blending it with hands on workshop and shop floor skills training/ learning activities, giving students more flexibility to customize their learning experiences.

3.    With blended learning the possibilities are endless when it comes to the ways in which instructional technologies can be blended into a teacher/ instructor led pedagogical approach. These blended methodologies shall promote faster adoption of technology in learning systems and enable scalable models in future areas of skilling. It is also the most effective way to move towards *Personalized Education* and to provide *"Continued and Consistent Positive Experience"* of education across a large country like India.

4.    Blended learning is a very significant step, especially in the new age and future skilling, and these guidelines will serve as an important document for incorporation of blended learning models in the skilling ecosystem. The blended learning methodology also makes VET and Skilling more cost-effective, efficient, scalable, and inclusive by providing a level-playing learning environment.

5.    'Blended learning is thus the future'. However, we need to prepare ourselves as well as the ecosystem for taking full advantage of the same and ensure quality with proper blend of online and offline learning components as well as usage of cost effective and affordable technologies for delivery for ensuring inclusivity.

6.  These guidelines have been finalised after extensive stakeholder and public consultations. The Guidelines were uploaded on the NCVET website on the 13th April 2022 for 21 days for the public scrutiny and comments. The comments received were analysed and suitably incorporated in the guidelines.

7.  The guidelines of blended learning shall be applicable in the skilling ecosystem for implementation/ assessment of NSQF aligned and approved qualifications by Awarding Bodies including Sector Skill Councils, implementing institutions and Assessment Agencies. The Awarding Bodies may incorporate the blended learning methodologies in their new /revised qualifications based on these Guidelines on Blended Learning for vocational education, training and skilling.

8.  The Guidelines on Blended Learning for vocational education & training and skilling have been approved in the 6th Council meeting of the NCVET, held on the 13th of July 2022 and are being officially notified herewith. These guidelines may be further amended/ updated from time to time with the approval of the Chairperson, NCVET based on the dynamic needs of the industry, changing requirements and the feedback received during the implementation of the guidelines.

(Col. Santosh Kumar)
Director, NCVET

# PREFACE

The NEP 2020 is built on the foundational pillars of Access, Equity, Quality, Affordability and Accountability, these are aligned to the 2030 Agenda for Sustainable Development and aims to transform India into a global knowledge superpower. These Blended Learning Guidelines on Vocational Education, Training and Skilling are an important approach to achieving this goal making optimum use of technology.

NCVET as the national regulator of vocational education, training and skilling anchors various initiatives which aim to create a positive disruption and transformation in the Skilling ecosystem in the country while also opening gateways and creating multiple pathways between general education and vocational education & skilling. Blended learning is a very important aspect, especially in the new age and future skilling, and these guidelines will serve an important document to provide the impetus in the right direction for adoption of the blended learning approach in Vocational education and training/skilling. The blended learning while adopting the disruptive digital and educational technologies makes this cost effective, efficient and scalable it makes vocational education more inclusive and provides a level playing learning environment.

Blended learning integrates technology and digital media-based learning with traditional instructor-led classroom teaching, as well as hands on workshop and shop floor skills learning activities, giving students more flexibility to customize their learning experiences. With blended learning the possibilities are endless when it comes to the ways in which instructional technologies can be blended into a teacher/ instructor led pedagogical approach. These blended methodologies shall promote faster adoption of technology in learning systems and enable scalable models in future areas of skilling. "Digital First" today is need of the hour not only in basic education and 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 and Consistent Positive Experience*" of education across a large country like India.

There are seven major components of vocational education, training and skilling Ecosystem identified, namely 1) Theory/ Lectures, Imparting theoretical and conceptual knowledge; 2) Imparting Soft Skills and Life Skills/ Employability Skills, Mentorship to learners; 3) Showing Demonstrations to the learners; 4) Imparting Practical Skills, Imparting skills for working with Hands, Lab Work; 5) Tutorials, Assignments, Drills and Practice; 6) Proctored Monitoring/ Assessment, Evaluation, Examinations; and 7) On the job training (OJT), Internship, and Apprenticeship Training options.

Along with the major Activities to be covered under each of these 7 components, the guidelines also identify the Face-to-Face teaching and learning options, Online Course/ Course Module, Methodology of on-line Training and the proposed/ recommended ratios of learning hours between online and offline learning to create the right blend for different sectors and Qualifications. Any specific sector may recommend higher percentage of online or offline components as per needs while creating the particular Qualification. Various assessment options have also been mentioned.

Blended learning acts like a 'Self-Driving Force' which opens opportunities towards self-learning & self-engagement, peer-to-peer learning and review, randomised assessments, teamwork and collaboration in the virtual world, randomised assessments, among many others. Education and Studies through "blended learning" is more affordable, and saves time, and teaching is less expensive to deliver, highly modular and scalable, reduce the failure rates, improves learning outcomes, boosts the learner engagement & retention and enriches the learning experience while

offers a larger sense of responsibility for learning. This concept is proving to be a scalable learning model that simply works for diverse populations of students and learners who are pursuing vocational education, training and skilling to learn at their own pace in their own time.

'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 and ensure quality with proper blend of online and offline learning components as well as cost effective and affordable technologies to be used for delivery for ensuring inclusivity.

I am of the firm belief that it is the need of the hour to make flipped classrooms and hybrid learning a reality in the Vocational Education and Training space. The Awarding Bodies recognised by NCVET must work in this direction across sectors to make learning more aspirational while improving the learning outcomes.

I encourage the adoption of these Blended Learning Guidelines on Vocational Education, Training and Skilling with suitable changes by all other bodies like school boards and higher education institutions to take advantage of technology for improving access, equity, quality, affordability.

I Acknowledge the work done at NCVET under the able guidance of Executive Members, Dr. Neena Pahuja and Dr. Vinita Aggarwal with the team comprising of Col. Santosh Kumar, Shri Lav Bhardwaj, Shri Amresh Kumar, Shri Amit Sharma and all Awarding Bodies/ Sector Skill Councils. NCVET also received valuable inputs from the MSDE, DGT and other Awarding Bodies in the development of these guidelines which are well appreciated. NCVET welcomes the further suggestions for improvement on this document which is dynamic in nature and shall be updated periodically.

My best wishes for the Implementation of these Guidelines on Blended Learning.

Dr. N.S. Kalsi, IAS Retd.
Chairperson
NCVET

# Blended Learning and Assessment of Vocational Skills and "Digital First" as a Strategy to Achieve that

## Contents

## 1. What is Blended Learning

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 and efficient. Blended learning or "hybrid learning" can be one such tool.

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.

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.

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.

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".

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 and Assessment is mostly carried out in physical/ off-line mode as it requires training and learning in hands-skill. But with availability of newer and affordable technology tools for effective delivery of education, training and skilling, a combination of offline and 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 and 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 own pace. 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 and 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 and 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 and 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 and 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 innovative solutions 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 also facilitate the learners to watch the lecture/ training sessions multiple times which otherwise may be subject to taking notes in a classroom learning situation. This can be very useful for persons with special abilities.

**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, and be future ready.

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 and 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 and 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 for learning

**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 have 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 and 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 and Asynchronous, which may be used for learning together with assessment blend including that of formative and 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 preparation of the required content, but also the trainers who can steer these blended learning programs.

## 7. Blended Learning in Vocational Education and Skilling Ecosystem

**7.1**     This section proposes possible Resources and Methodologies that may be used in the subcategories for learning and evaluation. Learning process of most of the Vocational qualifications may be divided into the 8 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.    Augmented Reality (AR)/ Virtual Reality (VR)/ Extended Reality (XR) based learning

    VII.    Metaverse- immersive learning

e. **Reference Material 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 **leaning outcomes**

h. **Hackathon** (ref. Appendix C for definition)

**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 and Language Skills including foreign language skills

    III.    Digital Literacy, IT, Collaboration and Design Thinking

    IV.    Financial and legal literacy

    V.    Customer Service Skills

    VI.    Sales and Marketing Skills

    VII.    Collaboration, Social Media and Presentation Skills together with skills

    VIII.    Skills for Facing Interviews

    IX.    Sensitivity to gender, SEDG, PWD

    X.    Safety and Risk Management Skills

    XI.    Organizational Behaviour

    XII.    Greening/Environmental Sustainability

    XIII.    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.    (i) Physical mode

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

    III.    (iii) Simulated online Discussion/ GD room

f. Mentorship to learners

    I.    (i) Physical One-to-One, One-to-Many

    II.    (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, demonstrations, Actual Plant/ process videos recorded in the real workplace along with narrations.

d. AR/VR/XR 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, painting, games, firearms practice etc.

c. Use of cobot or collaborative robot (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/XR, 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/XR, 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-build continuous/ formative/summative assessment to check leaning 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/XR 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 are used

g. There should be a well-defined candidate's evaluation checklist for every type of OJT, Internship and Apprenticeship.

**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-build formative

assessment with backend LMS to store progress of learning outcomes.

   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. From PwD Perspective we may add features on accessibility like ISL Window, short and precise frozen captioning.

   b. 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.

   c. 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.

   d. The institutions implementing such training will increasingly need to use frameworks such as Universal Design of Learning to create flexible and fulfilling learning environments.

   e. IT literacy may also be thoroughly required for the special education teachers / skill trainers as well as students.

### 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 especially 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 and 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. The Awarding bodies should focus on this aspect also while rolling out blended learning courses.

   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 and 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'.

## 7.3 Components of Vocational Education, Training and Skilling 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 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 |
|---|---|---|---|---|---|---|---|
| • **Major Activities covered under this component** | • Delivery of the content on theory/ conceptual knowledge:<br>  o One-to-Many<br>  o One-to-one<br>  o Many-to-Many<br>• Online curated self-learning | • 21st century Skills<br>• Communication Skills<br>• English Skills<br>• Digital Literacy, IT, Collaboration<br>• Financial and legal literacy<br>• Customer Service<br>• Sales and marketing<br>• Facing Interviews<br>• Sensitivity to gender, SEDG, PWD | • Self-Explanatory video demonstrations of processes for better understanding.<br>• Physical site visits- for actual touch and feel<br>• Practical demonstration of activity in the lab/ shop floor | • Learning hand and other skills<br>• Practicing and sharpening the hand skills.<br>• Doing practical in the Laboratory, Virtual Labs<br>• Simulation<br>• Gamification<br>• Digital Twins<br>• Animation | • Physical mode - classroom<br>• Class tutorials for clearing doubts<br>• Assignments: Activities or lesson plans designed to enable students to learn skills and knowledge. | • Assessment<br>• Continuous Assessment<br>• Class tests, quiz, written exams, viva-voce, portfolios, final projects and standardized tests<br>• Examinations | • On the Job training will enable the student to do learning by doing<br>• Structure of OJT to ensure the learning outcomes<br>• . Case Studies |
| • **Face-to-Face teaching and learning** | • Classroom: Actual Physical learning with a teacher/ instructor<br>• Classroom: Robot Led learning<br>• Classroom: Broadcasted/ podcasted lecture | • Presentations<br>• Group Discussions<br>• Case Studies<br>• Social Training<br>• On-line Quiz | • Videos<br>• Social Training<br>• Case Studies | • Physical product is created as part of skilling in Lab/ Workshop/ Shopfloor<br>• At home or own place of learner Simulation | • Classroom Tutorials<br>• Offline assignment, submission, and assessment<br>• Online assignment, submission, and offline assessment<br>• Classroom/ home assignments<br>• Minor/ major projects | • Class tests, Quiz<br>• Viva-voce<br>• Interviews<br>• Minor/ Major projects<br>• Semester Examination<br>• Competitions | • OJT, Internship, Apprenticeship at actual work place/ project sight<br>• Combination of Simulator and on-job training<br>• |
| • **Online Course/ Online Course Module**<br>• **Methodology of on-line Training** | • Lectures through Broadcast/ TV Channels<br>• Video Modules (Recorded)<br>• Web eLearning<br>• Online curated self-learning<br>• Presentations<br>• Micro Learning (Consisting of Micro Nuggets) | • Via eLearning resources<br>• Practicing simultaneously using online assessment tools.<br>• Presentation<br>• Case Study<br>• Social Networking | • Video – Video Instructional.<br>• Actual Plant/ process videos.<br>• AR/VR/XR<br>• Illustration/ Graphic/ GIF:<br>• Photographic Image – | • Virtual Labs<br>• Gamification<br>• Digital Twins<br>• Animation<br>• Development Tool<br>• Workshop and Training Material development.<br>• Simulation based | • Online interactive mode (two-way) - Instructor/ teacher led<br>• Online interactive mode (two-way) – AI/ Robot Led<br>• Simulated online Discussion/ GD | • Online Assessment Tools<br>• Quiz/ Test.<br>• E-Portfolio:<br>• Proctored Online assessment with built-in controls, biometrics, security, evaluation of the | • For all jobs which are to be performed online or in a remote mode<br>• Simulation training in the near actual job environment<br>• Proctored Online OJT with built-in controls, |

| | | Tool- | Instructional | Drill and Practice | room | quality and efficiency of output | biometrics, security, evaluation of the quality and efficiency of output |
|---|---|---|---|---|---|---|---|
| | • Mobile Learning<br>• The metaverse<br>• Experiential and project-based learning | • Via Projects, challenges, group learning | • Case Study: | • 3D printing at home/ other places<br>• Hands-on approach for project<br>• Real-world use cases | • Online, proctored, one-to-one or one-to-many tutorials<br>• Online assignment, submission, and assessment<br>• Learning by doing on industry provided problem statements, projects, learning paths | • Formative assessments through rubric-based evaluation and summative assessment through project outcomes<br>• Structured and clear outcome-based hackathons<br>• Hackathon | • Digital Twins<br>• Metaverse<br>• End-to-end journey on problem solving<br>• Hackathon |
| • **The ratios of learning hours between online/ offline**<br><br>• **Specific Sectors may recommend higher percentage of offline components as per needs.** | • Proctored online content delivery with in-build formative assessment with full backend LMS to capture student details on learning time, assessments etc: Can be up to 80% to 100% on-line.<br>• Without use of appropriate tech tools 80% Offline and only upto 20% online otherwise.<br>• Usage of Broadcast/ Web/ TV Channel: Up to 40% online<br>• Online Instructor led teaching, can be one-to-one or one to many or many-to-many: up to 80% to 100% online<br>• Metaverse components: can be 100% online<br>• For remote jobs it can be 100% virtual/ online mode if delivered with in-build formative assessment with full backend LMS to | • Simulated online Discussion/ GD room with students available: upto 50% to 70%<br>• Without use of appropriate tech tools, 80% Offline and only upto 20% online otherwise.<br>• Check for body language with the soft skills: 20% online<br>• Assessment tools with built-in controls for checking students' attention and ensuring no frauds during the process: 50% to 80% on-line depending upon sectors/ qualifications<br>• 100% virtual while Working in virtual teams / virtual collaboration | • For all skills, where a physical product is created, at least 50% shall be on practical demonstrations and site visits<br>• Can be up to 100% online for all online technology products and services depending upon sectors/ qualifications. | • 100% offline without the use of any technology tools.<br>• For most skill qualifications this shall not be more than 30% Depending upon sectors/ qualifications unless higher online part could be justified.<br>• In case of Simulation, upto 50% online based on area (e.g. aviation)<br>• Can be 50-80% online in case of virtual labs.<br>• In case of purely IT/ software based qualifications resulting in online jobs, 80 to 100% online.<br>• Digital twins components 60-80% online<br>• Can be 100% online for 100% online tools but not wherever | • 70% offline and upto 30% online where a physical product is created as part of skilling<br>• Can be 80% online for Proctored one-to-one or one-to-many tutorial depending upon sectors/ qualifications<br>• Can be up to 100% online for of purely IT/ software technology depending upon sectors/ qualifications | • 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 Real-time or as a video.<br>• Upto 100% online, with availability of fully technology based proctored assessments platform and tools with biometrics, security and anti-fraud features.<br>• Will include project-based learning subject to assessments. | • For all shop-floor based job roles, Job roles requiring physical presence: 100% offline.<br>• In case of Simulation, upto 50% online based on area.<br>• For on online/ remote job roles: 60% to 80% online.<br>• Can be up to 90% online in case of usage of Digital Twins.<br>• With Metaverse becoming reality, the online usage may be relooked at<br>• Can be 100% online for virtual internships and apprenticeships for jobs that are 100% virtual subject to assessments of |

| | | | | | | | |
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| | capture student details on learning time, assessments etc | | | hardware interfacing is required e.g. IOT | | | learning outcome. |
| • **Material Type** | • Qualification/ Syllabus<br>• Books/ e-books<br>• E-Content/<br>• Curated digital content<br>• Video Content<br>• Presentations<br>• Collection<br>• Open Journal – Article<br>• Open Textbook<br>• Reference Material | • Video Content<br>• Presentations<br>• AR/VR/XR Content<br>• Two-way video platforms<br>• E-Content/<br>• Curated digital content | • Simulators<br>• Digital Twins<br>• Resources to create a physical product | • Simulation Engines to simulate the almost real like situations.<br>• Digital Twins<br>• Resources to create a product | • Simulation Engines to simulate the almost real like situations.<br>• Digital Twins<br>• Resources to create a product | • Online Question Bank: multiple-choice, fill-in-the-blanks, file upload and essay Assessment Engine with facility to check for learning outcomes<br>• Hackathon | • 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 LMS can be hosted either as a stand-alone product on the course offering organisation's server, or cloud-based platform hosted by the software firm. It is recommended to have Cloud-based LMS which can be accessible from anywhere with an internet connection. 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.

The LMS must be disability friendly and must have voice command feature, so that learners may be able to access the content without major readability issues.

### 9.2 Clear Learning Objectives and Outcomes

Teachers must identify and define clear learning objectives and 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 and 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. The content should be made NOS-wise and aligned to the 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 and 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.

**9.6.5** 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 or any other assessment 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 and 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** Provide learners with feedback on their responses to support learning.

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

**9.9.5** 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 Sharable Content Object Reference Model (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.

The *usage of different type of content and 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 and 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 a 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 and 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).

**10.2.3** 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.

**10.2.4** 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.

**10.2.5** 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:

**10.3.1** Based on the listed learning outcomes in the qualification, the assessment process should be able to ensure the 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 the above methodologies may be used for assessment.

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

Based on the learning outcomes, 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 or extended reality (XR).

### 10.5 Suggested Assessment Delivery Process

**10.5.1.** The Assessment Agency (AA) shall ensure that assessment tools to be used for the assessment delivery for various qualifications are approved by the concerned Awarding Body (AB) before the assessment delivery.

**10.5.2.** The AA shall be responsible for preparing multiple sets of questions, minimum 5, for each Performance Criteria (PC) of a NOS of a qualification to be assessed. These Question banks shall be prepared in consultation with the concerned AB. A process for periodic review of question banks must be defined by the AA and every cycle of review should be done in consultation with the concerned AB. Question banks should be available in local vernaculars and dialects also, as per requirement. Sample questions should be readily available on the website of concerned AB and the AA. The question banks should have a proportional mix of easy, medium and hard questions as guided by the AB and should be changed/ upgraded periodically (say after every 2-3 cycles). The assessment platform of the AA should be able to handle all types of multiple-choice and short answers questions.

**10.5.3.** The AA shall ensure proper use of appropriate technology viz, Artificial Intelligence (AI)/ Machine Learning based test engine, computers, tablets, mobile applications, video communication tools, etc. to deliver domain specific assessments. ICT tools and processes to be used by the AA for the assessment delivery shall be approved by the concerned AB and /or NCVET. ICT/ technology tools to be used for assessment delivery should be aligned to the competencies as defined by the AB in its qualification. ICT/ technology tools shall be used for the assessor verification (during the time of assessment), conducting the assessment in online mode and recording of results. There should also be technology tools available for disabled-friendly assessments.

**10.5.4.** The AA must follow the assessment norms prescribed by the ABs for each qualification based on the performance criteria (PCs) laid in the qualifications. The Assessment Guide will be shared with the AA by AB.

**10.5.5.** The AA should ensure that assessment, whether online or offline/ physical mode, is structured in such a way that it assesses the competencies as per the 'Assessment Criteria' outlined in the qualification concerned.

**10.5.6.** The AA should be able to conduct assessment based on individual National Occupational Standard (NOS) and Performance Criteria (PCs) within a NOS and provide the assessment results NOS and PCs wise as well

**10.5.7.** The AA shall take all reasonable steps to prevent the occurrence of any malpractice or mal-administration in the assessment process. The AA must establish and maintain, up to date written procedures for the investigation of suspected or alleged malpractice or maladministration, and ensure that such investigations are carried out rigorously, effectively, and by persons of appropriate competence who have no personal interest in their outcome. The AA shall submit a copy of such report to the AB concerned. In case of the cases of serious nature, a copy of the report shall be submitted to NCVET.

**10.5.8.** Any AA which is using online mode for assessment must also provide a link for real time monitoring of the assessment process. Others using offline or blended mode of assessment must also provide video clips & pictures of the batch being assessed.

**10.5.9.** Data security, privacy & storage guidelines as provided by Government of India must be followed.

**10.5.10.** Any non-compliance found at the time of assessment e.g. "UID not validated" or similar red flags must be informed in writing by AA to NCVET within one week of assessment.

*Based on the type of Vocational skill, a combination of above methodologies may be chosen. For example, for assessing soft skills, Presentation and Group Discussions as a methodology may be chosen, whereas for testing Welding as a skill, Demonstration/Practical exam (which may also be done using simulators) 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 and assessment maintaining **"Digital Records"** of students' progress and assessment rather than paper records. Certificates/ degrees and detailed mark sheets should be maintained in digital form indefinitely, while other data logs may be maintained for 1 year.*

## 11. Additions in the Guidelines for Creating NSQF and NCrF Aligned Course

**11.1** As per the National Credit Framework (NCrF) guidelines, the national 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 NCrF, each credit corresponds to approximately 30 hours of learning and with minimum 1200 hours of learning in a year, which are 40 credits to be covered in one year. The NCrF, 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 course author 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 and assessment in a qualification may depend on 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 and assessment'.

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

**11.6.** The following template can be modified to define the blended ratio (Offline: Online) and applicable tools for the course/ qualifications.

| Sl. NO. | Components of Vocational Education, Training and Skilling Ecosystem | Ratio of Offline: Online | Tools to be used (Tentative) |
|---------|--------------------------------------------------------------------|--------------------------|------------------------------|
| 1 | Theory/ Lectures<br>Imparting theoretical and conceptual knowledge | | • Books/ e-books<br>• Presentations<br>• Reference Material<br>• Audio / Video Modules with 2D and 3D animation |

| | | | |
|---|---|---|---|
| 2 | Imparting Soft Skills, Life Skills and Employability Skills<br>Mentorship to learners | | • Self-Learning Videos<br>• Broadcasts<br>• Mobile Learning<br>• Curated Digital content |
| 3 | Showing Practical Demonstrations to the learners | | • Simulators<br>• Video Content<br>• E-Resource library<br>• AR/ VR/ XR |
| 4 | Imparting Practical hands-on Skills<br>Skills for working with Hands<br>Lab Work/ workshop/ shop floor training | | • Simulators<br>• Digital Twins<br>• Meta-verse<br>• Video Play presentations |
| 5 | Tutorials, Assignments,<br>Drill and Practice | | • Online Question Bank<br>• Mobile Quick test app<br>• MCQ based tests |
| 6 | Proctored Monitoring/ Assessment/ Evaluation/ Examinations | | • Assessment engine for Essays<br>• Up-loadable file examinations<br>• Mock test sessions |
| 7 | On the Job Training (OJT), Project Work Internship,<br>Apprenticeship Training | | • Simulators<br>• Proctored Online tests<br>• Offline assessments |

**11.7** The Director General Training (DGT), MSDE, has proposed blending ratio (Offline: Online) for the delivery of some of its courses based on current practice, which may evolve based on the courses and state of technology & content maturity. The theoretical and conceptual knowledge may be delivered in 60% offline and 40% online mode. With a large number of technology-based tools available for teaching soft skills, life skills and employability skills, they can have slightly higher online touch points and may be delivered in 50% offline and 50% online mode or as specified in the section 7.3. The practicals may be demonstrated 60% in offline and 40% in online mode, as it requires demonstration of hand skills in most courses. Also, the practical hands-on skills/ skills for working with hands/ Lab Work/ workshop/ shop floor training/ may be imparted in 80% offline and 20% online mode, giving more focus to hand skills. The tutorials, assignments, drill, and practice may be covered in 70% offline and 30% online mode. The Proctored Monitoring/ Assessment/ Evaluation/ Examinations may be conducted in 30% offline and 70% online mode. Whereas OJT/ Project work/ Internship/ Apprenticeship for the current Training may be provided in 90% offline and 10% online mode for their qualifications.

Note: The blended ratios mentioned above are for some of the DGT courses. This ratio may change over the period of time with the change of technologies and/ or by feedback received from different stakeholders regarding the impact of the offered blended course. It is only for the reference purpose. It is also suggested to restrict the usage of online assessment based on the course, expected outcomes and the modes of learning and demonstrations.

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

## 12. Summary and 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 and use the available resources at their convenience.

For every sector and every qualification/ course, the percentage of blend of different components and 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 and assessment process.

Since NCrF 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 NCrF guidelines. This will provide the learner flexibility of learning without making any compromise with the National Credit framework (NCrF).

**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 and 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 and 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:**
  o **Industry Compliance:** LMS must also conform to the industry standards. Ideally it should be SCORM or Experience API (xAPI).
  o 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 and Livelihood" (DESH) portal
  o System should be able to give information in a secure way and also adhere to the data privacy guidelines, laid by the GOI
  o The LMS should be flexible enough to create NOS based qualifications and provide information based on NOS based compliance
  o Product should have the basis built-in governance for role management.
  o 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 and Question Bank
   b) Should allow the following features in Questions
      - Questions Randomization and NOS based question
      - Possibility to create questions of different difficulty levels
      - Ability to use Images/Media/Map in the questions
      - Facility to Create Multi-Skilling, Cross-Function Skilling Assessment
      - Ability to add Case Studies (Scenario based questions) and 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
   e) Should enable integration to LMS to support formative assessment, as required
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 and Image format, Screen Zoom, Word Zoom and Image Zoom functionality
   c) Low vision (LV) or visually impaired (VI) candidates: Questions and Answers in Audio format, Screen Zoom and Word Zoom functionality
   d) Intellectual disability (ID)-Questions and Answers in Text format, Questions and Answers in Video and Image format, Screen Zoom, Word Zoom and Image Zoom functionality
   e) Speech and Hearing-Impaired people (SHI): Questions and Answers in Text format, Questions and Answers in Video with text caption and Image format, Screen Zoom, Word Zoom and 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 and Privacy Guidelines**
   a) Data Encryption as required in transmission and 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 and 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 and Realtime Audio/Video feed
   f) Geo location with time stamp tracking
   g) Face Authentication and  Multiple Face/ Device Detection during assessment time using AI
   h) Product should be user friendly and support the difficulties faced at remote locations. It may support a combination of off-line/online version to address that.
7. Usage of Bloom Taxonomy for Creation of Question Bank may be done and the product should also be built with Brower and device tolerance

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

- **Augmented Reality (AR)/ Virtual Reality (VR)/ Extended Reality (XR):**

  **Augmented reality (AR)** is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory. *(Reference: Wikipedia)*

  **Virtual reality (VR)** is a simulated experience that can be similar to or completely different from the real world. Applications of virtual reality include entertainment (particularly video games), education (such as medical or military training) and business (such as virtual meetings). *(Reference: Wikipedia)*

  **Extended reality (XR)** is a term referring to all real-and-virtual combined environments and human-machine interactions generated by computer technology and wearables. *(Reference: Wikipedia)*

- **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 leaning 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, and Regular Updates etc.

- **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

- **Video – Instructional:** A recording of moving visual images that show real people, places and things that enable students to learn skills or knowledge.

- **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.

- **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.

- **Animation:** The animations visually and dynamically present the concepts, models, processes, and/or phenomena in space or time.

- **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 and weakness, leading to higher engagement levels of learner.

- **Development Tool:** Software development applications platforms for authoring technology-based resources (e.g. web sites, learning objects, apps.).

- **Hackathon:** Hackathons can be presented as competitions, celebrations or as any other mode that focus on active engagement of the participants. This enhances the effect of delivery of education and training. While organising Hackathon, one should remember to have: a clear purpose, a dedicated team and committed organiser.

- **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.

- **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.

- **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.

- **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.

- **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.

- **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.

- **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.

- **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.

- **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 and sharpening the hand skills.

- **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.

- **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.

- **Quiz/ Test:** Any assessment device intended to evaluate the knowledge and/or skills of learners.

- **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.

- **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.

- **Social Networking Tool-** self-identified user groups for the purpose of sharing information, calls for actions, and reactions.

- **Reference material**

    o   **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.

    o   **Reference Material:** Subject specific directories to other sites, texts, or general information are examples.

    o   **Collection:** A meaningful organization of learning resources such as web sites, documents, apps, etc. that provides users an easier way to discover the materials.

    o   **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.

    o   **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