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**BlueMentor**

*Innovative Quality Mentoring program for development of a Blue Competence Framework in fin-fish production*

**D1.1 Learning outcome protocols**

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# Summary

**Overview**

Learning outcomes that are underpinned by recognized ‘Occupational Standards’ have a potentially important role to play within collaborative VET development and the harmonization of aquaculture qualifications. They can provide a clear framework to guide non-formal and formal VET development at company, national and potentially European level and can be presented in a range of formats. Although the development of Occupational Standards has evolved in different countries according to various methodologies, the use of Learning Outcomes is prevalent throughout European VET systems, offering a suitable basis for shared frameworks to support collaborative VET development.

**Definitions of occupational standards and competence**

Although to many, ‘competence’ is a non-technical term, various education authorities, agencies and academics have provided a range of definitions, some of which have evolved to become influential within European VET design. Most occupational standards refer to ‘competence’ as an important parameter. The published literature confirms that ‘competence and professionalization’ are inexorably linked and that definitions of competence have driven VET development in many well-established industry sectors.

The European Qualifications Framework (EQF) provides a basic ‘translation tool’ that can support the recognition of equivalent qualifications between countries, and it includes competence as an important parameter. However, wherever the methodology for the development of occupational standards is deficient or absent within a country, the reliability of an EQF driven recognition process is diminished.

**Recommendation**

The Learning Outcomes prevalent across Europe can be restricted to simple definitions of the knowledge, understanding, skills and competence (degree of autonomy) required to undertake defined tasks.

As most companies working with the BlueMentor VET partners are Norwegian owned multi-nationals and have Standard Operating Procedures (SOPs), they could provide common task definitions, to inform the development of a framework of shared Learning Outcomes (FSLOs).

The FSLOs can then be used to inform the development of a more flexible unitized curriculum, shared by Blue Mentor VET providers and ultimately with others in northern Europe delivering Aquaculture NQs to unqualified employees in the workforce.

However, prior to the creation of the FSLO construct, as the VET system in Norway and Iceland is not currently Unitized at national level, the partners must select their preferred Learning Outcome protocol and style of presentation. This is not possible without full consideration of the purpose and application of LOs within Unitized VET programs, and a full knowledge the other components of a Unit that are relevant to the development and delivery of a Unitized curriculum constructed from Learning Outcomes. This paper provides the information needed, with examples so as a well-informed choice can be made.

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# Chapter 1: Key concepts definitions and methodology

Occupational profiles can be created to describe the knowledge, skills and competences required to fulfill a defined role. Based on previous research within BlueEDU, employer expectations may differ between countries regarding responsibilities and the degree of autonomy at each occupational level. For example, the husbandry operatives on a Norwegian cage farm are expected to be able to undertake tasks normally undertaken by the site manager during any periods of absence. They also appear to be more involved in farm data collection and analysis. Whether such distinctions exist between Norwegian and Icelandic operatives requires clarification during the development of a Common Competence Framework (CCF) for finfish aquaculture.

Once a ‘Common Competence Framework (CCF) has been established, to define employer expectations in the partner countries, it can be referred to by VET designers to create a ‘Shared Framework of Learning Outcomes (SFLOs). This will allow the common ground between Aquaculture VET in each partner country to be defined, providing a sound basis for collaborative VET development.

## 1.1 Competence

Competence is broadly associated with what a person can do. Standards and frameworks addressing competence have been associated with signing off practitioners as ‘fit to practice’. Questions have been raised in the past regarding how well the daily reality of work is represented by the ‘skills or attributes’-based models that prevail. Consequently, capability-based models that take account of changing contexts, evolving practices and ethical demands have evolved more recently. The definitions of capability, although less tangible in nature, are beginning to have some influence on the evolution of ‘competence profiles’ for many professions.

Within aquaculture, competence definitions have tended to be task orientated in nature. However, recent BlueEDU qualitative survey work in Mid-Norway indicates that less tangible capabilities, such as collaboration, problem- solving and the use of initiative, are coming to the forefront within some companies. They are harder to define, and more challenging when it comes to forming reliable assessment strategies within a VET system. Some aquaculture employers have already recognized this challenge, acknowledging that assessing a learners theoretical understanding using traditional examinations, will be of limited practical benefit when addressing such capabilities. In addition, it is becoming clear that effective work-based assessment will be essential to gathering reliable evidence of capability-based competences, which is behavioral in nature, and can only be revealed by regular and astute observations of learners by experienced and well-trained managers. To ensure the judgements of different managers is consistent and fair, reliable assessment standardization and quality assurance systems become paramount.

Some competence definitions refer to ‘degrees of autonomy’ as a major determinant of ‘skills based’ competence. This is registered in practice by the level of supervision required to apply a skill, or skill set, to carry out a task. This principle is reflected in the European Qualifications Framework (EQF) which refers to ‘responsibility and autonomy’. (See Appendix 1)

From a practical perspective, the evaluation of a person’s competence can be achieved by placing their ability to undertake a ‘specified task to a required standard’ on the following scale:

1. The skill(s) required to complete the task need further development,
2. the skill(s) can be applied to complete the task under supervision,
3. the skill(s) can be applied to complete the task with limited supervision
4. the skill(s) can be applied to complete the task without supervision, and
5. can supervise others applying the skill(s) to complete the task.

The various philosophies and approaches that have been applied to defining competence have been evaluated in a study by Stan Lester and are summarized below.

**Table 1**: Definitions of competence according to Stan Lester: Professional Standards, competence and capability.

|  |  |  |  |
| --- | --- | --- | --- |
| Approach | Primary sources | Development methodologies | Format |
| Internal individual attribute-based competence |
| **Technocratic** |  | Derived from knowledge base or course syllabus | Tasks expressed as application of knowledge |
| **Instructional design** | Draws on blooms et al taxonomy | Job analysis, learning needs analysis | Table of knowledge skills and attitudes associated with the job |
| **Behavioural** | McBer organisation and associated authors eg. McLelland, Spencer and Spencer, Kemp | Behavioral event interviewing, Critical incident analysis, repertory grid technique | Behaviors approaches and dispositions, associated with effective job performance |
| External, social activity-based competence |
| **Task based** | Early UK Manpower Services Commission (MSC) Agency models | Task analysis | Descriptions of tasks and their component parts |
| **Role based** | Mansfield-Mathews job competence model and subsequent analysis | Functional Analysis | Descriptions of job functions and detailed activities within them |
| Job analysis, analysis of roles across professions | Descriptions of broad functions and key activities within them |

Europe has followed the UK lead this century with the adoption of processes for the development of occupational analysis. Latterly within the UK, functional analysis methodology within role-based approaches has been the most influential, having superseded early task analysis approaches deployed in the 1980s. This methodology led to the development of National Occupational Standards (NOS) in Aquaculture underpinning the Scottish Modern Apprenticeship (MA) in Aquaculture, the only National Qualification (NQ) available currently. The knowledge and skills associated with aquaculture at each occupational level are defined within the MA Units.

In summary, whilst skills-based competence systems remain very relevant to aquaculture, due to their practical and applied nature, capability-based definitions are gaining recognition and widening the scope. This is being reflected by some Quality and Human Resource Managers within larger aquaculture companies as they devise their own competence definitions and start to recognize the importance of less tangible capabilities, which are more transversal, such as ‘soft skills’.

## 1.2 Standard Operating Procedures (SOPs)

The production of finfish for the high-volume export markets is dominated by large multinational companies. Consequently, because they employ hundreds of staff across multiple farm sites, most have devised Standard Operating Procedures (SOPs), designed to underpin and control the operational management of fish production and processing from ‘egg to plate’. All activities are highly regulated, and quality assured to satisfy a multitude of criteria, largely driven by stringent food safety and animal welfare requirements imposed by legislation and the quality assurance (QA) requirements of a large and powerful food retail sector. There-fore, consistency in the way all tasks are conducted on the farm and in the fish processing facilities is paramount, alongside record-keeping to ensure the accountability and traceability of every step of the production process.

Many tasks involve the operation of increasingly sophisticated equipment and digital technologies. Therefore, as technology advances, SOPs need to be updated. The technology supply companies can support farms in the updating of SOPs when introducing new equipment. However, the process being undertaken is effectively a ‘task based’ analysis, as described in the table in Section 2.1. The SOP definitions, once developed, remain the intellectual property of the company.

Although a well-defined set of SOPs will define tasks that are often species, and/or technology specific, they will not always determine who is responsible for each component of the task. In the past some companies in Scotland have taken the next step in the continuum, allocating tasks to roles, thereby completing a competence/skills profile for each occupation that exists within their business.

1.3 National Occupational Standards (NOS) underpinning National Qualifications

Occupational/job profiles are a complete description of the knowledge, skills and competences required to undertake the tasks and responsibilities required to fulfil the role. Once every occupation within a sector has been defined in these terms, that sector then has a National Occupational Standard (NOS) covering all occupational levels to inform the design of National Qualifications (NQs).

In some, but not all countries, the national VET system demands that National Occupational Standards (NOS) are produced for each sector to inform the development of NQs. For the public-sector agencies organizing the standards development committees and task groups, effective employer representation is a real challenge. Ideally, all vested interests, including both small and large companies should have a voice in the process.

## 1.4 **Learning Outcomes (LOs)**

Recognition of the inherent advantage of Learning Outcome (LO) based VET systems has swept Europe, despite reservations having been expressed by some leading education experts, including Declan Kennedy. [13] The use of LOs has now been incorporated within VET systems by most EU member states over the last decade. Many of those countries have also converted to a Unitized system, whereby each Unit is composed of defined LOs.

### 1.4.1 Prescriptive LOs

In some systems, such as those in Scotland, Ireland and Finland, LOs are relatively prescriptive and can have associated performance criteria and assessment requirements that are mandatory. Proponents of such systems claim that whilst being standardized, quality assured and prescriptive, at provider level, they can and do remain responsive to local employer and individual learner needs, as NQ delivery can be customized. This is the principle upon which the Scottish MA in Aquaculture is founded, an NQ that can be achieved by a husbandry operative whether shellfish or finfish farming and working in the hatchery or on-growing site. This high degree of flexibility is achieved using a ‘mandatory and optional unit structure’, allowing a high degree of choice and by referring to company SOPs in the standards, as opposed to contravening them. Therefore, any farm can use the framework to support its staff development program, increasing the NQs accessibility, particularly if the delivery system supports individual learning and assessment plans.

### 1.4.2 Broadly defined LOs

Conversely, in the Norwegian VET system, learners and teachers are expected to address all 36 LOs, to equip them for any role in the fish farming process and it cannot be delivered in a narrow ‘farm specific’ context. The aquaculture curriculum consists of 3 main modules: *operation and production (17 LOs), farms and techniques (9 LOs), and farming and environment (10 LOs).* The LOs are broadly defined, aligning with the descriptions of the aquaculture curriculum. However, although all LOs are mandatory, the VET schools can give priority to some over others, by spending additional time on them.

The LO defines the knowledge, understanding or skill that will be gained by the learner, as a direct result of the learning activity, whatever its nature. Therefore, LOs reflect the NOS, where they exist. Some VET systems, as exemplified by Ireland, lack NOS within their system, but nevertheless, employers are involved with VET providers in developing a Unitized VET, which serves a similar purpose of alignment with industry standards.

In effect, occupational standards can be expressed as NOS at national level, SOPs at company Level, and reflected within Learning Outcomes at national and/or local level. The availability of each in the north European countries is summarized below in Table 2 and elaborated further in Appendix 3.

**Table 2** – Overview of the derivation and application of Aquaculture Occupational Standards

|  |  |
| --- | --- |
| **Country** | **Occupational Standards** |
| Aquaculture NOS | Learning Outcomes | SOPs Company level |
| Norway | **No.** Companies may influence VET providers locally to prioritize some of the LOs, but all LOs must be delivered.  | **Yes,** but LOs are defined in broad terms at national level and interpreted in more detail locally in collaboration with industry. | **Yes**, and linked to QA and company training |
| UK(Scotland) | **Yes** | **Yes**, NOS are reviewed by industry and inform NQs. Options structures offer learners and employers flexibility | **Yes** |
| Ireland | **No**, but standards are set in VET | **Yes,** and industry are involved in development | **Yes** |
| Finland | **No**, but Industry is involved in VET design | **Yes**, a flexible LO based VET system.  | Don’t know |
| Faroes (Denmark) | **No** | **No**  | Don’t know |
| Iceland | **No** | **Yes** LO’s are used. It may not be a Unitized VET system | Limited industry footprint currently |

In summary, whilst NOS are lacking in all north European countries, other than Scotland, most countries do deploy Learning outcomes (LOs). Despite a checkered history, the industry led NOS in Scotland has informed the development of credible work-based NQs. By comparison, in Ireland the VET develop within their NQs development process does not include a NOS stage. However, the development of a unitized NQ based on Learning Outcomes, stating what ‘learners should know, understand and be able to do’, achieves the same purpose in practical terms.

## 1.5 European Qualifications Framework (EQF)

The EQF is an interpretation tool, allowing different qualifications to be compared by determining the level of knowledge, skills and competences required to satisfy the Learning Outcomes.

This is defined in the following terms by the EQF system:

* Knowledge is described as theoretical and/or factual
* Skills are described as cognitive (involving the use of logical, intuitive and creative thinking), and practical (involving manual dexterity and the use of methods, materials, tools and instruments)
* Competence is described in terms of responsibility and autonomy.

The EQF, as fully defined in Appendix 1, will be applied to the process of identifying qualification equivalencies, as required to complete the VET supply analysis. The inclusion of competences within the EQF that are defined according to levels of autonomy, reflect the reality of the aquaculture workplace. This helps to make the EQF a useful common denominator when deriving qualification equivalencies

# Chapter 2: The role of occupational standards

Some detractors claim that a NOS will always be of limited value, as it can quickly become outdated. This can be a real issue. For example, in the UK (Scotland) the Aquaculture NOS went through a phase of evolution in the late 90’s that led to a ‘species-specific’ NOS for every species of farmed finfish. This became unsustainable, and today the UK (Scottish) NOS have moved to the other end of the spectrum and are very generic, to the extent that shellfish and finfish are catered for within the same standards.

A NOS written in broad, generic terms, does not date so quickly, as specific details can be referred to in standards. It is typical for a generic NOS to be informed by the following:

1. Industry Codes of Good Practice,
2. Technical Certificates, offered by a recognized awarding body, and
3. Company Standard Operating Procedures (SOPs)

Whilst (a) and (b) are consistent at national level, company SOPs’ can and do vary, to some degree, although they should reflect the Codes of Good Practice and Quality Assurance (QA) requirements. However, there are common denominators, as the cage farming industry across Europe is dependent on the same service sector companies, irrespective of the species farmed in many cases. For example, commercial feed companies provide balanced diets for a wide range of finfish commercially farmed in northern and southern Europe. Although fish feeding behaviors vary between species, the principles of feeding regimes, feed distribution, growth and food conversion, do not. This is one amongst various examples implying that significant common ground exists and could be defined.

Consequently, the aquaculture service sector, which includes companies supplying consumables, such as health products and feeds, and others supplying equipment and technology, is well placed to provide a valuable input to the definition of occupational standards. Arguably, it is in their interests to ensure that their aquaculture clients get best value for money from their products. In the case of equipment and technology, customer support costs could be reduced by suppliers through well designed VET, which may provide them enough incentive to get involved. If farm operators are well trained in the operational requirements of their equipment, this minimizes the risk of accidents, damage and sub optimal performance, to everyone’s benefit.

## 2.1 Legislative compliance

By its very nature, fish farming is an activity with the potential to threaten human health and safety, the aquatic environment, including its flora and fauna, and animal (fish) welfare, to varying degrees. Europe is a sophisticated society and the public demand a wide range of reassurances, whether they consume fish or not. Consequently, the industry has become a highly regulated food producer. Therefore, by implication, the European and national legislative framework has a strong direct and indirect influence on occupational standards.

Aquaculture equipment is getting larger and more sophisticated, and requires specialized operators who have been trained, assessed and certified by a recognized awarding body, to prove their competence. This is exemplified by the operation of work boats, radio communications and land-based vehicles, such as fork-lift trucks, all of which require certificated operators.

## 2.1 Codes of Good Practice (CoGP)

Some CoGP can be very comprehensive, specifying precisely what fish farms are legally obliged to comply with, as well as providing good practice guidelines across a wide range of core fish farming activities. As an example, the Scottish salmon farming CoGP made available for the Scottish Salmon Producers Organization include a chapter on Seawater farming, which runs to nearly 50 pages.

The scope of this chapter incudes sections on:

1. Documents and training
2. Food safety and consumer assurance
3. Fish Health and biosecurity
4. Managing and protecting the environment
5. Fish welfare and care
6. Feed and feeding

As all company SOPs must be compliant with all legally binding directives, well established Codes do provide a source of information that can be compared across countries. As many directives are driven by the same European statutes which are reflected in national statute, before being specified in the Codes, one would expect a high level of commonality. To keep the industry compliant, it is common for CoGP to be kept up to date by the national producer organizations, making then a very useful source of information when comparing and defining standards. For this reason, many in industry will place a much higher significance on them than they do on the NOS. The most enlightened will understand that the CoGP are often referred to in the NOS, thereby indirectly keeping it up to date whenever the CoGP is updated.

## 2.3 Quality assured fish production

The aquaculture industry is a producer of fish products for the powerful food retail sector, it’s main buyer. This necessitates a plethora of quality assurance (QA) standards. For example, in Scotland there are approximately 16 QA schemes that the salmon farming industry complies with, and many of these will have a direct influence on company SOPs. The aim of most food retail QA schemes is to provide reassurance to consumers, and this is achieved by imposing contractual demands on their fish suppliers QA system. This is one of the most important factors indirectly driving the design of company training (non-formal VET) and connects occupational standards to the real challenge industry faces when preparing documentation for multiple audits.

This is exemplified by the Salmar company in Norway, who will only deploy staff for a fish farming operation who have documented skills and competence derived from either, in company training, their NQ, or certification from a provider of specialized technical training. All staff skills and competences are registered on their QA and HR system.

Today, the fish-eating consumer wants to eat fish that is nutritious, tasty and safe to consume, necessitating accountability and traceability from ‘egg to plate’. However, it does not stop there, as many consumers are also looking for reassurances regarding the responsibility producers demonstrate towards the environment and animal welfare, leading to the incursion of other schemes such as ‘Freedom Foods’ and Organic Food standards for certain ‘niche’ markets. Both in company training (non-formal VET) and National Qualifications (formal VET) informed by NOS or their equivalent, must be fully aligned to all QA requirements that companies have to comply with.

**Table 3** Source information for documented aquaculture Occupational Standards

|  |  |  |
| --- | --- | --- |
| **Source information** | Countries | Comments |
| Aquaculture National Occupational Standards (NOS) | UK (Scotland) | The UK (Scottish) NOS were revised in 2016. Industry were consulted, but some of the main producers did not actively participate. |
| Aquaculture NQLearning Outcomes | UK (Scotland), Ireland, Norway | Norway has defined 36 LOs at national level. The descriptions are’ broad brush’, aligning with the descriptions of the national aquaculture curriculum adopted by 12 public and 2 private upper secondary schools at regional level. In addition, useful LOs may be revealed in other BlueEDU countries VET systems. |
| Codes of Good Practice(National CoGP) | UK (Scotland), Norway | The CoGP are very comprehensive in Scotland. |
| Standard Operating Procedures(Company SOPs) | UK (Scotland), Norway, Ireland. | SOPs are driven by QA requirements and the need for the safe, effective operation of equipment/technology.  |
| Quality Assurance Schemes | UK (Scotland), Norway, Ireland, Faroes | Many, but not all requirements, have been subsumed within CoGP where these exist.  |
| Operator Certification  | UK (Scotland), Norway, Ireland, | The certification of specified operations is under legislative control, such as boat handling. |

# Chapter 3: Learning outcome protocols

During discussions with industry members it has become apparent that fish producers must be well prepared, legally compliant and up to date with their associated documentation to cope with multiple audits. These requirements have driven the development of company SOPs and many in company training schemes (non-formal VET) focus on training their operators to comply with SOPs designed that address all forms of external regulation.

For any Aquaculture NQ to be respected, there must be a consistent linkage between the ‘quality assured assessment process’ leading to NQ completion and the company SOPS (that reflect the legislative and QA requirements governing salmon farming). Whenever industry members act as representatives on NOS and VET development committees, it is usually their own company SOPs at the forefront of their minds. (Based on personal observation by the author whilst working in Scotland)

The industry is most interested in the ‘practical competence’ of their staff, which to many simply means they can conduct the tasks within their defined role, safely, timeously and according to company SOPs, thereby remaining legally compliant. Any conversation with industry partners about education and training will commonly refer to definitions of competence. Therefore, within ‘BlueMentor’, the development of a Common Competence Framework (CCF) that all industry project partners support and endorse would be a major advantage to the project.

Once in place, a Framework of Shared Learning Outcomes (FSLO) representing the knowledge, understanding and skills learners need to gain can be formulated with reference to the framework of competences industry partners have endorsed. Once created, the FSLO can then be referred to by VET development teams, to underpin the development of a VET resource that can be shared across many aquaculture countries and ultimately aggregated into Units which could also be shared.

As each Unit will be composed of defined learning outcomes, the protocols for expressing learning-outcomes (LOs) must be agreed by partners at the outset before shared LOs can be developed. There are many European countries now using LOs, however in practice the style, format, quality and practicability of LOs for underpinning a quality assured assessment process is highly variable.

Within the most mature national VET systems, the description of LOs has become more structured condensed and prescriptive. This encourages brevity, clarity and unambiguity which makes the task of standardization and quality assurance of assessment (continuous and final) much easier for all actors to manage. The focus should be on the outputs from VET (achievement of LOs) and not the inputs (curriculum/syllabus). The latter can be safely left to the experts to define and well-designed NQs allow flexibility to accommodate the variable needs of learners and employers, without compromising the integrity of the NQ.

## 3.1 The anatomy of a Unit

In many European VET systems, Units are the building blocks of National Qualifications (NQs) and must have integrity, necessitating a quality assured LO driven assessment process, which every learner can access and complete. Whilst the nature, style, presentation and purpose of Units within NQs can vary between different national systems, most are founded on LOs. All types and styles of LOs have evolved, and the best are brief, unambiguous and accurately defined. To achieve this level of clarity, the LO methodology must be standardised before an SFLO (see above) can be created by partners.

Some Unit styles are more specific than others and the purpose of each component needs to be defined and understood by all actors within a VET delivery and assessment process. Examples are illustrated by the exemplar Units provided, two from the Scottish system and one from Malta, for partners to consider. They contain examples of the following components.

### 3.1.1 Purpose statement (or aim of the Unit)

Provides a summary of the knowledge and skills that learners will gain from the Unit and its occupational level. This statement is normally made in a short paragraph of several sentences at the beginning of the Unit descriptor. This is exemplified by the SQA HNC Unit in Fish Health provided.

### 3.1.2 Learning Outcome (LO)

The Learning outcomes define what the learner ‘must be able to do’ on completion of the Unit and provide the framework. Some outcomes are ‘cognitive’, whereas others require the learner to develop and apply practical skills.

1. Cognitive

There are two main types of cognitive LOs; one requires learners to demonstrate their knowledge and understanding, and the other requires them to apply knowledge and understanding to the completion of a cognitive task.

In both cases it is good practice to keep the learning outcome short and to pay attention to the ‘active verb’ as this determines the nature of the LO and its level. Blooms taxonomy provides a hierarchy, within which active verbs can be positioned, from those that are simple and straightforward, to the more demanding.



* Knowledge and understanding

 At the lowest level, the hierarchy may be exemplified by; ‘name’ and ‘state’, through to verbs which have more demanding connotations, such as explain and evaluate. In each case the active verb has implications regarding the depth of knowledge and understanding implied and the evidence needed to demonstrate the LO has been achieved. At the bottom of the hierarchy, written evidence may be provided in one word, for example to ‘name’, where as to ‘explain’ (which is higher up the hierarchy) is more challenging. This may require a more extensive response, depending on the breadth and complexity of the concept and/or subject.

* Application of knowledge and understanding

For the application of knowledge and understanding a hierarchy of active verbs presented in order of increasing difficulty may be exemplified by: ‘calculate’, ‘analyse’, ‘evaluate’, ‘formulate’ and ‘develop’. However, the nature of the task has a considerable influence on the level of difficulty. For example, to “calculate how many years have passed since the ‘big bang’ created the universe” is a much for challenging LO than “develop a feed schedule for a population of farmed finfish”. This can turn the hierarchy on its head in terms of the level of difficulty!

In practice, an analysis of the cognitive tasks undertaken within a vocation at each occupational level ensures effective levelling and alignment within national qualification frameworks.

Generally, cognitive tasks do not require any practical facilities. For example, the learning outcome “develop a feed schedule for a population of farmed finfish” does not require access to a fish farm but would benefit from access to a PC and spreadsheet.

1. Practical

Practical skills based LOs generally require access to facilities in order to generate the evidence required to demonstrate that the LO has been achieved. For some NQs it is acceptable to demonstrate the outcome through simulation or within demonstration scale facilities. Other NQs, such as the Scottish MA in Aquaculture, specify that practical outcomes must be demonstrated on a commercial farm and only allow simulation for a minority of specified tasks. These are important details to consider when LOs are being developed and written.

Assist, contribute to, conduct, supervise, manage are active verbs presenting in an ascending hierarchy, and each gives a clear indication of the level of challenge involved. To assist with a task is a relatively rudimentary requirement, one step beyond work shadowing. There may be some aspects of the task that can be assisted whilst others cannot, and this is important to specify in the ‘evidence of assessment (See later)

The level of autonomy required increases as one moves from EQF 3-6. Typically, conducting tasks assisted and unassisted is reflected in those definitions at the lower end of the EQF spectrum, whereas supervising others to undertake a task is at the higher end. The level of autonomy is integral to the competence that learners are required to provide evidence for, in order to demonstrate the LO has been achieved.

### 3.1.3 Performance criteria and skills statements

These two terms, performance criteria and skills statements are interchangeable and carry the same meaning. Whichever term is used in Unit descriptors, any skills that must be demonstrated in order to satisfy specific LOs, must be described clearly and unambiguously, so as they are not open to different interpretations by different assessors. Skills can be described by single sentence statements, and brevity is to be encouraged.

For example, this skills statement from the Scottish HN Unit on Fish Health is short and precise; ‘*Recommend disease management and treatment options*.’ However, in order to assess this skill, an assessor would need further specification, which can be provided as assessment evidence (See below).

 Commonly, practical skills statements refer to industry standards or Site Operating Procedures (SOPs), as exemplified by this performance criteria from the Scottish MA in Aquaculture Units: ‘*Monitor fish for the presence of disease or parasites in accordance with industry standards’*.

As described above, in most cases companies align their SOPs to the same industry standards referenced within performance criteria/skills statements.

### 3.1.4 Assessment Evidence

The assessment evidence provides a definition of the nature and amount of the evidence required to meet the standards in the Unit. For example, the evidence requirements for the skills statement referred to above from the SQA HN Fish Health Unit is as follows: ‘*Recommend one appropriate disease management option for any two of the following four disease conditions – bacterial, fungal, internal parasitic, external parasitic*.’

In addition, assessment guidelines are provided:

* ‘*This outcome could be assessed using performance evidence recorded on an observation checklist.*
* *The candidate should also submit clear and accurate records of all disease diagnoses*.

By interpreting the skills statement, evidence requirement and guidelines, it is clear what the learner must demonstrate to the assessor and how this is demonstrated. Although this approach to skills assessment is brief and prescriptive, it can also allow for flexibility. The above example from the HN Fish Health Unit provides a choice of two from four disease conditions and does not specify which specific diseases need recommended disease management options.

This allows the skill to be demonstrated in a lot of different situations and there are no unreasonable barriers to achievement, so long as the learner can have access to farmed fish stocks that are diseased on two occasions.

### 3.1.5 Range (or Scope statement)

Some Units use ‘range or scope statements’, in order to be more specific and/or prescriptive. The ‘range statement’ is often applied to a single word. For example, if it were considered essential that the learners were assessed in recommending disease management options that included vaccination as well as the addition of chemicals to the water and food, these three options could be specified through a range statement, as follows:

Disease management options: must include one example of each of the following, vaccination, chemicals added to the fish-feed and the addition of chemicals to the water.

This additional prescription means that all three types of treatment must be addressed at least once which ensures a greater diversity of disease management methods must be demonstrated, leading to a broader skills base. Range statements were part of the SQA system for many years but were dropped in favour of providing a more comprehensive prescription within the ‘assessment evidence’ (See above), which can be more challenging for Unit writers.

### 3.1.6 Core skills

Core skills can be flagged within Units in various ways, using a lighter touch or a more onerous prescription. For example, in the HN Fish Health Unit ‘the opportunities for core skills development are cited, stating which skills can be developed and to which SCQF level. However, it also makes clear that those skills are not automatically certificated by SQA, and if certification were needed. Learners would have to be entered for the appropriate SQA Core Skills Units. Within the SQA system the suite of core skills, numeracy, communication, ICT and working with others are all included.

Within the Maltese system the following core skills are specified as ‘being mastered’, communication, judgmental and learning. The way this can be demonstrated and the LOs offering those opportunities are specified in a matrix, providing a lot of definition for tutors and assessors to work to. (See MCAST Unit – Understanding Fisheries Management)

Conversely, the Scottish MA in Aquaculture makes no explicit reference to core skills development in the Unit descriptors and is silent in this respect.

### 3.1.7 Unit guidance

Within most systems guidance statements are non-mandatory and offered to assist tutors, instructors and assessors, regarding a wide range of matters, including subject context, approaches to assessment and core-skill development, delivery methods, resources and recommended reading lists. This is illustrated below in the Table – Unit Anatomy Comparative table.

**Unit Anatomy – Comparative table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Unit components** | Scottish MA  | Scottish HNC  | MCAST Diploma |
| Purpose statement (overview or summary) | ✓ | ✓ | ✓ |
| Learning Outcomes | ✓ | ✓ | ✓ |
| **Performance** |  |  |  |
| Performance Criteria | ✓ |  |  |
| Skills statements |  | ✓ |  |
| **Knowledge** |  |  |  |
| Knowledge statements |  | ✓ | ✓ |
| Knowledge and understanding | ✓ |  |  |
| Applied knowledge and understanding |  |  | ✓ |
| **Core skills** |  |  |  |
| Core skills delivery statement |  | ✓ |  |
| Communication skills |  |  | ✓ |
| Judgmental skills |  |  | ✓ |
| **Assessment**  |  |  |  |
| Assessment criteria |  |  | ✓ |
| Evidence requirements |  | ✓ |  |
|  |  |  |  |
| Glossary | ✓ |  |  |
| Range/Scope statement |  |  |  |
|  |  |  |  |
| **Guidance/Support** (non-mandatory) |  |  |  |
| Recommended prior knowledge and skills |  | ✓ |  |
| Content and context |  | ✓ |  |
| Guidance for teaching and assessment |  | ✓ | ✓ |
| Opportunities for developing core skills |  | ✓ |  |
| Delivery (breakdown)  |  |  | ✓ |
| Assessment activities (methods) |  | ✓ | ✓ |
| Self-study (non-guided learning) |  |  | ✓ |
| Resources |  |  | ✓ |
| Reading lists (Texts, journals and web-sites) |  |  | ✓ |

## 3.2 Selecting a protocol for Learning Outcomes (LOs)

From section 3.1 above it is apparent that protocols for Learning Outcomes can not be considered in isolation from the rest of the Unit specification which underpins the NQ and reflects the ethos of the national VET system.

There are some aspects that all LOs have in common. They define and prescribe the output of the learning or in other words ‘outcome’ and have assessment implications, which are prescriptive to varying degrees within different Unitized system, regardless of the balance chosen between continuous and final assessment.

The following Unit examples provided to support this paper should be referred to and demonstrate different strengths and weaknesses. The LOs and their associated prescription, vary in style, the level of details and comprehensiveness, with some more.

* Scottish Level 2 MA Aquaculture Unit in Feeding fish (EQF3)
* Scottish Higher National Certificate Unit in Fish Health (EQF4)
* Maltese Unit from the MCAST Diploma in Fish Management – Understanding Fishery Management (EQF4)

The Scottish MA Unit is the simplest format and simple lists the performance criteria (what the learner must be able to do) followed by the Underpinning Knowledge. However, the knowledge statements vary greatly, and the delivery team are left to determine the boundaries for themselves, which can lead to considerable variations in interpretation between different Scottish Aquaculture VET providers and practitioners.

The Scottish HNC Unit in Fish Health is a good example of minimalism, “how to say a lot in a few words”. Although practicing brevity, the evidence requirements leave little room for alternative interpretations (unlike the MA), making this a very good and relatively simple format, if the main aim is harmonization or standardization.

The Maltese Unit style is very comprehensive and provides a lot of educationally useful design prescription regarding the development of transversal cognitive skills (such as judgement and communications) and through use of well-designed matrices, shows which LOs lend themselves to the development of these skills. The assessment requirements are also comprehensively defined. IN addition, this comprehensive style of Unit lends itself to the development of associated ‘tutor support packs’, that could be developed by the partnership and shared, an example of which has been provided.

### 3.2.1 Selecting or creating the optimal specification

In summary, whilst Learning Outcomes (LOs) are at the heart of all the examples provided, there are significant differences in their presentation, ‘precision’ and comprehensiveness. Currently, Iceland and Norway do not have Unitized National VET system, and therefore, any move towards Unitization is a choice made at the institutional level, selecting a style of Unit to suit the partnerships short and longer term purpose, or hybridizing styles to create a new and more suitable variation.

However, as the BlueMentor aim is to create a system within which LOs can be defined and aggregated to form frameworks that are shared to support collaborative VET development and harmonization, it is important that partners consider and discuss the options carefully, before making their selection.

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# Appendix 1 - European Qualifications Framework (EQF)

**The 8 levels of EQF**

Defined by a set of descriptors indicating the **learning outcomes** relevant to qualifications at that level in any system of qualifications

| **EQF Level** | **Knowledge** | **Skills** | **Competence** |
| --- | --- | --- | --- |
|  | In the context of EQF, knowledge is described as *theoretical and/or factual*. | In the context of EQF, skills are described as*cognitive* (involving the use of logical, intuitive and creative thinking), and*practical* (involving manual dexterity and the use of methods, materials, tools and instruments) | In the context of EQF, competence is described in terms of *responsibility and autonomy*. |
| Level 1 | Basic general knowledge | Basic skills required to carry out simple tasks | Work or study under direct supervision in a structured context |
| Level 2 | Basic factual knowledge of a field of work or study | Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools | Work or study under supervision with some autonomy |
| Level 3 | Knowledge of facts, principles, processes and general concepts, in a field of work or study | A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information | Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems |
| Level 4 | Factual and theoretical knowledge in broad contexts within a field of work or study | A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study | Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities |
| Level 5[1] | Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge | A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems | Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others |
| Level 6[2] | Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles | Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study | Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups |
| Level 7[3] | Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or researchCritical awareness of knowledge issues in a field and at the interface between different fields | Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields | Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams |
| Level 8[4] | Knowledge at the most advanced frontier of a field of work or study and at the interface between fields | The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice | Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research |