

## *Optimized Training - Innovative Methods and tools for Acceptance of prior Learning in qualifications and workplace training*

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### O3-A1

## Vocational Education and Training providers and fish farming industry opinion about recognition of prior learning in qualifications and certification

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## Executive summary

Following a comparative evaluation of the Norwegian and Scottish VET systems to ensure that the VET national context, regulations and practices were fully understood, consideration has been given to the role and benefits of RPL adoption within aquaculture VET. Thereafter, an in-depth comparison of the aquaculture VET systems currently operating in each country revealed significant differences in delivery modes and assessment processes. Norway's mainstream aquaculture VET is founded on 2 years of school-based VET delivery prior to progression to a 2-year apprenticeship. Whilst Scotland currently relies on non-formal in company VET and the Modern Apprenticeship system for both school leavers (16 years old and above) and mature learners.

However, despite the different regimes in operation, both countries share a strong interest in the application of e learning to improve access to Nationally Recognised Qualifications (NRQs) and to help learners develop the knowledge required to complete their respective NRQ. Norway is heavily dependent on the final examination within a fixed curriculum, as opposed to Scotland's reliance on quality assured 'continuous assessment' of a flexible curriculum, delivered entirely through work-based learning.

Subsequent quantitative surveys and structured interviews in Norway, and structured interviews in Scotland revealed attitudes and opinions towards VET in general and Recognition of Prior Learning (RPL) applications specifically. Whilst awareness of RPL applications and their benefits was relatively low in both countries, a shared interest revealed by industry in 'e learning development' within blended learning programs. This indicated that RPL must be developed and presented as an integral and beneficial component of future school (facility) and work-based learning aquaculture VET delivery systems, to better serve the diverse interests of a very mixed group of learners.

The benefits of RPL systems supported by rapid response technology pioneered in Norway have been related to the Scottish partner for adaptation and application within the Scottish work based Modern Apprenticeship system. Conversely, Norway is developing and piloting RPL methodology and -resources to improve the pedagogy and organisation of large mixed ability group of mature learners from industry who attend attendance-based classes provided at the school. This makes the activities being developed and piloted in both countries complementary, thereby increasing the relevance of Optimal to more VET practitioners longer term, whether their focus is work-based or facility-based VET delivery.

Informed by feedback from VET providers and industry, recommendations have been formed at the end of this study that take full account of the aquaculture VET reality in each country. This will ensure that RPL is developed and adapted for piloting and hopefully longer-term adoption in each country in a way most likely to benefit a 'broader church' of VET providers, once the benefits of RPL adoption have been revealed and effectively disseminated.

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## **1. Comparison of the VET systems in Norway and Scotland**

The Scottish and Norwegian missions within their national VET systems are similar, despite significant differences in qualification structures and assessment strategies. The VET system for Norway and Scotland is more comprehensively described in Appendices 2 and 3 respectively.

The major role and cooperation of social partners (including employers and employees representative organisations) within policy formulation and VET design, is institutionalised through the Vocational Training Act in Norway. Whereas in Scotland, England and Wales the UK Sector Skills Councils represent employer interests and are responsible for the development of National Occupational Standards, defining the knowledge, skills and competences required by each occupation at each occupational level that has been defined.

### **1.1 Policy level**

The Norwegian Directorate for Education and Training (Utdanningsdirektoratet) manages the development process for any new national curricula and each subject area is developed by a subject team, informed through a broad consultation with social partners. In Scotland The LANTRA Sector Skills Council has vocationally specific sub committees responsible for National Occupational Standards (NOS) development for each sector of water and land-based industries, including aquaculture. Any new Scottish aquaculture National Qualification (NQ) development team must address the appropriate NOS that relates to the occupational level being targeted that they are developing, and incorporate the prescribed knowledge, skills and competences, to secure SQA validation. In addition, they need to demonstrate that there is a market demand for the NRQ and that the proposal meets the needs of its intended target audience.

The Norwegian VET system is regulated through a plethora of Education Acts (See Appendix 3 Norwegian Educations Acts regulating Norwegian VET) In comparison the Scottish VET regulatory environment is united under the auspices of the Scottish Qualifications Authority (SQA) which devolved authority for the Secondary School and VET qualifications system. The SQA validates all new VET qualifications, which must be informed by the appropriate NOS. New qualifications can be developed by single VET institutions or consortia, so long as they are an approved SQA centre and operate SQA compliant internal quality assurance systems. Any organisation can apply to become SQA accredited and many larger companies do so as that can approve and manage the delivery of NQs and/or their own 'customised SQA Awards', without having to rely on a public sector VET provider. This helps some organisations to overcome barriers to access, such as an inadequate transport infrastructure or colleges that are simply too far away to be of any practical benefit.

The Norwegian national VET strategy attempts to bridge the gap between the vocational schools and the apprenticeship system. By comparison, Scottish Modern Apprenticeships are informed by the same NOS as any other aquaculture NQs validated by the SQA.

### **1.2 VET structures**

The first year in upper secondary VET consists of general education and introductory knowledge of the vocational area chosen. In Scotland the integration of general education with trade specific vocational education is less advanced. The government have developed initiatives to make more vocational options available to the secondary school senior phase (14-16-year olds) through Foundation Apprenticeships currently being devised. However, once a learner leaves the compulsory secondary school system, as they can do at 16 years old, their general education has been completed, and they commonly undertake trade specific VET course. This may be a college based

National Certificate or Diploma, or a work based Scottish Vocational Qualification/Apprenticeship. There is a great emphasis on the continued development of core skills, including numeracy and communication, but these are embedded in trade specific qualifications and are delivered in that context. Typically, they are not separately assessed.

In Norway no formal distinction is made between vocational and non-vocational higher education. Whilst Scotland has been working hard to achieve parity of esteem between Higher VET (Higher National Certificates and Diplomas) and the first and second year of University Degrees. It is however, a variable landscape currently. Recognition of Higher VET is improving and there are some very successful articulation agreements between college-based VET and University based academic degrees. In aquaculture, it has been common for those entering degrees via the VET route to outperform those entering via the traditional academic route, due to their greater industry experience and vocational motivation.

### **1.3 Curriculum development**

In Norway, due to the Act on upper secondary (tertiary) Vocational Education No. 56 of 20 June 2003, revised in 2007, all providers must document their quality assurance (QA) systems. However, it is possible to obtain institutional accreditation for programmes within a defined field of study, rather than having to apply for recognition programme by programme. Scotland governs its national VET similarly, as the Scottish Qualifications Authority (SQA) must approve all new centres coming forward and during this process they will ensure adequate internal QA has been put in place. It also ensures that all new NRQs undergo a rigorous examination process with industry involved, before they are validated and enter the SQA catalogue. There are also systems for the recognition of informal and non-formal competence being encouraged in principal, but with limited adoption in practice as they are considered onerous. This has some bearing on attitudes towards RPL within aquaculture VET encountered in Scotland. (See 8.1)

In Norway, the Directorate of Education has responsibility for continuous curriculum development and appoints curriculum development teams that include professionals, and employer and employee representative organisations. Similarly Scotland, Sector Skills Councils are responsible for the development of vocational profiles, and, industry sector groups are established to inform developments, working with VET providers. The system has a further requirement; the development of detailed definitions of the knowledge, skills and competences required by each occupational profile. However, Scotland does not insist on the inclusion of trade unions or other forms of employee representation within the process and at times struggles to get meaningful industry engagement. This has been the case for aquaculture in the past.

There are no fees for learners at any stage of the in the public education system in Norway or Scotland. including higher education.

### **1.4 VET practitioner qualifications**

The formal qualification requirements for VET teachers are specified in national regulations in Norway. In principle, there is no difference between teachers in VET and other teachers. Both groups must have two sets of formal qualifications: in the relevant subject and in teaching. VET teacher education programmes follow the general degree system, with a three-year bachelor's degree and a two-year master's degree. To become a qualified VET teacher, one must either complete vocational practical-pedagogical education or vocational teacher education.

Scotland's VET lecturers have similar qualification requirements. Instructors and Assessors are also deployed, and many Instructors are also Assessors, but it is possible to split the role. Also, most VET lecturers will instruct and assess practical skills, at times. There are SQA qualification pathways to support the development of these additional VET practitioners which are an important to VET 'capacity building' within the Scottish system.

In Norway trainers (instruktører) are vocationally skilled, but not required to have a teaching certificate. Training supervisors (faglige ledere) in enterprises or other workplaces with apprentices must ensure that the training meets the requirements set by the Education Act and must have one of the following qualifications:

- trade or journeyman's certificate in the relevant trade or craft
- master craftsman's certificate in the relevant craft
- relevant higher education in the trade or craft
- adequate educational background in the parts of the trade which, according to the curriculum, will be taught in the enterprise
- six years of experience in the trade or craft

Scotland has a slightly different policy, as anyone assessing SQA work-based VET qualifications must be working towards a qualification in 'Instruction'. Anyone assessing a work-based qualification must have an 'Assessors Qualification', which is focussed on the assessment process, including the full diversity of methods. In addition, each approved centre must have qualified Internal Verifiers, responsible for internal quality assurance to ensure that the assessors are complying with the SQA 'assessment evidence' requirements. They also sample the assessors work to make sure assessment judgements are accurate, in relation to prescribed SQA Unit standards and consistently applied. Internal Verification is a vital part of quality assurance within the SQA system

Norway has no mandatory formal qualification requirements for training facilitators that deliver training outside formally approved education institutions. However, VET training personnel involved in non-formal and informal workplace training often do have a formal vocational qualification. Some training facilitators despite not having formalised their vocational knowledge and skills, can perform competently solely based on what they have learnt practiced in the work place.

Scotland has considerable non-formal and informal VET provision within aquaculture companies, often delivered by company staff un-qualified to teach, instruct, or assess. It does not lead to a formal NQ and therefore can be of a variable quality. Learners undergoing this type of non-formal VET delivery, remain unqualified and arguably less competitive in the labour market as a result.

## 2. Aquaculture workforce development

In Norway and Scotland the industry is dependent on the recruitment of staff who either have suitable qualifications and experience, or who can be developed, assisted by accessible internal and external education and training that can lead to the attainment of a Nationally Recognised Qualification (NRQ)

### 2.1 Norwegian aquaculture recruitment

It is difficult to recruit staff with Nationally Recognized Qualifications (NRQ) in fish farming. The growth in the fish farming industry during the last 6-7 years has been outstripped the growth in the number of students attending the VET schools. There has been a long period where new recruits have had to learn through their work experience and from colleagues. Industry reports that they consider it is easier to recruit personnel to their fish processing operations than fish production, although communication can be a challenge due to the wide range of cultures and languages represented within the fish processing sector. In 2018 farming companies recognise that there were many applications for fish production jobs by applicants who lacked a suitable NRQ.

Most of these unqualified recruits are heavily committed to the farm work schedules from the outset, making it difficult to release them for school attendance and training. However, most farms believe that the most important recruitment channel in Norway is the apprenticeship system. (See Figure 1 below). There are increasing number of young students today who are committed to an aquaculture career who have strong academic and attendance records from secondary school. Despite the rising popularity of aquaculture careers with the Norwegian youth, only approximately 60 % of the Norwegian salmon farming workforce holds a suitable nationally recognised qualification (NRQ) in aquaculture, as many unqualified recruits have been drawn in to the industry during a recent period of rapid expansion.

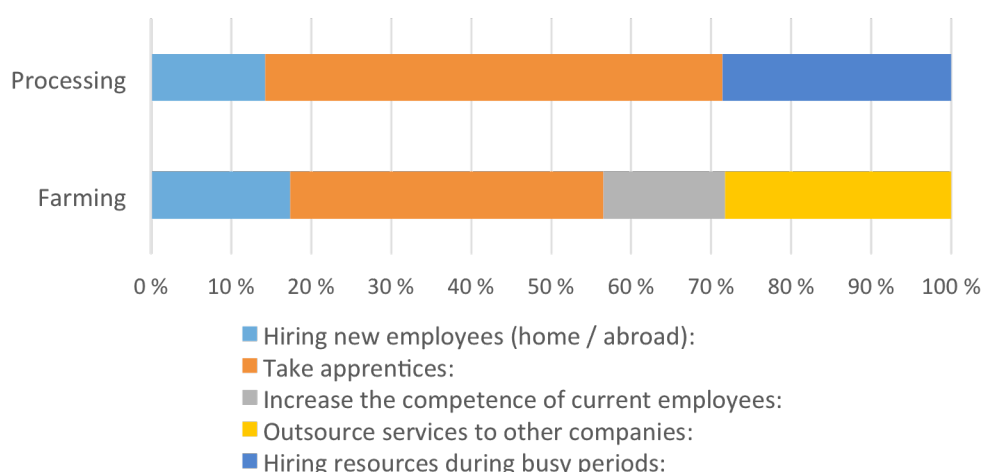


Figure 1. Norwegian work force development strategies (derived from data from Mid-Norway surveys)



The bars indicate the relative importance of different work force development strategies to meet the fish farming industry's demand for competent staff over the next 3-years. The data is derived from Mid-Norway (2017)

The apprenticeship system is clearly the most important source of recruits for both fish farming and processing companies. Outsourcing work operations to other companies satisfies more than 25% of the fish farming sectors labour requirement. The third most important recruitment channel is to employ new staff, in other words, mature entrants from other sectors and countries (17%) and do not hold an aquaculture qualification.

The whole fish farming industry supports the drive towards qualified staff and want as many as possible to complete training and take the exams that will award them their NRQ. In a survey undertaken in 2017 in Mid-Norway, 26 out of 30 site managers at fish farms pointed out that their staff will need aquaculture VET during the next 3 years. These 30 managers lead 270 workers at the cage farms and the survey results indicated that the second most important subject area for VET to target was technical and industrial production.

## **2.2 Norwegian aquaculture workforce development strategies**

The fish farming companies encourage unqualified mature entrants to start on the theoretical part of the NRQ within aquaculture vocational education and training (VET) as early as possible. This gives them the underpinning knowledge relating to fish production operations, despite being unable to complete their practical aquaculture exam until they have complete 4-5 years of farm experience under current VET regulations. This long delay is can adversely affect the motivation of these mature, but unqualified entrants to the workforce.

The aquaculture VET courses are delivered as a fixed program, whereby all course components and subjects have to be undertaken and assessed. The current pedagogy is to apply a combination of classroom based theory with practical on farm training, organised through cooperation between VET school teaching staff and experienced aquaculture company managers. It is a vitally important VET component and the students have often been shown how to operate some aquaculture equipment before having completed the corresponding theory session back at the school. The farm work schedule drives the arrangement and timing of practical training, not curriculum design.

Information about aquaculture courses leading to the NRQ is often distributed to the staff on the company's intranet. However, travel distances and the course timing can present significant potential barriers to access, as staff are often expected to cover the transportation costs themselves. On occasion the fish farming companies pay for 'bespoke' VET course, which often requires providers to hold courses in the evenings or at the weekends. In addition, the program has to be adjusted to students farm work schedule during busy periods.

Structured interviews with fish farming company managers has revealed that a combination of student self-study, on-site group learning and some e-learning is seen as providing the best 'blend of delivery modes. To increase and extend the staffs network is important and this can happen during group learning activities. Furthermore, they believe that staff learn most effectively when they can

apply their theoretical knowledge working within groups, during periods of practical training and experience, to encourage peer learning. The interest in the application of e-learning as a significant component of 'blended learning' has been growing, as it can help to overcome the geographic barriers to VET access. As there is not much in company training offered and external training providers need to be engaged, the same challenge of distant and dispersed farm sites is encountered when arranging external training.

In summary, the attainment of an NRQ by every member of aquaculture staff is an important aim for the fish farming companies. However, at the same time they emphasise that the increase in salary on becoming qualified should not be the motivation. The companies fully recognise the challenges associated with attending the on-site training, mainly due to the distances that need to be travelled and the staff work schedules.

### 3. Aquaculture VET

As highlighted in Section 2, although the VET systems in Norway and Scotland share the same general mission and both consult industry and other stakeholders to inform VET design, they are very different regarding their assessment strategies. This is reflected in their aquaculture VET programmes.

#### 3.1 Norwegian Aquaculture VET

To receive the recognised aquaculture NRQ in Norway (known as the Journeyman Certificate or “Fagbrev” in Norwegian) the candidates must pass a theoretical and practical exam. Both young and mature learners, including staff employed by the fish farming industry, sit the same exams, since the curriculum in aquaculture applies to all equally. Staff that are currently employed by fish farming companies have two options if they want to receive a Journeyman Certificate.

They may

- Become an apprentice for 2 years (Track 1 below), which is part of the ordinary study path for young students age 16-21, or
- Become candidate of practice (Track 2 below) after working full time in a relevant job in fish farming industry for 5 years.

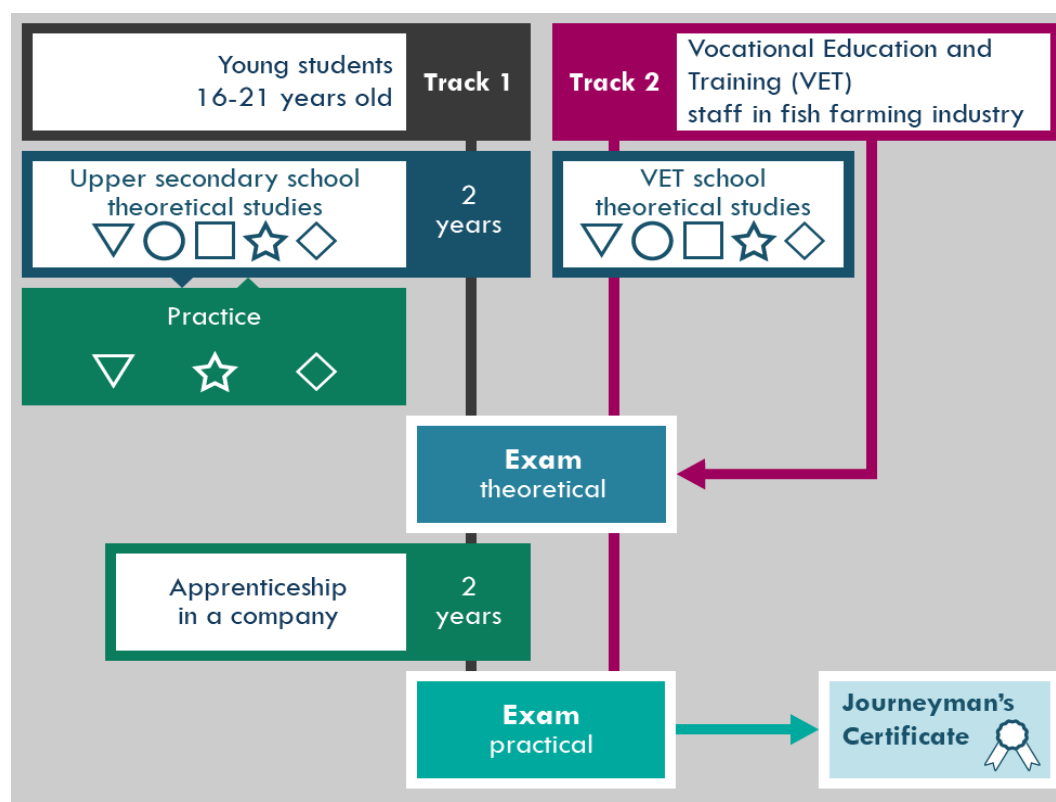


Figure 2. Illustration of the Norwegian VET pathways to NRQ completion

For each option the candidates must pass a theoretical exam first, before they may take the final practical exam. The practical exam may take up to two days to complete.

Both options however, have some limitations making it less attractive for those who are already in full time employment and wish to gain the NRQ (Journeyman Certificate). To be an apprentice results in a loss of income, since the salaries are lower. To be a candidate of practice requires that you must wait for five years or longer once you have gained a full or part time position.

The downside of both options is that many do not have the personal motivation to work for a Journeyman Certificate. Thus, the fish farming industry in many cases supports their staff by engaging the existing VET schools to offer a bespoke course (Track 2) for their candidates. These courses can apply more flexible training solutions consisting of a combination of e-learning and on-site training, to make courses more accessible to candidates in full time aquaculture employment.

Since 2017, the Norwegian government has been preparing a third path “Fagbrev på Job” (Track 3), whereby after one year of full-time employment in a company a person may apply for and sign a contract with their county and the employer to gain access to the guidance and training needed to complete the NRQ (Journeyman Certificate). This ensured that the candidate does not lose out financially due to a salary reduction. The contract will depend on an evaluation of the individual’s experience and expertise. Some may complete the training in under one year, whilst the maximum duration is four years.

### **3.2 Scottish Aquaculture VET**

Throughout the 1980’s and 90’s, a growing Scottish Industry was supplied many of its new entrants by three well-equipped Aquaculture Colleges. They provided new entrants with Scottish Qualifications Authority (SQA) qualifications at fish husbandry and site manager level, gained through full time attendance on Aquaculture VET courses. This provision has been lost.

Today, Inverness College and the North Atlantic Fisheries College (NAFC) Shetland, provide the work based Modern Apprenticeship (MA) in Aquaculture. This National Qualification is also provided by a Scottish private training provider, Polaris Learning Ltd, based in Aberdeen (North East Scotland). Increasingly the MA Level 2 (SCQF 5) is used as an entry qualification for school leavers after they have gained full time employment with a company. In addition, the salmon farming companies have developed their own in company training schemes aligned to company Standard Operating Procedures (SOPs).

#### **3.2.1 Modern Apprenticeship (MA) in Aquaculture**

The MA is a work-based qualification, requiring candidates to demonstrate their competence in a real place of work as opposed to a simulated work place or training facility. The MA is funded by Skills Development Scotland who contract providers, who are subject to their rules and regulations, The Scottish Qualifications Authority (SQA) are responsible to the quality assurance of assessment within the delivery of Scottish MAs.

#### i) Age of entrants

New entrants can start a Modern Apprenticeship at level 2 (husbandry/operative) on leaving school at age 16 and can progress to level 3 following their promotion to supervisory level. Mature learners can complete the MA at any age and stage of their career, to gain a Nationally Recognised Qualification (NRQ).

#### ii) Entry requirements

There are no formal academic entry requirements to the MA at level 2. The learner must be employed by an aquaculture company willing to support them and co-operate with the training provider regarding practical training and assessment.

#### iii) Modern Apprenticeship structure and content

National Occupational Standards (NOS) devised by industry have been used to define the practical skills and knowledge assessed by the MA validated by the Scottish Qualifications Authority (SQA). It is composed of mandatory Core Units, in addition to a prescribed number of Optional Units, at each level, selected to suit the nature of the farm operation and the learners' and employers' needs.

#### iv) Individualised Learning

The 'core and options' structure provides the flexibility to facilitate individualised learning and assessment to suit the farm operation and learner. For example, a learner based on a freshwater smolt facility, would normally only elect those Optional Units relevant to the freshwater phase of salmon production.

It is possible to enhance an individual learners' development plan by adding Units additional to the minimum requirement. All Units achieved will appear on the learners final SQA certificate, as evidence of their 'specific' knowledge and skills.

#### v) MA delivery and assessment

The assessment of practical skills must be undertaken in the work place, through many methods, including, observation by a qualified assessor and witness testimony provided by an experience supervisor.

The assessment of knowledge can be undertaken in a college or other supervised learning centre. It can also be undertaken on a farm, if invigilated, supported by the VET provider.

The learning process often includes a combination of approaches: supported distance or e learning, college block attendance (1-2 weeks), short course attendance and practical skills training on farm.

### 3.2.2 Company based training schemes

In response to the decline in full time college-based provision and the relatively low levels of MA funding available for 'mature' work-based learners, the Scottish aquaculture companies have become self-sufficient this century. Company' training schemes has been developed and have become increasingly sophisticated, and include initial induction, comprehensive training schemes and supervised work experience. Their delivery and assessment are driven by company Standard Operating Procedures (SOPs). However, they do not lead to an NRQ, and are not subject to quality assurance by an approved VET provider or authority. Therefore, a relatively high proportion of the Scottish Aquaculture workforce do not hold an NRQ relevant to their occupational role, despite having developed considerable skills and knowledge, in many cases.

## 4. Aquaculture VET assessment and quality assurance

Norway and Scotland both operate VET assessment systems that undergo quality assurance (QA). In Norway the process is undertaken at county level, whereas in Scotland QA is managed at national level by the Scottish Qualifications Authority (SQA), with certain aspects devolved to SQA approved centres to administer. In both systems providers are responsible for operating robust internal quality assurance and they are subjected to external evaluation periodically by their respective VET regulatory authority.

### 4.1 Quality Assurance of Norwegian VET

The National Qualifications Framework (NQF) provides a classification of the Norwegian educational system and the different levels of National Qualifications. The NQF helps to facilitate work on lifelong learning and can be used as a transparency tool to help meaningful comparisons to be made between Norwegian qualifications and the qualifications from other countries, with reference to the European Qualification Framework (EQF) and/or the European qualifications framework for higher education (QF-EHEA). The County Vocational Training Board (CVTB) provides advice concerning strategies for quality development in the vocational education system in the county and evaluate the quality assurance systems of providers. The Board is also responsible for securing the attainment of qualifications in vocational education and promotes cooperation between schools and the regional labour market. Other public bodies at the state and county levels are involved in quality control for primary and secondary schools.

The Norwegian Agency for Quality Assurance in Education (NOKUT) was established in 2002 and was operative as of 1 January 2003. It is an independent agency with the task of carrying out external quality assurance of higher education and tertiary vocational education in Norway. It performs this task through a variety of mechanisms:

- Accreditation of higher education institutions
- Accreditation of higher education programmes and courses
- Revision of accreditation
- Evaluation of internal quality assurance in higher education institutions,
- Evaluation of specific types of educational provision or defined aspects of such
- Recognition of tertiary vocational education
- General recognition of foreign qualifications

An up-to-date list of courses accredited by NOKUT can be found on NOKUT's website. All providers must document their QA systems, but obtain institutional accreditation for programmes within a defined field of study, rather than having to apply for recognition for each individual programme separately.

Secondary VET mainly leads to either a trade certificate (Fagbrev) for industrial and service trade or a craft or journeyman's certificate (Svennebrev) for traditional crafts. Graduates must pass the journeyman's examination, through which apprentices demonstrate their vocational skills and explain and justify the methods they have chosen to use to solve the test assignments.

Holders of a trade or journeyman's certificate may pursue further studies at a Vocational College (fagskole) and can also qualify for higher education. This has developed through four main pathways and leads to qualifications as master craftsmen or certificates.

## **4.2 Norwegian VET assessment process**

Within the Norwegian VET system for aquaculture there is great emphasis placed on final examinations within the assessment strategy. The typical aquaculture VET program is constructed to start with two years in school from age 16/17 years old, followed by a two-year apprenticeship period, commonly referred to as the 'two plus two' model of delivery.

### **4.2.1 Theory examination at the end of year 2**

The invigilated national theory examination is composed of one large open question that requires learners to demonstrate that they can apply their knowledge across a wide subject range. It may require them to plan for a fish farming operation, and/or to resolve a fish farming challenge which has many aspects to consider. Industry members are represented on the committee that sets the national theory exam questions each year and this ensured the examination meets their requirements.

### **4.2.2 Continuous assessment during years 1-2**

During the first two years of study at the Upper Secondary School, learners are continuously assessed. This enables them to receive feedback and helps them to monitor their own progress and development. The process is entirely controlled by the teachers and is based on their interpretation of the national curriculum. A range of assessment methods can be used to suit the subject and the individual learning styles and preferences of learners. As well as supporting the formative assessment process, the results of some assessments contribute towards the learner's result and grade and are therefore summative. The application of RPL under development at the Froya Upper Secondary school can be integrated effectively within the continuous assessment process, and supports formative assessment very effectively (See section 6)

### **4.2.3 Practical examination at the end of Year 4**

At the end of the two-year apprenticeship period, learners are assessed on a fish farm for a two-day period. This national practical assessment includes oral questioning to test the students understanding of farm tasks that they are required to complete. Managers from industry are involved in setting the assessment and the assessment process itself, during the two days. They are accompanied by teachers from an Upper Secondary School in another region who have had no previous involvement with the students. On successful completion, the students are fully qualified and receive a modest wage increase as a result.

## **4.3 Quality assurance (QA) and assessment in Scotland**

### **4.3.1 Quality Assurance of Scottish VET**

The overall regulatory body responsible for quality assuring VET in Scotland, is the Scottish Qualifications Authority (SQA), who are a Qualification Awarding Body as well as a national VET regulator. Their role is to ensure that all centres approved to deliver SQA qualifications have the facilities, quality assurance (QA) systems and staff capacity needed, and that they assess SQA qualifications according to the prescribed standards. Once SQA centre approval has been granted, most centres apply for and gain devolved authority for 'Internal Approval', allowing them to undergo documented internal approval processes for the delivery of SQA qualifications within their sphere of operation and capability. Typically, the SQA retain the authority for the validation of new NQs, so as

market demand is evidenced, and industry consultation has informed the NQ development or revision process, to ensure that the proposed NQ meets the needs of its target audience.

Assessment is internal and subject to internal QA processes, but also sampled by SQA who operate a national QA system. The VET providers internal QA processes must ensure that all staff are qualified to teach, instruct and assess the NQs that they deliver, and that the assessment devised meets the national standards within the SQA Awards and Unit standards. (See section 4.4). All assessments must be Internally Verified by an appropriately qualified Internal Verifier before use, to ensure that they meet the standards of assessment precisely as prescribed. The standards are defined in terms of Learning Outcomes, Performance Criteria and Evidence Requirements, which collectively determine the nature of the assessment process and the type and quantity of assessment evidence that needs to be gathered to demonstrate that the Performance Criteria have been satisfied. In addition, the assessment judgements made by internal assessors are verified through a selective sampling process to ensure that the judgements that they make all assessors make comply with the standards and are consistent with each other, and all learners are being fairly treated.

Although assessment is typically conducted by the same staff who have taught the learners, this rigorously prescriptive national system ensured that the assessment process is standardised and fair, irrespective of which SQA approved centre has delivered the NQ.

#### 4.3.2 Scottish VET assessment process

Scotland's VET assessment process at all SCQF/EQF levels is based on the principle of the 'continuous assessment' of learners' knowledge, skills and competence throughout their course. Assessment opportunities should be made available when learners are ready for assessment of a learning outcome, and learners normally have the right to at least one reassessment opportunity. Continuous assessment and the removal of unfair barriers to achievement are both central to the SQA VET philosophy. Therefore, diverse methods of assessment are encouraged, as exemplified by the availability of oral assessment of knowledge for learners that have dyslexia.

Latterly, SQA have welcomed digital applications and ICT based applications within assessment strategies but insist that all assessment evidence is 'robust and reliable', and therefore, invigilation is essential for 'closed book' knowledge-based assessments. This includes the use of on-line-multiple choice assessments which are becoming used more widely. Invigilation would need to accompany any assessment process generating evidence contributing to the achievement of any SQA Unit Learning Outcome. This would be a condition for assessment, prescribed in the Unit standards.

Practical skills and competences are also assessed in various ways to determine whether the skill has been demonstrated and the level of competence defined in the standards achieved. This includes;

- Recorded observation of the activity being undertaken by a qualified assessor
- Recorded witness testimony by a qualified expert in the field, for the assessor to judge and moderate
- Recorded judgement of the quality of a final product
- Learners activity log and/or personal statement (This needs to be complemented and validated by another method, such as witness testimony)

The both central principle of the assessment of practical competence when using witness testimony is the risk assessment of the evidence by the qualified assessor. For example, if the witness testimony provider was relatively inexperienced, other methods such as direct observation may have to be applied on a sampling basis. The same would apply if the witness testimony provider



was related to the learner, as this would be deemed to be 'high risk evidence' and potentially unreliable, in the absence of additional evidence. A qualified assessor can make these judgements competently.

Regarding the Modern Apprenticeship in Aquaculture, although the underpinning knowledge can be assessed in the same way as any other NQ using a diverse range of approaches, the assessment of skill-based learning outcomes must reflect real work practices and standards. Trainee competence must be developed in a commercial work place, often under the watchful eye of the trainee's company supervisor. They are often recording the evidence of competence as 'witness testimony' which a qualified assessor can then validate, allowing that evidence to then contribute towards the achievement of the Modern Apprenticeship qualification. Evidence of competence can be gathered over a long time-period and is often 'naturally occurring' and generated during the day to day work, as opposed to being based on contrived tasks to be observed by an assessor. This entire process is much easier if company Standard Operating Procedures (SOPs) and first harmonised with the NOS and MA. The closer the correlation, the easier it is for supervisors to gather reliable assessment evidence.

#### **4.4 Comparative evaluation of the Norwegian and Scottish assessment systems**

Scotland does not have a mandatory final examination as a part of its VET system, whereas this is the central pillar of the national VET assessment system for NRQs in Norway. The SQA philosophy is founded on continuous assessment. However, it would be possible and within the rules to include a final exam within a VET course assessment strategy. A minority of Scottish colleges have included final assessment, linked to their employer groups, to great effect. Recognition of the advantage of including this approach may lead to stronger assessment strategies in Scotland, particularly within Higher VET.

Likewise, whilst Norway does deploy continuous assessment, unlike Scotland, the teachers have complete control of the assessment methods, application and marking schemes. The SQA prescribe the continuous assessment process, including the nature of the assessment, assessment performance criteria and amount of assessment evidence of assessment. This is all enshrined within the SQA Units that compose the NRQ and is subject to both internal and external quality assurance.

The assessment of practical competence is not undertaken as a final practical exam within the Scottish system. The evidence of competence is gathered in several ways. Including:

- Observation of a practical task by a qualified assessor (work or college based)
- Witness testimony provided by a qualified witness testimony provider (typically the supervisor of the learner) and recorded in a portfolio for validation by a qualified assessor and verifier
- Assessment of a final product against a product specification

## 5. Enhancing VET students learning

Various research studies have confirmed that technology can be used to successfully enhance student learning and to reduce institutional training costs. Educational approaches and the best ways to embed technology-based (inter)active learning strategies within course design and delivery are still matters of debate. Enquiry/research that cover various issues such as motivation and engagement, conceptual understanding and critical thinking, catering for learning needs and different learning styles is ongoing.

Specialist literature confirms that student response systems (SRS) or 'clickers' have been used successfully in helping teachers transition from the traditional didactic 'transmission' of knowledge, to an active/social learning paradigm.

However, several key problems are identified within current research on SRSs, including: "a lack of systematic research, a bias toward using anecdotal, qualitative data, and an excessive focus on giving feedback and gauging attitudes. The literature claims that learning and cognitive processes are often given too little attention, and that samples are derived from limited educational settings. Several researchers have maintained that the majority of the SRS data collected to date is anecdotal or qualitative (Fies & Marshall, 2006; Kaleta, Skibba & Joosten, 2007; Schackow et al., 2004). However, both qualitative and quantitative data are needed to fully understand the use and impact of the SRSs (Kay & Lesage, 2009a)."

Even though relatively good logistic support is provided for the use of technology, there is uneven integration of technology and scarce research on its use in teaching/learning in aquaculture VET and VET at large in Norway.

### 5.1 The role of technology in RPL

For many years, projects dealing with course design have highlighted the role technology may play in various aspects of the teaching/learning process and the beneficial impact it may have on the learning outcomes, teaching practices, and institutional costs. To generate improved VET practice by rethinking/redesigning course work to include response based active learning may support improvements to aquaculture VET. This includes testing a rationale for a revised teaching methodology to verify and evaluate its effect both on learning outcomes, workplace-based learning and on institutional training costs. The overarching ambition is to create and disseminate a prototype for RPL applications within aquaculture VET to the fish farming industry and other interested parties.

Thus, the Optimal project will allow partners experienced in more conventional training approaches to test a new VET practices that integrate effective use of RPL supported by SRS and potentially, other suitable technologies. Reference will be made to best practices and learning methods that have a proven track record in in other fields. This includes testing a more streamlined RPL methodology leading to an evaluation of the cognitive learning outcomes and workplace based learning, informed by learners. VET providers will also consider the impact on institutional training costs. This project will encourage iterative processes for adding "new types of learning elements" and the application of response tools. This can be replicated within other disciplines to broaden the national benefit within the VET sector in general. As more "pieces" are added and applied within piloted learning activities with aquaculture VET students, the RPL applications will become more refined and streamlined.

## 5.2 Optimal contribution to RPL development

The Optimal project will become of future benefit to any institution offering VET and other disciplines, as they will be able to draw upon professional practices for designing and applying RPL materials supported by technology adoption as developed and piloted within Optimal.

This requires the Optimal project team to:

- investigate and support teaching/learning improvements in the digital era within the educational, social and economic context of fish farming industry
- generate improved academic practice by rethinking and redesigning RPL within course work, including drafting a specific methodology to include SRS-based active -learning.

To achieve this, it is necessary to identify the variables that influence technology acceptance and the incorporation of RPL for teachers and learners, and to identify learners' needs. The objectives should include to set, test, and validate learning scenarios and course materials adapted for usage supported by response system tools. In addition to set, test, and validate an RPL course design prototype that includes response system in combination with an independent, self-sustaining, subscriber-based entity that can maintain and expand the pedagogical model to other disciplines. It should be noticed that there are many sources that deal with the use of response systems in teaching various disciplines, including VET, to promote communicative approaches, increase engagement, and develop complex thinking skills. Our scenarios will adapt best practice models that have been successfully applied within engineering education.

## 6. Results and experiences from Norway

The Norwegian aquaculture VET schools currently use different pedagogical methods for teaching, but in general the application of RPL within NRQ delivery has not been widely adopted. This increases the potential value of the Optimal project to other aquaculture VET providers, on completion of the RPL specification, resources and teacher guidance.

### 6.1 Guri Kunna VET school – Mid Norway

The Guri Kunna VET school (Optimal partner) provides a typical example of Norwegian aquaculture VET delivery. Many teachers find that a combination of theoretical review followed by a review of farm operations and fish farm-based practice, with and without teacher supervision, are important components. It is important for learners to be familiar with fish farming operations before the theoretical classes are delivered at the VET school. This allows the students to apply their specific experiences within theory classes. For example when the teacher talks about a feeding system, the student has already seen it. Thus the pedagogy will often consist of a combination of watching, getting practice learning and learning about the theory.

Worked based training is very important, because it provides students 'hooks' to which they can relate the theory. It also allows them to create relationships with the aquaculture industry. There are many young students who receive an apprentice contract already during their first work practice period, when the farm has been impressed.

#### 6.1.1 The use of response-based feedback

Teachers at Guri Kunna VET School often apply response-based feedback systems such as 'Kahoot' to reiterate and summarize the curriculum learning goals. Asking several questions one by one does allow the students to give their feedback and the results can be shown on the blackboard. Currently, there isn't any attempt to use response systems to track students' prior learning and use this information to adapt or adjust what the teacher is going to teach. The pedagogical concept at the heart of the Optimal project will be developed, piloted and refined based on learner feedback.

#### 6.1.2 Courses offered to industry

Training provided by external companies to the fish farming industry has traditionally been offered as farm-based training activities. Each activity has been organized as a one-day training event where work-based learners travel from the farms to a classroom at a school in their region. During the school year 2017-2018, industry started to request training solutions whereby staff could undertake courses outside their working hours. Therefore, the VET school has started to offer on-site training during the afternoons and typically, each training session is 3.5 to 4.0 hours long. The teachers have observed that this is not the most effective delivery. Learners have been working manually for a full day before the on-site training starts up in the afternoon and fatigue can adversely impact on their learning.

## 6.2 Norwegian fish farming industry needs

The entire fish farming industry is positive and supportive of the education and training of their staff and want as many as possible to prepare for and take the exams leading to the nationally recognised qualification (NRQ) in aquaculture. In a survey undertaken in 2017 in Mid-Norway, 26 out of 30 site managers at fish farms pointed out that their staff would need aquaculture VET during the next 3 years. The 30 managers lead 270 workers at the cages and the survey results indicated that the second most important subject area for VET to target was technical and industrial production.

These site managers have reported that it is challenging for them to organise aquaculture VET since they operate in rural areas and they lack reserve staff to deploy in order to release others to attend courses. As the industry has 'scaled up' and the workforce has grown, they have become more restrictive and less able to encourage their staff to dedicate working time to training activities.

Industry reports that travel to receive training is the most expensive cost component for them. Many employers once they have found the course expect their staff to study during their free time. Due to this, the VET school must organize the training in shorter more frequent sessions. One way to achieve this is by offering the training during the afternoons.

In the Norwegian model for obtaining a nationally recognised VET based qualification, students from industry have to pass one theoretical exam and one practical exam. The practical exam may be taken when the students have documented 5 years of relevant experience. This exam is evaluated by the industry members. The theoretical exam is offered twice a year, at national level and students may sit it without having any practical experience. It consists of a case study, where students have to propose a solution and document a full production plan for a farm based up on the given premise.

The fish farming industry has recruited many unqualified workers during recent years. In order to get more staff qualified, they consider that encouraging staff to prepare for the theoretical exam is of some value. They cannot change the rule that requires 5 years with relevant experience in order to take the last practical exam. Due to this, many companies encourage their staff to start on courses that prepare them for the theoretical exam.

As a result, aquaculture VET classes can include staff with many years of relevant experience mixed with students with little or even no relevant practical fish farming experience. Thus, the classes often consist of heterogeneous groups of students. Teachers have reported that this challenges their teaching methods. Often some of the students know how to do certain operations and processes better than the teacher, while some students in the class with little experience from the industry, at the same time haven't heard of them, or participated in them.

Within this perspective, new methods for application of recognition of previous learning, become important in order to include and enhance learning activities that let:

- Experienced students help less experienced students during various teaching and learning activities
- Better support various types of learning styles for the students

- Create improved teaching experiences for various types of students groups

Fish farming industry in Norway foresee three main types of training activities that their staff should take part in:

- in company based training directly linked to the operation of machines and equipment. This typically involves the use of equipment that the VET schools cannot afford.
- Training leading to the NRQ and offered by the aquaculture schools
- Specialized training offered by external companies such as the technology supply companies that provide the industry with the advanced equipment.

Industry considers education and training offered by the aquaculture VET schools in Norway and leading to the NRQ (trade certificate) to be the most important strategy for increasing workforce competence. The opinion surveys undertaken in mid Norway demonstrated that 2 out of 3 site managers held this opinion. It should be noted that 50% of the site managers responding, consider continuous staff development to be quite important and an integral part of the work activities. (See figure 2 below). These opinions imply that education and training must be offered on a flexible basis, by combining accessible e-learning with on-site practical training activities. This will reduce the need for as much face to face course delivery and allow companies much greater flexibility to accommodate staff development without disruption to their work schedules.

Fish farming companies do not get very involved with how the education and training leading to the NRQ is organized and delivered. They simply 'outsource' to the aquaculture VET schools offering the courses. The companies focus on when and where the courses are delivered to minimise the disruption of their work schedules. Thus, the on-site training component must be delivered during afternoons or weekends. The staff are expected to participate in the on-site training in their local environment, necessitating teachers to travel to provide training in the farm locality. The companies invest money in the aquaculture VET course leading to NRQs, expecting staff to pass the theoretical exam as a result. When they pass the final practical exam the salary increases modestly. Many companies highlight that this should not be the main motivation for getting a nationally recognised qualification.

In summary, the industry does not apply any thought to the training methods. They focus on the practicalities and cost leaving the challenge of optimising the effect of training and learning, including the recognition of prior learning RPL to the schools to address.

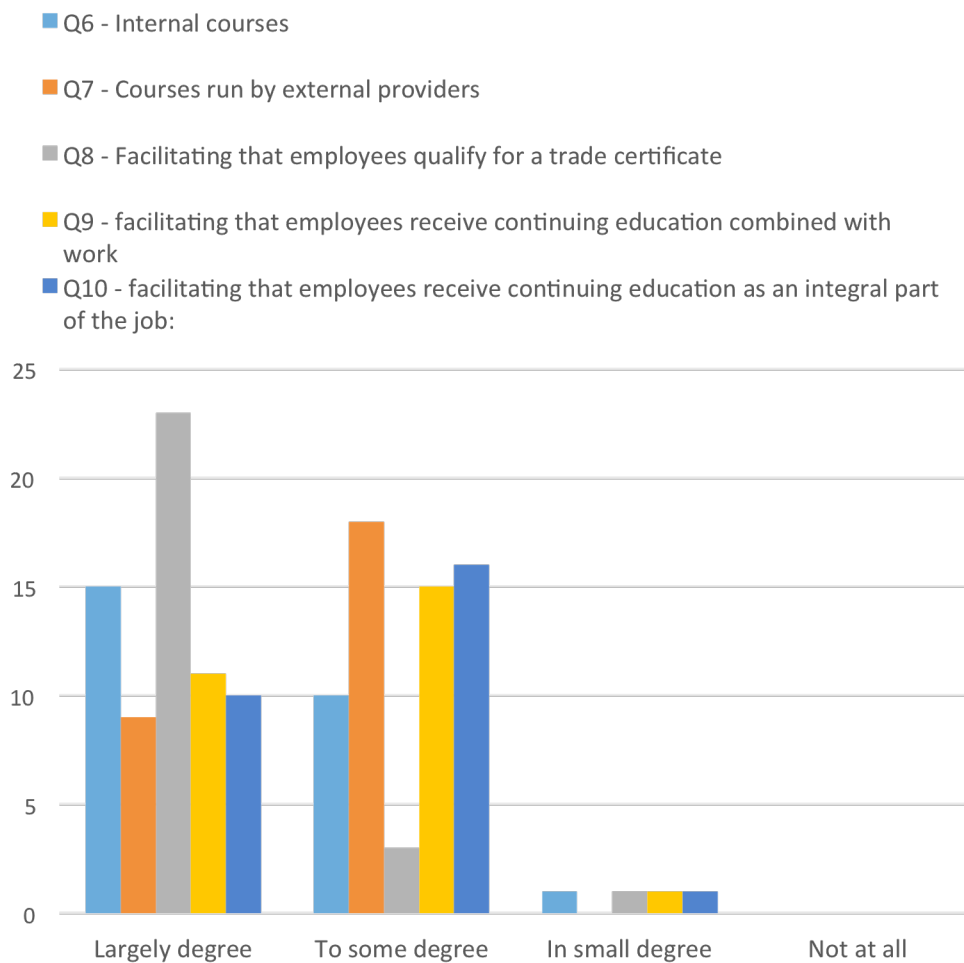


Figure 3. Industry's preferred staff development strategies (Derived from Mid Norway survey)

The bars show to which extent it is necessary to improve the competence of employees. There were 37 responders. They worked as site managers at various types of farms in Mid-Norway.

### 6.3 Anticipated benefits of applying RPL to aquaculture VET

The Guri Kunna VET school anticipate many benefits to applying RPL to their aquaculture VET delivery through the application of rapid response tools and will be evaluating the impact and benefits in relation to several perceived advantages.

The perceived advantages to teachers' of providing feedback to the class

- Feedback to questions posed can be analysed on an individual and group basis to establish the level of prior knowledge at the star of each topic
- Adjustments can be made to the course delivery plan according to the analysis of feedback
- Individual lessons can be optimized, taking account of which subject areas require the most emphasis
- The RPL system can be applied within onsite training or distance learning

The perceived advantages to the students' of giving feedback to the teacher

- All students can participate by using their mobile devices to provide instant feedback to questions asked by the teacher
- Peer learning can be encouraged, allowing experienced students to help less experienced students
- A wider range of learning styles can be better supported within a secure learning environment which does not reveal the learners' individual weaknesses to their peers



## **7. Results and experiences from Scotland**

To date, the survey process within Optimal relied on the gathering of quantitative data through One2 Act tools in Norway, complemented by structured interviews with both industry and VET providers. In Scotland, the process relied entirely on structured interviews to gain insights to attitudes to the application of processes for the Recognition and Accreditation of Prior Learning (RPL/APL) in aquaculture VET.

### **7.1 Survey activity in Scotland**

Quantitative on-line survey questions were developed in 2017 and circulated to Optimal Partners for feedback. The original intention under discussion was to include these questions within an on-line quantitative survey. The release of this survey in Scotland was delayed by the need to coordinate with a national Aquaculture Skills Survey undertaken by the Scottish Industry Lead Group (ILG 2030). More recently, some companies have been asked to circulate surveys to their staff internally during summer 2018 and are considering this request.

Conversely, Norwegian partners have undertaken quantitative and qualitative surveys and have held meetings with industry and VET providers to gather qualitative feedback, some of which relates to the Output 3 core theme above “recognition of prior learning in qualifications and certification” either directly, or indirectly. However, it should be noted that the Norwegian emphasis is on the recognition, as opposed to accreditation of prior learning (RPL as opposed to APL) to support the learning process as opposed to contributing to the achievement of qualifications. This distinction was clarified during the first year of Optimal, to ensure the project was relevant to the Scottish context and prevailing VET systems, as the Scottish Optimal partner (Polaris Learning Ltd) had a strong interest in APL.

During the second year of Optimal in Scotland some questions relating to RPL have been included within structured interviews with selected stakeholders most likely to have an interest. This included two salmon farming companies (Scottish Salmon Company and Scottish Sea Farms) and one fish farming college lecturer at Inverness College (UHI). This provided a limited insight but demonstrates that RPL systems are not considered be important, and to quote the Scottish lecturer, ‘RPL has never been requested, so we have never tried to provide it’.

### **7.2 The influence of the Scottish work-based VET system**

The status of the Scottish Aquaculture VET system is the most likely reason for the lack of enthusiasm for RPL. The only aquaculture NRQ available in Scotland currently, is the Modern Apprenticeship (MA) in Aquaculture. (See section 3). This is a work- based qualification and in addition to mandatory core units, offers many optional Units from which learners can choose. This encourages customisation to suit the opportunities available to a learner on their specific farm. By design, the MA is very flexible, and its delivery is normally individualised from the outset, with each learner drawing up an Individual Learning Plan (ILP) with their lead tutor/trainer, which is reviewed periodically by the provider, working closely with the learner’s employer. Assessment is largely practical, with evidence of underpinning knowledge and competence provided in a wide range of ways, determined by the ILP. Whenever practical skills and competence are assessed there is commonly a reliance on witness testimony. Therefore, due to the inherent flexibility of the MA, there is a limited interest in RPL by college providers. The learner and their ILP drives the delivery and completion of their NRQ, and a range of distance learning approaches support knowledge development. This tends to diminish the value of RPL as a concept in Scotland and is in contrast with

the delivery of a fixed curriculum (such as the Norwegian NRQ), some parts of which may be very familiar to the more experienced learners in a cohort. In the Norwegian system, the benefits of applying RPL are more apparent, arguably.

There was one exception to the general opinion that RPL is 'not very relevant', in Scotland expressed by Polaris Learning Ltd., the former Scottish Optimal partner. They had an interest in the 'accreditation of prior learning' (APL), and a specification was drawn up to allow them to introduce an APL process within their assessment strategy for the MA Level 2 Fish Husbandry. Knowledge development was to be supported by 'e learning' and APL resources presented via their Virtual Learning Environment (VLE). Unfortunately, due to a recent radical drop in demand for the MA during 2018, and a failure to recruit, APL in Aquaculture was not developed and pioneered by this company, as they left the Optimal project.

Subsequently, towards the end of the second year of Optimal, all the RPL/APL piloting activity has moved to the Froya Upper Secondary School, who have an interest in RPL only 'to improve learning' and motivation within large groups with a variable level of previous knowledge and experience. This is a very different driver to using APL to 'fast track' the assessment process, which was the main motivation in Scotland.

### **7.3 Industry opinions of RPL**

Two large Scottish salmon producers consulted have a slightly different outlook, according to interviews with their HR Managers.

#### **7.3.1 Company 1**

The first company have developed a well-structured in company training scheme (non-formal VET) and understand the potential advantages of RPL and APL could offer them. However, at this stage they have other priorities, and need to internally standardise their assessment process and assessors. This is essential before an effective in company APL process can be established. They expressed some interest in piloting the RPL questions under development with Guri Kunna VET school, but after careful consideration, decided not to proceed at this stage, until they have addressed their more urgent assessment issues described above. They are receptive to RPL demonstration during year 3 of Optimal

#### **7.3.2 Company 2**

The second company have a very comprehensive and impressive in company training system and resources called the 'Staff Learning Journey'. When asked if they take account of existing skills and knowledge when recruiting staff, they said that they always did so, and that this influences the individuals learning journey. This is done through a self-evaluation mechanism initially, whereby they use a competence-based selection interview and rely on new recruits to reveal their existing knowledge and skills. This is then assessed through observation to validate it against the company standards during their initial 6-month probationary period. Their line manager makes the final judgement on knowledge and competence and this determines and shapes the individuals' personal development plan. At this stage, the company have not been asked whether they are interested in a demonstration of the Optimal RPL resource, but as they have a policy of encouraging all new recruits to complete the MA in aquaculture and the question sets will be mapped to the MA knowledge requirement and NOS, they may be interested during the final year of Optimal.

#### **7.4 Evaluation of Scottish opinions of RPL**

In summary, Scottish opinion towards RPL/APL has been gauged through a limited selection of structured interviews which quickly demonstrated a general lack of interest. The likeliest reasons for this are the inherent flexibility of the MA in Aquaculture and a generally low awareness of how RPL could support the development of Individual Learning Plans (ILPs) that are a major element of the aquaculture work-based VET, currently. The two most receptive Scottish salmon farming companies have alternative assessment development priorities at this stage but may become more receptive over the coming 6 months. Demonstrations of RPL supported by rapid response technology are planned to gauge industry opinion on the potential for RPL/APL to support individualised learning and assessment which lies at the heart of the Scottish work-based MA system.

## 8. Findings and conclusions

There are some strong similarities and distinct differences between current Norwegian and Scottish aquaculture VET systems influencing the attitudes of both VET providers and industry towards RPL and APL applications within aquaculture VET delivery. Never the less, the Optimal partners continue to see great potential to improve both the effectiveness and efficiency of school (facility) and work-based VET in the future, through the application of RPL methodology and suitable rapid response technologies, once the methodology has been developed, piloted and refined for wider dissemination.

### 8.1 VET systems

The Norwegian and Scottish VET systems differ significantly. (See Section 4) Most notably Norway has a heavy reliance on the Upper Secondary school system (two years in school followed by two years in apprenticeship) which offers a well understood and respected fixed curriculum. Most of the young recruits enter industry via the final two-year apprenticeship. The assessment of their NRQ relies heavily on final examinations (theory and practical), as opposed to continuous assessment. Conversely, whilst Scotland used to have a strong college-based VET system at the end of last century, this has been lost and replaced this century by the work based Modern Apprenticeship (MA) and in company non-formal VET. The formal VET system in Scotland is entirely reliant on a formalised and heavily regulated continuous assessment process and diverse assessment strategies are devised by providers to support learners and employers who are partners in the delivery of the qualification. The use of 'negotiated' Individual Learning Plans (ILPS) lies at the heart of the system, supported by the flexible NRQ structure (core and optional units).

However, despite these distinct differences, Norway and Scotland face a similar challenge when it comes to providing mature learners access to NRQs. In both countries, once employed, it is difficult for the companies to release them for education and training courses. Therefore, the reliance on work-based learning and remote delivery methods increases. This makes the application of RPL and APL processes to improve work-based delivery relevant to both countries when they consider how to best serve this cohort in the future. In addition, the application of RPL to the management and delivery of the Norwegian NRQ to large mixed ability groups has great advantages to their Upper Secondary Schools. Although much less relevant to Scottish aquaculture VET currently, due to the demise of college-based VET provision in the short term, this could change if college-based VET is reinstated, which is currently under discussion.

### 8.2 Future demand for RPL/APL applications within aquaculture VET

Norway has a very buoyant demand for the full time NRQ offered by 14 Upper Secondary Schools supporting aquaculture youth development nationally. The four-year program provides many high-quality recruits for the industry. However, the rapid growth of the Norwegian industry has outstripped the supply of young qualified recruits, leading to the employment of many mature entrants who lack an aquaculture qualification and, in many cases, suitable experience. This group need to enter an NRQ program during their first few years of employment, leading to courses composed of large groups of students with a wide range of previous experience and prior knowledge. The organisation of these classes and student groups presents a major challenge to the teachers and the application of RPL processes within schools catering for large 'mixed' student intakes can offer both the teachers and learners many advantages. (See 7.3)

In Scotland the work based Modern Apprenticeship (MA) is currently the only NRQ available and due to the mandatory core and optional unit structure providing an inherent flexibility, RPL is seen as less significant. However, as the reliance on e learning and assessment is anticipated to rise, to support the work-based learners' aquaculture knowledge development more effectively, interest in the benefits of RPL and APL supported by rapid response technology is likely to grow. This can be presented and demonstrated as a significant component within aquaculture VET 'e learning applications.

### **8.3 Raising awareness of the benefits of RPL/APL applications**

The awareness of RPL, its application to VET delivery systems and the potential benefits offered, is limited in both countries, currently. However, in Norway, although the industry has not expressed any interest in RPL applications, they have expressed a growing interest in the application of 'e learning'. They do believe that this could improve access to the NRQ by their staff and reduce the disruption to their work schedules and costs of delivery. The application of rapid response systems to support VET delivery could be integrated within a wider move towards increased e learning which will reduce face to face delivery. Once presented in the context of offering 'real solutions to their challenges', the advantages would then be better understood by industry. Arguably, increased individualisation of learning to suit the requirements, circumstances and preferred learning styles of mature, employed learners, preparing for their NRQ final theory examination, could impact positively. This cohort experiences the greatest difficulty in becoming qualified in Norway.

As the Scottish aquaculture work-based VET system is flexible by design, learners and their employers can select 'optional' units to suit their development needs and opportunities available on their farm. As a result, learning and assessment planning is individualised as a norm. Consequently, although not formalised, the RPL concept is broadly familiar to companies who use 'individual learning plans or have sophisticated appraisal systems, once a conversation has been initiated. For those registered on the MA, as learning can be individualised through the selection of appropriate optional units, this can lead to a reduced interest in RPL applications in Scotland. Therefore, the wider benefits of RPL to aquaculture VET pedagogy need to be emphasised effectively in Scotland and in the context of the development of improved 'e learning' within the work-based learning systems that currently dominate. (See 7.3)

In summary, on comparing Norway and Scotland, despite clearly recognised differences, there is plenty of common ground. In both countries industry often see VET delivery as 'something for VET providers to deal with' and not something that they expect to apply much thought to. However, the Optimal partnership believe that industry will become increasingly receptive if RPL/APL methodology is presented within the context of e learning development, particularly if related to improved access, delivery cost reduction and more effective and better supported 'personalised learning'. These are attractive benefits to the industry in both countries and can ultimately gain their full attention.

## **9. Recommendations for further work**

The development of RPL methodology and piloting of resources is ongoing within the Guri Kunna VET school in mid Norway, supported by the Pisces Learning Innovation Lt (PLI). Once the RPL system and resources are sufficiently well developed, they will be presented to Scottish VET providers and aquaculture companies for comment, feedback and potentially adoption.

### **9.1 Mapping RPL resources to the Scottish MA in Aquaculture**

The mapping of aquaculture RPL multiple choice (MC) question sets to the knowledge requirement in the Scottish MA in aquaculture at SCQF level 5 (EQF 3). will be completed. This will increase their relevance within the Scottish aquaculture VET system and help to attract a Scottish VET provider to pilot RPL within Scottish aquaculture VET delivery. The Scottish Qualifications Authority (SQA), a current member of the Scottish Optimal Advisory group (see below), will be invited to support the process. Once the alignment of MC questions and other RPL resources to the MA has been completed, the SQA will be asked to host question banks and promote them to other aquaculture VET providers in Scotland, encouraging wider adoption during year 3 of Optimal and on completion of the project.

### **9.2 Promotion of RPL piloting in Scotland**

The RPL presentations under development in Norway for promoting RPL will be adapted for use in Scotland to raise awareness of RPL applications and benefits. This will help to stimulate interest in Scottish Optimal multiplier events devised to promote RPL benefits, methodology and resources.

A stimulating live demonstration of aquaculture RPL/APL approaches and resources will be developed to engage VET providers and their employers within future multiplier events on the Scottish mainland. Pisces Learning Innovations Ltd plan to demonstrate the use of multiple-choice questions within RPL and gather Feedback on the resources. Any interested VET mainland VET providers will be encouraged to pilot RPL methodology and resources, supported by PLI, during year 3 of Optimal.

The Scottish Optimal Advisory Group established in 2017 will form a sub-group of Scottish VET practitioners using response tools and applying RPL methodology within their VET delivery. This will provide a forum for the sharing of experiences and evaluations from Optimal with a wider community of practitioners. In the event of a Scottish aquaculture VET provider agreeing to pilot RPL, this opportunity for mutual exchange within the Scottish VET sector will be fostered (and open to all disciplines).

It is anticipated that Scotland's Rural College (SRUC) will join the forum as they are currently applying RPL and response technologies to VET delivery within Forestry and Dairy farming. They have also expressed an interest in re-establishing their aquaculture VET provision and footprint in Scotland.

### **9.3 Norwegian VET stakeholder network**

The Guri Kunna VET school plans to establish a VET stakeholder network in Norway consisting of several multinational Norwegian companies, including their farming interests in Scotland and Iceland and the Trøndelag and Nordland counties, the main providers of aquaculture VET. This includes 3 public and 2 private VET schools, and the two largest geographical areas for Salmon farming in Europe. This will help the project to organise multiplier events for relevant stakeholders. The poster

overleaf will be used to promote Optimal to potential attendees (See figure 4 - Poster to promote Optimal RPL Multiplier Events)

#### **9.4 Development of the 'Rapid Response' system**

The current One2ACT tools will be streamlined to better support aquaculture VET and optimize the effect of RPL applications. The tools will be improved such that teachers can spend less time on preparing the usage of them and improving the data presentation so as targeted feedback may be offered more easily and swiftly.

#### **9.5 Potential VET Harmonisation**

Guri Kunna VET School and PLI will investigate how aquaculture VET targeting salmon and trout farming could be harmonized between Norway, Iceland, The Faroes, Denmark, Scotland and Ireland.

This will help to support:

- joint development and sharing of learning materials,
- approval of NRQ across national borders,
- the incorporation of short certificate-based courses based up on joint industrial standards,
- better implementation of work-based learning,
- the development of shared continuous assessments and examination systems
- recognition of apprenticeship-based training systems
- accreditation of previous work experience
- improved VET formal and informal industrial collaboration and cooperation.

**Recognition of Prior Learning (RPL)**

**Optimized Effect of Training**

**Before course**

**During course**

**Pre-testing of knowledge**

*Course Plan with lessons*

**Students' advantage of giving feedback to the teacher**

- All students participate and use their mobile device to give nearly instant feedback
- Experienced students may help less experienced students
- Better support various types of learning styles
- Create improved mastering experiences

**Teachers' advantage of providing feedback to class**

- Analyze feedback
- Adjust course plan
- Optimize the lesson(s)
- May be used in onsite training or distance learning settings

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Figure 4. Poster to promote Optimized Effect of Training by use of RPL



## Appendix 1 VET system in Norway

The VET system, including apprenticeships, is an integral part of the Norwegian education system. The government views VET as a central means for achieving key national goals within their economic, regional and employment/labour market policies. Education and training, including VET, is a public responsibility to ensure an equal education for all, and equal access to high quality education is a fundamental political principle. There are no school fees at any level, including higher education in the public education system. Only a small share of pupils and students attend private education.

### 1. Strategy

Reform is an ongoing within VET national policy in Norway, initiated by a comprehensive curriculum reform introduced in 2006, “The Knowledge Promotion Reform” (“Kunnskapsløftet”). New national curricula were developed for each subject in both school-based and apprenticeship-based education and training. The Norwegian Directorate for Education and Training (“Utdanningsdirektoratet”) managed this process through a broad and open process. Each subject curriculum was developed by a curriculum team and been subject to a broad consultation process (electronic questionnaires, seminars, meetings) that has involved schools, school owners and the social partners.

The Norwegian strategy towards VET attempts to bridge the general and vocational divide and particularly the gap between the vocational schools and the apprenticeship system. The most important reform in this regard is “Reform 94” in 1994, which encompassed rights, structure and content. This produced changes in several aspects of VET. At the upper secondary level, both the act regulating education and training in schools, and the act regulating apprenticeship training were revised and harmonised with the aim of achieving a more uniform education and better coordination between education in school and training at work.

#### THE FORMAL VET SYSTEM :

Levels:

Tertiary education, age above 19

Upper secondary education, age 16-19

Secondary education, age 13-16 compulsory

Primary education, age 6-13 compulsory

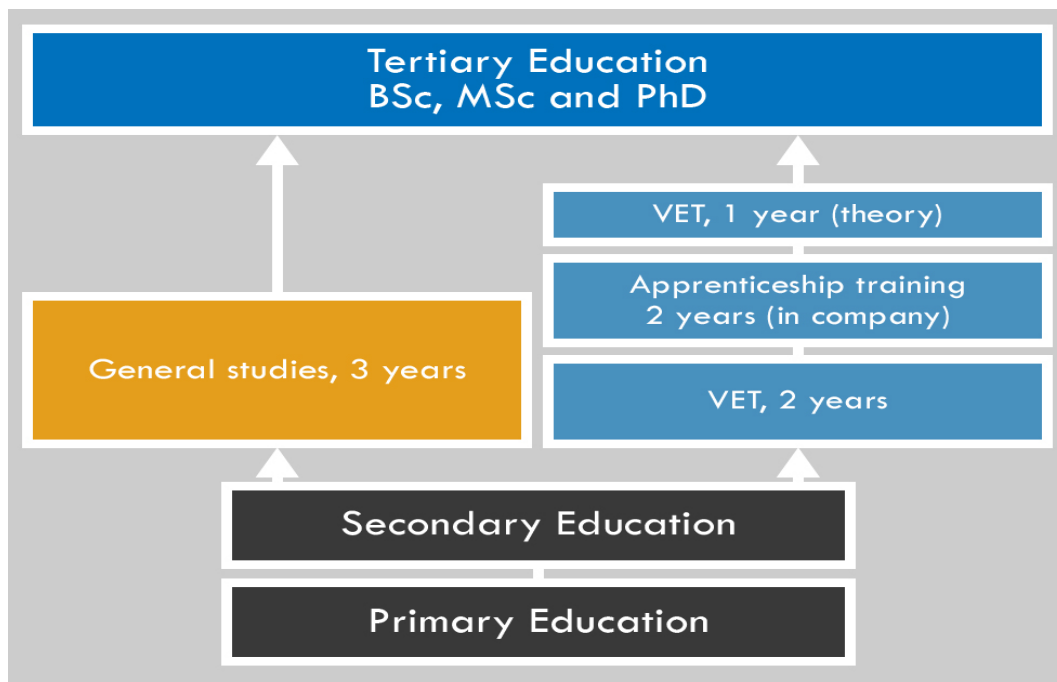


Figure 1. The main educational levels in the school system in Norway.

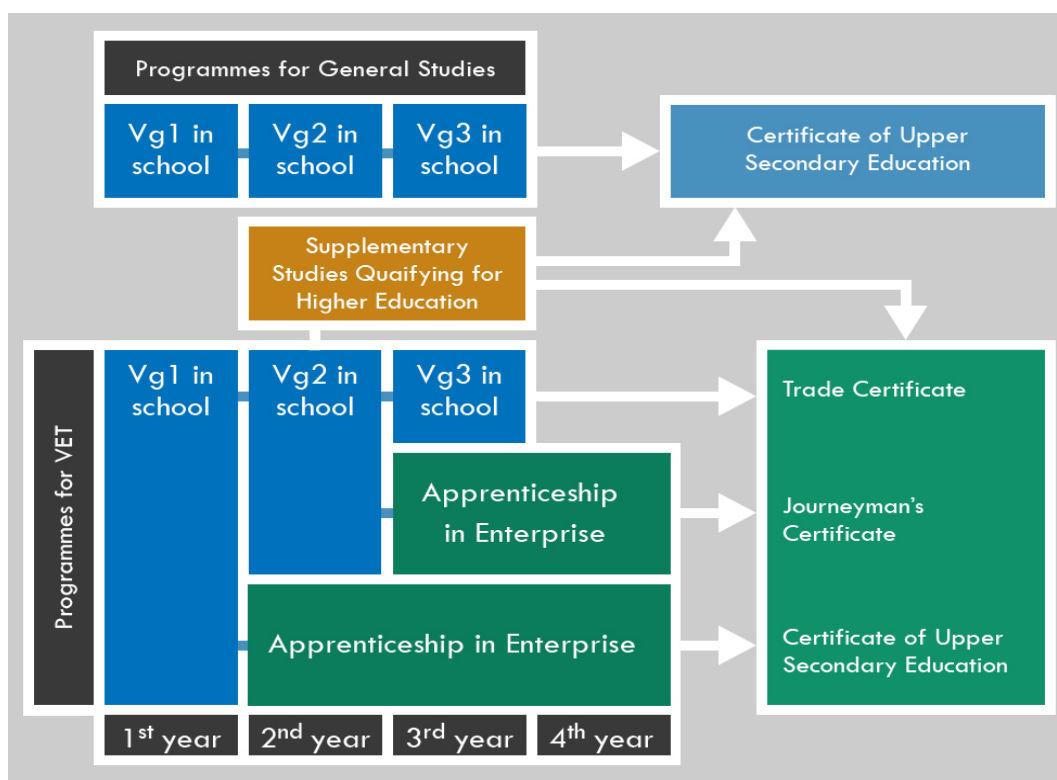


Figure 2. The organisation of the upper secondary VET education in Norway, including the apprenticeship system.

All young people leaving compulsory school have a statutory right to attend three years of upper secondary education. Since 1976, general and vocational education and training have been subject

to the same laws. Thus, today many upper secondary schools provide both general education and vocational training, often in the same building.

Students may choose from twelve programmes categorised as three general studies programmes and 9 VET-programmes. The VET-programmes are as follows:

- Technical and Industrial Production
- Electrical Trades
- Building and Construction
- Restaurant and Food Processing Trades
- Agriculture, Fishing and Forestry
- Health and Social Care
- Design, Arts and Crafts
- Media and Communication
- Service and Transport

The upper secondary VET leads to the trade- or journeyman's certificate ("fag- og svennebrev"). Most upper secondary VET students are in the age group 16-21.

## **2. VET delivery models**

Upper secondary VET normally includes two years at school with practical training in school workshops and short work placements in industry, followed by two years of formalised apprenticeship training and productive work in an enterprise or public institution. During the last two years, the apprentice is engaged in one year of training and one year of productive work. This is known as the "2+2 model". However, some programmes are entirely school-based. Another small group of programmes follow a "1+3-model", with one year in school followed by three years of apprenticeship training.

### **2.1 The first years 2 VET**

The first year in upper secondary VET consists of general education and an introduction to the vocational area. During the second year, VET students choose their specialisations and their courses become more trade-specific. While in school, students participate in practical training in workshops and enterprises in their chosen subject through an In-depth study project ("prosjekt til fordypning"). The two-year apprenticeship takes place with an employer (or employers) and follows the national curriculum.

In Norwegian higher education, all vocationally oriented courses and programmes are part of the ordinary higher education system. There is no distinction made between vocational and non-vocational higher education.

### **2.2 Tertiary Vocational Education**

The Tertiary Vocational education ("fagskole") is an alternative to higher education and is based on upper secondary education and training or equivalent informal and non-formal competence. A Higher Education entrance qualification is not required. The education consists of vocational courses lasting from half a year to two years.

After 2007, all providers have had to document their quality assurance systems. It is also possible to obtain institutional accreditation for programmes within a defined field of study, rather than having to apply for recognition programme by programme.

### 2.3 Governance

Norway enjoys a high degree of decentralisation amongst the three administrative levels:

- State,
- County and
- Municipality.

The municipalities (“kommuner”) are responsible for primary and lower secondary education.

While county authorities (fylkeskommuner) are responsible for public upper secondary school, their associated tasks include: operational responsibilities for the development of curricula, examinations and quality control, school management, recruitment of students, and the appointment of teachers.

The Ministry of Education and Research (“Kunnskapsdepartementet”) has the overall responsibility for national policy development and the administration of education and training at all levels, from kindergarten to higher education, including adult education. Higher education falls directly under the responsibility of the Ministry.

For upper-secondary (tertiary) vocational training (“fagskole”), the situation is slightly more complicated as the counties are responsible for most of the public funding, most schools are private, and a few schools are funded directly by the Ministry.

### 2.4 Curriculum development

The Directorate of Education has responsibility for the continuous curriculum development. For this purpose it makes extensive use of expert groups from both schools and companies that provide upper secondary education. When the need for a new qualification is identified, a tripartite group is set up to write vocational profiles (“kompetanseplattform”). This will form the basis for developing the subject curricula. The Directorate appoints teams for curriculum development consisting of professionals (most often suggested by the employer and employee organisations) and VET teachers. Also, the Directorate has recently developed a follow-up system for curricula called SOL (“System for oppfølging av læreplan”). The system aims to gain a more holistic and systematic curriculum overview.

### 2.5 Financing

Norway spends more than the OECD average on Education per student. In 2008, 5 per cent of GDP was spent on primary and secondary education and training, whereas OECD countries spent 3.8 per cent on average.

There are no school fees at any level of the public education system, including higher education. The finance comes from county authorities for public upper secondary schools while the Directorate of Education is responsible for tertiary education, including finance.

Only a small proportion of pupils and students attend private education. The Financial Support to Students and Pupils Act (“Lov om utdanningsstøtte til elever og studenter”-1985, latest amendment 2005) states that all registered students on formally recognised study programmes, at both public and private higher education institutions may receive grants and subsidised loans from the State Educational Loan Fund (“Statens lånekasse for utdanning”) for subsistence costs.

## Appendix 2 Description of VET system in Scotland

The Scottish VET system is an integral part of the national education system and includes college and work-based courses and qualifications. All young people leaving their compulsory schooling have a right to attend four years of College and/or University education, without incurring any course fees. VET is widely available, as both the main stream VET colleges and private training providers have been encouraged to widen access. Scottish VET is instrumental within economic development and the government expects VET providers to involve employers in VET design to ensure that their provision is fit for purpose. Consequently, UK Sector Skills Councils have been established to lead industry sector groups in defining their occupations and occupational standards, in terms of the knowledge and skills required at each occupational level.

### 1. Strategy

The Scottish Credit and Qualifications Framework (SCQF) has been created to allow meaningful comparison between the academic levels of Secondary School (Pre-16), College, University and Work Based Qualifications. This has enabled a wide range of 'Qualification Pathways' to be created with various entry and exit points within the system. Learners have greater flexibility and improved access in support of government life-long learning policies. Consequently, VET is more successfully promoted as an alternative pathway to Higher Education for many learners. Policy makers have been striving for 'parity of esteem' between VET and the more traditional academic Higher Education pathways, using the SCQF to demonstrate equivalencies between qualifications. Universities are increasingly recognising VET qualifications for entry to the first, second or third year of their Degree programmes, via well-defined articulation arrangements.

The Scottish Qualifications Authority (SQA) manage the development and validation of new and revised VET qualifications. They provide a national Quality Assurance system to ensure that the standards applied to assessment of their National Qualification do not vary, irrespective of which SQA approved centre delivers the Award. Each SQA Qualification is developed by a well-qualified and experienced Qualifications Development Team led by VET practitioners, but subject to consultation with industry. The current National Occupational Standards (NOS) developed by the appropriate Sector Skills Council must inform the development and revision of all National Qualifications.

The Education Scotland Act 1996 created the Scottish Qualifications Authority as a corporate, non-departmental public body of the Scottish Government, responsible for governing Education in Scotland. Although the SQA is best known for the delivery of the annual diet of public examinations within Scotland's Secondary Schools, the Act also made them responsible for accrediting a wide range of other Educational Awards, including VET within the tertiary education system

#### THE FORMAL EDUCATIONAL SYSTEM

Levels:

Higher Education, including Higher National Certificates (HNC) and Higher National Diplomas (HND) are offered by colleges to learners of 17 years old and above who have the Scottish Highers required for direct entry.

College VET, up to SCQF 6, is provided to learners who have reached or passed the mandatory minimum school leaving age (16 years and have been accepted on a VET programme appropriate to their academic level.

- Secondary-education provides is compulsory for learners from age 12-16.
- Primary education is compulsory for learners from age 5-12.

## 2. Types of VET provision

The Further Education (FE) Colleges in Scotland provide a very wide range of full time VET courses covering all trades and vocations. This includes full time course at the craft skill or operative level (SCQF 1-6) and 'higher technical and/or supervisory level (SCQF levels 7-8). Higher VET' as it is commonly known can also prepare learners for progression to University Degree programmes where articulation arrangements are in place. FE/HE articulation pathways were very successful in preparing aquaculture students for employment in the 1990s and early 21st century but have more recently lapsed.

In addition, the Scottish VET system offers two types of work-based qualifications:

Modern Apprenticeships popular with school leavers seeking immediate employment who want to 'earn while they learn'.

The National Progression and Professional Development Awards are commonly used by companies for their formal Continued Professional Development (CPD).

### 2.1 MAINSTREAM VET QUALIFICATIONS

The hierarchy of the main Awards undertaken in Scotland's VET system are described and summarised below. All qualifications are made up of defined Units prescribing the learning outcomes, performance criteria and assessment evidence requirements. This is to ensure national standardisation of VET assessment and quality, in the interests of learners, irrespective of their SQA approved centre location.

- 1 Year Access courses – 12 credits (SCQF 2-4)
- 1 Year National Certificates (NC) – 18 credits (SCQF 5-6)
- 1 year Higher National Certificates (HNC) – 12 credits (SCQF 7)
- 2 year Higher National Diplomas (HND) – 30 credits (SCQF 8)

Every trade and vocation is catered for within the Scottish VET system and for the vocations in highest demand there are many providers to choose from nationally. Although conventional academic studies stop at age 16 years for those leaving school, most SQA VET Qualifications integrate the development of transferable core skills. Every employer demands these skills, irrespective of the vocation:

- Numeracy
- Communication
- Working with others
- Problem solving
- Information Technology

Most of Scottish College VET students are in the age group 16-24 and embark on a specialist courses in the vocation of their choosing. Through the application of well-designed qualifications structures, learners can often specialise by choosing a defined number of Optional Units within their Award Framework. All the Units undertaken have meaningful titles, which are reflected in the learners' final SQA certification.

Conversely, the work based Modern Apprenticeship has no pre-determined duration but does also allow flexibility through a core and optional Unit structure. They have been devised to suit a diverse group of mature work-based learners who are at various stages of their career, from new entrants to the more experienced. Therefore, programmes of study are often individualised by a tutor and/or assessor and this process can be assisted by the Accreditation of Prior Learning (APL)

- MA Level 2 Operative (SCQF 5)
- MA Level 3 Supervisory (SCQF 6-7)
- MA level 4 Managerial (SCQF 8)

## 2.2 Common VET pathways

Commonly, entrants to the VET system leaving school at age 16 have not undertaken Highers and are therefore ineligible for entry to Higher VET or University Degree programmes. By undertaking a VET qualification, they can be prepared for entry to a trade or vocation at the operative level.

Learners who have taken their Highers but lack high enough grades to gain direct University entry often undertake Higher VET in a College. This can lead to a higher technical level of employment and/or supervisory responsibilities.

Conversely, many earners will often enter employment at age 16 on leaving compulsory education and start their apprenticeship at SVQ level 2. They can in time progress to level 3 (supervisory) and ultimately level 4 (managerial) MA programmes.

The Modern Apprenticeship at level 3 can often be accessed following a full time College based National certificate at SCQF level 5. Progression pathways composed of work and college-based qualifications are very effective as they allow the learner to develop and progress at a pace that suits them and their circumstances. Typically, a level 3 Modern Apprenticeship will take a minimum of 2 years for a 16-year-old school leaver to complete.

Currently learners have access to the MA in Aquaculture only, as college-based aquaculture VET became unavailable in Scotland from 2012.

## 2.3 Governance

Scotland has one VET Awarding Body, the SQA, which is responsible for the approval of all VET centres delivering SQA Awards, validation of new VET qualifications and the quality assurance of all approved VET providers internal assessment practices.

It is possible for an SQA approved centre to apply for devolved authority to validate and/or approve the delivery of SQA Awards, once they have demonstrated that they operate robust and compliant internal Quality Assurance systems.

## 2.4 Curriculum development

Some qualifications are developed at national level by selected committees of experts. This includes the secondary school examination diet and SQA led VET provision in high demand. In addition, any SQA approved centre can propose new SQA qualifications to satisfy local learner and industry demand.

All new qualifications (Awards) proposed by providers and revisions to existing awards must undergo rigorous validation process led by an SQA Development Officer. Robust market research is required

to establish the needs of the target audience and to demonstrate sufficient and sustainable demand from potential learners and the industry in question.

The Award will normally target a defined occupational level, and therefore, the current NOS provide a description of the knowledge and skills requirements. From this, Awards can be constituted in broad terms to determine the subject areas/ SQA Units.

Once this Award framework of Units is agreed, Learning Outcomes and Performance Criteria can be written for each Unit, to define the knowledge and skills to be assessed. Finally, the evidence requirements prescribed in each Unit define the nature of the assessment process that must be applied consistently by all centres delivering the Award, once it has been validated. The NOS must be interpreted carefully to ensure they are all incorporated somewhere within the appropriate Units and this should be made evident to industry representatives during the approval process.

Each Unit of a college based National Qualification has a credit value. One credit is equivalent to 40 hours of teaching, learning and assessment activity, whatever its nature and whether it is teacher or earner led. The system provides great flexibility as a single Unit can act as a specific qualification which is underpinned by National Occupational Standards and has undergone QA. It is possible to create new customised programmes relatively quickly as well as update existing qualifications, whenever there is a need. All qualifications can be reviewed and revalidated on whatever pre-determined cycle is required to ensure they remain up to date. The SQA system can accommodate a more regular review and revision than the typical 3-5-year cycle, if the providers and industry are motivated enough to submit the necessary revisions.

The work based Modern Apprenticeships, although also informed by the same NOS but make no assumptions about credit values as their duration is entirely dependent on the individual learner's background, previous knowledge and experience. Individual learning and assessment plans drive the delivery process and its duration and timing.

## 2.5 Financing

Each public-sector College is led by an independent Board of Management responsible for governance at college level. Each college receives a government Scottish Funding Council (SFC) grant for the delivery of qualifications. In addition, they can bid for Skills Development Scotland (SDS) grants to support the delivery of Modern Apprenticeships in the work place. Private training providers cannot access SFC grant but can and do successfully bid for SDS funding to support Modern Apprenticeship delivery.



## Appendix 3 Norwegian Educations Acts regulating Norwegian VET

**Legislation:** Reform 94 produced changes in several aspects of VET. At the upper secondary level, both the act regulating education and training in schools, and the act regulating apprenticeship training were revised and harmonised with the aim of achieving a more uniform education and better coordination between education in school and training at work. The following acts regulate the current VET system:

1. *Act of 17 July 1998 no. 61 regulates the county authorities' responsibility for public upper secondary education and training, objectives and scope, organisation and division of responsibilities, financing and content of education and training delivered by both public and private institutions.*
2. *Act relating to Upper-secondary Vocational Education and Training (lov om fagskoler 2003, latest amendment December 2010) regulates public and private post-secondary vocational education and training with courses and programmes of 6 months' to 2 years' duration. Education and training under this law are not part of higher education.*
3. *The Adult Education Act (Lov om voksenoppl ring – 1976, latest amendment 2003) regulates different types of adult training that is not covered by the Education Act. Education and training for adults is provided by a variety of public and private institutions. Among the most important are private adult learning study associations (studieforbund), labour market training, work based training and distance training.*
4. *The Act relating to Master Craftsman Certificates (Lov om mesterbrev, 1986) establishes the framework for the master craftsman certificate (mesterbrev). It stipulates that only a person awarded the certificate is entitled to call him or herself a master craftsman (mester).*
5. *The Act relating to Universities and University Colleges (Lov om universiteter og høyskoler 2005, latest amendment 2009) applies to all higher education, both state and private. The Act regulates organisational and management aspects, provides for the recognition of study programme, examination and certification, for quality assurance as well as for the learning environment for students.*