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Key Action 2: Cooperation for innovation and exchange of good practices

Intellectual Output 1

Executive Summary of the State of Art Report on the ManuMobile Project



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LISBOA



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Foreword

ManuMobile: Transparency of credit allocation in Vocational Education and Training and Higher Education in Manufacturing, is an ERASMUS+ project, implemented between September 2015 and August 2017. The project consortium comprised five partners from four European countries, all partners contributing technical expertise to achieve the project objectives and a wide experience of participation and management of national and/or European projects:

Table 1 - Partners of the ManuMobile project

PARTNER	COUNTRY	ORGANISATION	
C1	UK	TWI	TWI LIMITED
C2	Belgium	EFW	EUROPEAN FEDERATION FOR WELDING JOINING AND CUTTING
C3	Portugal	ISQ	INSTITUTE FOR TECHNOLOGY AND QUALITY
C4	Portugal	IST	INSTITUTO SUPERIOR TÉCNICO
C5	Norway	EUROMASC	EUROMASC - European Masters of Skilled Crafts

The ManuMobile project had the overall aim to promote collaboration between Vocational Education and Training (VET) and Higher Education (HE), in particular through the development of a methodology and tools to allow transferability between VET and HE. The ManuMobile project focused on the need of qualified personnel in joining technologies, however, keeping in mind other manufacturing technologies to ensure a higher impact. The methodology and tools were developed to be applicable to VET and HE in any sector of employment.

This report delivers a summary of ManuMobile Intellectual Output 1, which comprised:

- 1. Development of a survey to identify the major stakeholders needs (focusing on universities, VET providers and industry);**
- 2. Research on existing methodologies and ongoing market requirements, specifically requirements for transferability between HE and VET;**

3. Mapping techniques for the validation of informal and non-formal VET qualifications.

The full Common State of the Art Report, which is published in English and is accessible and available for download in the project website: <http://www.manumobile.eu/>.

This executive report is structured in six parts and summarizes the main conclusions of Common State of the Art Report, as follows:

Part 1, provides an overview of the different approaches in each ManuMobile partner countries (Norway, Portugal and United Kingdom) towards recognition of prior learning.

Part 2, provides an overview of the national credit transfer system of the United Kingdom, known as CATS (Credit Accumulation and Transfer System). This narrative recognises the fact that the United Kingdom has taken a leading role in Europe with policy provision to support transferability and permeability of VET into HE.

Parts 3, 4 and 5 are dedicated to the analysis and review of seven approaches on the permeability and transferability between VET and HE: the VQTS model, the VQTS II project, the ANKOM initiative, the PERMEVET project, the BE-TWIN 1, the BE-TWIN 2 methodology and the EAGLE methodology. For each one of them, there is a general overview of the main principles and features, and explanation of how each addresses bridging between ECVET and ECTS, the mobility between the educational pathways and, where relevant, how they conceive recognition of prior learning. The overview is then supplemented by a critical review of the major outputs generated by each approach.

Part 6 presents the analysis of the main outcomes derived from the survey conducted by the ManuMobile partners regarding welding education and training courses that are provided in Vocational Education and Training (VET) and Higher Education institutions, representing current stakeholders requirements (Universities, VET providers and industry), and highlighting critical points and skills gaps in the welding sector.

Introduction: ECTS & ECVET / HE & VET

During the last years, European countries have recognised the need for cooperation in reforming the field of education and training, while taking into account quality standards. The urgent need for this joint action is mainly a result of the increase of participation and attainment levels, the upgrading of skills and competences in the workforce and the increase of the labour market relevance in the education and training systems. At the same time, permeability is being applied to education and training systems by reducing barriers and increasing opportunities. ^[20] The idea of *"learners to be able to move easily between different types of education (such as academic and vocational, and between different levels (such as upper secondary, or apprenticeship, up to higher education), as they decide (...)"*^[11] is widely supported by all the EU members and recommended in EU 2020 strategy. As a matter of fact, *"the increase of quality, efficiency, openness and relevance of the educational system are recognized as means for reaching the EU 2020 and ET 2020 targets."* ^[20]

Consequently, in order to achieve the desirable development of learners (and thus, the development of the European society) as well as the strengthening of the EU Single Market, EU has developed a range of instruments to facilitate mobility and Life Long learning.

Implementation of a European credit transfer systems for Higher Education and VET (ECTS and ECVET), combined with the learning outcomes (LOs) approach across all EU frameworks (EQF, QF-EHEA) and levels of education and training, is probably the most significant support for mobility and permeability between the different educational sectors, in particular, between vocational education and training (VET) and higher education (HE).

[20]

Before moving forward, it is noteworthy to clarify the key concepts underpinning this state of the art:

Learning Outcomes (LOs) can be defined as *"Statements of what a learner knows, understands and is able to do on completion of a learning process and which are defined in*

terms of knowledge, skills and competences that can be assessed and validated (Recommendation on ECVET, 2009)".

Learning Activities (LA) are understood as courses, modules, internship, practical training, thesis, practical experimentations, on the job training etc. ^[18]

ECTS credit system *"is a learner-centred system for credit accumulation and transfer based on the transparency of learning outcomes and learning processes. It aims to facilitate planning, delivery, evaluation, recognition and validation of qualifications and units of learning as well as student mobility (ECTS Key Features)". "ECTS credits quantifies the volume of learning based on the student workload "Workload indicates the time students typically need to complete all learning activities (such as lectures, seminars, projects, practical work, self-study and examination) required to achieve the expected learning outcomes (ECTS Users' Guide 2015)".*

ECVET credit system *"is a technical framework for the transfer, recognition and, where appropriate, accumulation of individuals' learning outcomes with a view to achieving a qualification. ECVET is intended to facilitate the recognition of learning outcomes in accordance with national legislation, in the framework of mobility, for the purpose of achieving a qualification (Recommendation on ECVET, 2009)." ECVET points are a "numerical representation of the overall weight of learning outcomes in a qualification and of the relative weight of units in relation to the qualification (Recommendation on ECVET, 2009)." ECVET points are first allocated to a qualification as a whole and then to their units.*

On the one hand, the common aims of the ECTS and ECVET credit systems are: i) enabling recognised mobility in Europe; ii) facilitating the accumulation and transfer of the assessed learning outcomes; and, iii) fostering both lifelong learning and transparency of the European system. ^[18]

On the other hand, LOs are the driving force of the contemporary higher education reform and the very core assumption behind the ECVET framework. ^[9] Indeed, in higher education *"The adoption of learning outcomes shifts the focus on the learner, the role of a teacher shifts towards that of a facilitator of the learning process. It furthermore recognises*

that many activities can take place outside the classroom, based on learners' own independent activities. This approach has influenced significantly the ECTS system transforming it towards an output based tool what we could call "learning outcome based ECTS credits". ^[18]

Regarding the *"framework of ECVET, the learning outcomes constitute the very core of the philosophy. We can even consider that it is not necessary to take into account the curriculum to define the learning outcomes, these being defined related to the job profile and occupational standard only."* ^[9] So, we can thereby conclude that *"(...) deciding levels of qualifications on the basis of learning outcomes provides a real opportunity to make education and training systems more permeable and interactive."* ^[10]

Nonetheless, although there have been some improvements to make education and training systems more permeable and flexible, many inconsistencies and obstacles still persist. For instance, not all countries have fully implemented the ECVET systems in VET, some doubts persist regarding the allocation of credits or the writing of learning outcomes and how to effectively perform the horizontal and vertical mobility of learners through the educational systems.

This evidence is also pointed out in the CEDEFOP briefing note [9072 EN pp. 3-4] ^[0], which led us to conclude that a better compatibility, comparability and permeability between VET and HE, and the credit system, is still needed:

"While many steps have been taken to make education and training systems more permeable, there is a danger that learners will continue to face barriers to their desired learning paths. Validation, recognition, credit transfer and qualification frameworks are only slowly becoming permanent features of the European education and training landscape. In many cases, they cover only parts rather than the whole education and training system and, paradoxically, are reproducing the segmented and hierarchical structure they are meant to bridge."

"European credit transfer systems for VET and higher education are being developed separately, potentially reducing rather than increasing permeability."

"The situation for academic recognition is similar. Some centres in the academic recognition networks ENIC and NARIC support VET students and provide information on VET qualifications, but this is not a specific task of the network. A more systematic exchange of information on recognition of VET qualifications throughout Europe is needed. There are similar problems with validation. Countries have largely chosen to develop validation arrangements linked to subsystems, such as VET and higher education. Few initiatives have emphasised the links between different subsystems and institutions."

"Many countries have taken significant steps to bridge the divide between different parts of their education and training systems. Instruments are partly in place, but the challenge of implementing them is substantial. Progress is, sometimes, hampered by a lack of coordination. Strategies that strengthen links and encourage synergy between European and national initiatives are needed."

Regarding the learning outcomes, "(...) *the full potential of learning outcomes can only be realised through close cooperation and dialogue between sectors and education and training subsystems.*

The danger is that learning outcomes will be implemented differently in general, vocational and academic education and training, cementing rather than reducing existing barriers. If the shift to learning outcomes is to support permeability, there must be common agreement as a basis for dialogue, understanding and trust. Work on implementing NQFs and learning outcomes has demonstrated the need for comprehensive strategies if future developments are to succeed."

In this context, this report intends to document and describe the latest accomplishments in reforming the educational field towards a higher transparency between VET and HE. The particular focus is on illustrating the current methodologies and tools applied for promoting permeability and transfer between VET and HE.

STATE OF THE ART: AN OVERVIEW OF RECOGNITION OF PRIOR LEARNING (Part 1)

1. An overview on recognition of prior learning

Norway

In Norway, the non-formal and informal learning has deep historic roots and has been developed in parallel with the formal education system. It is highly recognised in civil society and is important for skill formation in the Norwegian economy. ^[1]

Prior experiential learning comprises all the competence a person has acquired through paid or unpaid work, in-service training, continuing education, leisure activities in addition to the competence documented through basic education and training.

All adults in Norway who are entitled to receive primary, secondary and upper secondary education and training are also entitled to an assessment of their prior experiential learning. They can apply for an assessment of prior experiential learning both when seeking admission to higher education and when seeking recognition of education if they want to take a Norwegian apprenticeship examination for a Norwegian craft certificate.

Portugal

Portugal has developed a systematic approach to the recognition and validation of non-formal and informal learning. After a period of great national expansion between the years of 2001 and 2010, the system of Recognition, Validation and Certification of Competences (RVCC) has entered a new stage of development. In 2013 it was announced the creation of new centres in charge of the certification and validation processes – CQEP (Centros para a Qualificação e Ensino Profissional/Centres for Qualification and Vocational Training) replacing the former CNO (Centros Novas Oportunidades/New Opportunities Centres).

The new centres are responsible for the validation process at a national level, using the same national standards and methodologies used by the former CNO. Also the Key Competences Standards used in the academic process and the Standards used in the professional processes remain the same.

The main difference between the CQEP and the former CNO is the target audience. The CQEP centres serve not only adult population, but also young people, starting from 15 years old. The CQEP centres have the mission of providing information, counselling and guidance to young and adult people looking for the improvement of their qualifications that can be done through training or by the development of a RVCC process. Nevertheless, the RVCC processes are only available for individuals older than 18 years of age and up to 23 years old that have at least 3 years of professional or certified experience to be eligible for validation.

The Recognition, Validation and Certification of Competences (RVCC) processes are based on the national standards for education and training included within the National Catalogue of Qualifications. The RVCC serves both the basic and secondary levels of education and professional areas, corresponding to the level 1 to level 4 of the NQF which is linked to the EQF.

The RVCC process allows individuals to validate non-formal and/or informal learning and therefore obtain a partial or full certification depending on the competences held. However, in order to get a NQF qualification, the adult needs to have full certification in the RVCC process.

In the Portuguese RVCC system, adults can be oriented to an academic process or a vocational process, they can do it in a separate or integrated way. The academic process allows the adults to improve their qualification levels by obtaining a basic or secondary certificate. In the vocational process, adults who do not have formal qualifications in their occupational areas can also improve vocational qualification levels.

According to the 2014 European Inventory, qualifications obtained through validation of non-formal and informal learning should provide access to the next level qualifications in the formal learning system. The certification awarded by the RVCC process has the same value as any other different route of obtaining the same certification, permitting the adults to continue studies in the national education and training system.

The recognition and validation of competences can be carried out through a range of activities. It can be done by declarative methods, interviews, simulations, tests and examinations with the intention of organising a portfolio. The portfolio should contemplate different documentation that can be biographical or curricular, thus allowing the assessment and validation of competences according to the respective standards. The validation of competences comprises the learning reflective portfolio self-assessment and the assessment made by the Orientation, Recognition and Validation of Competences professionals and trainers from the qualification areas. The certification is decided by a jury, which evaluates the candidate based on a written, oral or practical examination. After the approval, the candidate gets a certificate of the attained full or partial certification. If a candidate is awarded a partial qualification, the CQEP will have to define a personal plan of qualification in order to achieve a full certification.

United Kingdom

In the United Kingdom statutory recognition of vocational competences gained through experiential learning and assessed through on-the-job performance, was introduced in 1986. Awards, at different levels of achievement, are known as National Vocational Qualifications (NVQs) or Scottish National Vocational Qualifications (SNVQs).^[4]

According to several case studies^[1] undertaken in UK, the experiential portfolio is the most used tool on the recognition and accreditation of prior experiential learning, leading to awarding of diplomas. An example of the process on this matter will be given, concerning the experience of The Welding Institute (TWI).

The Welding Institute, as other institutions, recognises all forms of learning as relevant to the professional development of technicians and engineers. Through its regulations and guidance on the Individual Route for applications for Registration, the Engineering Council provides for the recognition of knowledge and understanding based on evidence other than exemplifying qualifications.

In the first part of the process, the TWI professionals need to establish that the applicants have been operating at the appropriate level of responsibility and technical engagement. Then the professionals need to understand the gap between the applicants' existing exemplifying qualifications and the required level of knowledge and understanding, and be able to confirm that they have had experience that has supported learning.

Within the scope of the individual route, two options exist, either the Experiential Portfolio Option or the Technical Report Option. The Experiential Portfolio purpose is to provide evidence that satisfies the UK Standard for Professional Engineering Competence (UK-SPEC) requirements for technical knowledge and understanding, in particular the UK-SPEC competences A (knowledge and understanding) and B (design and development of processes, systems, services and products).

After a previous personal consideration, if the applicants choose Experiential Portfolio some steps are mandatory to follow. Applicants are required to provide evidence and a personal reflection on what they have learned through their experience in work and knowledge gained through other types of learning. The Assessment criteria are based on the qualification descriptors for BEng and MEng degrees given in the framework for higher

education qualifications in England ^[4], which have been mapped onto the UK-SPEC requirements and incorporated into the TWI assessment process.

The Experiential Portfolio Option contains multiple pieces of evidence drawn from the applicants' working life, each one chosen to satisfy one or more of the assessment criteria. The applicants are expected to make personal statements to identify for the assessor the evidence that they feel satisfies each assessment criteria. Only the evidence provided in the portfolio can be assessed to validate the technical knowledge and understanding against the assessment criteria.

A Professional Advisor with knowledge in the applicants' area of expertise and application is assigned to provide applicants with support during the development of their submission.

After submission of the evidence, the portfolio is assessed by at least two experienced assessors and feedback is provided to supply the required information. Applicants who successfully satisfy the Individual Route assessment criteria are invited to proceed to Professional Review Interview, which may also address aspects of the UK-SPEC competences A and B.

STATE OF THE ART: an overview of a Credit Transfer System (Part 2)

2. An overview of a Credit Transfer System

United Kingdom

As a supplement, in addition to the European Credit Transfer and Accumulation System (ECTS) and the European Credit System for Vocational Education and Training (ECVET) frameworks already briefly described at the introduction, an overview on the United Kingdom's system will be provided, the Credit Accumulation Transfer Schemes (CATS). In this scope, credit accumulation and transfer rely not only on allocation of credits to modules, but also (and more than the previous meaning) rely on prior learning experiences, formal or experiential ^[8].

A credit accumulation and transfer framework in the United Kingdom was first born in the 60s with the Open University, but only in the 90s it was recognised among other universities and, eventually, published, aimed at enabling flexible learning pathways and providing flexibility and choice both for learners and employers. ^[8]

Currently, the UK's credit transfer systems are divided into two types: i) national credit transfer system for accredited qualification in England, Wales and Northern Ireland and ii) credit transfer system in Scotland. Both credit systems are similar on the credit accumulation, differing on the transferability.

In 2011, the Qualification and Credit Framework (QCF) was born and comprises 8 levels.

Under the QCF, the learner is awarded credits for completing units and depending on the total amount of accumulated credits, the learner can gain three kinds of qualifications – award (1-12 credits), certificate (13-36 credits) and diploma (37 credits or more). The QCF levels vary in difficulty with each subsequent level increasing in difficulty. ^[9]

According to the credits mentioned, the calculation is done based on the following criteria: 1 credit point represents 10 hours of learning. Thus, an award requires 10 to 120 hours of learning, a certificate requires from 130 to 360 hours, while a diploma takes at least 370 hours of learning. Since credits indicate the size, not the difficulty level, an award can be acquired at any level including Level 1.

As a closing remark, the credit frameworks in the different UK countries are aligned, as they are based on the achievement of learning outcomes and a notional ten hours of learning per credit. They are also aligned with national qualifications frameworks, eg. The

United Kingdom Framework for Higher Education Qualifications (FHEQ); the European Qualifications framework for Higher Education (FQ- EHEA) and the European Qualifications Framework (EQF).

STATE OF THE ART: AN OVERVIEW OF BRIDGING EDUCATIONAL SYSTEMS (Part 3)

3. An overview of bridging educational systems

VQTS Model (2003-2006)

CRITICAL REVIEW

The VQTS project "*contributed to the development of a model that facilitates transnational comparison of competences and qualifications by offering a solution for a structured description of work-related competences and their acquisition (including credit points): the VQTS model.*"^[13] Hence, the VQTS model represents one of the earliest attempts to use learning outcomes in bridging different educational systems in order to improve mobility and implement procedures enabling VET learner to proceed there studies abroad.

As previously verified, the core outputs of the VQTS model are the Competence Matrix, the Competence Profiles and the Competence Profile Certificate (including the credit points). These elements offer main potentialities:

On one hand "*The VQTS model and, in particular, the description of competences in relation to the work context can support understanding between the world of education and the world of work. Hence, the approach developed can be used not only for the transfer of competences acquired internationally, but also for other purposes where the transparency of competence profiles is highly important.*"

On the other hand, "*Competence Profiles (in addition to other documents) can, for example, provide important information about knowledge, skills and competences acquired by graduates of VET schools or colleges for future employers or personnel managers.*" (...) "*The transparency of competence profiles is also highly important on the interface between VET and HE.*" "*(...) the VQTS model can also be used for making visible the overlapping areas of the competence profiles of VET and HE qualifications. This is the focus of the follow-up project VQTS II, which started at the end of 2007 and is funded by the Lifelong Learning Programme.*"^[13]

In brief, in our perspective, the Competence Matrix is a valuable instrument as it allows a clear and objective description of a particular qualification. It has the advantage of being a learner-centred approach, which gradually introduces the notion of development and increases complexity while learning occurs (from a beginner to an advanced level).

Additionally, it allows both training and learner profiles to be described, having the corresponding ECVET credits allocated. This approach was designed to specifically enhance mobility in the vocational system, and to support recognition of competences acquired during either the training period abroad or throughout the non-formal or informal learning.

Finally, the Competence Profile Certificate is the central document that proves the acquisition of competences.

However, this model has some limitations. In fact, it does not include a reference to mobility between VET and HE, neither does it show how to compare different modules and LOs in the same matrix. As we will see, these issues are undertaken by the coming approaches.

VQTS II MODEL (2007)

CRITICAL REVIEW

In brief, the VQTS II project proved that the VQTS model is an important instrument to enhance transparency and trust in the accreditation process. *"With the VQTS tools, curricula can be 'translated' and compared, and one can identify equivalences and differences of learning outcomes. Recognising prior learning from formal, non-formal and informal learning can also be enhanced with the VQTS tools."*^[13] In fact, it seems clear that the VQTS II project added an unequivocal value as it allowed testing the use of the VQTS model, in particular the usefulness of the Competence Matrix and the Competence Profiles.

At the same time, the project showed that *"The Competence Matrix is easier to use and more likely to be used when HE programmes have a strong practice-oriented focus, follow a work-task orientation and are described in terms of learning outcomes or competences."*^[13]

The VQTS project also showed that the model allows promoting sustainable advancement from VET to HE by establishing new partnerships between VET and HE providers and by developing learning paths that facilitates the students' progression from one system to another.

Finally, the VQTS project represents a great effort towards TRANSNATIONAL MOBILITY, as it proposes orientation for the development of both a memorandum of understanding and a learning agreement.

STATE OF THE ART: AN OVERVIEW OF BRIDGING EDUCATIONAL SYSTEMS (part 4)

4. An overview of bridging educational systems ANKOM initiative (2005-2014)

CRITICAL REVIEW

In our opinion, ANKOM represents an excellent example of a governmental initiative that promotes cooperation between vocational and higher education institutions. In fact, over almost a decade, it engaged partners for the design and testing of several projects aiming to enhance the permeability and transparency between educational systems.

The ANKOM initiative proved that *"There is equivalence of VET and HE regarding learning outcomes (proof of concept). As well as it proved that "the pilot projects have developed and tested accreditation models and thus proved that different learning environments can procure equivalent learning outcomes." So, "With ANKOM finished now there are some really good examples to be spread and more sophisticated experience to be drawn upon which other HE institutions can benefit from and thus make it easier for them to set up accreditation procedures at an advanced level. The results of the ANKOM initiative show that there is considerable effort involved to make permeability within the educational system real when applying quality-assured recognition procedures."*^[15]

The equivalence check methodology represents a fairly guiding approach for those who want to go forward in comparing learning units from different programmes, giving them advanced knowledge in how they should perform, i.e. crossing LO, Levels and Workload. At the same time, the equivalence check has a tremendous potential: *"(...) the equivalence check, which is basically a procedure designed to identify commonalities between education and training programmes, by definition has the property of identifying differences, too. By virtue of this property the procedure can also serve as a means to assess education and training programmes with the aim to detect possible shortcomings or gaps, and to identify the potential for improving programmes. (...)"*.^[14]

As it was corroborated by the study presented above, the instruments used in the equivalence check, namely the LOM (Learning Outcome Matrix) and the LMI (Level Module Indicator) revealed themselves as efficient and precise in pointing out the similarities between modules, having therefore an undeniable value for future recognition procedures: *"A particular advantage of the Module Level Indicator is that it allows for a precise and transparent*

assessment of the level of vocational learning outcomes, which provides a scientifically valid basis for their accreditation and supports quality assurance in the organisation of permeability. The results of the level comparison in this specific case also emphasis the quality of vocational training in the technology sector and demonstrate that learning outcomes related to these quite demanding training occupations do not necessarily fall short of learning outcomes achieved at the level of tertiary education. This gives further support to the idea that the vocational track is indeed a promising route for learners who are interested in further intellectual development through higher education." ^[14]

PERMEVET Project (2009-2011)

CRITICAL REVIEW

As this project implemented in 2009, it was too ambitious to combine three dimensions of permeability in one project, covering 24 months of activity. Firstly, to bridge VET and Higher Education itself is a challenge, due to regulations and prestige positioning, as well as traditional opinions and attitudes itself create some obstacles to be overcome. Over time, there has been a growing interest in the identification of these obstacles to avoid situations where unjustified barriers are dominating.

Secondly, to bridge between EQF levels, targeting the same area of learning outcomes creates a similar discussion on the levels, the identification and mapping of them to education systems and structures, as well as ownership to parts of the 1-8 EQF range. Traditionally, the VET vs Academic split has been strong, and for many years, the EQF scale has been divided in two sections: 1-5 belonging to VET and 6-8 as belonging to Higher Education institutions.

This split is contrary to the underlying definition of EQF, where the learning outcomes' definitions are independent of institutional backgrounds. During the recent years, the discussion around SCHE (Short Cycle Higher Education), where the competition between vocational education providers and Higher Education institutions around EQF-5 has become more open, the question of how learning outcomes are aggregating results of training and experience is a really valid one. With the additional interest in recognition of prior learning, the questions raised in PERMEVET are interesting, as they focus on what is needed to bridge across the EQF levels.

Finally, the challenge of transnational accreditation creates the third dimension in this perspective. Adding to the first two, the PERMEVET partners managed to find examples and pathways where possible permeability options were identified between countries. However, the extent to which this could be implemented on a broader scale than just bilateral exchanges and transitions is still to explore.

As a project aiming at the three mentioned dimensions, PERMEVET has given examples of options and opportunities for permeability and flexible learning and training

pathways. Although, a broader roll-out and implementation of the ideas and methods are still fermenting in the pipeline of European developments.

BE TWIN 1 methodology (2010)

CRITICAL REVIEW

The BE-TWIN 2 project (2010), which will be presented below, considered the BE-TWIN methodology as an important approach that attempts "to contribute to individualisation of learning (part of student-centred learning approach) and to conceptualise training and learning as a lifelong continuum, [offering] individuals various points of entry and departure throughout their lives and crosses not only geographical borders but also sectorial barriers".^[20]

In fact, the potential usage of the BE-TWIN methodology can possibly be:

- *"To reshape the training offer and make it more transparent for the learners in the case of a university or a higher education institution. The matrix could also serve as a technical instrument, frame, for evaluating the results of prior learning – formal, non-formal or informal."*
- *"(...) for an institution to better connect the identified (job) profile and the proposed qualification to the training offer and pedagogical investment."*
- *"(...) to fill in both sides of the grid: the ECVET and ECTS. For instance, VET degrees at higher education level, which exist in several national educational systems, would benefit from the matrix by converting their training offer both in ECVET and in ECTS. This double allocation of credits would be beneficial for the learners who could better value their gained learning outcomes towards the economic world, and better present their qualification towards the academic world."^[18]*

Nevertheless, the model has some limitations. For instance, when the BE-TWIN project took place in 2008-2010, the ECVET was not implemented yet and ECTS credit system was in transition. *"In the new Users' Guide, published by European Commission in 2009, ECTS system was introduced as a student-centred one, in which ECTS credits were based on the workload students needed in order to achieve expected learning outcomes. This was the change compared to the previous methodology which was based to allocation the ECTS credit points to learning activities."^[21]* So, it can be stated that the BE-TWIN matrix may reflect an old vision of ECTS targeted to input and curricula. In fact, despite the expressed learning outcome philosophy, it only refers to credits from ECVET assignment.

STATE OF THE ART: AN OVERVIEW OF BRIDGING EDUCATIONAL SYSTEMS (part 5)

5. An overview of bridging educational systems

BE -TWIN 2 Methodology (2012)

CRITICAL REVIEW

It seems clear that the BE-TWIN 2 project added an unequivocal value as it allowed testing the use of the matrix BE-TWIN methodology, thereby proving its relevance in "bringing existing tools (curriculum, learning outcomes and credit systems) in one place and to interlink them" and giving a "better description and deeper understanding of what a qualification is in reality and what are the entire key constructs of qualification (credits, LOs, and LAs, i.e. curricula including their prerequisites)." [20]

Additionally, the project reinforces the learning outcome approach, the ECVET system, and the development of the level 5 of qualification as key elements in the rapprochement between vocational and higher education and in the recognition of non-formal and informal prior learning. Although, it does highlight the fact that these elements cannot be used individually; they must be applied in a holistic way.

We also think it would have been interesting if the BE-TWIN 2 project had pointed out some considerations regarding a possible reformulation of the matrix. In particular, it would be valuable to rely on the results achieved and take into account the transition occurred in the ECTS, as the learning activities approach became meaningless.

Eagle methodology and toolkit (2012)

CRITICAL REVIEW

In our perspective, the greatest advantage of the EAGLE methodology and toolkit is that it includes and allows prediction of the necessary steps towards recognition, validation and certification of formal learning. Additionally, the approach seems to effectively guide student in making their vocational choice for transfer between teaching systems or within the same systems in different countries, according to their individual needs.

However, we think that the EQF- ECVET- ECTS -LO foundation grid model should be further explored in order to provide a clearer guidance regarding the steps necessary to fill the matrix.

As a future challenge, it would be *interesting to apply the EAGLE* to other educational sectors.

STATE OF THE ART: AN OVERVIEW OF MARKET'S NEEDS (part 6)

6. An overview of market needs

Survey's analysis

The analysis of the survey results highlighted global results and, at the same time, indicated possible specific needs related to the European Qualifications Framework (EQF) level of the qualifications. The answers collected were gathered in 3 different groups, as follows:

- First group, for qualifications assigned by respondents to EQF Levels 1 to 4;
- Second group for qualifications assigned to EQF Level 5;
- and the Third group for qualifications assigned by respondents to EQF Levels 6 to 8.

This was the baseline for comparison and outline of possible trends, and was driven by the segregation of respondent's answers based on the nature of their experience of qualifications and the institution likely to be delivering it, being either a Vocational Education and Training (VET) provider or a Higher Education (HE) institution. Level 5 qualifications responses weren't added to any of the previous groups, due to their merged nature and joint provisions delivered either by VET providers or HE institutions; and due to a wide range of possibilities addressed to this level and under discussions yet to come.

Main findings and conclusions

Despite the fact of the majority of suggestions provided seem to be coherent with the assessment expressed throughout the survey, some of them are not applicable to the European Welding Diplomas, given that these qualifications are already implemented. Such responses lead to the conclusion that these respondents were not fully aware of the EWF system or were enrolled in other courses/qualifications. Nevertheless, these answers will be considered and EWF guidelines will be carefully reviewed to check whether they are actually covering the suggested topics and/or which areas might be improved.

Overall conclusions from the survey included:

- An agreed alignment between EQF and NQF levels 3, 4 and 6. Yet a totally inconsistent alignment in EQF and NQF levels 1 and 2, due to this option being chosen by those respondents who didn't seem to know what to answer. In levels 7 and 8 there were also inconsistencies between EQF and NQF levels. Within these levels, the majority were making reference to qualifications outside EWF's scope.
- Group 2 is underrepresented.
- Group 1 considered the courses/programmes more practical than theoretical.
- Group 2 and Group 3 considered the programmes more theoretical than practical.
- Generally, all 3 groups were satisfied with weight of theoretical and practical components, with Group 3 being the least satisfied (64%).
- The nature of the responsibilities and tasks of Group 1 is operational and of compliance with standards, requirements or supervisors' instructions.
- The nature of the responsibilities and tasks of Group 3 reveal a high level of reviewing and critical thinking, matching to the supposed qualifications' nature delivered by Higher Education institutions.
- The three main technical competencies achieved by learners after completing the welding qualification course of Group 1 are linked to operational tasks, such as "Handle welding equipment", "Comply with safety standards" and "Deliver work with quality".

- Table 2 - Fading scale of soft and technical skills achieved by learners after completing the qualification - Group 1

Soft skills	
1	Autonomy
2	Responsibility
3	Problem solving
4	Team work
5	Communicate effectively technical issues
6	Application of knowledge
Technical Skills	
1	Knowledge of welding processes and materials
2	Knowledge of standards, procedures and quality
3	Handle welding equipment
4	Comply with safety standards
5	Identify/deal with welding problems
6	Deliver work with quality
7	Possess expertise in welding (theoretical background)
8	Ability to operate a robot

- The Group 3 main technical skills achieved by learners after completing the qualification course are: to “identify/deal with welding problems”, to “perform welding coordination activities” and to “lead optimization/innovation of practices” seem to be in line with this EQF level(s). By the same token, the soft skills that ‘stand out’ from the bulk are the ones that are referenced for skills and competences of higher levels of qualification, especially, in EQF level 6, such as, “Hold advanced skills, demonstrating mastery and innovation, required to solve complex problems in a specialised field of work or study” and “Manage complex technical or professional activities or projects, taking responsibility for managing professional development of individuals and groups” (European Commission, 2016).

Table 3 - Fading scale of soft and technical skills achieved by learners after completing the qualification - Group 3

Soft skills	
1	Problem solving

2	Communicate effectively technical issues
3	Deliver and supervise work instructions
4	Team work
5	Autonomy
6	Application of knowledge
7	Responsibility
8	Innovation mindset
9	Confidence
Technical Skills	
1	Knowledge of standards, procedures and quality
2	Knowledge of welding processes and materials
3	Identify/deal with welding problems
4	Perform welding coordination activities
5	Possess expertise in welding (theoretical background)
6	Lead optimization/innovation of practices
7	Manufacturing technology
8	Handle welding equipment
9	Design of structures
10	Comply with safety standards

- The technical and soft skills suggested to include in graduates' profiles by Group 1 are: to "Comply with quality standards", to "Perform destructive and non-destructive testing" and to "Perform tasks in real work environments (e.g. internships)", "willingness to learn" and to "adapt to different work environments".

Table 4 - Fading scale of soft and technical skills suggested to include in graduates' profiles - Group 1

Soft skills	
1	Adapt to different work environments
2	Willingness to learn
Technical Skills	
1	Comply with quality standards
2	Perform Destructive and Non-Destructive Testing
3	Perform tasks in real work environments (internships)
4	Interpret inspection and testing plans
5	Perform tasks in new equipment
6	Interpret specific design codes

7	Hold knowledge in welding economics
8	Hold knowledge of arc welding technology and joint design
9	Hold deep knowledge of materials properties

- The suggestions provided by Group 3 respondents were definitely oriented to coordination, management, design and development tasks: It reinforced the willingness to “Coordinate and supervise welding procedures according to standards”, the need to “Solve industrial case studies”, to “Perform tasks in real work environments (internships)” and to “Hold knowledge in welding economics”.

Table 5 - Fading scale of soft and technical skills suggested to include in graduates' profiles- Group 3

Soft skills	
2	Leadership and communication
3	Willingness to learn
Technical Skills	
1	Coordinate and supervise welding procedures according to standards
2	Solve industrial case studies
3	Perform tasks in real work environments (internships)
4	Hold knowledge in welding economics
5	Develop Welding Procedures Specification (WPS)
6	Manage quality systems
7	Apply automatized and robotized standards
8	Hold knowledge in organisational management
9	Develop mechanical systems applied to joining

- The great majority of the respondents expressed themselves positively (86%), suggesting that the output profiles of the learners fit the current labour market's needs.
- Despite the fact of the majority of the respondents being satisfied with their training courses/programmes and being satisfied with graduates' preparation for the labour

- market, the majority (63%) requested to revise it. This is aligned with the desire for enhancement.
- The changes needed highlighted by Group 1 are: to “Invest in teacher training” (3.27), to include an “Individual research project” (3.06), “Seminars” (2.86) and “Group project” (2.76). At least, other change proposed was to modify “Teaching hours” (2.3).
 - The changes highlighted by Group 3 were the inclusion of “Case studies” (3.12), of “Group project” assignments (2.82), of “Laboratory practical teaching” (2.68) and the provision of lectures in “e-learning” (2.74). At last, similar to Group 1, to “Invest in teacher trainer” (3.04).
 - Major strengths stressed by all respondents were the “body of teachers and trainers”; the “recognition of courses and programmes” and the “training” itself.
 - In a global overview, the suggestions provided by the whole universe of respondents could be summarized in a few topics as, for example, to add “more practical hours/internships to courses/programmes”; deliver courses/programmes with “updated welding processes, materials and technologies”, to “Include/ Improve access to e/b-learning”, to “search for governmental incentives/funding to design training envisioning future’s needs” and to “comply with international standards”.

Finally, in parallel with a state of art on competences across occupations reported by the European Centre for the Development of Vocational Training ^[25], it seems that some of the most emphasized competencies are in line with those depicted by Cedefop in the manufacturing sector. These competences include the need to adapt to new equipment or materials, the need of instructing, training and teaching people and the ability to solve complex problems (both above the average when compared to other sectors).

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