



Promoting Multi-Stakeholder Contributions to
International Cooperation on Sustainable Solutions
for Aquaculture Development in Southeast Asia

EURASTIP BEST PRACTICE CASE STUDIES: AQUACULTURE TRAINING AND CAPACITY BUILDING COLLABORATIONS BETWEEN EUROPE AND SOUTHEAST ASIA



ACKNOWLEDGEMENTS

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PREFACE

This document was compiled to support future cooperation and collaboration between European and Asian educational institutions and other organisations with an interest in aquaculture sector training and skills development. It is primarily aimed at educators and administrators who may be directly responsible for establishing schemes involving staff and especially student communications and mobility between the regions. It should also be a useful resource for other organisations involved in supporting education and training in the aquaculture sector. Though not intended as a guide for students seeking mobility opportunities, the document does provide case study examples of different activities and academic relationships that exist between aquaculture actors in Europe and Southeast Asia.



INTRODUCTION

Although Europe has been at the forefront of many innovations in aquaculture processes and technologies, Asia is by far the largest aquaculture production region globally. Whereas European aquaculture has had to respond to many demands on environmental, food safety and consumer-related issues, the rapid growth of aquaculture now poses serious challenges to Asia in terms of sustainability, social equity and suitable technologies. There are evident mutual benefits in developing cooperation between the Asian and European aquaculture sectors, including the development of common solutions for shared technical and managerial problems, the harmonisation of policy and regulations, and collaboration in the field of education and capacity building.

Travelling abroad to study or work (temporarily or long-term) allows people to develop their professional, social and intercultural skills and to increase their employability. People who have taken part in an international collaboration experience say they have a greater appreciation of others cultures, and most report an improvement in their problem-solving abilities. These so-called transferable skills are what most employers internationally are looking for when recruiting new talent. These are skills that can be transferred between jobs, organisations and industries and which have many applications in the workplace. Another major benefit of international collaboration and exchange is that it strengthens international relationships and makes lasting connections.

The European Union Horizon 2020-funded project **EURASTiP** – Promoting Multi-Stakeholder Contributions to International Collaboration on Sustainable Solutions for Aquaculture

Development in Southeast Asia – aims to consolidate existing European and Southeast Asian collaborations in the field of education and training, along with the development of new training material and best practice examples. EURASTiP provides a structured basis for multi-stakeholder dialogue between Europe and Southeast Asia and builds on the experience of the European Aquaculture Technology and Innovative Platform (EATiP), the Asia-Europe Meeting (ASEM) aquaculture projects, and the individual organisations involved. It also responds to the Banda Seri Begawan Plan of Action 5 for strengthening the ASEAN-EU enhanced partnership (2013-2017), which specifies cooperation to address regional and global challenges of shared concern.¹

Another key focus of the **EURASTiP** project is to promote mobility between Europe and Southeast Asia and strengthen collaboration of educational organisations, including work-integrated learning. Within the aquaculture sector, significant collaboration currently takes place between Europe and Asia in relation to training and capacity building, such as through Memorandums of Understanding, joint courses and co-location. There is also collaboration taking place at industry level with exchanges and internal capacity building, amongst other activities.

This report presents the results from a desk study which aimed to identify, describe and characterise current capacity building collaborations with a view to present best practice case studies. It is intended to be a useful tool to support future collaboration opportunities between Europe and Southeast Asian stakeholders.

¹https://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/EN/foraff/129884.pdf



Photo by Paden Sams

TRAINING THE INTERNATIONAL AQUACULTURE EMPLOYEE

When considering the use of educational frameworks in the context of the aquaculture industry (or indeed other industries), much of the specialist training required is not provided by traditional academic institutions and often does not result in a nationally recognised qualification. The diverse skills required are often not available through one institute, or even in one region. Recognition of non-accredited and informal learning is particularly difficult to achieve in a transparent and consistent manner, but a clear description of competences attained could provide a practical basis for acknowledgement. If job roles were also described in terms of required competences this would provide a clear structure for aligning training provision and qualifications with the needs of industry.

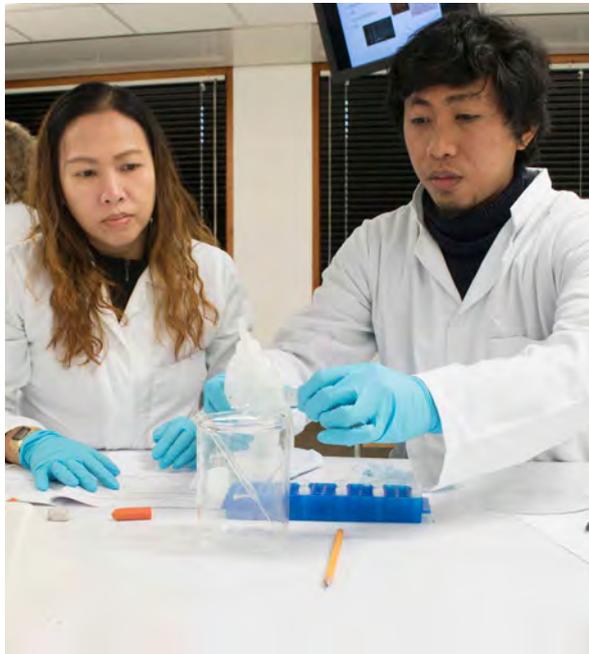


Photo by Denny Conway

To date, this alignment is limited in the aquaculture field, though EU-funded projects such as Aqua-tnet, WAVE, VALLA and BlueEDU have worked on various aspects of this. An overarching initiative at EU level is ESCO, the “multilingual classification of European Skills, Competences, Qualifications and Occupations”, which is part of the Europe 2020 strategy. ESCO “identifies and categorises skills, competences, qualifications and occupations relevant for the EU labour market and education and training. It systematically shows the relationships between the different concepts”.² The ESCO occupational classifications currently include eleven types of aquaculture worker:

- aquaculture hatchery manager
- water-based aquaculture technician
- aquaculture husbandry technician
- aquaculture cage technician
- aquaculture husbandry worker
- aquaculture hatchery worker
- aquaculture mooring manager
- aquaculture rearing technician
- aquaculture hatchery technician
- aquaculture harvesting technician
- aquaculture recirculation technician

For each occupation there is a simple definition of the role and its required knowledge and competences. For example, a hatchery worker is expected to have the following knowledge and competences:

²<https://ec.europa.eu/esco/portal/home>

Knowledge, skills and competences required for an aquaculture hatchery worker (ESCO)

Essential Skills and Competences

- carry out fish transportation
- carry out hatchery production processes
- clean off fouling
- collect broodstock
- collect fish samples for diagnosis
- condition broodstock
- cultivate plankton production
- culture aquaculture hatchery stocks
- feed broodstock
- follow hygienic practices in fishery operations
- follow safety precautions in fishery operations
- identify aquaculture species
- inspect fish eggs
- maintain aquaculture water quality in hatcheries
- maintain hatchery equipment
- maintain hatchery facilities
- monitor larval development
- operate forklift
- operate hatchery trays
- operate photoreactors
- operate water-heating equipment
- perform fish grading operations
- use water disinfection equipment
- work in shifts

Essential Knowledge

- biosecurity

Optional Skills and Competences

- check diving equipment
- communicate by telephone
- comply with legal requirements for diving operations
- critique the dive with the dive team
- maintain diving equipment
- maintain internal communication systems
- operate pumps in aquaculture facilities
- perform diving interventions
- report to the team leader
- undertake continuous professional development in fishery operations
- use different communication channels
- use oxygenation equipment
- work in a fishery team
- work in inclement conditions
- work in outdoor conditions

Optional Knowledge

- diving operation requirements
- sanitation measures for aquaculture hatchery production

Source: <http://data.europa.eu/esco/occupation/a8c7004a-e59c-4a4d-9092-2cb4533ffe58>

Employers are encouraged to use ESCO classifications when advertising posts and developing training programmes. Employees can also use the classifications as a resource while writing their CVs. ESCO does not currently contain any details concerning the assessment of knowledge or competences. However, the opportunity is there for qualification providers to incorporate ESCO classifications within their own descriptions.

Resources such as ESCO's job requirement lists can help guide aquaculture workers to training and international mobility opportunities that will enhance their career prospects. Collaboration within education in Europe and Southeast Asia can contribute to the development of classification structures and help train a more highly skilled aquaculture workforce to respond to the needs of the sector.

MODELS FOR CAPACITY BUILDING COLLABORATION

Student mobility and provision of training opportunities abroad are priorities of the EU.³ Students from higher education institutions, vocational movers and even professionals are encouraged to take advantage of courses in other countries at all levels. This may involve undertaking a degree, another course or being involved in a shorter-term visit such as an academic exchange, or a placement (traineeship/internship) within an enterprise or organisation in another EU country. Mobility enables training through both undergraduate and postgraduate studies for academic students, and through short-term courses or hands-on and professional practice for vocational or professional movers. The objectives of these placements are:

- To promote cooperation between enterprises from different countries;
- To contribute to the development of a pool of well-qualified, open-minded and internationally experienced young people as future professionals;
- To enable movers to develop specific skills including language skills and to improve understanding of the economic and social culture of the country concerned in the context of acquiring work experience.

The main models for capacity building collaborations are outlined below.

Summer Schools and Short Courses

Many education providers offer shorter courses (from 1-2 days to 2-3 months) which do not normally accrue academic credit (i.e. are not part of a formal programme), but which offer opportunities for cultural experience or specialist subject teaching. Often such courses are targeted at people in specific employment as continuing professional development (CPD), however they can also be a mechanism for collaboration between institutions and targeted at existing students. Administratively, these can be the simplest types of collaboration to establish.

As short courses normally require specific funding they are often organised in association with broader networking and research projects, such that direct costs to students are minimised. However, some institutions have developed successful summer school programmes primarily funded through participant fees. Course attendance is usually recognised through provision of a certificate. Collaboration of these courses normally takes place through the involvement of staff from two or more teaching institutes and through mobility of students attending the course.

Student Exchange / Study Abroad

Student Exchange or “Study Abroad” schemes are relatively common in degree programmes and may be mandatory, for instance in language courses. Students in their second or third year of undergraduate programmes typically spend one semester (term) or a full academic year studying at an overseas university with which there is a partnership agreement. The credits accumulated at the overseas university are recognised as equivalent to those of the home university. Students remain registered at their home university and continue to pay fees. Partnerships are developed between educational institutions, but eligibility will be related to individual degree programmes where courses can be shown to be broadly equivalent in subject matter content, and indeed in level and credits. Within Europe this type of mobility is often supported through Erasmus+ funding and use of the Europass tools.

A similar mechanism that is more often used at Master’s level is a research project where a student carries out some or all of the practical work at another educational institution, often abroad. These activities often develop from other types of research collaboration between institutions rather than more formal cooperation on teaching.

³https://ec.europa.eu/education/policies/european-policy-cooperation/et2020-framework_en

Joint Programmes

Two or more educational institutions can cooperate to provide a single academic programme. This can be achieved in various ways. The first option is a Joint Award, an arrangement in which two or more awarding bodies together provide a programme, leading to a single award offered jointly by all participants. A single certificate or document (signed by the competent authorities) attests to the successful completion of this jointly delivered programme, replacing the separate institutional or national qualifications.

A second alternative is a Dual/Double or Multiple Award, which is an arrangement where two or more awarding bodies together provide a single jointly delivered programme (or programmes) leading to separate awards (and separate certification) being granted by all participants. From an administrative point of view a double or multiple award is usually simpler, as each institution can apply their own regulations to their own award. A joint award usually requires higher levels of mutual recognition of each institutions' quality assurance and other processes.

Joint programmes can be delivered by students moving between institutions (Erasmus Mundus model), or through teacher mobility, where staff from one institution travel to another to carry out teaching and assessment activities ("Flying faculty"). Such programmes can also be supported through online teaching provided by one or more of the partners (blended learning programmes).

Articulation

This is a process whereby all students who satisfy academic criteria on one programme are automatically entitled (on academic grounds) to be admitted with advanced standing to a subsequent stage of a programme of a degree-awarding body.

These arrangements, which are subject to formal agreements between the parties, normally involve credit accumulation and transfer, so that credit achieved for the approved study at the first provider is transferred to contribute to the programme and award completed at the second (the degree-awarding body). The two separate components are the responsibility of

the respective organisations delivering them but, together, contribute to a single award (of the degree-awarding body). Students normally have a contractual relationship with the organisation which delivers the first component and subsequently with the degree-awarding body. Examples of such agreements can include entry into the second or third year of a degree programme, for example 2+2 or 3+1. Other combinations are also possible.

Teaching on an articulated programme can be provided by the respective partner institution alone, or through other collaborative mechanisms including "flying faculty" or blended learning. This arrangement is put in place where there are a number of students articulating from one programme at an institution to one or more programmes at another institution. The most common examples are students transferring from community college to university courses in the United States of America. In a similar example, the University of Stirling (UK) has an articulation agreement with the nearby Forth Valley College such that the first two years of an Applied Biology degree are delivered at the College and the second two years at the University. The students transfer their registration between the two institutions at that point.

Where articulation agreements involve students joining part-way through a wider programme, there also needs to be significant coordination of curricula to ensure incoming students have equivalent preparation.

Approved Learning Partners

This is a process by which a degree-awarding body agrees to authorise a delivery organisation to deliver (and occasionally assess) part (or all) of one or more of its own approved programmes. Often, the degree-awarding body retains direct responsibility for the programme content, the teaching and assessment strategy, the assessment regime and quality assurance. Students normally have a direct contractual relationship with the degree-awarding body. A UK example is Scotland's Heriot Watt University, which has a network of 43 approved learning partners in 35 countries. These partners offer between one and ten courses, most commonly relating to business studies. The University claims there are 10,500 students on such programmes globally⁴.

⁴<https://www.hw.ac.uk/study/international/in-your-country/approved-learning-partners.htm>

The University of Stirling offers a bachelor's degree in marketing through the Singapore Institute of Management, as well as six bachelor programmes in business, marketing and computer science with Muscat College in Oman⁵.

This approach can be beneficial where there is capacity for course delivery on the part of the local partner, but where the additional support and quality assurance of the lead institution is valued by both the local partner and students on the programme. Such programmes often directly involve a member of staff from the degree-awarding body managing delivery of the programme at the partner institution and/or flying faculty to provide some of the teaching inputs and conduct assessments and grading.

These models include franchising where one organisation is authorised to deliver programmes on behalf of a lead institution. Conversely, the degree-awarding organisation may simply validate a course developed and delivered by the other.

International Branch Campus

This is a university campus that is located in a country other than the 'home' campus, has a physical presence in the host country including some local staff, is at least partly owned by the university, and from which the students can earn degrees of the 'home' university. Examples of this include:

- University of Nottingham (UK) with campuses in Malaysia and China
- Heriot Watt, Southampton, Reading and Newcastle Universities (UK) with campuses in Malaysia
- James Cook University (Australia) with a branch in Singapore

The rationale is that courses can be delivered at the same standard as the overseas university but potentially adapted to better meet local needs at lower cost. However, there are many

challenges in this approach such as a difficulty in reproducing the key characteristics of the home institution in the host country. Also, local adaptation might be resisted in order to remain as close as possible to the programme of the parent institution. Hence, there are doubts concerning their value and long-term viability (e.g. Altbach, 2010⁶; Garrett, 2018⁷; Hill & Thabet, 2018⁸).

Research projects, staff exchange and internships

Many organisations collaborate through research programmes where the student carries out some part of their work at another institution. For more substantial programmes these are often termed "Split centre research" and may or may not involve awarding of a joint or double research degree (e.g. a PhD).

The EU provide funds for teachers to spend short periods at other institutions to foster collaboration. There is also support for students or recent graduates to carry out internships abroad, which also provides opportunities to foster collaborative links between institutions.



Photo by Denny Conway

⁵<https://www.stir.ac.uk/international/our-partnerships/>

⁶Altbach PG, 2010. Why Branch campuses may be unsustainable. *International Higher Education*, 58, 2-3 <https://ejournals.bc.edu/ojs/index.php/ihe/article/view/8467/7601>

⁷Garrett R. 2018. International branch campuses: Success factors. *International Higher Education*, 93, 14-16. <https://doi.org/10.6017/ihe.0.93.10417>

⁸Hill C, Thabet RA, 2018. Managing international branch campuses: Lessons learnt from eight years on a branch campus in Malaysia. *International Journal of Educational Management*, 32 (2), 310-322. <https://doi.org/10.1108/IJEM-04-2017-0079>



Photo by John Bostock

CASE STUDIES

There have been numerous individual and bilateral initiatives to provide aquaculture-related mobility opportunities. These have mostly focused on exchange of MSc and PhD research students, but short courses have also been held. Examples of these are highlighted in the case studies below.

A key development within the field of aquaculture, fisheries and aquatic resources management was the formation of Aqua-TNET, an Erasmus thematic network which fostered cooperation over nine years (building on earlier activity under a broader agriculture, forestry and fisheries network). A history of the network and its achievements can be found in the paper by Eleftheriou et al (2015)⁹ and on the website www.aquatnet.com. The network did not provide a mobility programme for students, but it did lead to numerous other projects funded through the Leonardo da Vinci and other programmes, which provided collaborative courses for students.

Aqua-TNET was also a precursor for a series of EU-Asia projects which included activities aimed at fostering educational cooperation. The first of these, the “ASEM Aquaculture Platform” was funded between 2004 and 2006, during which it held six expert workshops. One of these was on Education and Training and was held in partnership with SEAFDEC in the Philippines.¹⁰ A follow-on project “AqASEM09” (EC 7th Framework Programme) continued under the

banner of the ASEM Aquaculture Platform between 2010 and 2012, with a work package on Education and Training. This carried out more in-depth analysis of aquaculture education in Asia and opportunities for collaboration, including exchange schemes between Europe and Asia.¹¹ The knowledge gained from this project informed the design and activities of the current H2020 EURASTiP project and its dedicated work on Education and Training, which includes capacity building and mobility activities.

Support for mobility in the ASEAN region is far less developed, however, this is being addressed through SHARE, a joint EU-ASEAN project which commenced in 2015 and concluded in early 2019.¹² SHARE worked on qualifications reference frameworks and quality assurance, an ASEAN and ASEAN-EU Credit Transfer System and a student mobility and scholarship scheme.

Also, in Asia the ASEAN Fisheries Education Network (ASEAN-FEN)¹³ was established in 2011 with eight founding members, expanding to 29 by 2018. As an initiative of the member institutions it is self-funded and able to respond flexibly to the needs and priorities of its members. It organises an annual fisheries conference and is developing other activities such as student exchanges, cultural events and internship programmes. As a partner in **EURASTiP** it is actively linked with the European networks and leading academic institutes for aquaculture education.

⁹Eleftheriou M, Reuver M, Bostock J, Sorgeloos P & Dhont J. (2015) AQUA-TNET: an 18-year chronicle of development and achievement - how the AQUA-TNET Thematic Network developed its response to the Bologna Reforms and the EHEA. *Aquaculture International*, 23: 703-713. <http://dx.doi.org/10.1007/s10499-014-9857-4>

¹⁰<http://www.asemaquaculture.org/activities/expert-workshops-2004-2006-activities-111/40-activities/19-workshop-on-education-a-training>

¹¹<http://www.asemaquaculture.org/activities/themes/education-training>

¹²<https://www.share-asean.eu>

¹³<https://aseanfen.org>

Example ASEAN-FEN Mobility Events			
Date	Type	Country	Details
11/2018	International Symposium	Thailand	8th International Fisheries Symposium – “Sustainable Fisheries and Aquaculture for the Benefits of Mankind” Prince of Songkla University
7/2018	Sports event	Malaysia	3rd International Staff Sports Day between Universiti Malaysia Terengganu (UMT) and Prince Songkla University
7-9/2018	Internship	Thailand	Internship for students of UMT at Kasetsart University in Thailand
6-9/2018	Internship	Indonesia	Internship programme between UMT and Universitas Airlangga - Bachelor of Applied Science (Fisheries)
3-7/2018	Industrial training	Vietnam	Diploma students from UMT spent 3 months at Can Tho University
9/2017	Sports event	Thailand	2nd International Staff Sports Day between Universiti Malaysia Terengganu (UMT) and Prince Songkla University
11/2017	Symposium	Indonesia	7th International Fisheries Symposium – “Projecting ASEAN FEN Plus for Supporting Sustainable Aquaculture, Fisheries and Aquatic Ecosystems” - University of Brawijaya (UB)
10/2016	Student exchange	Thailand	Outbound mobility for students from Universiti Awam (Malaysia) to Prince of Songkla University
11/2015	Mobility programme	Thailand	Intellectual learning programme for aquaculture students

Further details at <https://aseanfen.org/mobality-program/>

A further Asian initiative to note was the AARM Asia Link programme¹⁴ run by the Asian Institute of Technology which provided 145 placements for Asian students and around 20 for European and North Americans in the late 2000s.

Another example of cross-regional collaboration is the EURAXESS ASEAN, which serves researchers interested in scientific collaborations

between Europe and Southeast Asia. The initiative’s activities include four seminars, which provide information sessions introducing opportunities for researcher mobility and cooperation projects between Southeast Asian and European countries, with a particular focus on Postgraduate Fellowships under the Marie Sokolowski-Curie (MSCA) funding scheme.¹⁵

¹⁴<http://aarm-asialink.info/internship.html>

¹⁵<https://euraxess.ec.europa.eu/worldwide/asean>

The Erasmus+ funded “Curriculum Development for Sustainable Seafood and Nutrition Security (SSNS)” project¹⁶ is a recently launched collaborative aquaculture initiative, which has nine Asian and four European partner organisations. The project aims to address the issue of sustainability of seafood production, supply and consumption through need-based higher education, and vocational training. The three-year project started in October 2017. It aims to build capacity of the participating Higher Education Institutions and strengthen linkages

among institutions and individuals. Project activities include identification of needs and gap analysis in existing aquaculture / fisheries curricula and development of new curricula for SSNS programs. It also includes accreditation of curricula.

The results from the **EURASTiP** desk study of best practice have been collated within this report and seven Best Practice Case Studies specific to EU-SE-Asian collaboration are presented over the following pages.



Photo by John Bostock

¹⁶<https://www.seafood-security.org>

BEST PRACTICE CASE STUDY 1: PHD BOOT CAMP

At a Glance	
What:	PhD Boot Camp
Organisations and countries involved:	Europe: Ghent University (Belgium) and Belgian companies Asia: Can Tho University (Vietnam) and Vietnamese companies
Duration	Three weeks maximum
Status	Ongoing collaboration activity
Contact person	Jean Dhont ASEANplus Ghent University regional platform Jean.dhont@ugent.be



Case Study Description

What	<p>A PhD boot camp is a short consultancy assignment carried out by a PhD researcher from Ghent University for a Vietnamese or Belgian company active in or interested in Vietnam, under supervision of a professor from the university.</p> <p>Consultancy assignments may focus on fields as varied as agri-tech, engineering, life sciences and business & economics. Challenges that are best addressed with the help of an expert include customer and market trends, feasibility and viability of business ventures, optimization in production operations, new technologies, data management, etcetera.</p> <p>Ghent University, in collaboration with Can Tho University, facilitates the matchmaking between UGent PhD researchers and the commissioning company.</p>
Capacity Building Approach	The PhD researchers are prepared in Belgium with tailor-made coaching sessions on intercultural skills and other competencies required for successful completion of the consultancy assignment.
Impact	<p>PhD students that have gone through the experience witnessed that it broadened their perspective to an international career and a number of them confirmed it has effectively contributed to finding a job.</p> <p>The initiative proved very rewarding for PhD students in increasing their employability and bridging the gap between their academic and professional track.</p>
Financial information	Funded by VLIR-UOS, the Flemish University Development Cooperation Agency (www.vliruos.be). The project funds international and local travel up to €1800 per PhD student. Matching funds are expected from the hosting company for local accommodation.

BEST PRACTICE CASE STUDY 2: TRAINING OF TRAINERS FOR RECIRCULATION AQUACULTURE SYSTEMS (RAS)

At a Glance	
What:	A range of training interventions, and the design and construction of demonstration facilities for recirculation aquaculture systems in Vietnam
Organisations and countries involved:	Europe: Wageningen University & Research (the Netherlands). Asia: Can Tho University (CTU) (Vietnam) and Research Institute for Aquaculture No 2 (RIA-2) (Vietnam).
Duration	October 2010 - December 2012 (thereafter in other research projects)
Status	Ongoing with other research projects
Contact person	<ul style="list-style-type: none"> Pham Thanh Liem, Can Tho University, ptliem@ctu.edu.vn Dr. Nguyen Nhut, RIA-2, nhut300676@yahoo.com Roel Bosma, Wageningen University & Research, roel.bosma@wur.nl



Case Study Description	
What	<p>Both Vietnamese partners identified the need for training and research in the design and management of RAS to train students and farmers, and the capacity to develop and adapt this technology further using new Cradle to Cradle (C2C) concepts. The indoor systems of temperate countries are relatively expensive, but the Vietnamese aquaculture sector is under international pressure to reduce its nutrient-rich waste water disposals.</p> <p>RAS-C2C contributed to RAS development in Vietnam through seven areas of activities:</p> <ol style="list-style-type: none"> 1. Two-month training at WUR of four instructors (two CTU and two RIA-2) on design and management of RAS, and on recent technologies in RAS and other industries aiming at waste recycling, while experiencing student centred learning. 2. Designing and building three RAS facilities, adapted to local conditions and systems, for training and in-door experiments, by the instructors and experts. 3. Designing programs for training and courses for BSc and MSc based on learning goals. Afterwards the trainees prepared the course materials and the experts provided feed-back. 4. Teaching of RAS within regular BSc and MSc courses of CTU, including practical training on RAS in the MSc of CTU as a specialisation, and MSc and PhD thesis research on RAS. 5. Vocational training by RIA-2 of 19 staff members, 11 technicians and 8 managers from Provincial Aquaculture Departments and Breeding Centres on brackish water RAS.

Case Study 2 continued

Case Study Description	
	<p>6. Ten-day Training of Trainers on RAS for 10 lecturers from eight partner universities and research centres from the Vietnamese Fisheries Institutes Network in three locations.</p> <p>7. Identification of research needs related to RAS and the main exported fish <i>pangasius</i> at a workshop in Can Tho, and presentations of a poster and a flyer at the International Fisheries Symposium at Can Tho to disseminate the project results.</p>
Capacity Building Approach	<p>The lecturers of CTU/CAF had sufficient background in teaching, but the two lecturers from RIA-2 lacked skills in interacting with students and using different teaching methods. The later training of technicians was provided by CTU/CAF also. The RIA-2 instructors focussed on research and design for the private sector.</p> <p>Two participants deemed 10 days to be too short, but two others considered it as too long. The majority found the length fine but would have liked more time for practice and exercises. Calculations on laptop should be practiced on more than one system and explained better. To increase time for practice and calculations, without adding days, they suggested to reduce travelling time between sites, although assessing two systems is necessary; get rid of the overlap in theory on design, compartments and drum-filters.</p> <p>The women in the group suggested that when two participants come from one institute, one should be male and the other female to ensure that all practical know-how is learned by the team.</p>
Impact	<p>Hundreds of Vietnamese BSc students and dozens of MSc students were trained in design and management of RAS. The MSc course is also dispensed in English, with participants from Vietnam, Cambodia, Myanmar, Tanzania, Uganda, Nigeria: https://caf.ctu.edu.vn/en/33-top-news-see-all/129-announcement-and-call-for-abstracts-for-the-international-fisheries-symposium-ifs-2019.html</p> <p>Technicians were trained in management of RAS, and dozens of RAS were designed for companies, contributing to reduced environmental impact of the Vietnamese aquaculture sector.</p> <p>Application of RAS for larval rearing of striped catfish (<i>P. hypophthalmus</i>), larval rearing and grown-out of bighead catfish (<i>Clarias macrocephalus</i>), and swamp eel (<i>Monopterus albus</i>).</p>
Financial information	<p>Training equipment, technical support and Training of Trainers were funded by the Vietnam Facility of the Dutch Ministry of Foreign Affairs (about €340,000), and the two Vietnamese institutions (about €40,000). Attendees of the last Training of Trainers paid for their own travel costs.</p>



Photos by Roel Bosma

BEST PRACTICE CASE STUDY 3: IMPROVING WASTE MANAGEMENT FOR PANGASIUUS CULTURE IN MEKONG DELTA IN VIETNAM (SUPA)

At a Glance	
What:	Capacity building activities involving PhD and MSc students focused on improving waste management for Pangasius culture in the Mekong Delta (Vietnam)
Organisations and countries involved:	Europe: Ghent University (Belgium); Wageningen University & Research (the Netherlands) Asia: Can Tho University (Vietnam); Research Institute for Aquaculture (RIA-2) (Vietnam)
Duration	Phase 1: January 2011 – September 2015 Phase 2: October 2015 – December 2018
Status	Not active
Contact person	<ul style="list-style-type: none"> • Dr. Nguyen Nhut, RIA-2, nhut300676@yahoo.com • Prof. Nguyen Thanh Phuong, Can Tho University, ntphuong@ctu.edu.vn • Prof. Jo Dewulf, Ghent University, jo.dewulf@ugent.be • Prof. Marc Verdegem, WUR, marc.verdegem@wur.nl



Case Study Description	
What	The SuPa project was funded by a public-private partnership based upon the recommendations of an environmental impact assessment. The assessment was conducted by a team of Dutch and Vietnamese scientists. SuPa aimed to improve the sustainability, i.e. reduce environmental impact, of farming striped catfish (<i>P. hypophthalmus</i>). The research of SuPa's four PhDs focused on improving feed and water management to reduce environmental impact and safeguard fish health, while maintaining or improving yield and product quality. An EU project of the same name focused on extension of technologies.
Capacity Building Approach	SuPa contributed to capacity building by training Vietnamese scholars through PhD studies in the four mentioned fields. MSc students from various nationalities also strengthened their research skills by contributing to the experiments and their analysis. Listed below are the names of the PhDs and their thesis titles.

Case Study 3 continued

Case Study Description	
Capacity Building Approach <i>cont'd</i>	<p>Examples include:</p> <ul style="list-style-type: none"> • Dr. Nguyen Nhut completed his PhD thesis at WUR in 2016: Improving Sustainability of Striped Catfish (<i>Pangasianodon hypophthalmus</i>) Farming in the Mekong Delta, Vietnam, through Recirculation Technology (http://edepot.wur.nl/394048). • Dr. Pham Thi Ngoc completed her PhD thesis at WUR in 2016: Economic Analysis of Technological Innovations to Improve Sustainability of Pangasius Production in Vietnam (http://edepot.wur.nl/394048). • Dr. Nhu Thuy Trang defended her PhD at Ghent University in 2017: Environmental Sustainability Assessment of Fish Products from Aquaculture in Vietnam: a focus on Pangasius hypophthalmus (https://biblio.ugent.be/publication/8514626). • Mrs Tran Le Cam Tu and her supervisors published the paper: Effect of Ingredient Particle Sizes and Dietary Viscosity on Digestion and Faecal Waste of Striped Catfish (<i>Pangasianodon hypophthalmus</i>), <i>Aquaculture Nutrition</i> 24:961-969.
Impact	<p>The developed SuPa feed, containing more lipid and plant-based ingredients than the typically used commercial feed, improved fish production and reduced waste loads in both recirculation and flow-through systems. The pangasius from the pilot had off-flavour, which was eliminated in flow-through. This pilot RAS for shallow ponds had a lower footprint than traditional pangasius ponds. Deep ponds used in the present pangasius production system are not appropriate for RAS. Recovering phosphate and producing biogas from the pangasius waste is not economically feasible with present technologies. Certification by e.g. ASC can reduce the environmental impact. Two conditions for adoption of RAS are access to favourable loans, and a premium for certified fish. However, the skewed price transmission through the international value chain hampers a premium-based certification.</p> <p>From this case study, the lessons learned were that developing innovations needs time and a step-by-step approach before successful upscaling to farm level. The programmes of some donors and industries are more short term. Also, matching the PhD studies with the priority for experiments may hamper the candidate's learning curve.</p>
Financial information	<p>SuPa was funded by the Public-Private Partnership Fisheries of the Netherlands (NL/VRF10/WSSD/1), Netherlands Transition Facility for Vietnam (TF13VNP15), scholarships of Wageningen University, Netherlands government and Flemish federal government, Vietnam's Ministry of Agriculture and Rural Development (MARD), and five private partners: Vinh Hoan, a vertically structured export company, the feed companies De Heus and PROVIMI (Cargill), and two European companies focusing on seafood import: Queens and Marine Harvest.</p>



The innovative recirculation aquaculture system (RAS) at RIA-2 designed in a shallow pond (photo by Roel Bosma)

BEST PRACTICE CASE STUDY 4: SEMINARS AND TRAINING ON BLENDED LEARNING

At a Glance	
What:	Seminars and training workshop on blended learning
Organisations and countries involved:	Europe: University of Stirling (United Kingdom) Asia: the International University – National University Ho Chi Minh City (Vietnam)
Duration	One-day seminar and a three-day workshop (August 2012)
Status	Not active
Contact person	John Bostock, University of Stirling, j.c.bostock@stir.ac.uk



Case Study Description	
What	This initiative was inspired by successful workshops on digital teaching skills organised as part of the Aqua-TNET (Erasmus Thematic Network) project. It aimed to share ideas, approaches, tools and methods with staff of the International University to stimulate the development of blended learning programmes.
Capacity Building Approach	The initial seminar introduced the rationale for blended learning and key tools and concepts. It provided opportunities for discussing these in the context of programme development at the International University. The training workshop involved significant hands-on sessions to help staff develop competence and confidence in producing audio and video as well as to improve presentations and assessments for an online environment. The workshop was supported through the development of a manual which was translated into Vietnamese. Sessions were also recorded on video and these and presentation materials were made available as long-term support within the International University.
Impact	The first day seminar attracted over 50 participants and the subsequent workshop involved around 20 staff, mainly from the School of Biotechnology. Tools and methods introduced during the seminar and workshop have been adopted and implemented by teachers in the International University particularly in undergraduate programmes in Aquatic Resource Management, Biotechnology and Food Technology.

Case Study 4 continued

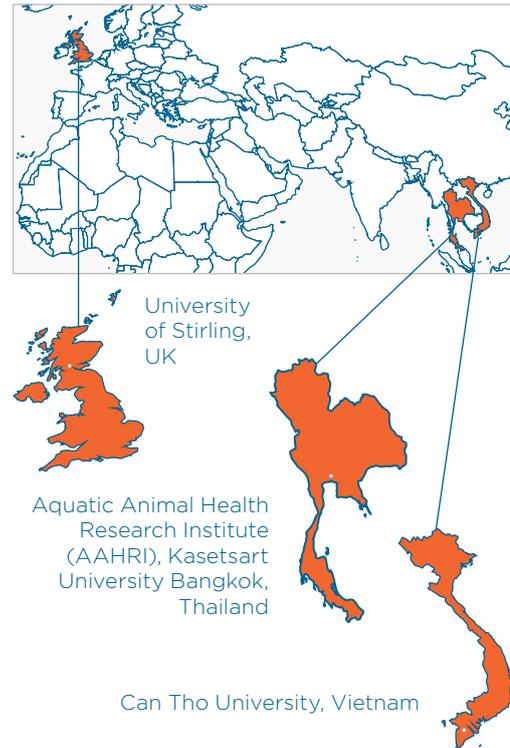
Case Study Description	
Impact cont'd	The seminar and workshop were well-received, and participants felt better informed and more confident in producing a wider range of teaching and assessment material suitable for deployment in blended learning environments. There was also enthusiasm for encouraging students to use a wider variety of tools for academic collaboration and communication of their ideas. Constraints included institutional expectations and restrictions which could limit when new media could be employed. Variability in student access to the Internet and to computers and mobile devices was also seen as a constraint.
Financial information	The seminar and workshop were funded through AusAid the World Bank Vietnam Blended Learning Programme with some cost sharing from the International University. The total budget was US\$32,678. There was no fee for participants.



Photos by John Bostock

BEST PRACTICE CASE STUDY 5: IMPROVING AQUATIC ANIMAL HEALTH FOR ASIAN AQUACULTURE

At a Glance	
What:	Workshops for improving Aquatic Animal Health for Asian Aquaculture
Organisations and countries involved:	Europe: University of Stirling (United Kingdom) Asia: Aquatic Animal Health Research Institute (AAHRI), Kasetsart University Bangkok (Thailand); Can Tho University (Vietnam)
Duration	Three to five-day course
Status	Not active
Contact person	Dr. Mags Crumlish, Institute of Aquaculture, University of Stirling, Mc3@stir.ac.uk



Case Study Description	
What	Several workshops were conducted at AAHRI (Thailand), with topics including bacterial pathogens and fish immunology. Stirling University was involved in these over three-year periods. The aim of the workshops was to improve attendees' theory and laboratory skills, including sampling animals for diagnosis, performing identification methods for bacterial pathogens, and immunology methods for detecting innate immune responses of host species. The duration of the workshop depended on the topic and availability of colleagues as well as premises. Many of these workshops were aligned with research projects and included shrimp, fish, frogs, and other aquatic animals.
Capacity Building Approach	The approach was a combination of diagnostic and laboratory research methods. Theory (lectures/seminars) was followed by or supported with laboratory practical classes each day. The same approach was used on the MSc programmes in University of Stirling. Consumables were purchased separately for each practical and workshop, whereas laboratory equipment was already in place at AAHRI. Attendees were invited, and all costs paid to ensure participation. Participants were then able to ask how the methods could be adapted for their own laboratories. Each participant received a handout for the workshop which included the theoretical and practical aspects. This was only available in English.

Case Study 5 continued

Case Study Description	
Impact	<p>All workshops were well attended by scientists from a range of backgrounds, all actively working in aquatic animal health and disease diagnosis. Several participants then went on to do MSc and/or PhD studies, often abroad. A network of researchers in Southeast Asian aquatic animal health was formed, which has been maintained and has shown growth over time. It has led to continued collaboration with several participants, both with course organisers and between themselves which has resulted in joint research projects, further workshops and peer reviewed manuscripts.</p> <p>Some of the key lesson outcomes of the workshop for participants are:</p> <ul style="list-style-type: none"> • Sampling for disease diagnosis and bacterial recovery • Improved understanding of appropriate bacterial identification methods • Ability to perform antibiotic sensitivity testing • Better aseptic techniques • Identification of innate immune responses of fish and frogs
Financial information	<p>This was part of a series of funded workshops in capacity building for Southeast Asian partners in Aquatic Animal Health. Approximately £1000 per person was allocated for each workshop which included travel, subsistence during their stay in Bangkok as well as lunch, dinner and travel in the country. This also included consumable costs for the laboratory work.</p>



Commercial growth trials in Tilapia in Thailand. Photo by Marion Short.

BEST PRACTICE CASE STUDY 6: CAPACITY BUILDING FOR FISHERIES AND AQUACULTURE IN MYANMAR

At a Glance	
What:	Capacity building workshops for fisheries and aquaculture for staff at Yangon University, Myanmar
Organisations and countries involved:	Europe: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany Asia: University of Yangon (Myanmar); Ministry of Livestock, Fisheries and Rural Development (Myanmar); Ministry of Education (Myanmar)
Duration	Starting 2018-2019
Status	Ongoing
Contact person	Omar Myint, Department of Zoology, University of Yangon, Myanmar



Case Study Description	
What	<p>Myanmar is one of the most productive countries for fishery and fishery products and has impressive freshwater capture fisheries. The country has extensive fishery resources due to its confinement with a long shoreline and large river system. Hence, the Government of Myanmar has encouraged the promotion of the fishery and aquaculture sector.</p> <p>A new Fisheries and Aquaculture BSc course has been designed at the University of Yangon's Department of Zoology to provide advanced knowledge and skills to meet industry demand. An innovative, integrated and multi-sectoral approach to the management of aquatic resources aims to maximize the ecosystem goods and services obtained from the use of oceans, inland waters and wetlands, while also providing social and economic benefits to the local people. The courses will also include intensive training, field study, and an internship course. The main aim of the project is to support the sustainable intensification of the aquaculture sector, thereby realizing its potential for food security, nutrition and livelihoods. One of the project's key activities is to ensure higher quality service provision to aquaculture producers, including for fish health and hygiene, as well as higher education and vocational training.</p>

Case Study 6 continued

Case Study Description	
Capacity Building Approach	<p>Teacher training is a pillar of the national sustainable development program. In order to reach its objectives, attention should be paid to the contents and structures of education as well as to the challenges and development of all stakeholders. To develop the capacity building program for the fishery and aquaculture sector in Myanmar, the Department of Zoology is working together with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) under the Myanmar Sustainable Aquaculture Program (MYSAP).</p> <p>MYSAP organized capacity building workshops at the Department of Zoology to improve skills in educational leadership and to contribute best practices in teaching and research. The workshops covered the following topics: fish biology, fish nutrition, fish disease, induced breeding, water quality, fresh water ecology and fishery management. In addition, the project will also provide other facilities needed for the undergraduate students specializing on the Fisheries and Aquaculture course.</p>
Impact	<p>The Department of Zoology is currently trying to implement the new Fisheries and Aquaculture undergraduate programme in order to meet industry needs and specific UN Sustainable Development Goals. Implementation will mark a turning point in the sustainable development of fisheries and aquaculture and in the government's rural development and poverty alleviation program in Myanmar.</p> <p>By the end of the course, students will be able to understand the principles of fisheries and aquaculture, which will provide them with a range of career options. The skills and knowledge gained from this course can also be translated into a number of other related fields, such as wildlife conservation and environmental management.</p>



Study of hilsa size ranges. Photo by Department of Zoology, Yangon University, Myanmar.

BEST PRACTICE CASE STUDY 7: EURASTIP EDUCATOR EXCHANGE PROGRAMME

At a Glance	
What:	Educator exchange programme to maximise collaboration and strategic partnerships and adopt a bottom-up approach between Europe and Asia.
Organisations and countries involved:	Any European or Asian education/training institute is eligible to apply.
Duration	2017 – 2019
Status	Ongoing
Contact person	<ul style="list-style-type: none"> • Marieke Reuver, AquaTT, marieke@aquatt.ie • Jane Maher, AquaTT, jane@aquatt.ie



Europe:
United Kingdom, Belgium, Greece, Turkey, Portugal, Sweden, Italy, the Netherlands and Denmark

Asia:
Bangladesh, Indonesia, Malaysia, Thailand and Vietnam

Case Study Description	
What	<p>Within the framework of EURASTiP Work Package 2 (Innovation Education, Training and Capacity Building) an “Educators” capacity building exchange programme has been developed and is being implemented. This programme aims to maximise collaboration and strategic partnerships and adopts a bottom-up approach, allowing a two-way exchange of “educators” between Europe and Asia. The programme is based on an open call and any European or Asian education/training institute is eligible to apply. Selection is carried out by an independent committee following defined criteria (capacity building potential, innovative aspects, and long-term sustainability). To date there have been three calls. The fourth and final call of the programme closed in April 2019. The programme has supported 13 educators in total. Selected candidates taking part in the exchange should work a minimum of 2 weeks (10 working days) in an aquaculture provision institute (any level) in Europe if they are from Southeast Asia, and in Southeast Asia if they are from Europe. Ideally, the exchange is two-way, which means the educator from Europe visits a Southeast Asian institute and an educator from that same Southeast Asian institute visits the same European institute. The aim of this is to allow for knowledge exchange on training provision to take place but also to allow for strategic partnerships for future bi-lateral cooperation.</p>
Capacity Building Approach	<p>The Educators’ Capacity Building Exchange Programme focuses on knowledge exchange and training provision to build strategic partnerships between European and Southeast Asian educator institutes for future bilateral cooperation. Each of these exchanges must propose a novel dimension to be piloted (e.g. innovative teaching method, new material, collaborative approach) to ensure an innovation aspect. Each exchange participant is required to contribute to a blog/vlog during the exchange so that other actors can follow their progress, and to engage a wider audience.</p>

Case Study 7 continued

Case Study Description	
Impact	<p>The programme has facilitated knowledge exchange, shared best practice in aquaculture teaching, developed new innovative approaches, and increased collaboration between European and Southeast Asian educator institutes. All of this has contributed to the establishment of strategic partnerships for future bi-lateral collaborations. The EURASTiP project, and in turn the work of the European Union through Horizon 2020, has been promoted more broadly, both in Europe and Southeast Asia. All exchange candidates have reported rewarding experiences, developed new skills, and have positively contributed to their host institutes. Some of the listed impacts from exchanges candidates are:</p> <ul style="list-style-type: none"> • The exchange and introduction of new innovative learning techniques, such as storytelling, pedagogy, and outcome-based education in Southeast Asian institutes. • The introduction of new aquaculture topics and techniques to undergraduate and Master’s students in institutes, such as a proteomics module. • The development and trialling of a shared online education platform for joint learning resources between a European and Southeast Asian institute. See the AquaTED Platform for more information; https://medium.com/aquated • New perspectives in education, resulting from growth and development of teaching and research skills of exchange candidates
Financial information	<p>Successful candidates to the Educator Exchange Programme receive €3,000 to provide support for travel, accommodation and living expenses for the duration of the exchange. Once booking confirmation is provided for travel and accommodation in the exchange location, the first half of the exchange bursary is issued to the candidate. The final instalment of the bursary is issued once the exchange visit is complete and all reporting requirements have been successfully met.</p> <p>The funding for the educator exchange programme comes from the EURASTiP project, which has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No. 728030.</p>

Concluding remarks

This report highlights best practice examples of current capacity building collaboration between European and Southeast Asian aquaculture stakeholders. The examples provided here result from a desk study which required input from numerous external aquaculture stakeholders from educational institutes in Europe and Southeast Asian.

The examples include collaborations between Europe and Southeast Asian in capacity building actions of PhD research consultancy; training and research design for RAS; public-private partnerships for improved waste management; and seminars on rationale, key tools and concepts of blended learning. This report also highlights

the collaboration built amongst various European and Southeast Asian educators who have taken part in the EURASTiP Educator Exchange Programme, which has resulted in the sharing of innovative learning techniques, the development of online learning platforms, and the introduction of new modules benefitting BSc and MSc students. All of which highlight the potential for collaboration in the sector and provide best practice examples for future collaboration. This report has provided numerous examples of capacity building that have potential to be used amongst aquaculture educators. For more information, ideas and resources on collaboration in education please see the Annexes attached.

ANNEX 1

Introduction

For almost any education or training activity it is necessary to consider whether the content is at a suitable level for the participants. Some degree of prior knowledge or an existing skills base is assumed. For short training courses this can often be defined fairly simply by specifying the job that the participants might already be doing, or specific knowledge and skills that are required to undertake the training. For most formal courses however, expectations are usually expressed in terms of required qualifications to undertake the course (course entry requirements or pre-requisites). Most countries have a wide range of nationally recognised qualifications covering school students, vocational programmes and academic education. There are usually progression pathways through these qualifications, but even within national schemes there can be difficulties in recognising prior qualifications for people wishing to move from a vocational track to an academic track or vice versa.

Internationally, things are considerably more complex as even something as universal as a degree may not be equivalent in either academic content, study duration or typical age at completion between two countries. To overcome these difficulties, countries can establish national qualification frameworks that create a structure for the different schemes and qualifications. Once these are in place, mapping can be carried out between different national education frameworks. The EU has considerable experience with this and has produced the European Qualifications Framework. Individual country qualifications can be mapped against the European Framework which in turn provides translation between the qualifications of individual countries.

The two basic elements of a qualification framework are the defined levels and the study effort. Courses leading to nationally recognised qualifications are primarily defined in terms of level within the framework and the number of credits required to achieve the qualification. Credits are a measure of nominal study time required to achieve the qualification. The third key element required is a description of course content. This is now most commonly framed as the expected learning outcomes from the course. These are descriptors of what the student should know or what they should be able to do having completed the course. These learning outcomes can be assessed and the qualification either awarded or not depending on the extent to which the learning outcomes have been achieved. Consideration of learning outcomes along with a measure of level and indication of learner effort provides reasonably transparent means for courses in one country to be compared with another, and most importantly, for judgements to be made concerning the suitability of a course in one country for someone who has completed previous training in another country. This also acts as a basis for educational organisations to collaborate in providing a joint programme of some type.

The European Qualifications Framework

The European Qualifications Framework (EQF) is a common European reference framework with the aim of making qualifications more readable and understandable across different countries and systems. It defines eight levels in terms of knowledge, skills and responsibility and autonomy (replacing “competences” in 2017).

Table 1: The levels of the European Qualification Framework¹⁷

	Knowledge	Skills	Responsibility and autonomy
	<i>In the context of EQF, knowledge is described as theoretical and/or factual.</i>	<i>In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).</i>	<i>In the context of the EQF, responsibility and autonomy is described as the ability of the learner to apply knowledge and skills autonomously and with responsibility</i>
Level 1 <i>The learning outcomes relevant to Level 1 are</i>	Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context
Level 2 <i>The learning outcomes relevant to Level 2 are</i>	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
Level 3 <i>The learning outcomes relevant to Level 3 are</i>	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
Level 4 <i>The learning outcomes relevant to Level 4 are</i>	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5 <i>The learning outcomes relevant to Level 5 are</i>	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others

¹⁷<https://ec.europa.eu/ploteus/content/descriptors-page>

Table 1 continued: The levels of the European Qualification Framework¹⁷

	Knowledge	Skills	Responsibility and autonomy
<p>Level 6 <i>The learning outcomes relevant to Level 6 are</i></p>	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
<p>Level 7 <i>The learning outcomes relevant to Level 7 are</i></p>	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
<p>Level 8 <i>The learning outcomes relevant to Level 8 are</i></p>	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

The EQF provides the framework for each country to map their own qualification against these levels. In terms of the EU Bologna Process for the harmonisation of higher education level 6 corresponds to first cycle (first degree), level 7 to second cycle (masters) and level 8 to third cycle (doctorate).

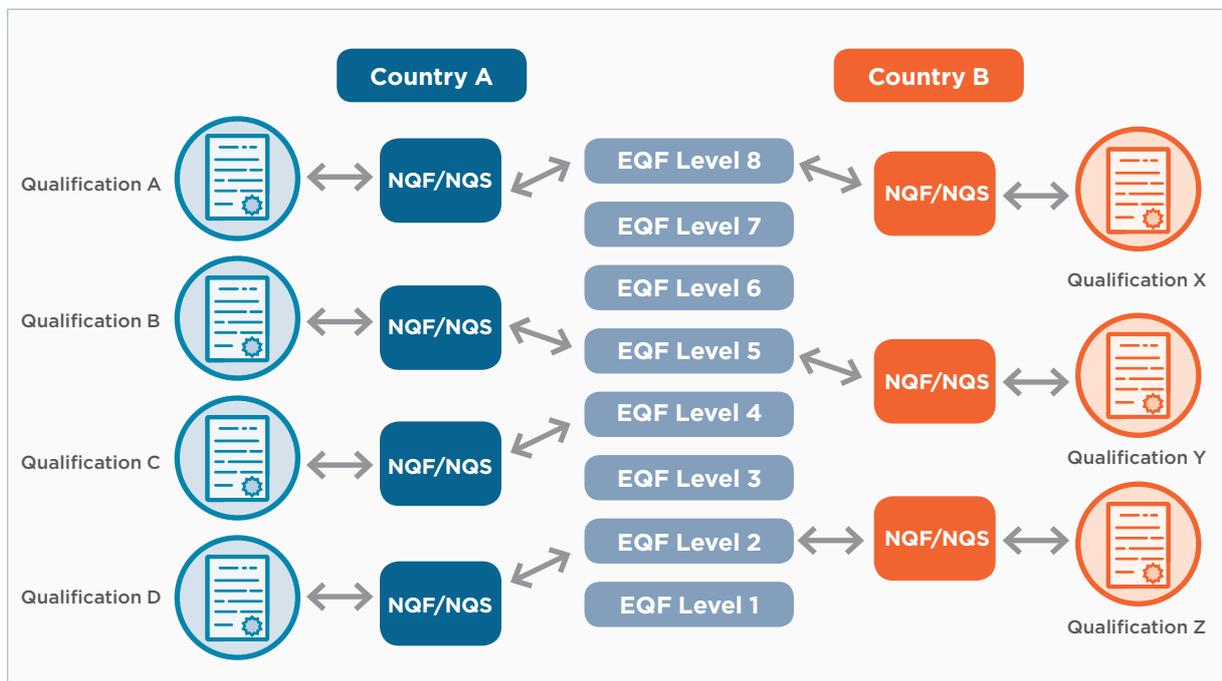


Figure 1: Mapping national qualifications through the European Qualification Framework¹⁸

An example of mapping national qualifications to the EQF is shown below using Scotland as an example.

Table 2: Example mapping Scottish qualifications against the EQF¹⁹

SCQF levels	Examples of Qualifications		EQF levels
	Academic track	Vocational track	
12	Doctoral Degrees	Professional Apprenticeships, Professional Development Awards (PDA)	8
11	Master's Degrees, Integrated Master's Degrees, Postgraduate Diplomas, Postgraduate Certificates	Professional Apprenticeships, SVQ5, PDA	7
10	Bachelor's Degrees with Honours, Graduate Diplomas, Graduate Certificates	Professional Apprenticeships, SVQ, PDA	6
9	Bachelor's/Ordinary Degrees, Graduate Diploma, Graduate Certificates	Technical Apprenticeships, PDA, SVQ4	6
8	Higher National Diplomas (HND), Diplomas of Higher Education (DipHE)	Technical Apprenticeships, PDA, SVQ4	5

¹⁸https://www.researchgate.net/publication/307623094_Mapping_National_Qualifications_Frameworks_and_Awards_using_MapQFTool/figures?o=1

¹⁹Adapted from QAA: Qualifications can cross boundaries: a rough guide to comparing qualifications in the UK and Ireland, "014, accessible from: <http://www.qaa.ac.uk/en/Publications/Documents/Qualifications-can-Cross-Boundaries.pdf>

Table 2 continued: Example mapping Scottish qualifications against the EQF¹⁹⁰

SCQF levels	Examples of Qualifications		EQF levels
	Academic track	Vocational track	
7	Higher National Certificates (HNC), Certificates of Higher Education (CertHE), Scottish Baccalaureate, Advanced Higher	Modern Apprenticeships, PDA, SVQ3	5
6	Higher	Higher, Modern Apprenticeships, SVQ2, PDA, National Progression Award (NPA), National Certificate	4
5	Credit Standard Grade, Intermediate 2	National 5, Modern Apprenticeships, SVQ2, NPA, National Certificate	3
4	General Standard Grade, Intermediate 1	National 4, SVQ1, NPA, National Certificate	2
3	Foundation Standard Grade	Access 3, NPA, National Certificate 3	1
2		Access 2, NPA, National Certificate 2	
1		National 1, Access 1	

The qualification frameworks of 39 European countries have now been mapped through the EQF.

European credit systems

The second element for communication and comparison of European qualifications is the measure of effort required to complete a course/ programme. For higher education this is the European Credit Transfer and Accumulation System (ECTS). Most countries now simply use ECTS although the UK has its own credit system where 1 ECTS equals 2 UK credits. The system is based on each year of academic study leading to 60 ECTS credits. It is assumed that each credit is equivalent to 25 – 30 hours of workload (encompassing all activities in and out of formal teaching). Its counterpart for further education is the European Credit System for Vocational Education and Training (ECVET)²⁰ which is based

on an expected 60 – 80 credits for one year of full-time further education. The ECVET system is more ambitious than ECTS as it is expected to be used with defined and assessed learning outcomes. This is due to the much greater diversity of education and training approaches used in vocational programmes. ECVET is therefore mainly expected to be used as a tool for enabling mobility between different countries and institutions involving a memorandum of understanding (See Figure 2). ECVET and other tools to improve vocational training provision and professional mobility are developed through The European Centre for the Development of Vocational Training (Cedefop)²¹.

²⁰<http://www.ecvet-toolkit.eu>

²¹<http://www.cedefop.europa.eu>

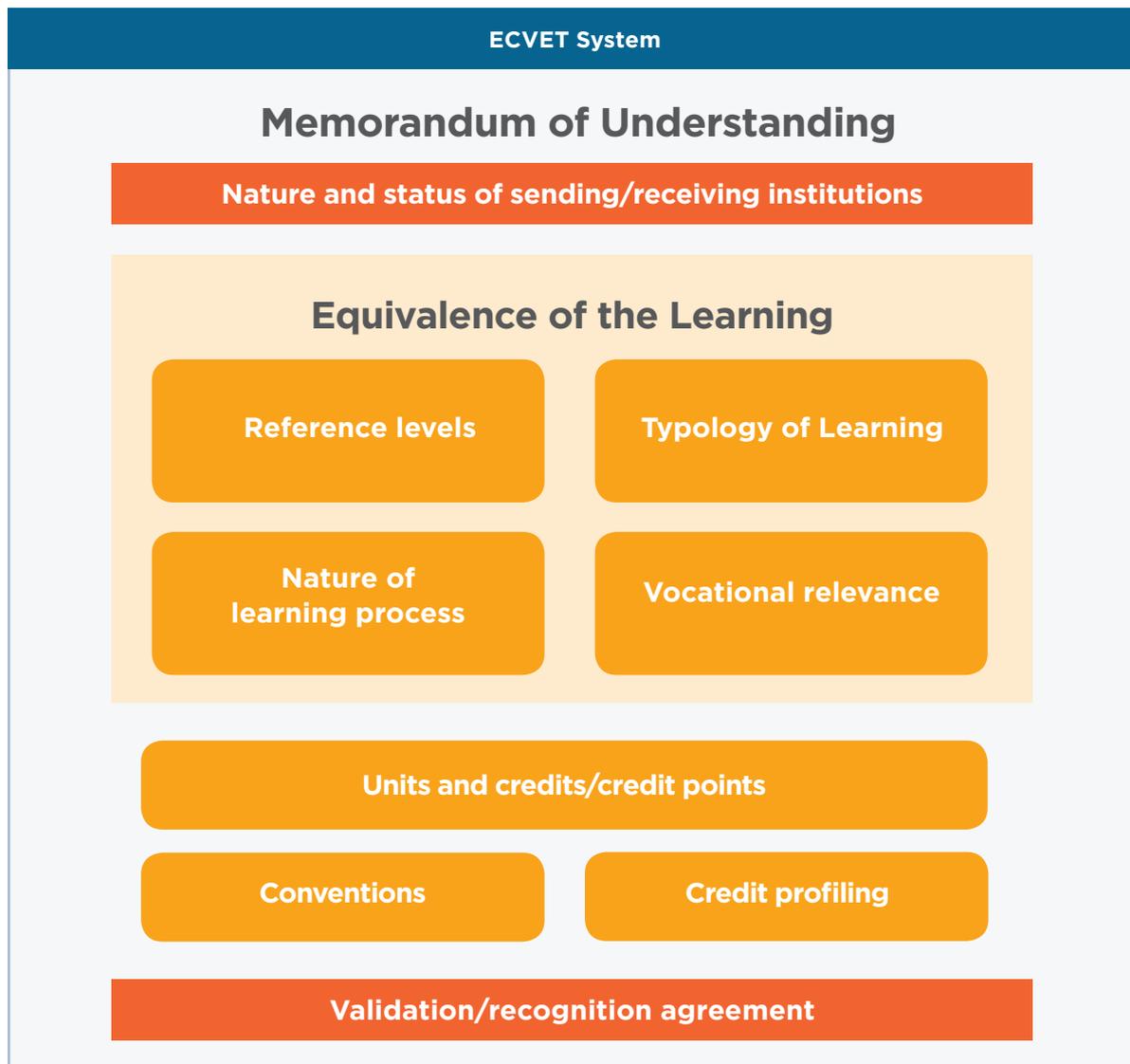


Figure 2: Diagrammatic content of envisaged Memorandum of Understanding between vocational education and training organisations for mutual recognition of courses and qualifications²².

Qualification frameworks in Asia

The development of national and regional qualification frameworks in Europe has been mirrored to a great degree in Asia. Of most relevance to EURASTIP is the establishment of the ASEAN Qualifications Reference Framework (AQR) which was ratified in 2015. This was built over ten years of initiatives with APEC (Asia-Pacific Economic Cooperation) and APQN (Asia-Pacific Quality Network). The purpose of the AQR is given as²³:

- Support recognition of qualifications
- Encourage the development of qualifications frameworks that can facilitate lifelong learning

- Encourage the development of national approaches to validating learning gained outside formal education
- Promote and encourage education and learner mobility
- Promote worker mobility
- Lead to better understanding of qualifications systems
- Promote higher quality qualifications systems

The AQR is based on a similar 8 levels as the EQF.

²²European Commission 2005. European Credit System for VET (ECVET) Technical Specifications (Report of the Credit Transfer Technical Working Group). Directorate-General for Education and Culture. Brussels 28/06/2005 EAC/A3/MAR. https://www.naric.org.uk/downloads/ecvt2005_Tech_Specs.pdf

²³<http://asean.org/storage/2017/03/ED-02-ASEAN-Qualifications-Reference-Framework-January-2016.pdf>

Table 3: The levels of the AQRF

	Knowledge and Skills	Application and Responsibility
	<i>Demonstration of knowledge and skills that:</i>	<i>The contexts in which knowledge and skills are demonstrated:</i>
Level 8	<ul style="list-style-type: none"> • is at the most advanced and specialised level and at the frontier of a field • involve independent and original thinking and research, resulting in the creation of new knowledge or practice 	<ul style="list-style-type: none"> • are highly specialised and complex involving the development and testing of new theories and new solutions to resolve complex, abstract issues • require authoritative and expert judgment in management of research or an organisation and significant responsibility for extending professional knowledge and practice and creation of new ideas and or processes.
Level 7	<ul style="list-style-type: none"> • is at the forefront of a field and show mastery of a body of knowledge • involve critical and independent thinking as the basis for research to extend or redefine knowledge or practice 	<ul style="list-style-type: none"> • are complex and unpredictable and involve the development and testing of innovative solutions to resolve issues • require expert judgment and significant responsibility for professional knowledge, practice and management
Level 6	<ul style="list-style-type: none"> • is specialised technical and theoretical within a specific field • involve critical and analytical thinking 	<ul style="list-style-type: none"> • are complex and changing • require initiative and adaptability as well as strategies to improve activities and to solve complex and abstract issues
Level 5	<ul style="list-style-type: none"> • is detailed technical and theoretical knowledge of a general field • involve analytical thinking 	<ul style="list-style-type: none"> • are often subject to change • involve independent evaluation of activities to resolve complex and sometimes abstract issues
Level 4	<ul style="list-style-type: none"> • is technical and theoretical with general coverage of a field • involve adapting processes 	<ul style="list-style-type: none"> • are generally predictable but subject to change • involve broad guidance requiring some self- direction and coordination to resolve unfamiliar issues
Level 3	<ul style="list-style-type: none"> • includes general principles and some conceptual aspects • involve selecting and applying basic methods, tools, materials and information 	<ul style="list-style-type: none"> • are stable with some aspects subject to change • involve general guidance and require judgment and planning to resolve some issues independently
Level 2	<ul style="list-style-type: none"> • is general and factual • involve use of standard actions 	<ul style="list-style-type: none"> • involve structured processes • involve supervision and some discretion for judgment on resolving familiar issues
Level 1	<ul style="list-style-type: none"> • is basic and general • involve simple, straightforward and routine actions 	<ul style="list-style-type: none"> • involve structured routine processes • involve close levels of support and supervision

The situation with credits is more complex. There are three credit systems in use in the ASEAN region: The University Mobility in Asia and the Pacific Credit Transfer Scheme (UMAP-UCTS); the ASEAN University Network Credit Transfer System (AUN-ACTS); and the ASEAN International Mobility for Students (AIMS) which is the Southeast Asian Ministers of Education Organization – Regional Centre for Higher Education & Development (SEAMEO-RIHED) Academic Credit Transfer Framework²⁴.

UMAP is an umbrella organisation of 438 higher education providers in the Asia-Pacific Region covering 23 countries including 7 ASEAN members. The UCTS credit transfer system was launched in 2000 and based on the European ECTS. It has more recently been updated to a simpler system based on the concept of Asian Academic Credits (AACs) which have a

one-to-one conversion among participating organisations (Hénard et al, 2016) based on required study effort.

The ASEAN University Network-ACTS involves 30 mainly more elite academic institutions. It was developed with student exchange programmes in mind and covers both study effort and learning outcomes. There is also an agreed ACTS grading scale.

However, there are around 7000 higher education organisations in ASEAN so AIMS was introduced to encourage and support wider mobility. It is an inter-governmental level initiative so more ambitious in scope. Its credit scheme is based on UCTS.

So far, harmonisation between ECTS and UCTS or ACTS only appears to have been done at the level of individual academic programmes.

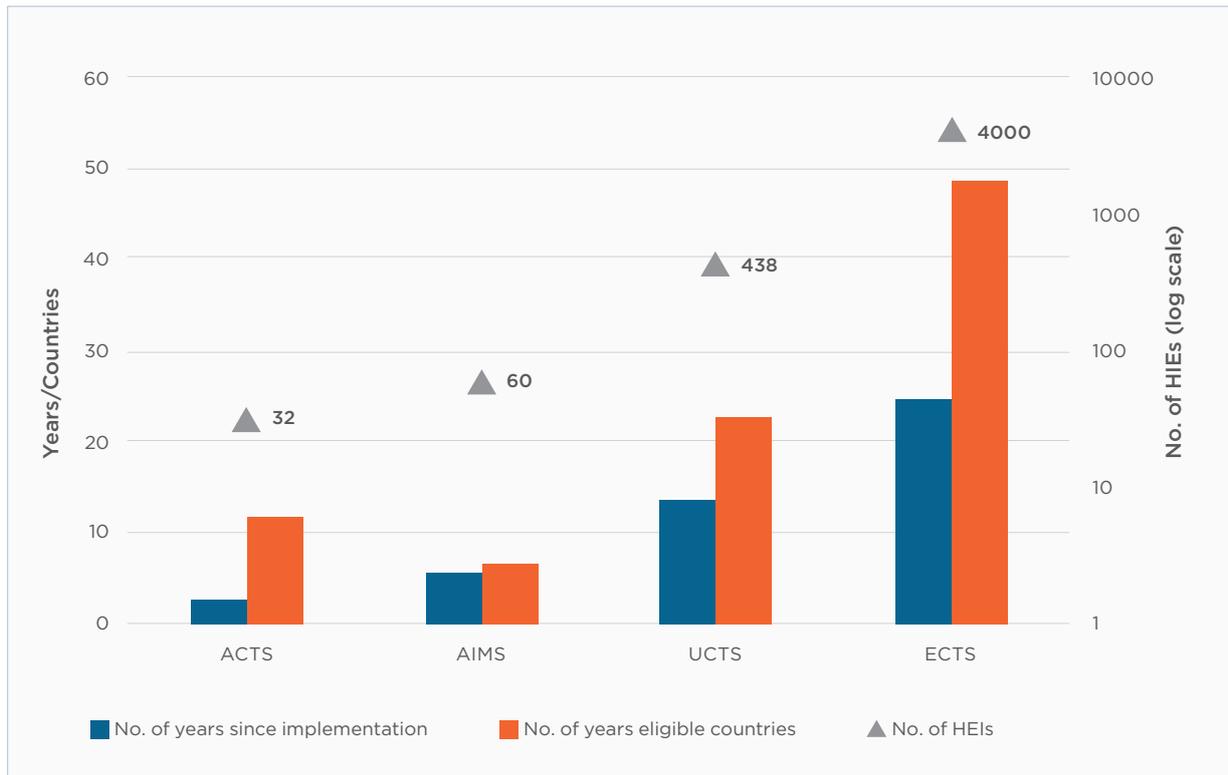


Figure 3: Credit transfer systems in use across ASEAN and EU (from Hénard et al, 2016)²⁵.

²⁴<https://www.share-asean.eu/activities/credit-transfer-system>

²⁵<https://www.share-asean.eu/activities/credit-transfer-system>

The Education Youth and Sports Division of the ASEAN Secretariat have developed a strategy for closer integration of education and training within ASEAN countries to 2025. The key elements are shown in the table below.

Table 4: Key recommendations and commitments on higher education and TVET in support of the ASEAN Kuala Lumpur Declaration on Higher Education (2015) (from Lanceta, 2017)²⁶

Higher education and student /staff mobility	Technical and vocational education and training (TVET)
<ol style="list-style-type: none"> 1. A single ASEAN brand scholarship by 2025 2. A commonly agreed platform and operating mechanisms for sharing and managing data on student mobility 3. A working group to harmonise mobility activities with respect to credit transfer and quality assurance 4. Capacity building for staff involved in managing mobility programmes 5. Leadership development programmes for ASEAN higher education leaders 	<ol style="list-style-type: none"> 1. A regional TVET centre on research, capacity building and collaboration of institutions concentrating on TVET qualifications at the postgraduate level 2. Academic pathways for TVET specialists at the postgraduate level 3. A TVET network for cross-border internship placement and partnership development with other TVET institutions within and beyond ASEAN

Student Mobility and Europe-ASEAN harmonisation

At the tertiary level, individual students can be motivated to carry out some or all of their studies overseas by a range of factors which could include:

- Perceived higher quality education
- Lower cost or higher value
- Expand personal independence and broaden horizons
- Improve foreign language skills
- Access courses not available in their own country
- Expand or improve career opportunities

At the policy level, drivers for providing support for outgoing mobility might include:

- Encourage nationals to improve their knowledge, skills and international contacts so that they will bring those back to their home country in due course
- Provide motivation for students and employees to work towards an overseas scholarship
- Build long-term collaborative links that will benefit home institutions

Countries might support incoming mobility for reasons such as:

- Income generation
- Increasing diversity of the student population and hence outlook and experience of home students

Most international mobility involves students applying for and taking courses in a different country which is either privately funded or enabled through a scholarship from either their home or receiving country. Globally the main mobility has been from less developed economies to more developed economies, especially in North America and Europe. Figure 4 below shows that there was substantial mobility to North America and Europe from Southeast and east Asia in 2013. There was much lower mobility in the opposite direction and also quite limited mobility within the region. There is much greater mobility within Europe and fair mobility between Europe and North America.

Data from 2013 indicates that only 9% of mobile students from ASEAN countries stay within the region. This is especially the case for Vietnam and Malaysia, whilst the proportion from Lao PDR, Cambodia and Myanmar that stay within the region is much higher (Table 5). As Asian universities rise in the International rankings and economic development continues it might be expected that more mobility will be seen within and to the Southeast Asian Region in future years.

²⁶<http://www.ieaa.org.au/documents/item/1114>

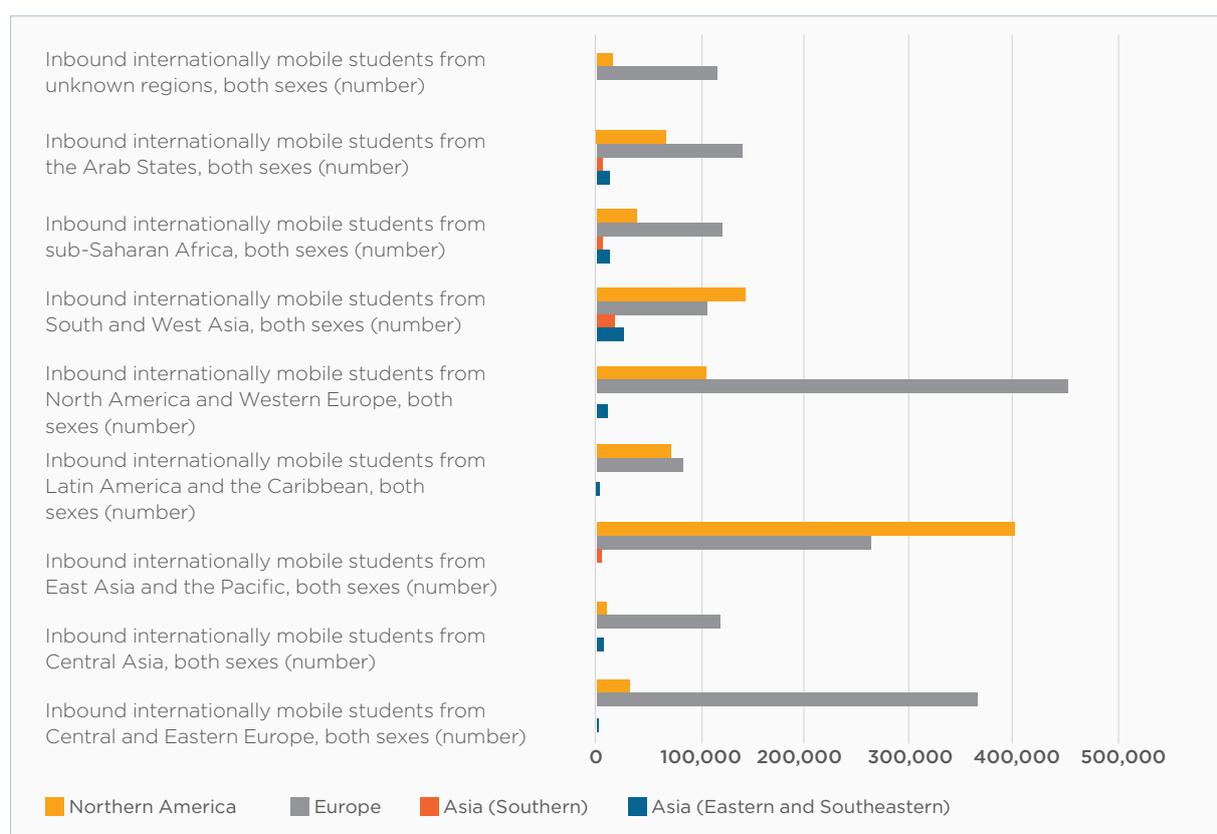


Figure 4: Tertiary student mobility to North America, Europe, Southern Asia and Eastern and Southeastern Asia in 2013

Table 5: ASEAN Tertiary student mobility in 2013 (Hénard et al, 2016)²⁷

Country	Total Outbound Students	Intra-ASEAN Mobility	Percentage
Malaysia	56,260	2,766	4.92%
Viet Nam	53,546	2,003	3.74%
Indonesia	39,098	6,579	16.83%
Thailand	25,517	1,036	4.06%
Singapore	22,578	855	3.79%
Philippines	11,454	507	4.43%
Myanmar	6,388	1,833	28.69%
Lao PDR	4,985	3,184	63.87%
Cambodia	4,221	1,468	34.78%
Brunei	3,361	309	9.19%
Total	227,408	20,540	9.03%

²⁷<https://www.share-asean.eu/sites/default/files/Student-Mobility-and-CTS.pdf>

Another view on this data is to consider the International students as a percentage of the total student population. Figure 5 below shows this for OECD countries (2016 or latest data available). This shows Luxembourg to have the highest proportion of international students, presumably

due to its small population. Other countries with high international student populations include New Zealand, UK, Switzerland, Australia and Austria. Despite attracting large numbers of incoming students, the USA is middle ranking by this measure with around 5% international students.

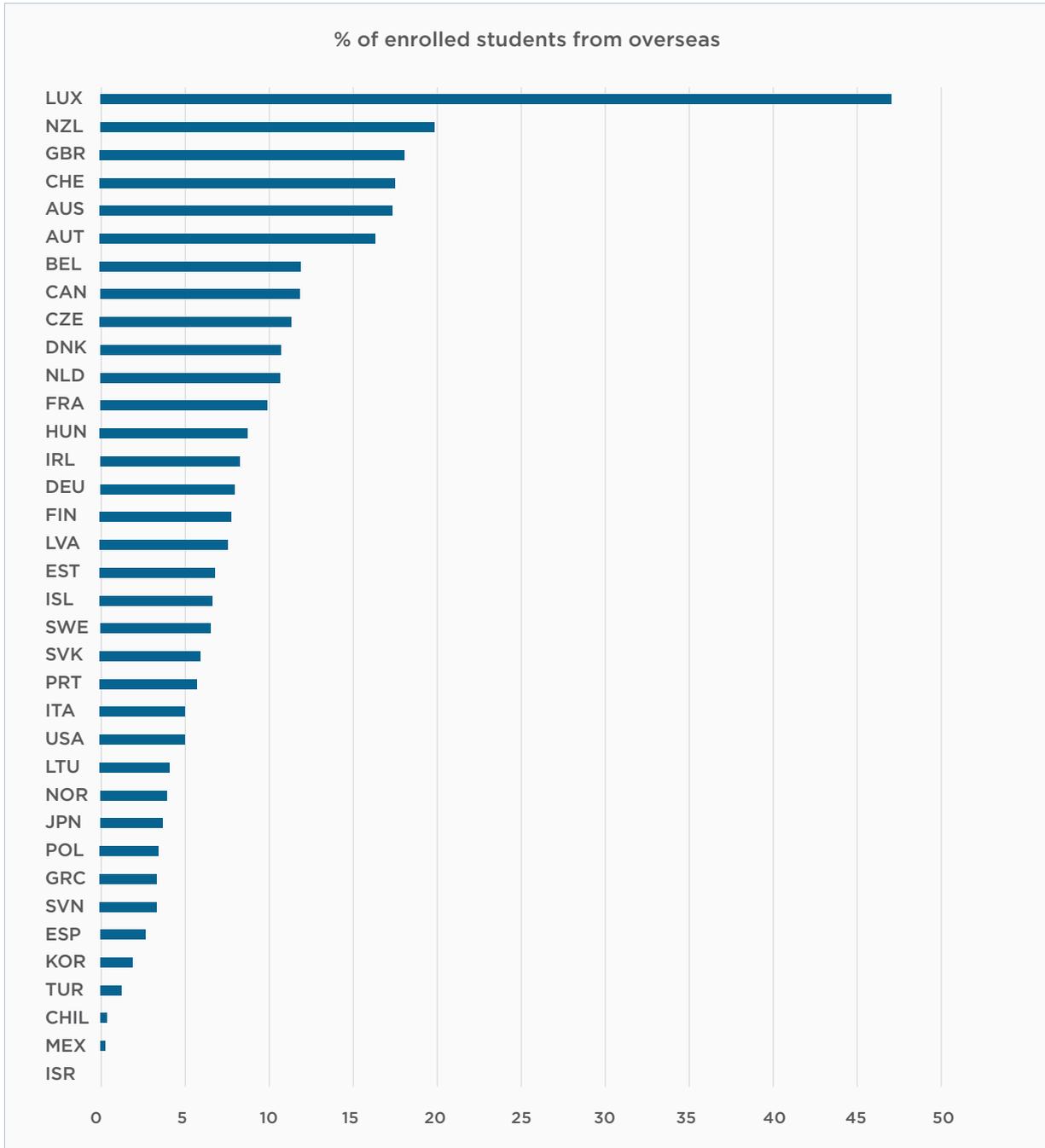


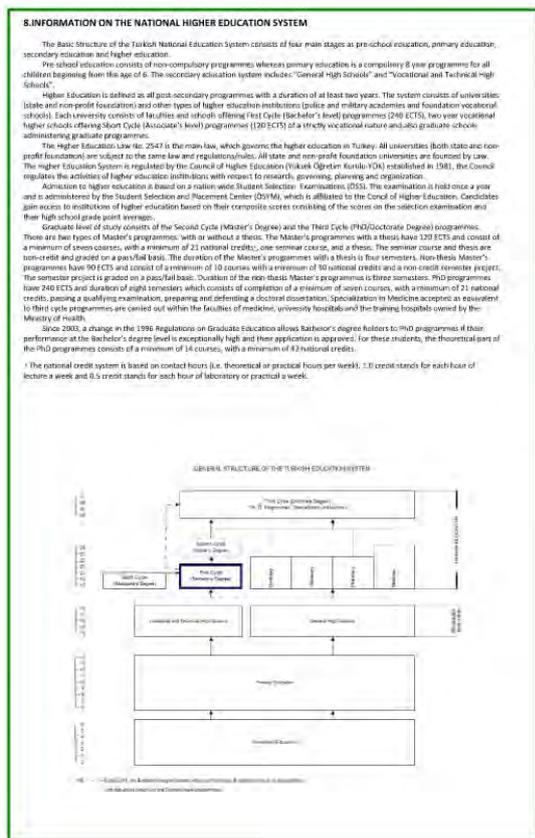
Figure 5: International students as a percentage of total student population, OECD Data²⁸

²⁸OECD (2019), International student mobility (indicator). doi: 10.1787/4bcf6fc3-en

Mobility enabled through institutional cooperation and collaboration or indeed embedded within academic programmes is a smaller part of this larger picture, but of greater interest in the context of this report. Along with a common credit system and qualification framework the EU have also promoted the use of a “Europass” Diploma Supplement (or Transcript) which can be issued by education providers to give information on student achievements in terms of the subjects studied, the credits awarded and levels in a standard format to facilitate translation to other systems. Employers can use “Europass Mobility” (online tool) to record individual’s placements and experience in another country. Students are also encouraged to use a standard Europass format CV. Specific support schemes have also been established within the EU to promote international mobility under the Erasmus+ programme. These include:

- **Study Abroad** (3-12 months) for exchange between cooperating institutions

- **Traineeship Abroad** (2-12 months) for students to receive training in an organisation as part of their degree course or as an internship for recent graduates
- **Erasmus Mundus Joint Masters** – Scholarships to undertake courses offered by a partnership of higher education organisations in different countries
- **Erasmus+ Master’s Degree Loans** – To help students access courses in other countries
- **Staff (teaching)** support for teachers to spend between 2 days and 2 months teaching at another partner country institution (universities, vocational training and schools)
- **Staff (training)** support for a training placement at another country institution for between 2 days and 2 months
- **Young people** support for volunteer opportunities or youth exchanges in different countries
- **Youth workers** support for networking and training including study visits and job shadowing.



DUZCE UNIVERSITY DIPLOMA SUPPLEMENT Diploma No : 20161802702
Diploma Date : 19.12.2016

This Diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO/CEPES. The Purpose of the supplement is to provide sufficient independent data to improve the international transparency and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). It is designed to provide a description of the nature, level, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgement, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

- 1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION**
 - 1.1. Family Name(s)
 - 1.2. Given name(s)
 - 1.3. Date of Birth
 - 1.4. Student identification number (if applicable)
- 2. INFORMATION IDENTIFYING THE QUALIFICATION**
 - 2.1. Name of the qualification (in original language)
 - 2.2. Main field(s) of study for qualifications:
 - 2.3. Name and status of awarding institution: Duzce University - Devlet Universitesi
 - 2.4. Name and status of institution administering studies: Duzce University - State University
 - 2.5. Language(s) of instruction/examination: Turkish
- 3. INFORMATION ON THE LEVEL OF THE QUALIFICATION**
 - 3.1. Level of qualification: Second Cycle (Master's Degree)
 - 3.2. Official length of programme: 3 years, 2 semesters per year, 16 weeks per semester, 240 ECTS
 - 3.3. Access requirements(s): High School Diploma, Placement through a centralized national university placement examination
- 4. INFORMATION ON THE CONTENTS AND RESULTS GAINED**
 - 4.1. Mode of study: Full-Time
 - 4.2. Programme requirements(s): Students must have a Cumulative Grade Points Average (GPA) of not less than 2.00/4.00 and have completed the courses with at least a letter grade of D in the program in order to graduate.
Objectives: Offer education by giving postgraduate education to train Computer Engineers (M.Sc.) who can work about design, productivity and research/development in industry and public research institutions with success and who are creative, who have systematic approach in problem-solving, teamwork skills, sensitive to environment, social, economic and professional ethics and features of leader.
Our vision as Department of Computer Engineering/Master's Degree program is to train individuals who generate and apply scientific knowledge based on advanced scientific and technological approaches about digital quality in education, training, research and practice, who are committed to quality, open to development and questioning, who conform to ethics of human rights, who strive to service of region, country and humanity.

Figure 6: Example Diploma Supplement²⁹

²⁹<https://ogrencisleri.duzce.edu.tr/Dokumanlar/ogrencisleri/Dosyalar/onyuzuyksek.jpg>

The number of beneficiaries of Erasmus+ mobility support reached almost 800,000 in 2017 with the greatest proportion of support to higher education (learners and teachers) (Figure 7).

To date, only one MSc programme with an aquaculture focus has received Erasmus Mundus funding. That is a course in Aquaculture, Environment and Society run by the University of Crete (Greece), University of the Highlands and Islands (UK), University of Nantes (France) and Radboud University (The Netherlands). Mobility

between institutions using the Erasmus+ study abroad scheme is more common.

Support for mobility in the ASEAN Region is far less developed, however, this is being addressed through a joint EU-ASEAN project – SHARE (<https://www.share-asean.eu>) which commenced in 2015 and concludes in early 2019. This is working on qualifications reference frameworks and quality assurance, an ASEAN and ASEAN-EU Credit Transfer System and a student mobility and scholarship scheme.

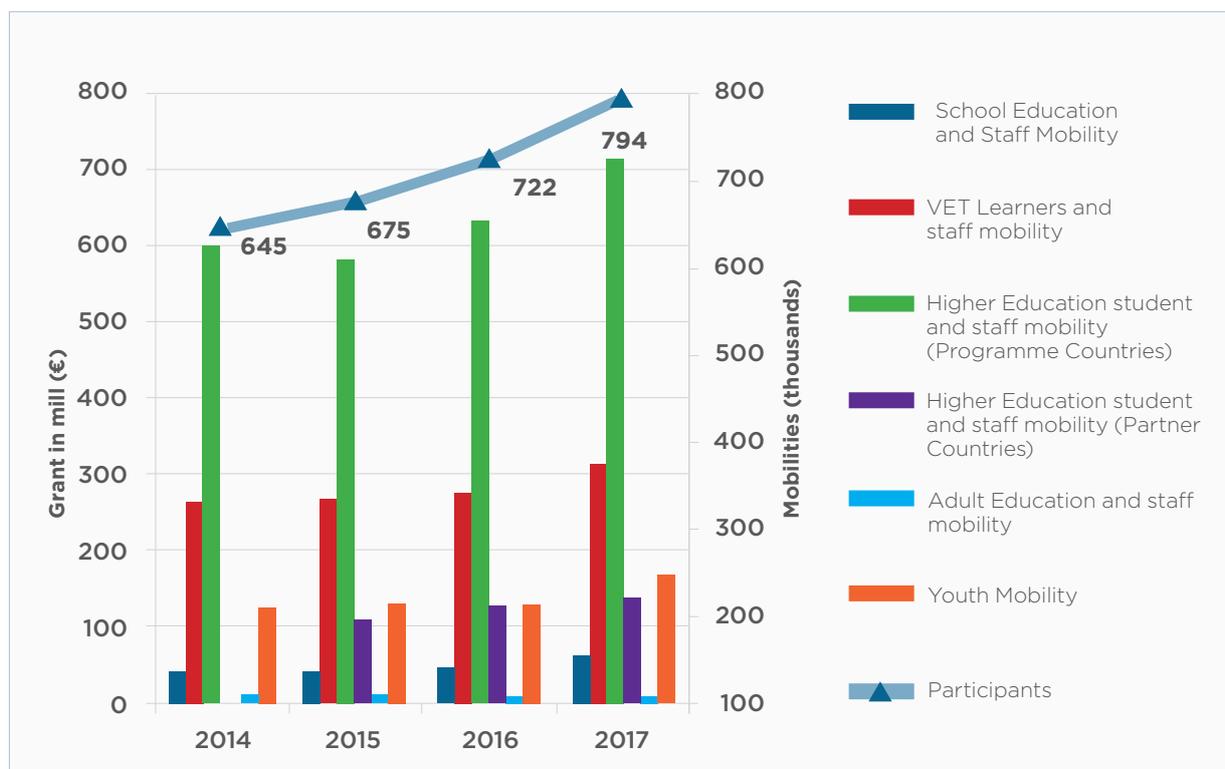


Figure 7: Erasmus+ Mobility funding 2014-17 (European Commission, 2019)³⁰

Funding for mobility within the ASEAN Region is more fragmented. Current and recent programmes include (Source Hénard et al (2016):

- SEAMEO – Various scholarship programmes and funding for student and staff exchanges through SEAMEO Centres
- Brunei Darussalam Government Scholarships for Foreign Students
- Malaysian Technical Cooperation Programme (MTCP) – ASEAM Masters Scholarship
- ASEAN-UNINET (ASEAN-European Academic University Network)
- Thai International Postgraduate Programme
- Sasin – Royal Thai Government Scholarships MBA Program
- Singapore Ministry of Education – ASEAN Scholarship
- AMERTA (Academic Mobility Exchange for Undergraduate at Airlangga)
- Temasek Foundation – Leadership Enrichment and Regional Network Award

³⁰European Commission (2019) Erasmus+ annual report 2017. Directorate General for Education, Youth, Sport and Culture, 102 pp. <https://publications.europa.eu/en/publication-detail/-/publication/4e5c3e1c-1f0b-11e9-8d04-01aa75ed71a1>

ANNEX 2: USEFUL PROJECTS AND LINKS

Relevant projects

EURASTIP Project - www.eurastip.eu
 ASEAN-FEN - aseanfen.org
 Aqua-TNET - www.aquatnet.com
 ASEM Aquaculture Platform - www.asemaquaculture.org
 AQUACASE - www.aquacase.org
 WAVE Project - www.waveproject.com
 VALLA Project - www.vallaproject.com
 FishFarm Project - <http://fishfarmeurope.eu/fishfarma/>
 BlueEDU Project - www.blueedu.eu
 AQUALEX & PESCALEX Projects - <http://www.aqualex.org>
 HealthyFish project - <http://healthyfish.apomar.es>
 Vocational Aqualabs Project - <http://www.aqualabs.eu>

Other Web resources used in writing the report

<https://www.share-asean.eu/>
<https://asean.org/asean-eu-to-boost-student-mobility-in-the-asean-region/>
https://www.britishcouncil.org/sites/default/files/h233_the_shape_of_asean_higher_education_report_final_v2_web_1.pdf
<http://www.universityworldnews.com/article.php?story=20180629090604303>
<http://www.universityworldnews.com/article.php?story=20180504111845291>
<https://www.share-asean.eu/news/second-asean-student-mobility-forum-28-29-august-2018-yangon-myanmar>
<https://www.emeraldinsight.com/doi/full/10.1108/HEED-08-2017-003>
<http://www.researchcghe.org/perch/resources/chankseliani-cghe-talk-slides.pdf>
https://www.agence-erasmus.fr/docs/2115_soleoscope-10-en.pdf
[http://publications.jrc.ec.europa.eu/repository/bitstream/JRC108895/student_mobility_in_tertiary_education_final\(1\).pdf](http://publications.jrc.ec.europa.eu/repository/bitstream/JRC108895/student_mobility_in_tertiary_education_final(1).pdf)
https://pjp-eu.coe.int/documents/1017981/1668225/YKB17_Oguz_MOBILITY_IN_HIGHER_EDUCATION_INSTITUTIONS.pdf/ed299641-76a0-4cdf-bad8-bceb4fa86a18
<https://www.britishcouncil.org/education/ihe/knowledge-centre/student-mobility>
<https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/International/UK-Strategy-for-outward-student-mobility-2017-2020.pdf>
https://www.heacademy.ac.uk/system/files/resources/academic_perspectives_on_the_outcomes_of_outward_student_mobility_-_final_report.pdf

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