AQUAVET

INTRODUCING AQUAPONIC IN VET:
TOOLS, TEACHING UNITS AND TEACHER TRAINING

Result 4:

Analysis of the VET Situations in partner and neighbouring countries

Internal evaluation of the result

Version	
1; DRAFTS	All partners
2	Nadine Antenen
3; FINAL	Ranka Junge

Contents

1   Description

This report describes the Vocational and Educational Training (VET) situation in Slovenia, Switzerland and Italy and in their neighbouring countries Croatia, Germany, France and Spain presenting professions that are potentially interested in aquaponics, and could profit from new skills. In addition, this report also contains identification of target clients for dissemination, and description of the accreditation system in the aforementioned countries.

2 Analysis of the situation of VET professions that are potentially interested in aquaponics and could benefit from new skills

2.1 Slovenia

In Slovenia, 65.4% of students in secondary education were enrolled in VET programmes in 2011 compared to the EU average of 51.5%.

2.1.1 Types of VET programmes in Slovenia

- Short-term vocational programmes or "nižje poklicno izobraževanje" (NPI): 2 years of schooling, completed with Final exam, 120 credit points (CP)
- Vocational programmes or "srednje poklicno izobraževanje" (SPI): 3 years of schooling, completed with Final exam, 180 CP
- Technical programmes or "srednje strokovno izobraževanje" (SSI): 4 years of schooling, completed with Vocational Matura exam, 240 CP
- Vocational-technical programmes or "poklicno-tehniško izobraževanje" (PTI): additional 2 years of schooling after completed 3 years of SPI schooling, completed with Vocational Matura exam, 120 CP

2.1.2 Curriculum structure of VET programmes (NPI, SPI, SSI and PTI) in Slovenia

- General subjects (Mathematics, Slovenian language, Foreign language, Science, etc.)
- Vocational modules (mandatory and optional)
- Open curriculum: 20% of all teaching hours; Open curriculum enables students (i) to gain additional professional skills and qualifications; (ii) to develop practical skills; and (iii) to gain additional knowledge (key competences). The school coordinates contents of open curriculum together with social partners (chambers, companies, institutes and trade unions), teachers and students.
- Practical training or "Praktično usposabljanje z delom" (PUD) is an obligatory part of the curriculum in a form of practical education of students at employers, where students use the knowledge gained at school in the actual work situations (in practise), and thus gain additional practical knowledge and skills.
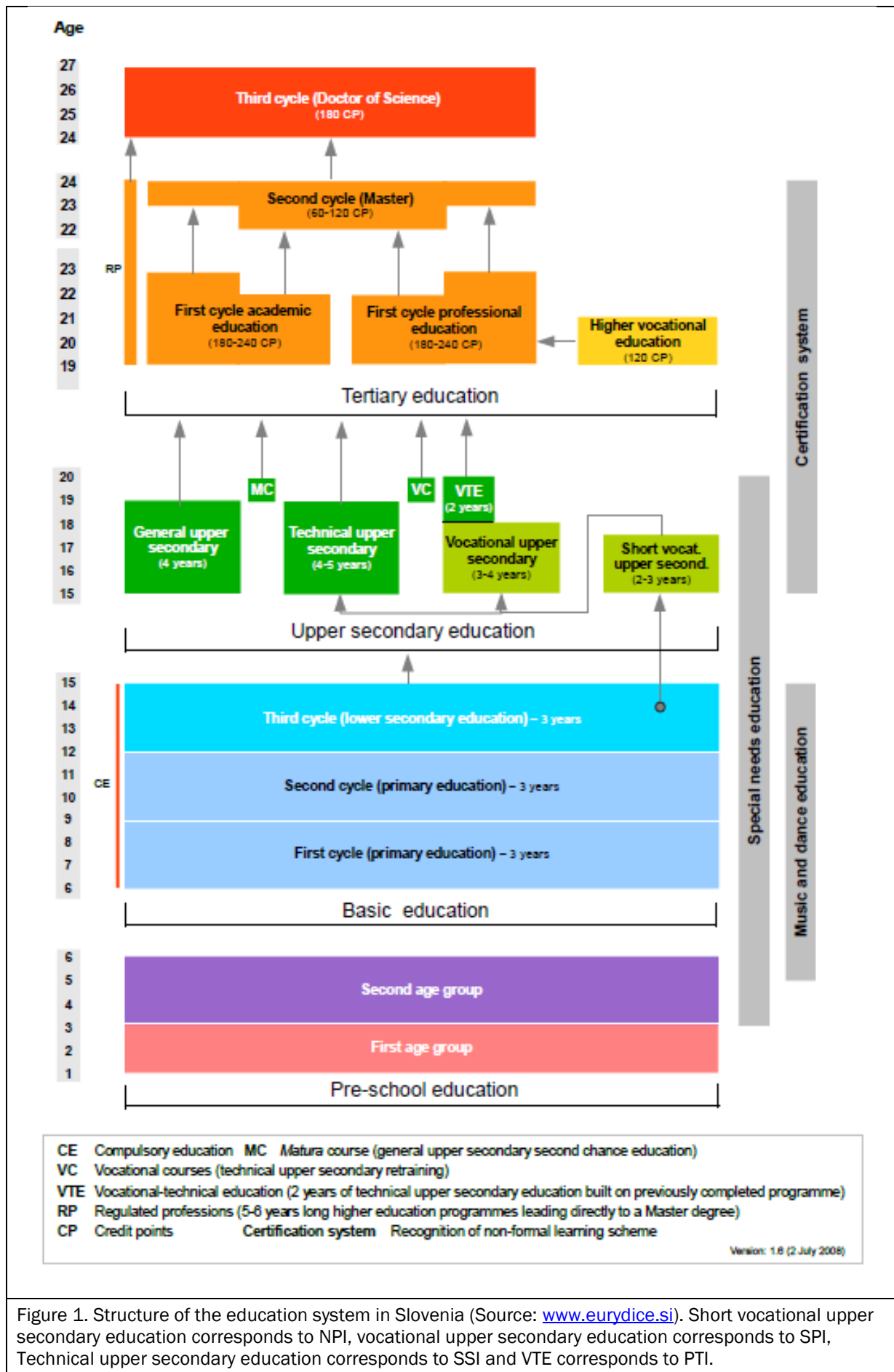
Figure 1. Structure of the education system in Slovenia (Source: www.eurydice.si). Short vocational upper secondary education corresponds to NPI, vocational upper secondary education corresponds to SPI, Technical upper secondary education corresponds to SSI and VTE corresponds to PTI.

2.1.3 List of VET programmes potentially interested in aquaponics accreditation in Slovenia

Educational programme	Number of VET institutions implementing the programme in Slovenia	Vocational modules potentially interested in aquaponics
Short term vocational programmes (NPI)		
Assistant in biotechnology and care	14	Animal husbandry Basics of plant production Herbs production and use Maintenance and hygiene of workplace
Vocational programmes (SPI)		
Farmer	5	Environment protection with basics of sustainable development Basics of plant production with plant protection Animal husbandry Biological treatment plants and composting facilities Vegetables production Management of alternative energy sources, materials and environment
Gardner	8	Environment protection with basics of sustainable development Basics of plant production with plant protection Basics of horticulture Ornamental plants production Vegetables production
Technical programmes (SSI)		
Agricultural technician	7	Sustainable development Animal husbandry Crops production
Veterinary technician	2	Veterinary technology of farmed animals
Food-processing technician	4	Food safety Food quality control
Nature protection technician	6	Sustainable development Processing of organic waste, maintenance of biological treatment plants and constructed wetlands Ecological analysis and monitoring
Environmental technician	9	Environmental technologies Wastewater management Drinking and process water management

2.2 Croatia

In Croatia, 71.5% of students in secondary education were enrolled in VET programmes in 2011 compared to an EU average of 51.5%. All VET programmes combine occupational and general education, to varying degrees; most include mandatory work experience.

2.2.1 Types of VET programmes in Croatia

In Croatia, following VET programmes are offered (Figure 2):

- 4-year school-based programmes of technical orientation, completed with State Matura exam
- 3-year programmes that can be school-based or take the form of apprenticeships, completed with final practical assignment
- Shorter programmes (1-year and 2-year programmes of lower professional qualifications), completed with final practical assignment.

Curriculum structure in 3- and 4-year VET programmes in Croatia:

- General subjects
- Vocational modules (mandatory and optional)
- Final practical assignment/State Matura exam

2.2.2 List of VET programmes potentially interested in aquaponics accreditation in Croatia

| Four-year programmes of technical orientation	
Educational programme	**Professional modules potentially interested in aquaponics**
Agricultural technician	Basics of plan production technologies Basics of animal production Principles of ecological production Production in protected space Animal husbandry
Ecological technician	Chemistry of the environment Living beings and the environment Sample analysis Waste Applied ecology
Food-processing technician	Food production technology Food quality control and food safety Health and environment protection
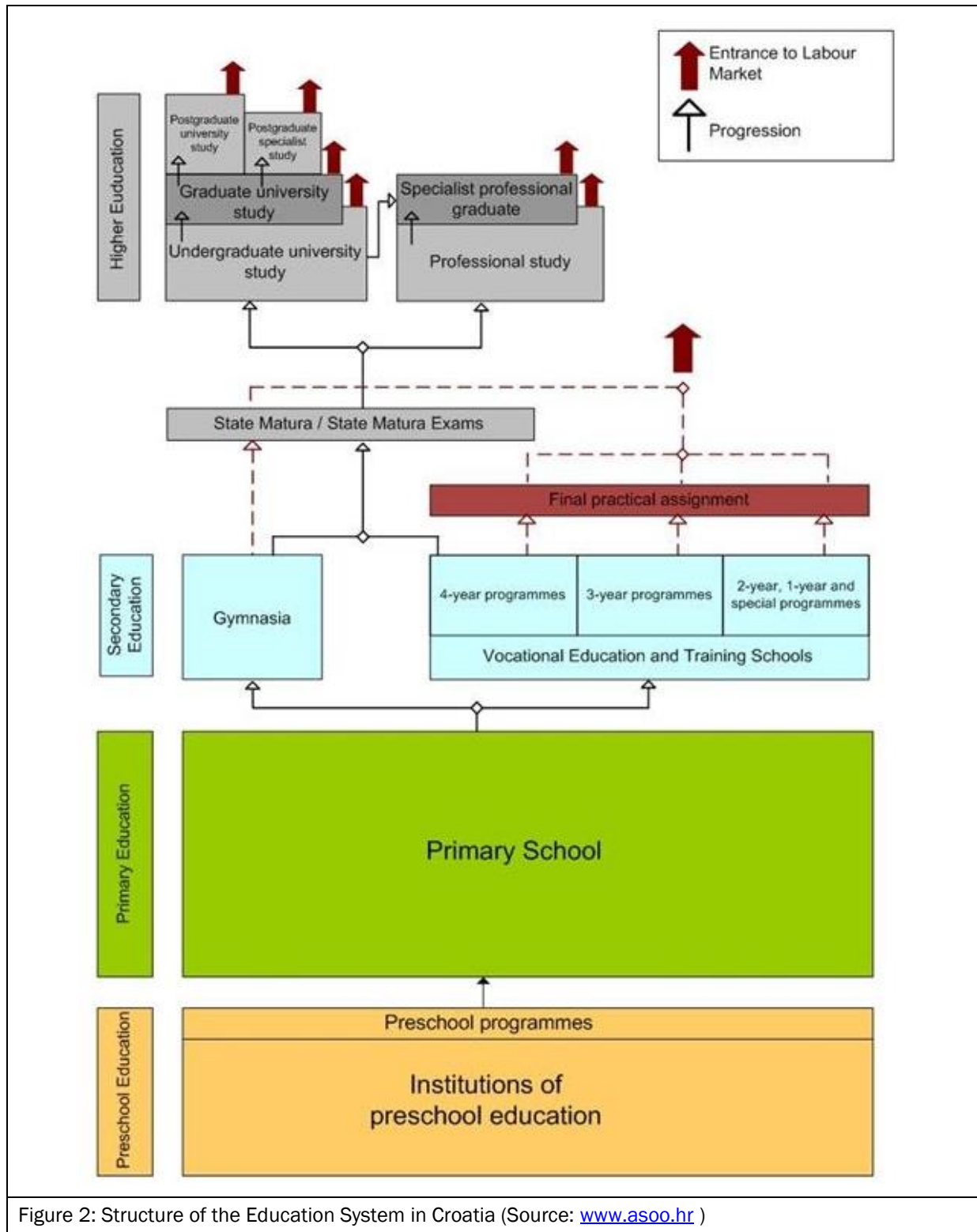
Figure 2: Structure of the Education System in Croatia (Source: www.asoo.hr)

2.3 Switzerland

In Switzerland there are many possible pathways to obtain vocational / professional education and training (VET or PET, respectively), concluding this education with a VET (or PET) diploma (Figure 3). The vocational education and training can start in the upper secondary level after 9 years of mandatory school. About $^2/_3$ of Swiss teenagers enrol in vocational education and training (berufsbildungplus.ch 2014). The access to tertiary level education can be approached either directly via a Federal Vocational Baccalaureate, or via a VET diploma or with additional requirements such as work experience. Different pathways are possible. There also exist a lot of bridges between the different pathways.

2.3.1 Types of VET & PET programmes in Switzerland (BQ-Portal 2012a)

- 2 years Berufslehre (basic vocational training), completed with Eidgenössischer Berufsattest EBA (federal VET certificate)
- 3-4 years vocational training, completed with an eidgenössisches Fähigkeitszeugnis EFZ (federal VET diploma) that grants access to advanced VET and PET
- VET can be complemented with a Berufsmatura (federal vocational baccalaureate) to gain access to tertiary level education

In Switzerland the professional education and training (Tertiary-level B) follows the vocational education and training. Together with the universities and universities of applied sciences (Tertiary-level A), they make up the tertiary level of the Swiss Education System. The goal is to supply the Swiss Economy with qualified, well-educated workers that have professional experience. A professional baccalaureate enables a transition from the Tertiary-level B (VET/PET) to the Tertiary-level A (University and university of applied sciences).

There are about 400 different degrees to choose from within the professional education and training system, which are accredited by the Swiss Federal Secretariat for Education, Research and Innovation (SBFI). Such an accreditation permits the education provider to award their course with a federally protected title. The professional education and training programmes have different qualifications and titles, which are listed in Table 1.

PROFESSIONAL EDUCATION AND TRAINING (TERTIARY-LEVEL B)

HIGHER EDUCATION (TERTIARY-LEVEL A)

Advanced Federal PET Diploma / Federal PET Diploma

PET college degree

Master's degree / Bachelor's degree

Doctorate / Master's degree / Bachelor's degree

National PET examinations

PET colleges

Universities of applied sciences

Universities/ Federal institutes of technology

TERTIARY LEVEL

Federal Vocational Baccalaureate

Specialised Baccalaureate

Baccalaureate

Job-related continuing education and training

Federal VET Certificate → Federal VET Diploma

Specialised schools

Baccalaureate schools

Vocational education and training

General education schools

UPPER-SECONDARY LEVEL

Bridge-year courses

Compulsory education

Direct access

Additional qualifications or practical experiences required

Figure 3: Pathways of Swiss education system (SERI 2013: 5)

After high school (lower secondary level) pupils usually continue to either do a VET diploma or a baccalaureate (Matura). To enter the Matura programme (full time school) a certain grade average is needed. VET diplomas are done in a dual system. The main part is done in a company (or farm in case of farmers) where apprentices are trained. Additionally several days of the week are spent in school. The vocational baccalaureate can be accessed with sufficient work experience in the targeted domain. The vocational baccalaureate is mainly the key to apply to universities of applied sciences. To enter the federal institutes of technology additional qualifications are needed.

After a VET many graduates increase their value by doing an advanced training (Tertiary-level B) which are accessible without baccalaureate.

Table 1: Overview of different educational pathways, their purpose, the achieved qualification and examples in the area of vocational training (Source: SERI 2007).

Type of PET programme	Purpose	Qualification/Titles used in Switzerland	Examples
PET programmes leading to national professional examinations	Obtaining first specialisation/ deepening of technical knowledge and skills Developing managerial skills	Federal PET Diploma **Eidgenössischer Fachausweis** [*name of profession*] mit eidg. Fachausweis	Federal PET Diploma in Human resources management, marketing, social insurance, electrical safety, logistics, automotive diagnostics
	Gaining expertise Developing skills needed to hold top-level managerial positions within a company	Advanced Federal PET Diploma **Diplom** dipl. [*name of profession*] [*name of profession*] mit eidg. Diplom [*name of profession*]-Meister	Advanced Federal PET Diploma in Corporate auditing, border control, taxation, construction, communications management, gardening
PET programmes leading to professional college degree	Obtaining specialisation and gaining expertise Developing skills needed to hold top-level managerial positions within a company	Professional college degree **Diplom HF** dipl. [*name of profession*] HF	Professional college degree in engineering, surgical technology, business administration, caregiving, social pedagogy, tourism, etc.

2.3.2 List of educational programmes potentially interested in aquaponics in Switzerland

Educational programme	Institutions	Modules related to aquaponics
VET's in the upper Secondary Level (Federal VET Diploma)		
Vegetable Gardener (EFZ)	Inforama Seeland Ins	Vegetable cultivation, technical installations, working environment
Farmer (EFZ)	24	Modules in animal husbandry and plant production
Federal PET Examination (Federal PET Diploma)		
Fish breeder (BP)	Bayerische Landesanstalt für Landwirtschaft, Starnberg Bavaria (Germany)	Fish farming and breeding
Farmer (BP)	24	Modules in animal husbandry and plant production
Advanced Federal Examination (Advanced Federal PET Examination)		
Master vegetable gardener (HFP)	Berufsbildungszentrum Wädenswil, Inforama Seeland Ins, Landwirtschaftliches Zentrum Liebegg	Greenhouse vegetables, quality management, finances, agricultural policies
Master farmer (HFP)	24	Modules in animal husbandry and plant production
PET colleges (PET college degree)		
Agro-technician(HF)	Inforama Rütti Zollikofen, Strickhof Lindau, Institut agricole de Grangeneuve, LBBZ Schluechthof Cham, Agrotechnik HF	Modules in animal husbandry and plant production
Universities of applied sciences (Bachelor's degree, (Master's degree))		
Agricultural scientist / Agronom (BSc FH)	Hochschule für Agrar-, Forst- und Lebensmittelwissenschaften HAFL, Zollikofen Haute école du paysage, d'ingénierie et d'architecture de Genève	Modules in animal sciences
Environmental engineer (BSc FH)	ZHAW, Wädenswil	Modules in nature management, horticulture and urban gardening
Federal Institute of Technology (Bachelor's degree, Master's degree)		
Agricultural scientist / Agronom (BSc FH)	ETH Zürich	Niches in animal production, horticultural science
Environmental engineer	ETH Zürich, EPF Lausanne	Water resource engineering

(Source: own illustration)

2.4 Germany

2.4.1 Types of VET & PET programmes in Germany

The German Educational System comprises different levels: elementary (pre-school) education, primary education, secondary education level 1 and 2, tertiary education and continuing education. Within this system, there are different pathways to obtain vocational education and training (VET). Figure 4 presents an overview of the basic structure of the German Educational System.

Figure 4. Basic structure of the German Educational System (Source: http://voieproeurope.onisep.fr/en/files/2012/11/allemagne_en.jpg)
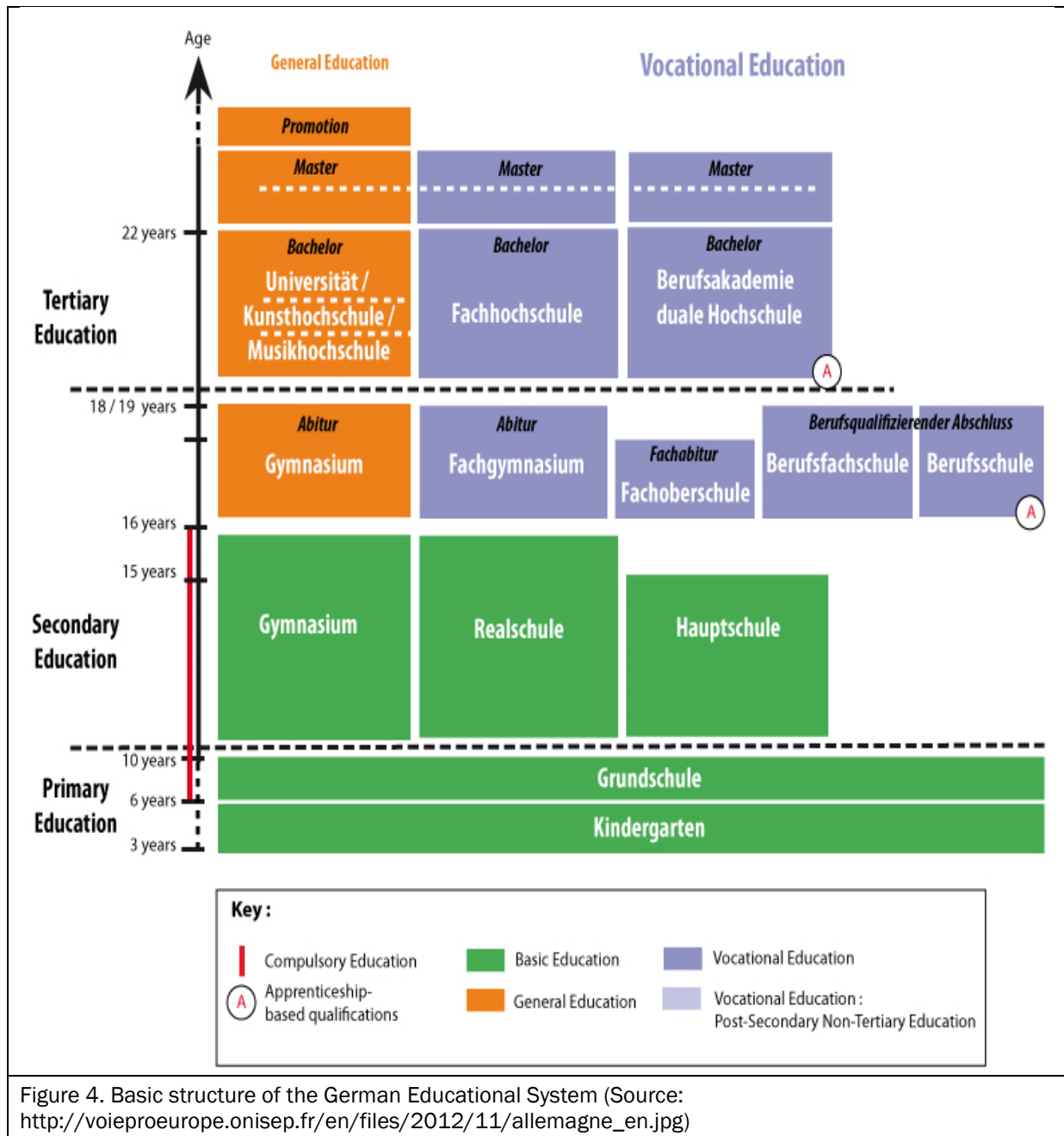
According to the BQ-Portal (2012b), there are following types of VET & PET programmes in Germany:

- 3-4 years vocational training in the dual system, completed with either:
    - Gesellenbrief (vocational qualification for skilled work)
    - IHK-Prüfungszeugnis (certificate from the chamber of commerce and industry)
    - IHK-Facharbeiterbrief (certificate as a skilled worker from the chamber of commerce and industry)
- 2 years trade and technical schools following initial VET, completed with a Meisterbreif (master craftsman's diploma) or an occupational designation of "State certified/recognised"

Compulsory school starts at the age of 6 and lasts 9 (or in some cases 10) years up to the end of lower secondary school. After completion of compulsory school, pupils move into upper secondary education. Another three years of full-time or part-time (vocational) school is mandatory, meaning that young people must visit some form of school from ages 6 to 18 (at least). At the end of grade 9 (lower secondary education) pupils receive a first general education qualification with an accompanying leaving certificate. This is used for admission to different types of upper secondary education: vocational education and training within the dual system (learning and training are conducted in two places: the company and in vocational schools), to attend a certain type of full-time vocational school (Berufsfachschule) or to gain admission to schools for continued vocational training (Fachschule). (Lohmar & Eckhardt 2013: 127, Hippach-Schneider et al. 2011: 42) Additionally, pupils can choose to follow a general education pathway at a full-time school. The upper level of the Gymnasium grants graduates a baccalaureate (Abitur), which is a general higher education entrance qualification to enter tertiary education institutions. Completion of one of the vocational schools culminates in a degree that either counts as higher education entrance qualification or a vocational qualification for skilled work (Geselle). (Lohmar & Eckhardt 2013: 132-133, Hippach-Schneider et al. 2011: 46-48) Currently, there are 329 state-recognised occupations within the dual system of VET at upper secondary level. (Hippach-Schneider et al. 2011: 42, BiBB 2013)

In addition to completing vocational qualification for skilled work in the dual system, senior vocational schools (Berufsoberschule) enable the attainment of either subject-restricted higher education entrance qualification (fachgebundene Hochschulreife) or after two years of full-time school the general higher education entrance qualification (Allgemeine Hochschulreife). (Hippach-Schneider et al. 2011: 54) Once the vocational qualification is finished and work experience gained, there is the possibility of an upgrading qualification (e.g. as a technical engineer, master craftsman, business specialist or certified clerk). These qualifications are known as formal advanced training or postsecondary VET (Tertiary-level B). (Hippach-Schneider et al. 2011: 66, Fazekas & Field 2013: 13) These advanced vocational examinations are regulated by the Vocational Training Act (Fortbildungsgänge nach dem Berufsbildungsgesetz), individual regulations of the chambers of crafts and trades and the chambers of industry and commerce (Fortbildungsgänge nach Ordnung der Handwerks- und Industrie- und Handelskammern) on the one hand, or trade and technical schools (Fachschulen) structured under Land (Bundesland) law. Advanced vocational examinations

are typically taken after finishing an upper secondary VET (most often an apprenticeship within the dual system) and gaining some work experience. Successful candidates of federally regulated and chamber examinations receive the title of Meister, whereas graduates of trade and technical schools receive an occupational designation of "State certified/recognised". Advanced vocational graduates can apply for university studies (Tertiary-level A) and people with an upper secondary VET certificate can get a subject-related university degree if they can evidence three years of professional experience and pass a university aptitude test. (Fazekas & Field 2013: 13-17)

2.4.2 List of educational programmes potentially interested in aquaponics in Germany

Educational programme	Modules related to aquaponics
VET programmes within the dual system	
Fish breeder	Fish farming and breeding
Farmer	Animal husbandry and plant production
Vegetable gardener	Vegetable cultivation, technical installations, working environment
Advanced vocational training at a higher VET school or college (Berufs-/Fachoberschule)	
Agro-technician	Animal husbandry, plant and fertiliser production, management
Agricultural business administrator	Business administration in agricultural companies
Agricultural economist	Management of agricultural companies
PET (*Meisterprüfung*)	
Master Fish breeder	Fish farming and breeding, management, marketing
Master Farmer	Animal husbandry and plant production, management
Master Vegetable gardener	Vegetable cultivation, technical installations, management
Universities of Applied Sciences (Bachelor's degree, Master's degree)	
Environmental Engineer (BSc, B.Eng., MSc FH)	Modules in nature management, horticulture and urban gardening
Agricultural Scientist (BSc, B.Eng., MSc FH)	Animal and plant science
Agricultural Economist (B.A., BSc, MSc FH)	Production and Marketing of agricultural products
Universities and Technical Universities (Bachelor's degree, Master's degree)	
Environmental Engineer (BSc, MSc)	Closed loop resource management, water management
Agricultural Scientist (BSc, MSc)	Animal and plant science
Fishery Science and Aquaculture (MSc)	Fish Breeding and Fish Pathology, Fishery Management, Limnology and Ichthyology
Horticultural Scientist (MSc)	Crop Quality Assessment, Ecophysiological Basics of Urban Horticulture, Advanced Plant Pathology, Farm Management
Agricultural Crop Scientist (MSc)	Plant production, physiology, genetics, pathology

(Source: own illustration)

2.5 France

In France the Educational System is organised into 4 phases, starting with the non-mandatory Nursery School (école maternelle). School is compulsory from the age of 6 and the beginning of elementary school (école élémentaire). After five years of elementary school, secondary education begins. This is divided into the lower secondary level (collège) and upper secondary level (lycée or apprentissage). Up to the end of the lower secondary level all pupils follow the same educational path. They finish lower secondary school with the lower secondary level diploma (brevet des collèges). On the one hand, upper secondary level education is provided in lycées, where three pathways exist: the general pathway, the technological pathway and the vocational pathway, all culminating with the national baccalaureate (general, technical or professional). The Baccalaureate permits entry to tertiary general and vocational education (Roussel et al. 2013: 12). Figure 6 gives an overview of the system and the general as well as vocational pathways.
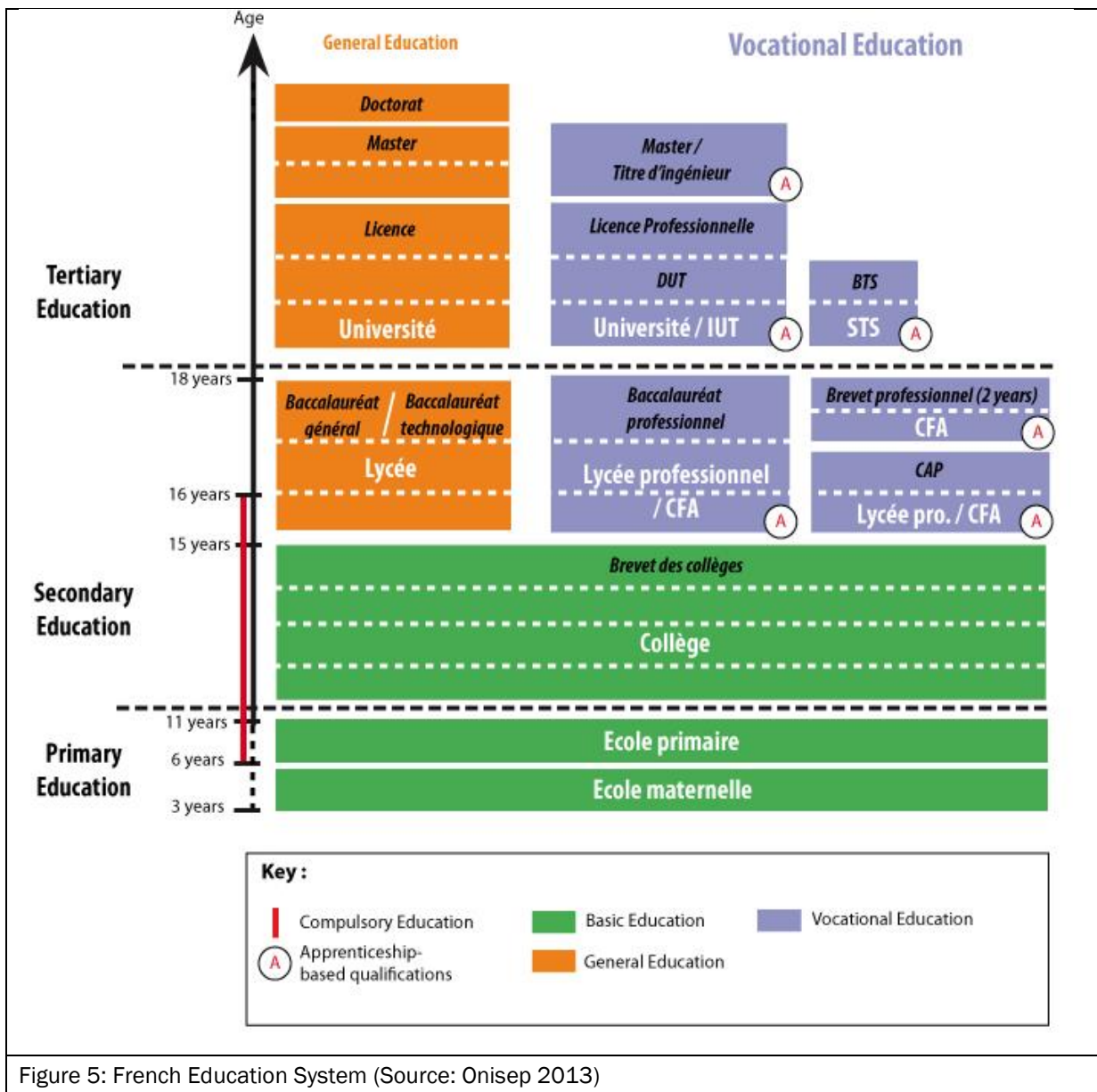

Figure 5: French Education System (Source: Onisep 2013)

Types of VET & PET programmes in France (BQ-Portal 2012c):

- 2 years lycée professionnel or apprenticeship in the dual system with school at a Centre Formation d'Apprentis (CFA), completed with a Certificat d'aptitude professionnelle (CAP)
- An additional year of school after the CAP to reach the Baccalauréat professionnelle (bac pro) or directly via the lycée professionnel after 3 years
- 2 years within the dual system, completed with the Brevet professionnel (BP)
- 2 years within the dual system or at a lycée professionnel, completed with a Brevet des métiers d'art (BMA)
- 2 years within the dual system, completed with a Brevet technique des métiers (BTM)
- 2 years at a university of applied science, completed with a Diplôme universitaire de technologie (DUT)
- After the BTM, 2 years higher education within the dual system, completed with the Brevêt de Maîtrise (BM)

On the other hand, upper secondary schooling in France includes the apprenticeship system. Young people between the ages of 16 to 25 get a theoretical and practical education to achieve professional qualification. Apprentices are trained on-the-job and at an Apprentice Training Centre (CFA – centre de formation d'apprentis) for two years after collège and attain a CAP (certificate d'aptitude professionnelle: professional skills certificate). It allows for entry into the work place. (Roussel et al. 2013: 13, Ministère Education Nationale 2010: 5-6) Additionally a Bac Pro (secondary vocational diploma) takes three years after collège or one year after a CAP. It is used for entry into the work place, but is also an access to higher (tertiary) education. All the vocational diplomas can also be attained at full-time school, the lycée professionnel (vocational upper secondary). Within the upper secondary level of education, paths can be changed the first couple of years from vocational to general or technical and vice versa. (Ministère Education Nationale 2010: 6-7)

Tertiary education consists of general education at universities and grandes écoles with the goal of doing a licence (Bachelor's degree), Master's degree and Doctorate. Tertiary vocational education, which can be accessed through apprenticeships, comprises the Brevet de Technicien Supèrieur (BTS – higher technician diploma) or the Diplôme Universitaire de Technologie (DUT – university technology diploma), both of which can be followed by directly joining the work force or by doing additional studies to reach the Licence Professionnelle (vocational Bachelor's degree) and a vocational Master's degree. (Onisep 2013)

There are over 450 trades and professions offered through the apprenticeships programme. CAPs cover over 200 specialisations, with the Bac Pro offering around 70 specialisms in different sectors. (Ministère Education Nationale 2010: 6, Roussel et al. 2013: 18)

2.5.1 List of educational programmes potentially interested in aquaponics in France

Educational programme	Modules related to aquaponic
VET programmes within the apprenticeships system	
Fish breeder	Fish farming and breeding
Farmer	Animal husbandry and plant production
Vegetable gardener	n/a
CAP (certificate d'aptitude professionnelle) / Bac Pro or Bac Techno	
Fish breeder	Fish farming and breeding
Farmer	Animal husbandry and plant production
Vegetable gardener	n/a
BTS (Brevet de technicien supérieur) / BTSA (Brevet de technicien supérieur agricoles)	
Fish breeder	Fish farming and breeding
Agronomist: crop production	n/a
Horticultural producer	n/a
Universities and Technical Universities	
Environmental Engineer	n/a
Agricultural Engineer	n/a
Aquaculture Technician	n/a

(Source: Own illustration)

2.6 Italy

In Italy in 2011 53.4% of students in secondary education were enrolled in VET programmes, compared to the EU average of 51.5%.

2.6.1 Types of VET programmes in Italy

- 5 years ending with the examination (esame di stato) enabling pupils to enter higher education: IT (Istituto Tecnici) and IP (Istituto Professionali). IT has 11 curricula, divided into an Economical (Management and Marketing, Tourism) and a Technological Sector (Mechanic and Energy, Transport and Logistic, Electronic, Informatics and Telecommunication, Graphics and Communication, Chemistry, Fashion, Agronomy, Construction and Environmental). IP has 6 curricula: 2 with Industry and Handicraft topics (Handicraft and Industry Production, Maintenance and Technical Assistance) and 4 in Services (Agriculture and Rural Development, Health and Social, Wine and Food, Commercials).

- 3 or 4 years vocational training under the aegis of the regions ending with the examination (Certificato di qualifica professionale): IeFP (Istituto di formazione professionale). This kind of VET school offers a general knowledge basis and also vocational training that enables students to start working or to go to upper secondary school to continue their studies or specialise in a post-qualification course.

- 2 to 6 semesters of courses, usually enrolled in after secondary education, awarded the higher technician diplomas: ITS (Istituto Tecnici Superiori) and IFTS (Istruzione e Formazione Tecnica Superiore). ITS corresponds to a course of 1800 to 2000 hours, of which 1000 are meant for an internship, and limited enrolment. It has 7 technological area (Energy Efficiency, Sustainable Mobility, New Life Technologies, New Technologies for Made in Italy, Innovative Technologies for Cultural Heritage, Information and Communication Technologies). IFTS consists of only 800 to 1000 hours with a mandatory internship, the duration of which is at least 30% of the total course and it can also be done abroad. IFTS courses are offered by regions, according to the zone vocational requirements within these sectors: Agriculture, Health and Social, Industry and Handicraft, Trade, Insurance.
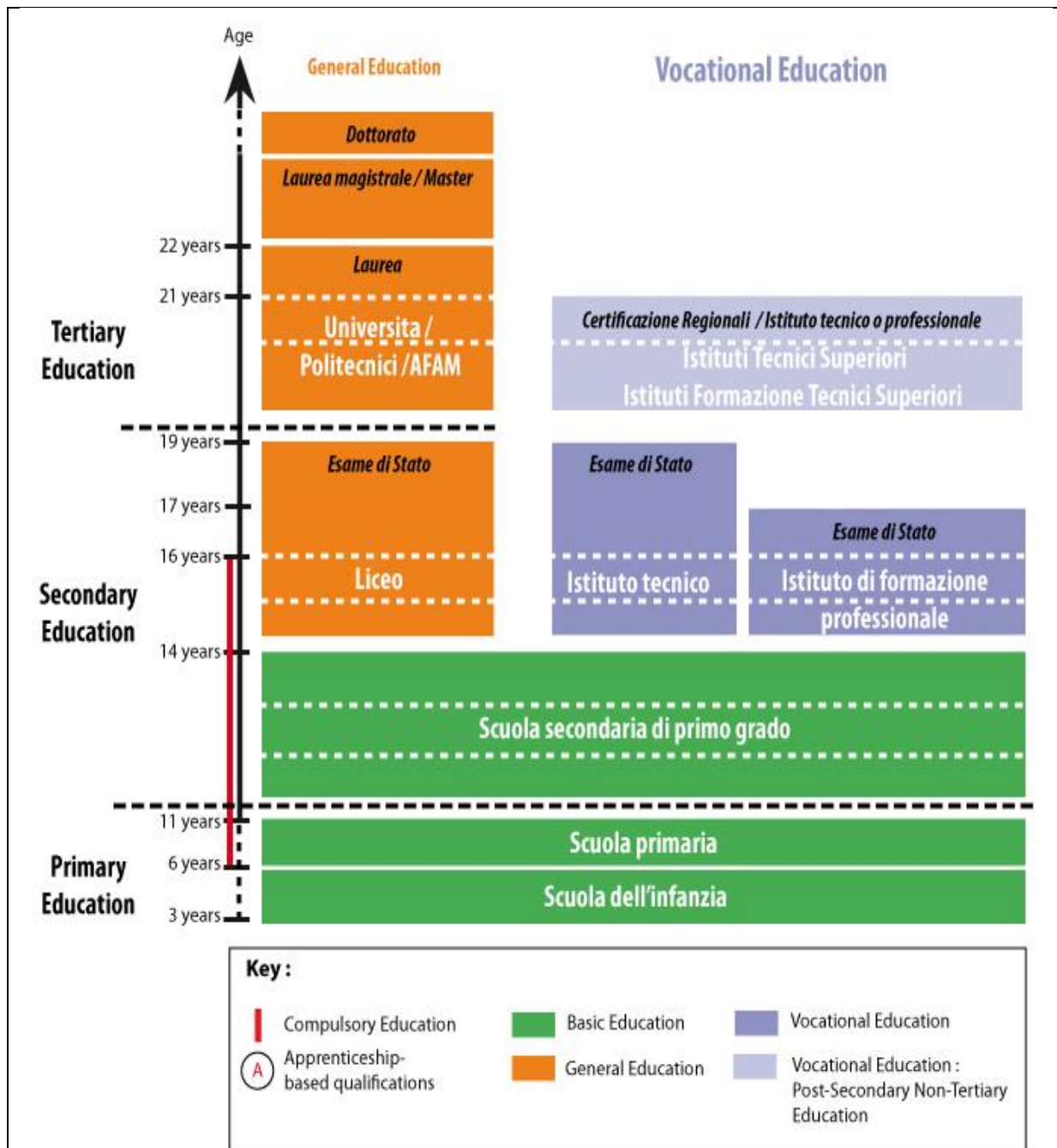
Figure 6: Italian Education System (Source: http://voieproeurope.onisep.fr/en/initial-vocational-education-and-training-in-europe/italy/)

2.6.2 List of educational programmes potentially interested in aquaponics in Italy

The following table shows the data regarding the presence of IT, IP, ITS and IFTS in Italy and the area that may be interested in the development of educational activities related to aquaponics. The actual number of VET schools is difficult to define because some courses (IeFP) are activated annually individually by the Regions.

Educational programme	Number of institutions implementing the programme in Italy	Modules potentially interested in aquaponics
5 years Technical schools (IT)		
Technical Institute for agriculture	144	Animal husbandry Vegetables production Environment protection and management Food processing
5 years Professional schools (IP)		
Professional Institute for Agricultural services	240	Animal husbandry Vegetables production Environment protection and management Ecology
3/4 semesters Technician Institute (ITS)		
Energetic efficiency	9	
High school		
Scientific high school	1236	Science
University		
Agricultural science and technologies (Bsc and Msc)	-	Plant production, horticulture, animal science.
Veterinary (Msc)	-	Fish breeding
Environmental science (Bsc and Msc)	-	Nature resources and management, Wastewater management
Environmental engineering (Bsc and Msc)	-	Water management

2.7 Spain

In 2009 in Spain 45% of the students in upper secondary education were enrolled in VET courses. Since the percentage of young people who leave school is very high, Spain is improving the quality and appeal of vocational training by setting up new qualifications and validating experience acquired at work.

2.7.1 Types of VET programmes in Spain

The spanisch educational system is depicted in Figure 7.

- A 1 ½ or 2 year course, finishing with 300 hours of work placement in an enterprise, ending with Técnico (technician) diploma: Formación professional de grado medio (intermediate level VET school). This school allows pupils to continue their education up to the Bachiller (mainstream secondary education) or further education for technicians but not to higher education at university.
- A 1 or 2 year course ending with Técnico superior (Higher technician) diploma: Formación professional de grado superior (upper level VET school). It prepares students for specialised vocational qualifications and one quarter of the time is devoted to vocational training. Holders of the diploma for higher technician are admitted to university courses leading to the Grado (1st university qualification).

The VET school diploma has almost 150 different diplomas, divided into 26 professional sectors. The ones relevant for the Aquaponic Farmer Education are: Agraria, Comercio y Marketing, Edificación y Obra Civil, Hostelería y Turismo, Industrias Alimentarias, Marítimo – Pesquera, Química, Sanidad, Seguridad y Medio Ambiente, Servicios Socioculturales y a la Comunidad.

Furthermore, starting from September 2014, young people from 15 years onward will be able to start vocational training for a period of two years called Formación Professional Básica.

2.7.2 List of educational programmes potentially interested in aquaponics in Spain

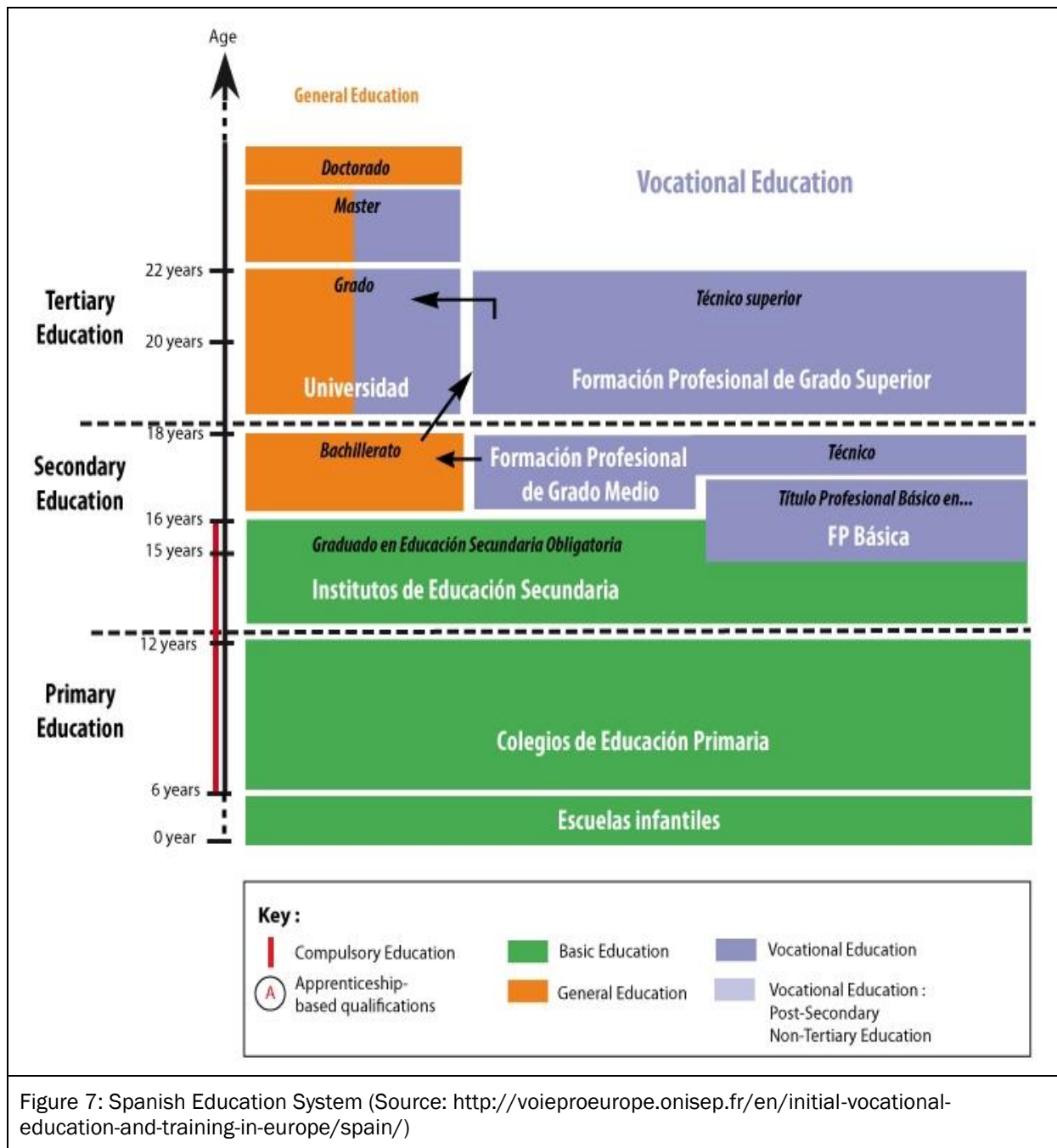| Educational programme	Modules related to aquaponics
VET schools	
Agraria (Agriculture)	n/a
Industrias Alimentarias (Food Industry)	n/a
Marítimo y Pesquera (Fishery and Aquaculture)	n/a
Universities and Technical Universities	
Environmental Engineer	n/a
Agricultural Engineer	n/a

Figure 7: Spanish Education System (Source: http://voieproeurope.onisep.fr/en/initial-vocational-education-and-training-in-europe/spain/)

3 Identification of target clients for dissemination

3.1 Slovenia

Target clients for dissemination in Slovenia (key holders in VET system):

- Ministry of Education, Science and Sport (MIZŠ) is the main responsible body for VET; it prepares legislation, adopts educational programmes and finances public schools.
- Ministry of agriculture and the environment is the main responsible body for agriculture development in Slovenia and is also responsible for preparation of strategic document on development of aquaculture in Slovenia
- Fisheries Association of Slovenia (RZS) unites Slovenian freshwater fishermen and is responsible for conservation and protection of fish populations and their environment, training of fishermen and fish farmers. RZS also participates in preparation of legislation, fish-breeding plans and management.
- Fisheries Research Institute of Slovenia performs public service activities in the fields of freshwater and marine fisheries, market activities for sports and recreational angling and fish farming, and various research and professional tasks in the field of fisheries biology.
- Social partners (chambers, companies, institutes, trade unions) are involved in VET at all levels: preparation of vocational standards as a base for formal VET programmes, participation in Council of Experts for VET (consulting body for MIZŠ), cooperation at local level in preparing "open curricula" (employers) and practical training for students. Chambers involved:
  - Chamber of Craft and Small Business of Slovenia
  - Chamber of Commerce and Industry of Slovenia
  - Slovenian Chamber of Commerce
- Institute of the Republic of Slovenia for Vocational Education and Training (CPI)
- Local companies cooperate actively with VET schools in business-to-business training centres (MIC), which are a part of school centres.

3.2 Croatia

Potential target clients for dissemination in Croatia (key holders in the VET system):

- Ministry of Science, Education and Sports
- Agency for Vocational Education and Training (ASOO)
- Agency for Adult Education
- Education and Teacher Training Agency
- National Centre for External Evaluation of Education
- Ministry of the Economy, Labour and Entrepreneurship
- Croatian Chamber of Trades and Crafts
- Croatian Chamber of Economy
- Croatian Employment Service
- State Office for Statistics
- Croatian Employers Association
- Education institutions

3.3 Switzerland

Target clients for dissemination in Switzerland:

- State Secretariat for Education, Research and Innovation (SERI), regulate and co-fund VET and PET
- Swiss Federal Institute for Vocational Education and Training (SFIVET) is the Swiss governmental centre of competence for the provision of tertiary-level basic and continuing training for VET and PET professionals and examiners, does research, studies, pilot schemes and provides services
- Swiss Conference of cantonal Ministers of Education (EDK), has a secondary function and fulfils tasks that cannot be performed by the regions or cantons
- The 26 cantonal VPET offices, responsible for implementing VET and PET at cantonal level
- Trade associations and industry organisations define training content and national qualification procedures, organise basic training and offer higher vocational education and training
- Social partners and other organisations offering vocational training, in cooperation with trade associations they help develop vocational training
- Companies offer apprenticeships, their involvement in VET is voluntary
- Vocational Schools in charge of vocational and professional education and training
- Career counselling centres, offer information to young people and adults

3.4 Germany

Potential target clients for dissemination in Germany:

- Federal Ministry of Education and Research (BMBF)
- Federal Ministry for Economic Affairs and Energy (BMWi)
- Federal Institute for Vocational Education and Training (BiBB)
- Federal Employment Agency (BA)
- The Ministries of Education and Cultural Affairs of the Länder
- The Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany (KMK)
- Chambers of Commerce and Industry or other chambers/partners from the economic sector
- Social partners
- Vocational Education institutions
- Career counselling centres

3.5 France

Potential target clients for dissemination in France:

- Ministry of National Education, Higher Education and Research
- Ministry of Labour, Employment and Social Dialogue
- Ministry of Agriculture, Food and Forest
- National office for education and career information (Onisep)
- Chambers of trades and crafts
- Chambers of commerce and industry
- Social partners
- Companies
- Apprentice Training Centres (CFA) and other vocational education institutions
- Career information and advice services

3.6 Italy

Target clients for dissemination in Italy:

- Ministry of Education, University and Research (MIUR) regulate and co-fund VET
- National Institute of Documentation for Innovation and Educational Research (INDIRE)
- Ministry of Labour and Social Policy
- Regional Department of Labour of each Region
- Regional Department of Education and Vocational Education and Training of each Region
- Regional Agency for Labour and VET of each Region
- Vocational Education Centre (CFP), institute that helps youth and adults in perfecting their vocational education
- State school for adults
- Public and private bodies that conduct VET.

3.7 Spain

Potential target clients for dissemination in Spain:

- State school for adults
- Public and private bodies that conduct VET
- Ministry of Education, Culture and Sports
- Ministry of Labour And Social Security
- State Board of School
- General Board of VET
- National Institute of Education (INCUAL)
- National system of VET (SNCFP)
- Spanish Employment Service.

4 SHORT Description of the accreditation system

Accreditation is a formal and transparent process that uses defined standards to examine whether institutions and/or programmes offered at university level comply with minimum quality requirements. Accreditation increases the national and international visibility of university performance and can provide students, representatives of universities, politicians, employers and the general public with guidance and an aid in making decisions. In addition, the purpose of accreditation is to achieve international recognition and to improve the comparability of degrees.

For more details on accreditation process in Slovenia, Italy and Switzerland refer to Result 13 of this project.

4.1 Slovenia

Proposition of the new VET programme, prepared in consideration with the relevant legislation and classified with KLASIUS code, is proposed by the Institute of the Republic of Slovenia for Vocational Education and Training (CPI). CPI also has to enclose an opinion on the adequacy of the proposition done by the relevant department of the Ministry of Education, Science and Sport. Proposition is then discussed by the Council of Experts. If approved, the proposition is sent to the Minister of Education, Science and Sport to sign. The validity of the programme is confirmed by the public announcement.

4.2 Croatia

Overall responsibility for VET lies with the Ministry of Education in cooperation with other ministries in charge of specific VET sectors, such as the Ministries of Labour and Entrepreneurship and Crafts, and other stakeholders. It is supported by the Agency for VET and Adult Education (ASOO) whose remit is to develop, organise, monitor end evaluate VET. ASOO assesses labour market demand and is responsible for occupational standards and VET qualifications; collaborating with the Education and Teacher Training Agency for the general education element, it plays a key role in designing VET curricula, which then need to be approved by the ministry. ASOO also regulates VET teacher training. Its management board is appointed by the government and includes social partner representatives. Social partners, chambers of economy, trades and crafts, the employment service and the economic and social council are also members of the VET council. This council proposes areas for new or revised programmes and recommends measures and strategies for VET development. The VET Act set sector councils the task of analysing skill needs, identifying related VET qualifications and preparing relevant standards. Councils will increase in number and, according National Qualification Framework Act, they will take on new roles.

4.3 Switzerland

In Switzerland, unlike in other European countries, the accreditation system operates on a voluntary basis. In accordance with the Cooperation Agreement between the Federal Government and the University Cantons, accreditation may be granted to public or private institutions or programmes at university level. In line with international regulations and practices, the procedure consists of three stages: a self-evaluation carried out by the university unit is followed by an external appraisal by an independent group of experts. The decision on whether to grant accreditation is made by the SUK/CUS following a recommendation by the Swiss centre of accreditation and quality assurance in higher education (OAQ). (OAQ 2007)

The accreditation procedure for a new course in professional education and training is multi-layered, the same way it is for the Tertiary-level A. The procedure is regulated through the decree by the Swiss Federal Department for Economics, Education and Research (WBF) from March 11th 2005 on the minimal requirements for the accreditation of vocational courses and postgraduate studies of vocational colleges (MiVo-HF).

There are 5 different actors involved within that procedure:
a) The education provider
b) The canton where the education provider is located
c) SBFI (Swiss Federal Secretariat for Education, Research and Innovation)
d) Experts
e) The Swiss Federal Commission for Vocational Schools (EKHF)

The procedure is divided into 4 phases. These are listed in table 1. In order for the course to achieve the necessary importance and to get the support of economic actors, the education provider needs to incorporate sponsors from the economy and politics.
After clarifying the demand, the education provider has to develop the curriculum, define locations and prepare the documentation of the course.
In the first phase the application is either handed in to the canton of location for a statement and the canton then forwards it to the SBFI, or the education provider hands in the application directly to the SBFI.
In the second phase experts tasked by the SBFI review the first course as a reference course. Those same experts make an application by way of the EKHF to the SBFI.
In the third and last phase the Swiss Federal Commission for Vocational Schools (EKHF) has to file the application to the SBFI, which will decide on the approval of the new course.

Table 1: Phases of the accreditation procedure according to the SBFI guideline 2013

Phase	Steps	Responsibility	Estimated time requirement
Pre-phase: Development of a Curriculum (based on curriculum framework)	1. Clarification of demand	Education provider	3 - 6 months
	2. Curriculum		
	3. Discussion with canton of location		
	4. Preparation of documentation	Education provider	2 - 3 months
Phase 1: Application	5. Hand in application to canton of location for a statement	Education provider, canton of location	2 months
	6. Forwarding to the SBFI (before the start of the 1st semester of the reference course)	canton of location	1 month
Phase 2: Review of the reference course	7. Assignment of experts	SBFI on recommendation EKHF	2 - 3 months after the deadlines of the EKHF
	8. Preliminary mandate	SBFI	2 - 3 months after kick-off date
	9. Review of the reference course	Experts	Accompanying the implementation of the reference course
	10. Report and application to EKHF	Experts	3 months after conclusion of the reference course
Phase 3: Approval	11. Application EKHF to SBFI	EKHF	2 - 3 months after the deadlines of the EKHF
	12. Decision **SBFI**	SBFI	1 month

4.4 Germany

Accreditation is regulated through the VET act of 2005. Part 2, chapter 1, paragraph 1, subparagraph 4, section 1 states, that as a basis to achieve standardised vocational education and training the Federal Ministry for Economic Affairs and Energy or another responsible ministry, in accordance with the Federal Ministry of Education and Science, can recognise VET courses by ordinance and decree education arrangements. Those arrangements have to meet certain points, put forth in subparagraph 5:

1. the VET course must have a name

2. the duration of the course has to be set and must be 2 or 3 years long

3. the minimal required skills and knowledge competences must be defined

4. a training framework must be devised

5. the examination requirements must be elaborated. (buzer.de 2014)

Some of the points of the education arrangement are drafted in collaboration with chambers of commerce and industry, social partners and VET educators.

4.5 France

The training market in France is open. Thus, training institutions do not have to publicise the way courses or qualifications are constructed. Nonetheless, if a course wants to get official recognition, then it has to be certified. "Professional Certification" in France means the specific goals that individuals need to achieve during their education and the document that they receive for doing so. There are different bodies (including State ministries) responsible for awarding the qualifications. To do this, they have set up various organisations and procedures to develop the certifications. One type of organisation is a CPC (commission professionnelle consultative). The CPCs are made up of representatives of employers, employees, public authorities and experts. They are part of the Ministry of National Education. If a new qualification wants to be created, an opportunity study first has to take place. The CPCs then give their opinion on the creation, updating and termination of professional courses, from CAP to BTS, depending on expected job development and employment opportunities of the new certification. The committees are compulsory. Along with the CNCP (national committee for professional certification) they are in charge of adding courses to the national vocational certificate register RNCP (repertoire national des certifications professionnelles). (Roussel et al. 2013: 27-28, Ministère Education Nationale 2014, EQAVET 2011: 77) For higher education the quality of the training programme, the level of education, the quality of education teams and the job prospects of students are assessed. Depending on the educational sector, different assessment bodies are charged with that task. Based on their findings, the Ministry of Higher Education decides on whether to approve the course or not. Professional bodies create their own certifications. These are usually based on the work of the joint employment and vocational training committees (CPNEF – Commission paritaire nationale de l'emploi et de la formation professionnelle) and the qualifications and employment prospective's observatories (OPMQ – Observatoires prospectifs des metiers et de qualifications). They study trends in the job market and for employment, resulting in identifying and defining/recommending specific qualifications for employment and training. (Roussel et al. 2013: 29-31)

4.6 Italy

In Italy VET course accreditation is regulated through the Ministerial Decree nr. 166/01 of 18th February 2000 and is awarded by the Regions. In order for the course to achieve the accreditation, it must guarantee the requisites contained in the operating model of the mentioned Decree (Annex II), concerning:

- Management and logistic competences;
- Economic situation;
- VET competences

- Efficacy and efficiency in the previous VET activities.

The course applies to the Region, which examines, evaluates and verifies the documents and the structure, according to the Decree, and finally communicates the outcome to the Ministry of Labour.

4.7 Spain

In Spain there is the National Agency for Quality Assessment and Accreditation of Spain (Agencia Nacional de Evaluación de la Calidad y Acreditación: ANECA), a Foundation created in 2002, the aim of which is to provide external quality assurance for the Spanish Higher Education System and to contribute to its constant improvement through evaluation, certification and accreditation.

5   Conclusion

This chapter focused on the different education systems, dissemination targets as well as accreditation of educational programmes in partner countries plus neighbouring ones. It gives an overview of the situation in which the project is operating. If a new VET course or VET profession for Aquaponics is to be developed for the partner countries and throughout Europe, it will be necessary to have knowledge on the different systems and procedures. Although seven different countries were considered there are several similarities between the systems. In all of these countries, schooling is compulsory for everyone up to the age of 15 or 16. Starting with upper secondary education each system distinguishes between a general education path and a vocational or technical path. Additionally, all countries try to have an open education system after upper secondary level, where it is possible to pass from one path to the other. The majority of pupils in upper secondary education in the partner countries are enrolled in a VET course. This is different in some of the neighbouring countries like Spain or France.

For Aquaponics and Aquaponics education to gain more prominence, it is important to be clear on where to disseminate the results of the project. For all partner countries (Slovenia, Italy and Switzerland) the national ministries in charge of education, VET, research, fisheries or agriculture, innovation and of labour are targets for dissemination, since they are normally in charge of accreditation of new courses or professions. Another important target group for all countries are organisations from the world of work. Chambers, trade associations, industry organisations, individual companies and trade unions are all involved in VET and therefore need to be involved as early as possible. Lastly, VET schools and teachers are the direct link between the Aquaponic teaching material developed in this project and the students that will become professionals in this field. Each of these groups plays a significant role when developing VET courses or professions. Depending on the partner country, the focus on one or the other group will be stronger. Nonetheless, dissemination activities will be similar in all partner countries.

It can be seen that for all the differences that might exist in the details of the national systems, there are still a lot of similarities that make it easier to coordinate an international project like AQAU-VET.

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