



GO TO WORK IN EUROPE

GOVERNANCE AND TOOLS FOR WORK-BASED LEARNING IN EUROPE

Erasmus + KA2 project n. 2015-1-IT01-KA202-004728

WORK BASED LEARNING IN EUROPE

AN INNOVATIVE MODEL FOR WBL IN VET

PROJECT FUNDED BY THE EUROPEAN UNION



Erasmus+

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PROJECT SUMMARY

CONTEXT/BACKGROUND OF THE PROJECT

Work-based learning (WBL) is a fundamental element of - Vocational education and training (VET) that promotes the individual employability and increases economic competitiveness. The VET's mission is to encourage students to acquire knowledge, skills and competences essential for their working life and it is considered a main asset to increase life standards by European Commission. In Europe there are three main WBL modes: 1) the apprenticeship, known as the "dual system", in order to realize integration of companies as training providers together with education/training institutes; 2) On-the-job training periods in companies incorporated as an element of VET programmes leading to formal qualifications; 3) the alternation integrated into the school curriculum that allows a "real life" work environments simulation and presupposes a close collaboration with the labor market and local businesses.

The last WBL model include a complex governance, involving schools and VET providers with the complicity of territorial stakeholders, in order to structure a training proposal "on the job". In Europe there are differentiated levels of integration according to the countries' regulatory system: some Countries have an advanced stage, others are still struggling to improve new opportunities.

OBJECTIVES

The project aimed to enhance WBL standards in third type of VET activities, integrated into the scholastic curricula, implementing an innovative and integrate model of different types of WBL experiences (ECLI): Expert, when experts go to school and helps students understanding specific production processes; Classroom, when classes visit companies in order to understand both production processes and professional profiles; Laboratory, when students learn in laboratories and/or companies' laboratories; Individual Experience, when students have an on-the-job experience in a company. Its objective is to enhance WBL experiences already implemented by the partners and systematize them in order to achieve the following learning outcomes: a) to define and structure an effective governance of the different actors in the area of education, training and labor market (IO #1); b) to define a shared ECLI model, apply it with students, validate it and implementing needed toolkits (IO #2); c) to train school staff about WBL management, tools and assessment; d) to enhance competences levels in the school curricula and VET courses through the definition, evaluation and certification of key competences adequate to national and international labor market; e) to disseminate ECLI model in a European perspective. The ECLI model, originally defined by Italian partner schools, is implemented in 4 Countries (Italy, Spain, Romania and Sweden) and integrates their WBL experience into a transnational dimension. For this reason, it was necessary to identify WBL transversal and common competences shared by the whole partnership (IO #3).

Number and profile of participating organisations

The Project involved 9 partners from 4 Countries (Italy, Spain, Romania and Sweden): 7 scholastic institutions: from Italy, IIS Marconi (Bergamo), ITIS Paleocapa (Bergamo), ITIS Rapisardi (Paternò); from Sweden, ABB Industrigymnasium (Vasteras); from Spain C.I.P.F.P. Ciutat de l'Aprenent (Valencia); from Romania, Liceul Tehnologic "Mihai Viteazul" (Zalau), Colegiul Tehnic A. Papiu Ilarian (Zalau); 1 VET provider

(Coordinator) FORMA - Sistemi Formativi Aziendali srl (Bergamo, Italy), who since 1st June 2018 changed its legal name in Servizi Confindustria Bergamo srl; 1 research and consultant agency Noviter srl (Milano, Italy). The following companies were deeply involved into the project: Tenaris Dalmine (Italy), Tenaris Silcotub (Romania), ABB Dalmine (Italy), Dolfin Spa (Italy), Confindustria Bergamo (Italy).

Description of undertaken main activities

The project lasted 36 months from September 2015 to August 2018.

As forecasted the main activities carried out are:

- 5 Transnational project meetings involving the subjects related to the 9 partners and realized in 4 Countries: 3 days meeting, 63 presences.
- 1 Short-term joint staff teachers training; 7 days in Bergamo (Italy), 24 presences.
- 4 blended mobility of VET learners: 7 days in Sweden, Italy (Bergamo and Paternò) and Romania, 55 students and 16 supporting teachers (higher numbers than provided).
- 5 Multiplier events lasting 1 day in each of the 4 partners' Countries: 194 external presences (180 local and 14 international guests)
- Project management: forecasted partnership's activities were fully implemented
- 3 Intellectual outputs finalized into the final report uploaded on the Erasmus Dissemination Platform
- The deviations from original project occurred only in the following cases:
- 25 students and 1 additional teacher were involved in the blended mobility of VET learners.
- The dissemination outcome was wider than provided (see attached table).

Results and impact attained

The final report aims to make available for all the VET stakeholders (schools, public companies, companies, european and national operators of Labor Market) an innovative WBL model called ECLI.

The model was conceived, described, tested and validated by the project partners and its governance framework and implementation was disseminated through the Final Report, an educational toolkit composed by best practices for a WBL school-based program in a European perspective.

Longer-term benefits

In addition to the immediate impact of the project, achieved during the 36 months of dissemination, in the long run, the project forecast a wider diffusion of the ECLI model and its adoption by a greater number of operators in different European Countries.

INTRODUCTION

GENERAL AIM OF THE PROJECT

The project Governance and Tools for Work-Based Learning in Europe (acronym GO.TO.WORK.IN.EUROPE) intends to increase the quality of Work-Based Learning (WBL) through the definition and development of an innovative model, the ECLI model, (acronym of Expert, Classroom, Laboratory and Individual Experience).

It intends to achieve this goal through the cooperation of 9 partners from 4 countries (Italy, Spain, Sweden, Romania), for innovation and the exchange of good practices. The partners of the project have different backgrounds:

- 2 Intermediary bodies.

- FORMA - SERVIZI CONFINDUSTRIA BERGAMO srl (Bergamo, Italy) as training centre (Coordinator of the project)
- Noviter srl (Milan, Italy) as research institute

- 7 Schools (secondary level):

- IIS Marconi (Bergamo, Italy)
- ITIS Paleocapa (Bergamo, Italy)
- ITIS Rapisardi (Paternò - CT, Italy)
- ABB Industrigymnasium (Vasteras, Sweden)
- C.I.P.F.P. Ciutat de l'Aprenent (Valencia, Spain)
- Liceul Tehnologic "Mihai Viteazul" (Zalau, Romania)
- Colegiul Tehnic A. Papiu Ilarian (Zalau, Romania)

- Plus Enterprises supporter:

Tenaris Dalmine, Tenaris Silcotub, ABB, Dolfin Spa, Confindustria Bergamo

SERVIZI CONFINDUSTRIA BERGAMO srl (hereafter SCB srl) was founded in 1982 and is directly controlled by Confindustria Bergamo, association representing companies. SCB srl provides training services for employees of associated companies (about 1200 companies in province of Bergamo). Confindustria Bergamo, association representing companies, since 1982 has developed training activities with an internal division dedicated specifically to training.

NOVITER SRL is based in Milan and was founded in January 2009 with the purpose to carry out studies and research in the field of education, training and labour market. Noviter also works to develop strategic projects and to provide operational assistance and technical support to public and private institutions at the national, regional and the local level. The team is composed by experts with long experience and high competences in the definition, implementation, monitoring, evaluation and assessment of policies in the field of education, VET and labour market.

The partner schools are described below in the report.

In fact in the Europe the WBL may mean three levels:

- 1) APPRENTICESHIP It is based on the integration of companies as training providers together with VET schools or other education/training institutes
- 2) ON-THE-JOB TRAINING IN COMPANIES
On-the-job training periods typically cover internships, work placements or traineeships that are

incorporated as a compulsory or optional element of VET programmes leading to formal qualifications.

- 3) **INTEGRATED IN A SCHOOL-BASED PROGRAMME:** on-site labs, workshops, kitchens, restaurants, junior or practice firms, simulations or real business/industry project assignments. The aim is to create "real life" work environments, establish contacts and /or cooperation with real companies or clients, and develop entrepreneurship competences.

The ECLI model of the project intends to integrate in a structured framework different types of WBL experiences already developed by partner schools, to promote and create an innovative system composed by a set of integrated pathways of WBL in a transnational perspective and in cooperation with other stakeholders of WBL system (intermediary bodies, public and private organizations, other schools, companies, chamber of commerce, etc.).

The ECLI model aims to structure the experiences listed below:

- **Expert:** it represents the case of the expert who enters the classroom and helps students understanding specific production processes;
- **Classroom:** it is the case where classes have the opportunity to visit companies in order to have a better understanding of both production processes and professional profiles;
- **Laboratory:** it is the cases when the “company goes to school” and some production processes are reproduced and/or when companies provide schools with the access to their laboratories;
- **Individual Experience:** it represents the individual on-the-job experience undertaken by individual students.

The project, lasting three years (from September 2015 to August 2018), involves countries where the dual system has not achieved high levels of development and implementation due to several reasons (cultural tradition, law, labour market, etc.).

The ECLI model instead aims to create and develop an innovative model of WBL recognized at the transnational level, especially within the involved countries (Italy, Spain, Romania and Sweden). The ECLI classes will be identified within the IVET institutions partner: the ECLI classes experienced the model in each different phase through a blended mobility and working on common projects.

The specific expected results of the project are the following intellectual outputs:

- a model of governance for the implementation of a WBL approach in IVET institutes based on the cooperation between schools and enterprises (Intellectual Output 1);
- the ECLI model as an integrated form of a WBL approach (Intellectual Output 2);
- 4 new competences (Intellectual Output 3)

More in general the project aims to:

- increase professional development of IVET teachers;
- modernize VET by adapting to skills needs and integrating work based learning in the manufacturing sector;
- improve international cooperation among the countries partners increasing a European perspective.

THE SPECIFIC AIM OF THE FINAL REPORT

The present report represents the first intellectual output of the Erasmus Plus Project “**Governance and Tools for Work-Based Learning in Europe**”, acronym *GoToWorkInEurope* (2015-1-IT01-KA202-004728). The project intends to increase the quality of work-based learning through the definition of an innovative model, the **ECLI model**, (acronym of Expert, Classroom, Laboratory and Individual Experience). The model

intends to integrate in a structured framework different types of WBL experiences: *Expert* - when experts go to school and helps students understanding specific production processes; *Classroom* - when classes have the opportunity to visit companies in order to have a better understanding of both production processes and professional profiles; *Laboratory* - when students learn in laboratories and/or when companies provide students with the access to their laboratories; *Individual Experience* - when students have a on-the-job experience in a company.

The project, lasting three years, involves four countries (Italy, Spain, Romania and Sweden) where the dual system (mainly as apprenticeship) has not achieved high levels of development and implementation due to several reasons such as cultural and educational tradition, legislation, labour market, etc. To the contrary, the ECLI model aims to create and develop an alternative way of combining different experiences of WBL.

GoToWorkInEurope attempts to realize three main intellectual outputs:

- The **MODEL OF GOVERNANCE FOR WBL IN VET ANALISYS** – This intellectual output, which is the main object of this report, is to develop a ECLI model of Governance for the implementation of WBL based on a solid network between schools and companies that promotes work-based learning and teaching activities. This model of Governance will be suitable for the integration of WBL into VET programs and able to anticipate local needs and changes at the international level.
- The **ECLI MODEL: ORGANIZATIONAL, DIDACTIC AND EVALUATIVE ASPECTS** - The aim of the second intellectual output (O2) is to develop a model where all organizational, didactic and evaluative aspects. The ECLI model wants to delineate within a precise framework the following activities: E (Expert in the classroom), C (Class in the company), L (Laboratory), I (Individual Experience On the Job).
- **NEW COMPETENCES IN EUROPEAN PERSPECTIVE** - The aim of the last intellectual output (O3) is to individualize and write 4 new competences, 2 transversal competences and 2 technical competences, in the Manufacturing sector. It means to individualize the EQF level, ECVET and learning outcomes of each of them.

The aim of the present report is two fold:

- the first one is related to the analysis of the model of governance of WBL activities applied in each school partners. Starting from a first description of the national scenario, the schools involved in the project describes their systems of governances and they provide examples of the most significant WBL projects where the governance has been applied;
- the second objective is to delineate the ECLI model and, in particular, its governance as a framework for the integration of different WBL experiences. The model indeed aims to identify the main actors and stakeholders and their roles, which are important in organization of a fruitful governance, so that WBL becomes a meaningful experience for both students and businesses. The purpose of a well structured governance thus foresees the creation of a stable and permanent network of providers and companies that supports different types of WBL activities.

In order words, the development of the present report will define a shared governance model, through the identification of best practices connecting and stable interaction between schools and the local production environment in order to identify the best conditions for developing the organizational tools and educational model of ECLI.

THE REPORT METHODOLOGY

The first delineation of the methodology for the model of governance took place before the staff mobility:

- Research in Bergamo and creation of the questionnaire for collecting wbl experiences
- Translation of the questionnaire

- Information collected through the questionnaire
- Discussion of the results of the questionnaires with teacher during the SCBff mobility in order to map the different model of governance used in each institution and identify common aspect for the delineation of the ECLI model
- Creation of a framework for the collection of addition information for the delineation of the present report

THE STRUCTURE OF THE DOCUMENT

PART 1 - investigates how WBL has increased in Europe at particularly the national level in the countries of partners: Italy, Sweden, Spain and Romania. The examination of the legislative excursus of WBL at the national level is useful in order to introduce how WBL experiences have been carried out in the school partners and what type of governance they have applied. In this chapter, the six schools will also provide concrete examples of WBL activities introduced in their curricula.

PART 2 - presents the ECLI model with a focus on governance and its toolkits. In particular, the model of governance will be a combination of successful practices coming out from the six schools' experiences. This part outlines some of the challenges for work-based learning and in particular of the ECLI Model. The chapter also presents some recommendations regarding the implementation of the ECLI Model and a common NEW COMPETENCES for WBL in European perspective in VET field.

PART 1

INTELLECTUAL OUTPUT 1 - MODEL OF GOVERNANCE FOR A WBL IN A EUROPEAN PERSPECTIVE

THE DEVELOPMENT OF WBL IN DIFFERENT CONTEXTS

In January 2012 the European Council recognizes the need to increase apprenticeships and traineeships in European Member States, in order to create opportunities for youth and strengthen more and more the fruitful collaboration between labour market and educational systems. In fact, the achievement of this result allows the realization of two different, but complementary, goals: on the one hand, to increase youth employment; on the other hand, to improve the economic competitiveness of young people in the Member States and eventually in the whole Europe.

Since many years, the creation of work-based learning opportunities has been the core of European educational policies. In 2013 the European Commission set up the "European Alliance for Apprenticeship" to confirm its main policies and also started the "Youth Employment Initiatives", through substantial financing. In particular the European Alliance for Apprenticeships (EAFA) is a platform that integrates Governments and the main Stakeholders interested to strengthen the quality of European apprenticeship. Moreover, the EAFA promotes youth employment and supports the Youth Guarantee objectives in order to reduce mismatch between offered skills by educational systems and requested skills by the labour market. In 2015 a working group dedicated to vocational training and education defined 20 principles to respond to the objectives set by the Commission's "ET 2020, Rethinking Education", by Bruges Communiqué and by Riga Conclusions of June 2015. The document "High performance learning apprenticeship and work-based: 20 guiding principles" intended to promote work-based learning (WBL) and apprenticeship, identifying guiding principles for national policies in education and training.

The leading principles concern the following fields of action:

- National governance and involvement of the social parts
- Supporting companies, in particular small and medium enterprises
- Attractiveness of apprenticeship and career orientation
- Certification of quality WBL

Despite the commitment, WBL quality changes from country to country. The forms of integration are diversified and are not still fully developed. For example, in Austria, Denmark and Germany, the WBL system and in particular apprenticeship are already improved and they involve more than 30% of students. Instead, in other countries like Spain or Portugal, the percentage of students involved is still low due to a cultural lack which promotes the integration of labor and education.

Therefore, a fragmented situation requires investing in apprenticeships, especially in those countries where it is undeveloped, in order to increase opportunities both for educational and working institutions. Moreover, investments should help to reduce early school leaving and youth unemployment.

The Member States who have a strong WBL system offers skills and competences that favors a quicker and more qualified transition from the school to the labour market. This happens because young people have

higher and specialized skills required by the labour market. However, European needs have to be translated into concrete actions (integration policies) by each country. During the period 2015-2020 5 key priorities for the development of vocational and educational training (*Good for youth apprenticeship for 2015. For the European Business Alliance*) have been identified:

1. *work-based learning*. The promotion of work-based learning in all its forms, increasing innovation and self-employment with a particular attention to apprenticeship through the involvement of social partners, companies and VET providers.
2. *Quality assurance*. The development of strategies in order to ensure quality in VET in line with the recommendations of the Quality Assurance in Education and Training (EQAVET)
3. *Accessibility*. The increment of access to VET qualifications through a more flexible and permeable educational system. This could be achieved thanks to the development of efficient and integrated guidance services and the validation of non-formal and informal education.
4. *Key competences*. The strengthening of key individual skills in VET curricula and offering better opportunities to acquire or develop qualifications through initial and continual training.
5. *Teachers and trainers*. Introducing opportunities and a systematic approaches of professional development for teachers, educators, tutors working in VET providers.

The document "Work-Based Learning in Europe. Practices and Policy Pointers "(2013) identifies three forms of WBL for the acquisition of knowledge, skills and basic competences essential to join in working life.

1. The connection between school and work is a typical mode of the German-speaking countries, where it is called "dual system". It is essentially based on the integration between companies, which act as operators training, and school or VET providers. The student spends a significant portion of time in the company as a trainee: he can work and assimilate general knowledge and competences related to his work in VET providers or in schools. The alternating period can be weekly, monthly or annually, depending on the country in which it is carried out.
2. Another WBL model is provided by Vocational Education and Training institutions, which include in training programs formal education together with on-the-job training periods.
3. In addition, the WBL can be integrated within school educational programs through laboratories, workshops, simulation of companies affairs or job assignments (real or simulated). The educational achievement of this model is to recreate work situations in appropriate environments, thus establishing a connection with the real world of work and creating a framework of cooperation with social realities and companies.

In European countries often WBL systems take a mixture of the three proposed models. However, the apprenticeship is the leading model and the more actually developed. In fact, the apprentice conducts long periods of training on-the-job, moreover he/she obtains a contract – similarly to an ordinary worker - and a salary (which amount varies depending by the Country and the job). The conclusion of the apprenticeship period can be considered as a tool for entering into the labour market with important educational experience. Opening up new job opportunities and reducing transition time to search a new job, apprenticeship is an opportunity in training and work that raises the quality level of the whole labour market. As one of its goal the project ERASMUS + KA2 "GO TO WORK IN EUROPE" structures a governance's model, called ECLI: the ECLI model wants to delineate within a precise framework the following activities:

E: when the expert goes to school and gives a lecture (Expert in the classroom),

C: when the class goes to visit a company

L: when the class has the possibility to learn in a company's laboratory

I: when the individual student has an on-the-job experience in a company

The same document "Work-Based Learning in Europe. Practices and Policy Pointers "(2013) identifies the governance as main theme for an effective WBL. WBL governance needs to clarify different points, that are implemented through the development of the ECLI model:

- Integration of WBL in education and training system. It is important that WBL is intended to foster advanced VET or further and higher education. WBL and school system should be permeable and each other complementary, ensuring the coherence of the educational pathway.
- Regulatory framework for WBL. Learners enrolled WBL are between studying and employment. They are learning but they are also employers that take part in the production process of a company. Therefore there is a need for a regulatory framework that clarifies the responsibilities, rights and obligations of each participant to the WBL. It should involve: the status of the learner; the remuneration arrangements; the obligations of the employer; the learner and the training centre; the contractual arrangements between the learner, the employer and the VET provider. The regulatory framework interests the relationships between the learner, the workplace and the VET provider or school, in order to incentivize companies, to define administrative intervention and to avoid mistreatment. The frameworks should concern also higher relationship and responsibilities about: qualification standards, curricula, learning plans, quality assurance, evaluation, funding.
- Involve social partners. Involving national social partners is necessary to ensure an incisive WBL. Local and national partners are essential for identifying skills requirements so that the development of skills across the economy could match with the needs. Social partners are also particularly helpful in making the necessary arrangements to maximise WBL opportunities. For involve social partners, there needs to be a governance structured according to the division of responsibilities.
- Address the WBL needs of SMEs. WBL challenges SMEs about regulatory and administrative framework. Because of that, their engagement can be encouraged by intermediary organizations that offer expertise, information and support to employers participating in WBL. Intermediary organizations can, for example, provide advice to SMEs on learning plans and on organizational "know-how" in different forms of WBL. Furthermore, Member States should promote networks of companies and empower intermediary bodies such as Chambers to facilitate high-quality WBL.

NATIONAL LEGISLATIVE AND ORGANISATIONAL CONTEXTS

The first rule that governed the relationship between school and company was section 18 Traineeships and orientation of the law June 24, 1997 nr. 196 (commonly called “Pacchetto Treu”) which provided the direct knowledge of the world of work through apprenticeships and internships initiatives, in favour of persons who had already completed their compulsory education.

Work-based learning enters our education system with the law nr. 53 of March 28, 2003 (commonly called Moratti Reform), regulated by the subsequent Legislative Decree n. 77 / 2005.

The work-based learning, aimed at students who are at least 15 years old, was a cross-training teaching method which intended to acquire to pupils in secondary schools valuable skills in the labour market.

Educational modules were designed, implemented, monitored and assessed, under the responsibility of the school or training, based on agreements with business and they did not constitute individual employment relationship.

The Legislative Decree of April 15, 2005, nr 77 stipulated that students presented the request to carry out the chosen training, with periods in the classroom and in the workplace, in line with the educational profile of their course.

The involved young people maintained student status, the module responsibility was held by the school and the work-based learning was presented as a teaching method and did not constitute an employment relationship, as it is repeated in the reform of the so called "Buona scuola" (Good School). The activities in the host structure could also be made in break periods of teaching activities.

The tutorial function was carried out by two important profiles: the teacher tutor inside the school and the external tutor.

The evaluation, certification and recognition of credits were granted to the school and ended with the release of a supplemental certification of skills acquired in periods of learning through work experience. The role of work-based learning was subsequently confirmed with the Regulations issued with dd.PP.RR. (Presidential Decrees) Nr. 87, 88 and 89 in 2010 (within the so called Gelmini Reform), concerning new systems of vocational schools, technical colleges and high schools.

An important role is also played by D.L. September 12, 2013, nr. 104, converted by the law November 8, 2013, n. 128, which boosts work-based learning following three main areas:

- the orientation development, aimed at students enrolled in the last year also for the purpose of implementing the measures provided by the European program "Youth Guarantee";
- the definition of the rights and duties of the secondary school students engaged in work-based learning activities;
- the introduction of measures for teacher training.

The law of July 13, 2015 nr.107 (inside the so called “Buona Scuola” Reform), on "Reform of the national education system and reorganizing the current laws”, establishes a mandatory amount of hours to activate work-based learning experiences that involve, starting from the third year, from the school year 2015/16, all students in the second cycle of education.

The innovation is that the work-based learning is inserted within the school curriculum and become a structural component of training "in order to increase job opportunities and abilities of students for their future choices”.

Italians students, like their European peers, acquire the right to "learning by doing."

The school offers students the opportunity to train basic soft skills to enter the labour market (problem posing, setting and solving, working in teams, keeping on a schedule and work organization).

The law states that the work-based learning is compulsory in the last two years in the second cycle of secondary education and in the last year and provides at least 400 hours in technical and vocational schools and at least 200 hours in high schools, to be included in the 'Three-year educational offer plan' of each school. It also provides the possibility to enter into agreements for conducting modules in WBL also with professional associations, carrying out activities related to artistic, cultural and environmental or sports promotion bodies recognized by CONI.

The work-based learning activities can be implemented in break periods of teaching activities and abroad, as well as with the student-run enterprise.

As established in the Charter of rights and duties of students in work-based learning, the student has the opportunity to express an opinion on the effectiveness and consistency of his/her experience with his/her curriculum.

The school headmaster is responsible to identify areas of business and public and private agencies available for the activation of work-based learning and to enter into agreements designed to promote the orientation of the student; also he draws up a final evaluation form on approved facilities at the end of each school year, in which highlights the specificity.

Other innovations: the creation of a National registry of work-based learning at the Chamber of Commerce, which is a fitting tool to facilitate the meeting between businesses and educational institutions; entrusting task for secondary schools of organizing training courses in the field of protection of health and safety in the workplace, for students placed in work-based learning activities; the funds used to carry out WB modules come from the Ministry of Education, University and Research (MIUR).

CASE STUDY: ITIS PALEOCAPA BERGAMO (ITALY)

PRESENTATION OF THE SCHOOL

Istituto Tecnico Industriale "P. Paleocapa", in Bergamo, is a technical high school for students aged from 14 to 19 years old with a strong and established relationship with the local industries.

The qualifications given to the students who attend our courses – Mechanics, Electronics, Information Technology, Textile Design – fully meet the requirements of the industrial context.

Therefore our school has recently decided to implement a challenging programme, whose keys ideas are innovation, creativity, entrepreneurship, teaching strategies, management competences in respect of the EU's policy and action and the directives for Education and Culture of the European Commission, in order to create new opportunities for growth and employment.

Educational objectives

Scientific and technological subjects are taught with care and in-depth and learning outcomes as skills, abilities and knowledge meet the EQF. The work is implemented through teaching in laboratories, problem solving, internship projects, apprenticeships and work-based learning. Also school devotes a great deal of attention to guest speakers and cooperation with experts from outside.

Qualifications

- *Electronics*

The students deal with electronic circuit design and management of electronic devices and systems.

– *Electrotechnology*

They deal with practical and industrial applications of electricity and design and management of electrical systems.

– *Mechanics and Mechatronics*

They deal with design, implementation and management of mechanical systems , machine tools and work organization.

– *Energy*

They deal with energy management projects for saving and using it in rational ways for safety and environmental protection.

– *Information and technology*

They learn how to perform tasks associated with developing and modifying software application, to be part of a team that provides customized software solutions for business and consumers or database development.

– *Textile and design*

This course is meant to provide students with an understanding of the creation and functional utilization of various textiles. They focus on the creation and design of different types of fabrics, supply chain management or business.

WBL ACTIVITIES DEVELOPED IN THE LAST THREE YEARS

Until the school year 2013/ 2014 students joined training activities and internships.

About 100 students from classes 4th and 5th were involved in these activities as part of their experience, contributing to their school credits. The students undertook internships as voluntary activities. Companies, about 348, were chosen by students themselves or selected from those already known or proposed during the school year. The stage lasted from 2 to 4 weeks. Companies were manufacturing type, related to the production and design of mechanical or electrical components, service companies, educational institutions, government agencies or private companies in the service sector. Since 2015 Paleocapa school has implemented the national legislation (L. 107) for the third year, adopting the ECLI model while the 4th and 5th classes continue individual voluntary internships. In addition some classes or groups of students have tried the new ECLI model.

NUMBER OF STUDENTS/CLASSES INVOLVED EACH YEAR IN WBL ACTIVITIES

In 2013/ 2014 9 classes and 120 students were involved;

In 2014/ 2015 12 classes and 197 students;

In 2015/ 2016 11 third classes, 11 fourth classes, 3 fifth classes (total amount 500 students).

TYPE OF ACTIVITIES REALISED

The activities were held at school or in companies: students went to factories to attend insights held by internal or external experts, to visit quality control laboratories, or deepen their knowledge of production lines and business organization. In classroom, students were involved in some workshops in which, on authentic tasks co-designed with the company, they have developed soft and specific skills.

Company experts have explored some issues related to company's field or to students' qualification. The class, together with the teachers, has developed interdisciplinary projects proposed by companies. They are annual and include authentic tasks shared with the tutor; the planned activities are carried out in company and at school, and cover both specific and transversal skills. Some students have tried student-run enterprise that has led to the creation of high-tech items.

HOURS PLANNED IN WBL

For the 3rd classes were provided 120 hours of individual training and 40/60 hours according the E-C-L-I.

While for 4th and 5th classes internships lasted 80 /120 hours.

NUMBER OF ENTERPRISES INVOLVED

The contribution of companies was really important: a strong and established relationship with about 20 large ones. The first step is a contact with the school to decide what project and which ECLI activity to develop. The companies then provide a tutor who agrees with the school tutor to design activities to be carried out in the company, shares the skills to observe, fills in all the necessary documents to enable the project, follows the student during the internship in the company, evaluates his/her activities. (e.g. ABB, BREMBO, SCHNEIDER, SIAD, GEWISS).

While 328 small and medium companies have joined the reform project of WBL ; 150 companies were involved before then and became available to receive students from 4th and 5th year who, voluntarily or at the request of the companies ,intended to carry out training activities. The other companies were added in 2015; most of them, especially the smaller ones, share the “internship I”; with some medium and large ones we have planned ECLI activities (e.g., CNC, MSE, Educational Institutions, Albini, Reggiani, etc.).

HOW THE SCHOOL IMPLEMENTED THE WBL IN THE RECENT NATIONAL REFORM (LEGGE 107/2015 “BUONA SCUOLA”)

Since 2015, with the introduction of Law 107/ 2015, within the so called “Buona Scuola” reform, the WBL has been organized according to the rules for different activities.

The WBL has been acquired as a teaching methodology: working with the ECLI model in all third classes and even partially in 4th and 5th, introducing class and laboratory activities with experts, at school and in the company, which complete students’ training.

After the publication of the Law nr. 107, the Head Teacher introduced to the School Board, in June 2015, the European Key Action 2 project, related to the WBL activities to be implemented in the following school year.

In the first phase (September -October 2015), the project involved just one 3rd class , called ECLI class. The School Board developed the original project with the class teachers’ training with regular and special meetings. They worked on internal planning, which mostly involved the school three leading figures, and on the first meeting organization with foreign partners. In Department or specialization Board meetings teachers planned WBL activities for the current school year with different timing and methods for each qualification, also considering company availabilities. Some classes have experienced peer to peer activities with schools; other classes have experienced skill learning in a structured module with a company.

In the planning stage a rapid and uncomplicated cooperation between school and company is required, choosing together skills to observe and to develop in students. This plan was shared with the Class boarding group which has been updated in progress.

ITIS Paleocapa School has specific profiles dealing with WBL:

- The Contact Person of the school for WBL projects who meets companies and coordinates relations with the Head Teacher;
- The Contact Person for each department, appointed by the Head Teacher, coordinates the scheduling of WBL activities, related to different qualifications;
- The class tutor, appointed by the class boarding group, monitors and helps implementation of class activities;
- Class boarding groups usually evaluate the results of WBL activities through models that take into account soft skills as well specific skills for each qualification. Such assessments, as WBL is now considered as a teaching method, converge into single subject evaluation, involved in this kind of activities. Transversal skills are part of the behaviour assessment. At the end of school year all the assessment are certified and included in the students' personal files.

Moreover, at the end of each school year the class boarding group gives credits to students: both acquired skills and their performances in WBL affect this assessment with a higher or lower mark within each range of evaluation.

The school office produces all the necessary documents (agreements with companies and students' educational plans), in legal compliance, and updates the database of companies collaborating with our school. The families offer hospitality to foreign students dealing their internship in Italy and help their children in choosing companies. Students help researching companies they are going to work with and perform WBL activities; they will draw up an internship diary about performed activities and self-assessment.

TASKS AND RESPONSIBILITIES RELATED TO THE PROFESSIONAL FIGURES INVOLVED IN THE PROCESS

Many people are involved in WBL process. The school headmaster and the contact person for WBL projects contact new companies in order to consider process sustainability, proposals from companies and resources they can make available.

In the second step, for each department it is involved the contact person who decides what classes to involve and what activities to plan; then the class tutor, chosen by the Class boarding group, who, together with the company tutor and the other teachers, plans the activities in terms of time and expertise to conduct, observe, evaluate and draws up the training project. The school tutor prepares the agreement with the company which will be signed by the headmaster, the training plan for student, signed by the tutor, and keeps in touch with the company throughout the period of performance of activities. The CBG prepares the evaluation table which is then given to the company tutor. The school tutor collects the feedback from the company tutor and the teachers, and summarizes it before the Class boarding group approves that.

Contact person of the school for WBL projects

1. He is responsible for a boost participation in quality education;
2. He monitors cooperation and partnerships with the European Union, the Ministry of Education, the Lombardy Region, Isfol, schools and University;
3. He collaborates with the Headmaster, following the initiatives with high schools which take place at local, provincial, regional and national level and the development of specific networks;
4. He works in the field of research and analysis of the evolution of training needs sector;
5. He has relations with companies;
6. If necessary, he visits industries, as preparatory work to ensure suitable conditions for WBL;
7. He collaborates with other system profiles in planning curricular innovations on the basis of training needs, identified through observation and analysis of the results;

8. He collaborates with other system profiles in planning courses, in response to specific needs of private sector;
9. He submits to the School Board and to Class boarding groups WBL activities in companies;
10. He monitors students' internships and work placements;
11. He works with referents and tutors defining training plans;
12. He works with referents and tutors updating forms.

Contact person of single departments for WBL projects

- Coordination meetings with the Headmaster and \ or the Contact person of the school for WBL projects;
- Definition of skills to be pursued in WBL training (third, fourth and fifth year);
- Definition of forms for WBL (questionnaires, agreements, etc.);
- Planning internships in companies (available companies and matching student / company);
- Making students' necessary data available for the school office;
- Having relationships with external trainers and business representatives in order to ensure the effectiveness of the courses (purpose, timing, place, resources);
- Supervision of training activities as part of WBL, organized by single departments with the cooperation of external trainers, including company tours;
- Drafting a condensed annual report.

School tutor

1. Drawing up the WBL register (SIDI);
2. Delivering internships in companies (available companies and matching student / company);
3. Available to be contacted by companies during internships;
4. Checking student-company relationship;
5. Developing and issuing tables for self-assessment questionnaires for students at the end of activities;
6. Developing and issuing tables for questionnaires for company tutors;
7. Drawing up the annual report about skills and abilities for each student (levels: L0, L1, L2, L3), to be submitted to class boarding group;
8. Drawing up the annual report about activities and timing in WBL (according to the ECLI model) to be submitted to class boarding group;
9. Working closely with the school office for monitoring all the activities as requested by the Ministry of Education.

ROLE OF THE COMPANIES

“PALEOCAPA” school has a long and established tradition of strong links with the local productive reality through the implementation of several projects for many years.

Some companies are traditionally linked to the school as, since the 60s, they have proposed internships to students of the 4th or 5th year; many entrepreneurs are Paleocapa former students who believe in educational value of teaching given here. Some contacts have been provided to students who have referred to the “I” activity, to companies close to their hometown: in the case the student identifies the company, provides it to the contact person who arrange a meeting and explore possible future activities. If the project is shared, we proceed with completing documents and the follow up.

With a view to consolidation and expansion of these relationships, we have been undertaken a series of WBL pathways to approach the school reality and the enterprises in order to overcome the gap between

skills acquired at high school and those required for the world of work. Both partners – companies and school tutors – agree on a common approach preparing and implementing WBL activities in terms of duration, tasks and skills for internships as well for Expert- Classroom- Laboratory activities. The company is responsible for a specific part of the safety training that the trainee has to perform, paid by companies. At the end of activities, company tutor makes an assessment of student, following comments and observations received, filling a form proposed by school tutor.

The hosting company may propose hiring to qualified students at the end of their internship and educational iter.

ROLE OF OTHER PUBLIC/PRIVATE ENTITIES OF THE TERRITORY (SUCH AS INTERMEDIARY BODIES, ETC.)

Paleocapa school has a strong and established relationship with the local industries as well with private institutions such as employment agencies and temporary employment agencies that provide opportunities for both training, guidance and later placement for students of the last two years – 3rd and 4th - and 5th year. There is a constant cooperation with **Confindustria**, representative association of manufacturing and utility companies in Italy, which supports the school for students' and teachers' training. Confindustria Bergamo plays an important role in training teachers involved in WBL activities, organizing systematically courses on implementation and evaluation, company tours with support of targeted conferences, seminars or workshops in order to promote exchange of experiences and good practices.

Some employment agencies (Adecco, Unimpiego) contribute to WBL activities developing training activities on specific, transversal skills. During the school year their trainers and human resource specialists develop activities agreed with the school tutor with a focus on self- management, work organization and as well provide a useful guidance for post-secondary and university education. Noviter agency has assisted the school in KA2 project and helped to develop specific strategies, providing national and international contacts in order to implement, monitor and evaluate the whole project. The project has led to a successful partnership with "ITIS Marconi", a public high school, which was then extended to other projects.

The Ministry of Education, the Regional Education Office and the local Education Office are important stakeholders in teacher training as well as in long-term planning and of WBL activities. WBL activities are monitored by the Ministry of Education, University and Research through a digital platform (SIDI) in which the school enters data related to students and companies where activities took place. The Regional Education Office has also set up a platform (www.inalternanza.it) to support the development of WBL both for monitoring and evaluation of activities.

PHASES, TOOLKIT AND RESPONSIBILITY INVOLVED IN PROCESS IN WBL (PLANNING, IMPLEMENTATION, MONITORING, EVALUATION)

The following specifications should be applied for students involved in the L.107/2015 reform.

Planning has initially engaged the system profiles involved in the project.

The focus was on understanding the implementation steps in line with the legislative innovation. Later class teachers were also involved, especially in the Expert phase.

ECLI class students have carried out preparatory educational activities before meetings in company (Expert phase). The implementation phase has been planned in order to raise awareness and involvement: the ECLI model was used for all third classes and, partially, even for the fourth and fifth classes.

Information and dissemination of activities have been completed both internally in share time and in meetings provided by the project itself. We intend to continue along these lines to promote the transfer and

use of results by more consumers so that they could become more visible and easily accessible by other people. Project monitoring has just been completed as for the Expert phase. The whole class was involved in stage “E” and such activities were monitored through evaluation boards about soft skills, ongoing and final activities. In addition, students will be asked to perform an ‘empirical test’, certifying acquired skills included in the project. The evaluation will be carried out primarily through the use of specific indicators. Contact persons lay down, jointly with school tutors, assessment criteria for skills, abilities, indicators for levels achieved by students in their internship (I). External tutors are also given the same forms to complete and return to school tutor at the end of the activities. Then, school tutor writes down an evaluation report for the class boarding group that will certify the skills acquired and the levels achieved. At the end of the school year evaluation of WBL performances through observation is expressed in entries on reports (cross curricular skills) both for general and specific education subjects usually involved within the traditional teaching. Skills acquired in the last three years as part of WBL provide an input for the evaluation at the end of high school and will be certified with specific models arranged by teachers. Of course, it would be advisable for students to work on a project related to their WBL experience for the Final Examination. It is important to emphasize, however, that we are waiting for the Final Examination Reform to know how these skills will be included and evaluated for the final grade. We don’t know yet how the Examining Boards will be made (maybe in March 2018); so we are waiting until further notice. Lastly, we will collect quantitative and qualitative data to improve the process, highlighting weaknesses and strengths. Students, whose training took place before the reform, and then joined WBL activities as an individual internship in the 4th and 5th year, were given their evaluation by company tutor and submitted to the Class Boarding group, in order to give the final credit with a higher or lower mark within each range of evaluation.

STRONG AND WEAK ASPECTS

The **assignments of tasks related** to WBL activities to specific profiles is a strong point in the governance of Paleocapa school. The school headmaster and the contact person for WBL projects contact new companies in order to consider process sustainability and new proposals from them; then the contact person of each single department and the class tutor plan the activities in terms of time and expertise to carry out and draw up the training project involving the Class boarding group. This organization encourages the monitoring of activities sharing the design phase, implementation and evaluation of activities.

Moreover, the incitement **to develop new teaching skills** according to new teaching methods as well students as an active part of **learning process** is now a focal point of the whole process.

ECLI model has also helped to improve WBL, enhancing some of our school educational goals included in the “Three year educational offer plan”: the development of students’ **digital** competences (e.g. use of ECLI IT platform); strengthening of laboratory methods and laboratory work (for example planning the visit to school during the meeting in Bergamo); providing career guidance because of the experiences of international WBL and enhancement of school as an active community.

Companies have benefited from the project and found a quality acquisition of **interdisciplinary** expertise; they welcomed the approach offered by the school in WBL planning activities through ECLI phases and required that all projects, from this moment forward, are planned using the 4 different steps. The results achieved have been considered replicable in other business experiences.

A weakness is found when planning activities with some companies that are not ready to carry out our ECLI model for WBL; the meetings must involve many profiles who work with the company tutor in planning sustainable activities.

In addition, difficulties have arisen in considering WBL as a teaching methodology that involves all the subjects, to be carried out with new timing and ways. Teachers need to develop a new understanding which develops and promotes "**learning by doing.**"

CASE OF SUCCESS

We have carried out a leading WBL project with Schneider Electric company: activities have been developed according to ECLI model, with a total amount of 112 hours. Activities crossed various qualifications with a continuous dialogue between company and teachers and has led to assessment arrangements shared by school and company. The experience has had positive effects on whole classes, thanks to dissemination activities.

The activities began in October 2015 and involved the classes: 5EA, 5EB, 5ECn, 5MA and 5IA. Some activities involved the whole class, others only small groups of selected students for each class.

Starting with the I phase activities (Individual) which involved only selected groups, they took place in the company and provided an analysis of tool components for energy efficiency and practical solutions in employment context. E phase took place between October 2015 and January 2016 - 34 hours - with presentations by experts and consultants , a conference and valuable insights on the topic of energy efficiency. C phase - 12 hours - took place in October 2015, involved 20 students and developed with a visit to the Bergamo University (Engineering) during an open day and joining to a WBL conference in Milan (EXPO).

The Laboratory activities (L phase) between January and April 2016 - 39 hours – developed a project of energy efficiency where a small group of students from different qualifications have worked together and almost simultaneously shared ideas with other classes (dissemination). Later the students have been evaluated according to the defined indicators about two cross-curricular skills (group working and self-management). The Class boarding groups have evaluated the students involved at the end of the school year considering the project developments and its results. This experience was an opportunity for some students to develop issues on their own and draw up an essay for the final examination.

FURTHER ADVANCES

In the next few months students (from 3rd, 4th and, to a minor extent, 5th classes) will develop new activities, according to the ECLI model, already planned by their teachers: valuable insights on particular topics with experts; visiting fairs and exhibitions; competing in contests and games; while winter and summer internships will help them to develop cross-curricular skills.

The goal is to create synergy between the various technological fields and provide students with a wider preparation and organizing a wider dissemination in which students have become more and more protagonists of "learning by doing".

It is expected that evaluation can become a learning experience for the whole school and the analysis of planned and achieved results could give a useful feedback for corrective actions and improvements.

Finally, the school is developing a project, called **Living Labs**, which is a major resource for work-based learning, as it develops teaching workshops (C-L), extends the network of companies and research organizations which collaborate with school (E), makes students protagonists of learning (I) through experiences of student-run enterprise and Project work.

PROJECT CONTRIBUTION TO EDUCATIONAL QUALITY AND INNOVATION

E.C.L.I. is the model we use and suggest to companies in the planning stage, performing the different E.C.L.I. phases in one or three years, involving a class or groups of students. This model is known in other schools as a possibility for WBL activities and it is often suggested during workshops and meetings carried out by Confindustria and other companies that deal with WBL. The same common framework made with schools involved in GOTOWORKINEUROPE project has become a goal to reach together with other partners (not only with Marconi school) in local, regional, national contexts (e.g. Traineeship project with Federmeccanica and Confindustria). The ECLI model is also offered to other schools at conferences and meetings, as an example of comprehensive training for students through WBL, as a replicable planning model in every other secondary school. Moreover the project has prompted the school to increase the internationalization of the WBL, not only between schools involved in KA2 - ECLI project (mainly with Swedish partners), but provided support for searching new partnerships with other European countries, such as for example the Netherlands and France.

CASE STUDY: ITIS MARCONI DALMINE BERGAMO (IT)

PRESENTATION OF THE SCHOOL

The Institute of Higher Education "G. Marconi "Dalmine (the name assigned at the beginning of the school year. 2011-2012) is a technical school for the formation of industrial experts. It is situated in a small town a few kilometers from Bergamo and the students come from more than 40 surrounding municipalities and from others.

The Institute responds to the training needs of the area which has many small and medium-sized enterprises specializing in the electrical, electronic and electrical engineering. There are also corporations that require more and more specialized staff.

The institute was founded in 1971 as a separate branch of Bergamo ITIS "Paleocapa" for specialization in electrical engineering. In August 1976 the headquarters of Dalmine obtained autonomy.

In 1982 it launched the electronic experimentation in the area of electrical engineering. This was established in 1987, first in the Bergamo province, majoring in electronics, in addition, in 1996, one in informatics was founded.

In June 2003 I.T.I.S. "Marconi" obtained the Quality Certification UNI EN ISO 9001: 2000 with a research avoid training program and strongly oriented to the development of constant innovation and continuous improvement of the "School System", both from an organizational point of view and from an educational point of view . In the realization of this project all members of the school were called upon to make a contribution. In the same year it received accreditation from the Lombardy region as the donor of Education and Guidance Services.

In 2003, as required by standards, it was decided to renew certification and in June 2009 adjustments to the UNI EN ISO 9001: 2008 were made.

With the reform of the Secondary School of the second level of Secondary School Education and the subsequent reorganization of the Education and Training System, starting from the school year 2010-2011, in accordance with the history of our Institute, the laboratory equipment with which it is equipped and the characteristics of the territory concerned, IIS G. Marconi Dalmine was assigned the following Technical Institute courses.

- Technological:

MECHANICAL, MECHATRONICS and ENERGY

- Articulation Energy.

ELECTRONICS and ELECTRICAL ENGINEERING

- Articulation ELECTRONICS,
- Articulation ELECTRICAL,
- Articulation AUTOMATION.

INFORMATICS and TELECOMUNICACION

- Articulation INFORMATICS.
- Articulation TELECOMMUNICATIONS

It was also awarded a three-year course (with possible fourth year) of the Vocational Education and Training (IeFP) for installers and maintainers of solar photovoltaic systems.

In the school year. 2016/2017, there were 1051 students divided into 41 classes: 115 teachers and 30 ATA.

WBL ACTIVITIES DEVELOPED IN THE LAST THREE YEARS

The school offers WBL activities to students at least 15 years old; mainly they re-inforce from summer internships activities for the fourth year students. The response of companies has always been good and numerically. In the AS 2013-2014 the number rose from 80 to 100 students for years. This experience is always considered valid by both students and companies, even if not provided large levels of design and did not require assessment. Subsequently, as can be seen in the tables below, the school has expanded the activity of WBL; by giving the opportunity of summer internships even to the third class students and fifth class students and also starting activities during the school year. As a result, the school has has increased both the number of students and also the contacts with companies. This has allowed a reduction of the problems in the change requested by the above mentioned Law 107, that regime will lead to a number of students approximately twice that of the last year (2015-2016).

The activities that belong to the WBL are substantially of three types

- **TYPE A:** classic summer activities in companies, an agreement and a training project is decided that contains the activities that the student will have to do, only requiring compiling a register of attendance. The activity allows the allocation of credits.
- **TYPE B:** Activities are carried out during the year or during the weeks of breaks in teaching. The activities are designed either lay the school (for a few deserving students) or by some students taking part in activities that go on in the company which has met and known them during summer internships.
- **TYPE C:** see ECLI model (activated only in the years 2015-2016 in the third class)

The tables below show some numerical data illustrating the evolution of these activities over the last three years:

NUMBER OF STUDENTS/CLASSES INVOLVED EACH YEAR IN WBL ACTIVITIES		
AS 2013/2014	AS 2014/2015	AS 2015/2016
TYPE A: 111 STUDENTS / 10 CLASS	TYPE A: 163 STUDENTS / 13 CLASS	TYPE A: 166 STUDENTS / 7 CLASS
	TYPE B: 21 STUDENTS / 7 CLASS	TYPE B: 65 STUDENTS / 7 CLASS
		TYPE C: 166 STUDENTS / 7 CLASS
NUMBER OF ENTERPRISES INVOLVED (***)SEE BELOW)		
AS 2013/2014	AS 2014/2015	AS 2015/2016

TYPE A: 5 IN THIRD CLASS 55 FOURTH CLASS	TYPE A: 37 IN THIRD CLASS 78 IN FOURTH CLASS	TYPE A: 48 IN FOURTH CLASS
	TYPE B: 9 IN FIFTH CLASS	TYPE B: 9 IN FIFTH CLASS
		TYPE C: 97 IN THIRD CLASS (<i>INDIVIDUAL</i>) 7 IN THIRD CLASS (<i>ECLI</i>)
HOURS PLANNED IN WBL		
AS 2013/2014	AS 2014/2015	AS 2015/2016
TYPE A: FROM 80 TO 120 HOURS	TYPE A: FROM 80 TO 240 HOURS	TYPE A: FROM 80 TO 240 HOURS
	TYPE B: FROM 70 TO 120 HOURS	TYPE B: FROM 20 TO 40 HOURS
		TYPE C: FROM 80 TO 240 HOURS (<i>Individual</i>) FROM 20 TO 40 HOURS (<i>ECLI</i>)

The school interacts with about 150 companies, mostly manufactory enterprises: about thirty of these have more than 100 employees, and some are multinationals. The product sector is usually close to the field of study of our students: electrical, electromechanical and mechanical manufacturing companies, suppliers of hardware and software services for companies, engineering and industrial design companies. Many enterprises have been very helpful in starting mentoring projects for our third classes, since they consider WBL projects much more valuable than the traditional summer stages projects.

Enterprises themselves have expressed an interest in coming into contact with the school, not only to help in skills development, but especially in order to build a stable relationship of cooperation and take part in the training of those students who could be their future employees.

HOW THE SCHOOL IMPLEMENTED THE WBL IN THE RECENT NATIONAL REFORM (LEGGE 107/2015 "BUONA SCUOLA")

The law of July 13, 2015/107 (within the Good-School Reform), on "Reform of the national education and training system and powers in the reorganization of existing legislation", establishes a number of hours required to activate the experiences of WBL that since the school year 2015/16 has involved, from the third class, all students in the second cycle of education.

The school has chosen to implement the WBL activities, dividing them into a certain hours of activity during the school year to the whole class and a number of hours of activities in summer internship activities, applying them since the first year by testing for all classes the ECLI model.

To reach the minimum amount of 400 hours required by National education Board in order to sit the final State Exam, WBL activities are organized as follows:

- 160 hours (40 of class activities and 120 of individual work) during the third year,
- 220 hours (60 of class activities and 160 of individual work), during the fourth year,
- 20 hours at least, in the fifth year, to develop technical projects in partnership with companies, to be submitted as project work or a case study at the State Exam. The 160 hours of the third year include the safety at work course. The school has organized in the first year of implementation training courses on safety, and are provided with all forms of collaboration and organization as highlighted below.

The most delicate and qualifying phase is obviously that of planning the whole ECLI project, in accordance with the legislation, which expressly requires the WBL activities to be planned, implemented, and evaluated by the class representatives along with companies.

Once the Company partners are identified, these steps are followed:

- definition, together with company tutors, of learning skills to develop, referring to the National Education Board programs and to the availability and resources of the Company: what companies can offer in terms of expertise and / or WBL support is matched to students' competences, skills and expectations
- after the WBL period in Companies, evaluation of the activities and individual assessment of each student by the Class Board

THE ORGANISATION OF THE SCHOOL/STAFF BOARD CONCERNING ACTIVITIES RELATED TO THE WBL

To organize the required change in the design, implementation and evaluation of WBL activities, the school analyzes the organization of our institution, adding new requirements to the figures already present.

LEADERSHIP and MANAGEMENT FOR WBL IN INSTITUTE

Overall coordination.

- Strategic definition of WBL activities based on the aims of the Management and the PTOF (Triennial Education and Teaching Plan), and the planning of all the activities of an Institute as defined by the School teachers' Board and approved by the School Council; from this the characteristics, organization and quality of a school can be inferred)
- Research and startup projects with Mentoring Companies for ECL stages, through new contacts or through the portfolio companies already hold
- Facilitation and standardization of the activities for Class boards and companies
- Control and supervision of the various stages and operations referring to school laws and deadlines
- For the success of the activities, some bureaucratic tasks must be accomplished: preparing the documents for the activation of WBL projects, such as: conventions, training plans, implementation circulars, letters of appointment etc. Those are normally drawn up by the head of the WBL project and by the senior teaching staff, always under the supervision of the head teacher

TEACHER / PERSON IN CHARGE OF WBL IN CLASS

- Coordinator of the TEACHING UNITS of WBL
- Contacts with company "Godmother", scheduling and task management regarding the whole the class.
- Evaluation skills (in collaboration with firms and / or other teachers) of a whole class activity (ECL).
- Collects all the documentation designed to record the activities carried out in the whole class.
- Coordinates with scouting/exploratory group for company pairings.
- Manages the companies carried by students, also communicating with the scouting/exploratory group.
- Coordinates with tutors and class coordinator of the evaluation arrangements for post Individual skills (INTERNSHIP) in September 2016

COORDINATOR of the teaching team

With the teacher responsible of ECL model and co-chair of the educational preparation and assessment of the UDA in the whole class, he also coordinates with tutors for the preparation of the assessment for post Individual skills (INTERNSHIP).

TUTOR / TUTORS

- Mentor / Monitors all the INTERNSHIP;
- Check(s) / control(s) either in person (at least once) or call(s) the subjects/enterprises involved in the INTERNSHIP.
- Check / verify that the student during the internship route draws up the documentation of report .
- Coordinate(s) / contact(s) and coordinate(s) with teachers to prepare the assessment for post Individual skills (INTERNSHIP) in September 2016.

TEACHER / S

- If requested for the definition of transversal skills and / or disciplines for the assessment of Expert, Classroom, Laboratory or Individual phases.

SCOUTING group with those responsible for WBL in the Institute (**STAFF of WBL**)

- Finding companies for Individual phases.
- With the person in charge of class: matching contact calls to companies and students (skills and timing)
- Database management of companies with the inclusion of companies, tasks and assigning students.

STUDENT

- In the Individual phase, he or she must see to compiling or producing a report on the activities: text files or media such photos, drawings, films...

The **INSTITUTE SECRETARIAT**

Print conventions and PERSONAL TRAINING PROJECT from company databases.

Collection of the returns of all the paperwork concerning the bureaucratic aspect of the internship: diaries, reports, business evaluations etc.

See to the publication of Circulars or the activation of documents of WBL activity.

Telephone the front office: If someone calls hear she must identify the internal resource in order to send the request: the person responsible for WBL, Class or tutor.

TASKS AND RESPONSIBILITIES RELATED TO THE PROFESSIONAL FIGURES INVOLVED IN THE PROCESS

We then formalized and defined more completely the role and tasks of those figures, considered strategic for the success of the WBL activities

The person responsible for WBL and tutors are identified within each class board group, but the responsibility of the main TEACHER IN CHARGE OF WBL is taken by a teacher from the technical department, with a deep knowledge of education programs and skills and competences to be reached: he/she can therefore better plan with Companies the WBL projects. This cooperation leads also to an increase in technical and organization skills of the teachers involved.

The **TEACHER IN CHARGE OF WBL**, as Head of the WBL class activities, must:

- Work with the DIRECTOR for WBL, in the planning stages of the training program and the identification of experts and companies in which the WBL activities will be carried out and in preparing the calendar of activities.
- Maintain contact with companies for activities for whole class.
- Present to the experts the situation of the class and with the same determination of strategies for educational effectiveness.
- Collect all the documentation required to record the activities and hours worked in the whole class (ECL), annotating in the register, on paper or in the computer.
- Evaluate, in collaboration with business experts and / or the class coordinator and teachers of the Class Council involved, the level of the work completed by the entire class (ECL).

- Co-ordinate and manage with the STAFF of WBL the companies / student pairings for Individual INTERNSHIPS.
- Coordinate with tutors and class coordinator the mode of assessment for post INDIVIDUAL skills (INTERNSHIP).
- Inform the WBL institute director, of the checks carried out, on the frequency of the students, the difficulties encountered, objectives achieved, by reporting any inappropriate behavior of students.

WBL SCHOOL TUTOR must:

- Monitor and verify the correct behavior of the students throughout the INTERSHIP activity;
- Maintain relations with relevant business figures for the INTERSHIP activity.
- Verify that the company and the student will take care: the INTERSHIP documentation, the final report, the summary sheet, the verification questionnaire.
- Coordinate with teachers and referent(s) of the Class Council, for the preparation of the assessment for post INDIVIDUAL skills (on INTERNSHIP).
- Inform the WBL institute director, of the checks carried out, on the frequency of the students, the difficulties encountered, objectives achieved, by reporting any inappropriate behavior of students and / or companies.

The WBL staff consists of 4 persons in the school, who interact with teachers involved in WBL activities in each Class boarding group:

- Work with the WBL institute director, to research the companies for Individual INTERNSHIPS
- Maintain relations with companies, and in particular the definition of the tasks and the periods for the alternating activities.
- Co-ordinate and manage with the teacher in charge of WBL, the companies / student pairings for Individual INTERNSHIPS to optimize the request of companies / students, tasks and periods.
- Inform the WBL institute director, of the performed activities, the difficulties encountered, objectives achieved, warning of any problems.

ROLE OF THE COMPANIES

Obviously, for the success of the WBL activities, it is necessary to count on a large number of companies that agree to accept students in such activities. Fortunately, the Bergamo area is characterized by the presence (as well as large companies) of many industrial and craft businesses; as already said, these have increased in number; this also thanks to the good reputation of our students and also to the widespread help of families and their acquaintances in the search.

The relationship with some companies dates back to the early '90s, when the first stage projects started. Each year we met new partners by searching companies working in our field of studies, thanks to information from students and families, or on the Companies own initiative: we could then enrich the number of our partners and even select them.

Referring to the ECLI project, there are two types of industry involvement

- **TYPE 1:** referring to the ECL, Company “godmothers” for the expert stage, who have the task of collaborating in the preparation of an educational informative / experiential tour, both at school and in the company, through workshops and company visits activities.
- **TYPE 2:** Companies that implement the individual phase or better welcome students in INTERNSHIP activities; in these for at least three weeks the student can test their skills / competences that have been agreed between the school tutor and the company tutor

Before the introduction of law 107/2015, companies were already important partners in WBL projects, but their role was different: they allowed students to experiment a real working context, but they were not involved in planning education projects through WBL.

ROLE OF OTHER PUBLIC/PRIVATE BODIES IN THE TERRITORY (SUCH AS INTERMEDIARY BODIES, ETC.)

A big role in the organization and implementation in the system of WBL activities was carried out by the Provincial Office of Education (a department of the Ministry of Education). In recent years it organized meetings and workshops to help those responsible in schools to standardize the approaches and implementation of documents and evaluation of WBL activities, in collaboration with the office in charge of relations with the school of the Industrial Union of Bergamo (Confindustria BG); and on safety and prevention by involving the person in charge of these issues of the Bergamo Health Facility (a department of the Ministry of Health).

Also, our school is interfaced with two intermediary organizations: CONFINDUSTRIA and Adecco.

Confindustria, an Italian representative association of manufacturing and utility companies, has been our partner for many years, playing an important role as liaison between school and companies, by suggesting company names, analyzing WBL data from our province, and by planning and organizing training for the implementation of WBL projects

Thanks to the Erasmus + the relationship has been consolidated because it works side by side on the WBS. In the last school year CONFINDUSTRIA took on some of our students to perform WBL activities in its offices. ADECCO is a temporary employment agency that has helped us find “godmothers” companies, create WBL training packages, organized company visits and training sessions; only one class will continue this collaboration for the current school year.

It is worth mentioning the collaboration that has been implemented (not only but also through the creation of the K2 ERASMUS project) between us and the PALEOCAPA Institute, both in terms of management (head-teachers’ partnerships for the exchange of ideas and organization of activities but also among some operational functions, and especially while insisting on a largely comparable territory, there were no conflicts both in students (collecting inscriptions) and in WBL activities.

With reference to this project, WBL project leaders of the two schools, together with class boarding groups and teachers in charge, cooperated in the design and definition of the WBL project for ECLI activities at ABB in Dalmine, which involved the two ECLI classes, one in each Institute. This allowed us to provide a common design, planning and evaluation document.

PHASES, TOOLKIT AND RESPONSIBILITY INVOLVED IN THE WBLPROCESS

Planning , Implementation, Monitoring, Evaluation

Shown in the table below is the typical design of WBL activities in time sequence with the figures involved in the implementation of ECLI model. Design and planning is the longest and most exigent phase of the whole project

EXPERT, CLASSROOM AND LABORATORY PHASE		
STEPS AND OUTPUTS	WHO	EXTERNAL FIGURES
Definition CLASS GROUP	Headmaster/ Staff management	
Definition TEACHERS INVOLVED	Headmaster/ Staff management	
Search for “GODMOTHER” company	Headmaster and/or director of WBL in institute	Strategic leadership figures within companies

Approval by the COMPETENT SCHOOL BODIES		
Definition of the referent teacher / responsible for the design	Headmaster/ Staff management	
First contact with the company "GODMOTHER", to start the project	Director of WBL in institute	Company reference figures
Meeting with the parents and students of the class involved, to explain the project. (Internal Dissemination)	Headmaster Responsible WBL Institute Class referent	
1st cognitive meeting with the company - illustration of the ECLI project	Headmaster Director of WBL in institute Class referent	Company reference Figures
ECLI programming	Class referent Class Coordinator Teachers	
2nd meeting with company. Planning EXPERT task	Director of WBL in institute Class referent Class Coordinator, Teachers	Company reference Figures
Definition of: - The timing with who does what and how - Definition of skills and goals - Definition of an assessment rubric	Class referent Class Coordinator Teachers	
Implementation, support and project monitoring	Class referent Class Coordinator Tutor, Teachers	Company reference Figures
Evaluation (and certification) Approval by the Class Council	Class referent Class Coordinator Tutor, Teachers	
Individual phase		
For the individual phase, or for the summer internship the process is similar, but is targeted and customized to each individual student. Obviously you can implement similar paths in different companies (but with the same mission), this fortunately allowed to replicate (with possible small adjustments) both during the design phase and subsequently (but we are working on this at the beginning of the school year) to the assessment phase.		

STRONG AND WEAK ASPECTS

WEAK ASPECTS

- Single projects are carried out with direct contact between the director of WBL in institute, so the head teacher, and the company; usually contact the person in the company who is usually someone from human resources, with little knowledge of specific manufacturing processes, that are the main interest of our students
- This problem is particularly relevant in medium and large enterprise.
- We are not faced by this problem in small enterprises, where the contact person is usually the owner, who has full control of production and organization
- Schools and enterprises do not share a common definition of competences and related standard levels, in order to describe competences required for work and common tasks
- We found competences which are common tasks to be reached both in companies and school, so assignments related to these tasks and competences are successful.

CASE OF SUCCESS

The Marconi Institute, together with the Paleocapa Institute, carried out a week of WBL , within ECLI, at the Multinational Company ABB, in May 2016. Two ECLI classes, one from each Institute, were involved: third class Electrical, from Marconi, with 22 students, and third class mechanics from Paleocapa, with 25 students.

Involved competences are:

- Mastering communication in the native language in different contexts: social, cultural, scientific, economic, technological
- Communicating in a foreign language, with reference to a specific subject language, in order to:
 - o Interact in different work and study contexts
 - o Define one's own role in teamwork

Thanks to the WBL projects, students from the two schools could compare their experiences in a group larger than their own classes. Through WBL activities the above mentioned competences could be monitored in a large, non scholastic context

Planning

The planning of the WBL week established the division of the work in five phases, one phase for each of the five days, that took place in two different locations. The first and the third day had as an objective the theoretical approach, then followed by a more practical one, for the axioms and the communication strategies, with the intent of making it more efficient and more straightforward. The second, the fourth and the fifth day worked on the technicality approach.

Implementation

DAY 1. (02/05/2016)

The work began with the whole groups (two third year classes, those of Paleocapa and those of Marconi), at the Stezzano ABB office, with the relative security procedure information of the company and with the presentation of the week's agenda. The group was then divided into two, taking students from both classes into each of the two groups. After the presentation given by ABB trainers, work was done on the Ground Rules: What can improve learning? Then the activities began: the first activity involved the students' presentation of their musical, sports or cinema idol, so as to best present their personal aspirations. In doing so, we were able to focus on the communication aspect: both verbal and non-verbal, analysing the importance of the context in which communication occurs and on the difference between the communicator and the listener. The second activity saw a study of the importance of feedback but only when it is constructive: a video was shown regarding this matter. Finally a game was played: the group was subdivided into five, each of which carried out an activity on the importance of careful and active listening.

DAY 2. (03/05/2016)

On the second day the students visited the ABB SMART LAB; divided in small groups, they could experience all the technologies available in the LAB: those activities had been considered of great interest to them, and they were enthusiastic about learning some of the most modern technologies. In the Lab they could see and experiment with medium and low voltage switchgear, protection relays, current and voltage sensors and the relative communication devices, in addition to the monitoring system that controls the network, inverters for photovoltaic plants and a monitoring device for distribution transformers. The Smart Grid Lab provides a structure that allows components and configurations to be tested in a flexible and dynamic way, enabling ABB and its customers to simulate real network conditions and study specific situations. Simulating different energy flows or fault conditions will help to understand which components

to use and what choices to make to ensure the greatest accuracy possible when managing electricity distribution networks.

In the Lab the following issues were studied

- Energy efficiency
- Intelligent management of electrical networks
- Automation
- Home automation

DAY 3. (04/05/2016)

The day began with the presentation of two cross-cutting issues: communication and team-work. Also in this case the activities were different. The first involved story-telling: two sheets were given to the students, subdivided into smaller groups, one with the representation of an object and the other with the representation of a feeling. Based on what they were given, they invented a story. The qualities of team-work were also clarified: starting from the fact that the objective is by definition common, it's necessary to be coordinated, conform, able to listen to and respect each other. Later the focus moved, also thanks to a video of the ex-international Italian volleyball coach Velasco, on the alibi culture: the students were encouraged to reflect on the importance of accepting their own responsibility, without using useless and destructive alibies, so as not to blame someone else for their mistakes. Afterwards work was done on understanding the meaning of "group" and on its features. Finally the groups were assigned an advertising publicity campaign to elaborate, to publicise the school, in order to test their team-work skills.

DAY 4. (05/05/2016)

EMC LAB (Electromagnetic Compatibility Laboratory)

In the Electromagnetic Compatibility Laboratory the students were able to see how the electromagnetic compatibility of different equipments, in different environments, is checked

They were again divided into small groups and were able to test all the available experiences.

Many students were deeply interested, because they were unaware of the problem of electromagnetic compatibility, and they could enhance their knowledge.

The laboratory consists of four separate rooms: a room for the acceptance of the sample input, the semi-anechoic chamber (CSSA), of considerable size, a screened room (CS) in aluminum and a control room. The CSSA has been produced with high-quality materials and technologies to make measurements in a fully compliant environment to the benchmarks set by international standards such as site attenuation (NSA, normalized site attenuation) and the homogeneity of the field.

EMC must be tested from the prototype stage. This is important because in both cases of susceptibility and apparatus emissivity the apparatus must be kept within the limits set by the standards.

DAY 5 (06/05/2016)

TEST LAB

Students were again divided into groups, so to be able to experience each activity.

The students had studied at school the laboratory tests on electrical / electronic, instrumentation but only from a theoretical point of view; with this activity they could perform such tests and were able to experience the relationship between theoretical contents and laboratory tests.

The medium-voltage laboratory system is organized into various internal divisions that are responsible for development testing on prototypes, type testing on new products and certification testing where required

on ABB or external customer products. These tests ensure that the components, manufacturing processes and finished products conform to reference standards and product specifications.

The laboratory performs the following tests:

Short-circuit tests

The short-circuit tests are used to check the behavior of the switches and electrical aspect of low and medium voltage in extreme working conditions, such as those resulting from fault conditions as a result of lightning, faulty maintenance or those found, for example, in power plants, industrial plants, chemical, offshore platforms or mines.

Research and certification tests are conducted in the experimental test laboratory:

- -temperature-rise
- Dielectric
- partial discharge
- functionality
- mechanical endurance
- climatic (controlled temperature and humidity, accelerated aging)
- protection degreentightness.

The experimental test laboratory also provides technical support for type tests that simulate seismic activity and vibrations, conducted in qualified external laboratories.

All of the equipment used to conduct research and type tests are adjusted to the severity of the tests and are periodically calibrated.

Material Testing

The materials testing laboratory is able to conduct tests for the determination of the mechanical properties in traction, compression and bending, on the fire resistance, the electrical resistances, the melting temperature and the glass transition of the insulating plastic materials.

The "Tests on electronic devices" Laboratory

The "Tests on electronic devices" Laboratory is able to simulate any type of current and voltage that can be found anywhere in the world, from galvanic systems, currents, solar power or fields of a submersible. Harmonics and noise up to 20 kHz, well beyond do deliver the inverters of wind farms, can be generated.

The electronics department is able to subject all electronic components with high noise levels with values ranging over 5kV (simulating lightning), 6 kV (high power radio transmitter) and 20kV ESD.

Monitoring

The monitoring activity was carried out with the use of a behaviour grid(see table below) for the students, that was filled in by each student and each teacher present during the activity, each day.

Evaluation

The skills developed during the week are assessed and evaluated through a competence-based test, consisting of a presentation prepared by each class, divided into subgroups, in the following weeks. The boys prepared with the support of multimedia material the presentation of a history chapter, organising the work based on the skills learned in WBL related to team-work and presenting the contents, taking into account the experiences with ABB trainers.

FURTHER ADVANCES

Erasmus+ and GoToWorkInEurope projects gave an organized structure to activities that schools in Italy were already developing: meeting with experts, class activities, visits to enterprises, laboratories in companies,

WBL stages. The novelty of the project is that these were part of a common framework and gave a structure to the various initiatives taken between school and companies.

A new legislation is asking students to describe their WBL experience during their Graduation Exams, and to present a project finalized during the WBL weeks in the companies: Erasmus+ projects results as being ahead of the times, since students involved already discuss in their Graduation Exam what they have finalized with their Mentoring Company. Our institute will implement WBL actions in several directions:

- Two students and a teacher will go to Catania from 17 to 22 October 2016, joining their peers and colleagues involved in the WBL project.

Their presence was not planned by the Erasmus + project, but we consider it essential to monitor the whole process of the project.

Another development is the opportunity that the school offers to a few students to have the WBL experience abroad. We agreed with the Swedish school, with which we are partners in the project Ka2, to host with us 5 Swedish students who will be involved in WBL in some Bergamo companies for three weeks, and our students will be then guests in Sweden for three weeks

In addition, in summer, one of our students will experience a WBL project in Australia.

CASE STUDY: IST. TECN. BIANCAVILLA SEDE ASSOCIATA ALL'I.I.S. "M. RAPISARDI"

PRESENTATION OF THE SCHOOL

The "Mario Rapisardi", High School in Biancavilla, is focused on Chemistry, Materials and Biotechnologies. It is associated with I.I.S. "Mario Rapisardi" Paternò, and has offered experimental curricula for Work-Based-Learning for ten years, in order to support pedagogical success, avoid drop-out cases, and reinforce students' skills.

Success in educational activities lies in the capability of WBL to make students protagonists in their learning and to show abilities that are difficult to assess in a traditional curriculum.

WBL aims also to promote the implementation of a considerable amount of operational experiences. In that way students will be allowed to enter the work market in a more efficient way and take advantage of the best job opportunities.

The WBL projects our school started are split into two different kinds of activities, inside the school and outside. The first are based on meetings with companies' experts, lessons on the activities which the stages are focused on. The second ones are realized by visiting different companies and working there.

Since the mission of our school is to provide an educational offer related to the right of our students to learn and to mature, by promoting the potentialities of each of them, adopting useful strategy useful to reach educational success, our WBL projects aims at the following goals:

1. To enrich school and educational curricula, by acquiring skills useful to succeed in the labour market
2. To implement flexibility in learning activities able to link school education and practical activities
3. To integrate school knowledge with everything required in specific work fields
4. To create an efficient link between school and the labour market

The main goals are:

For students:

- To know labour culture and entrepreneurship
- To be educated to work safely
- To be confident in their own skills and abilities

For teachers:

- To implement WBL projects as an aim of educational activity

- To be able to assess properly WBL activities
- To implement didactical activities based on "learning by doing" methodology
- To base curricula on work activities
- To be formed to be WBL tutors

Educational Goals:

- To have better communicative and relational skills to use during work activities
- To be educated to respect rules and different cultures in a multicultural perspective
- To be stronger the acquired knowledge in a school field by giving students a different vision of work possibilities in the Labour Market

Our WBL projects allowed our students to use their knowledge in different work contexts, to acquire new competences and to enrich their life skills for the future.

Different experiences in work contexts offered our students important occasions to make their specific skills stronger in a different and more effective way than traditional school education.

WBL ACTIVITIES DEVELOPED IN THE LAST THREE YEARS

Some significant samples of our WBL projects in the last three years are:

MODULE "QUALITY IN THE COMPANY"

The "**QUALITY IN THE COMPANY**" MODULE was carried out within the National Operational Programme, Competences for development, Objective C, Action C5. The project, which was conducted at the Central Inspectorate of the Safeguard of Quality and Fraud Repression of Agroindustrial Products (ICQRF), was characterized by activities aimed at the control of commercial conformity of agroindustrial products. Particularly, the areas "fruit juices, derivatives and fruit and vegetables" and, simultaneously, also the "wine sector" we're treated.

The project, focused on the last three-years pupils, provided **n. 10 hours of orientation and n. 110 of stage.**

- 1) During the orientation phase, the following issues were dealt with:
 - a) The internal organization of the Ministry of Agriculture and Forestry in a general way, and particularly the structure and functions of the Central Inspectorate Department of the Safeguard of Quality and Fraud Repression of Agroindustrial products;
 - b) The functions and responsibilities assigned to the Inspector General Head of Department, the Central administration, the dislocation of the entire national territory of laboratories and offices, were all topics addressed and discussed in detail;
 - c) The ICQRF relations with other police forces: police, carabinieri, financial police, rangers.

Eventually, the main objectives of ICQRF department were explained:

- to protect consumers on the one hand;
- to protect honest producer on the other.

2) In the stage phase, particular attention has been placed on the sectors, which were involved in the control and contrast to fraud, among which: **the wine sector, fruit juices and fruit, vegetables, cereals and derivatives, canned vegetables, honey, sugar substances** which are sectors under ICQRF's direct jurisdiction.

In the wine sector, among the analytical methods, particular attention has been paid to the gas chromatographic determination of methanol (toxic component) in white, red and rosè wines.

The introduction to the isotopic methods by the use of spectrometer of magnetic resonance NMR and isotopic mass IRMS was carried out on the theoretical plan.

Among all the laboratory analysis the following were performed: Density at 20° C (g/cm³), relative density of wine itself and its distillate, alcoholic strength by volume (% vol.), total dry extract (g/l), total acidity (g.

tartaric acid/l), volatile acidity (g. acetic acid/l), copper, sodium, zinc (ppm), through spectrophotometric determination in atomic absorption, methanol (mg/l), gas chromatographic determination in wine distillates, sulphur dioxide (mg/l), idiometric titling.

In the area of fruit juices and additives, the usual fraud investigation concerning the following commercial products was conducted:

- Juice-based beverage
- Jam
- Marmalade
- Red orange juice.

In this area, the following laboratory analysis were conducted:

- Acidity, brix, dry soluble residue, determination of antifermentatives, polyphenolic profile.
- The chromatography, in particular LC, GC and especially HPLC and LC-MS were performed in depth, so, by the end of the course students were able to manoeuvre and manage a HPLC AGILENT.
- Moreover, both the problem of antifermentatives illegally added and the characterization, then the difference between a red genuine orange juice and a red orange juice with added dyes have been faced by liquid chromatography.
- The experience at the laboratory of fraud repression was very interesting because it has greatly enriched the cultural and experiential baggage of students.

The only critical point was the too content number of hours available to allow students to investigate other methods which represent sources of strong enrichment of the curriculum of a future chemist.

EXPECTED RESULTS AT THE END OF THE COURSE

The course "**QUALITY IN THE COMPANY**" was realized through methodologies, which are aimed at developing competences based on laboratory didactics; it was directed to the identification and management of processes in organized contexts of different complexity.

The course was aimed at making the students self aware of their skills and competences; in this way, their autonomy has been made more effective and their way of adapting and integrating themselves into the context they operate in more flexible.

"A WINDOW IN COMPANY" MODULE

The project "A WINDOW IN COMPANY" was carried out within the National Operational Programme, Competences for development, Objective C, Action C5. It was addressed to the last three-year students. It is an educational program finalized to increasing the theoretical and practical knowledge and competences, especially regarding the new productions in the food and agroindustrial field referring to the **DOC, IGP, IGT, DOP, DOCG** typical local products; another aim is to learn and experience analytical methods mostly in use in the performance of chemical, chemical-physical and microbiological monitoring of both environment and food.

The competences achieved:

- being able to describe the productive process of certain foods;
- Knowing how to carry out PH controls and °BX on syrups;
- being able to perform physical-chemical controls;
- being able to identify the active principles and agroindustrial typicalness of the area.

The "A WINDOW IN COMPANY" project was articulated into **n. 10 hours of orientation and n. 110 hours of stage.**

During the orientation phase, the following issues were dealt with:

- Orientation to enterprise culture and the active citizenship ONE

- Training on key safety rules of the workplace.

During the stage phase in the Euroagrumi company, students had the opportunity of examining a broad spectrum of knowledges not only in a purely chemical field, but also in the contexts of biotechnology, sensory analysis, marketing and ecology. This enabled the participants to learn methods, get to know tools and try protocols to monitor and ensure quality.

In particular the following were conducted:

- A. drinking water analysis**, both tap water and wastewater of different productive contexts, which has allowed to consolidate the knowledges connected to water analysis by IRSACNR's methods. The latter is about official methods of water analysis, through analytical proofs for monitoring of chemical parameters of potability and parameters.
- B. determination of agrochemical residues in water**, a whole new look which has allowed to familiarize with the analytical methodology of extraction, purification and instrumental determination.
- C. use of training and evaluation techniques** of tasters' sensory abilities in the creation of a panel for sensory analysis with the subsequent analysis and interpretation of data collected by sensory tests.
- D. analytical tests** for the control of the microbiological quality of food with the study of methodics for the determination of agrochemical residues on vegetable matrices.
- E.** These methods used preferred the **learning by doing** formative techniques. Therefore, students were able to use the available equipments, acquiring manual ability and good competence of the illustrated methods.

Strong points:

- Knowledge about the reality of working world
- Promotion of education and educational success
- Consolidation of the relationship between school and local companies.

Critical points: Limited number of available hours in order to allow the students to experiment new analytical methods.

STUDENTS LAB PROJECT

Students lab, type biz, is a course which has enabled the management of two mini-enterprises from the **third and fourth years classes students, sections A.**

It is based on a learning through personal entrepreneurship experimentation, constituting particularly effective way to arouse new entrepreneurial vocations among young people according to the European Commission General Directory Enterprise and Industry. The beneficiary students vivified two real companies, under the Trainer Students Lab's supervision and with the coordinator's and the inner teachers'support. The students collected a share capital, took social positions, realizing concretely some products.

In this way, young people were oriented to become entrepreneurs themselves and were sensitized to favour the start-up.

Students were responsible for all aspects of their enterprise development and management, within an organizational structure which reproduces the real company functions, processes and objectives.

In each class you were allowed to give everyone a role with specific tasks and responsibilities, such as a real company would do, thanks to the *Jigsaw Classroom* Methodology.

Students identified the product, became start-up managers, thus managing their own budget.

After having prepared a *business plan* and determining the commercial strategy, the involved students collected share capital prices, planned both purchase of raw materials and stock financing, obtaining the product they have designed.

Then the product was sold inside and/or outside the school with the only aim of approaching the business world to the students one.

The third class of the school decided to create a company, the **Matteo's Ltd.**, which produced various essence distillates.

They took this decision since lemons, tangerines, cinnamon and liquorice are first materials in our territory. The distillates were produced within school laboratories, which were adequately equipped.

One of the distillates advantages was to be produced with raw materials typical of our land, without preservatives and dyes.

Chemical-alimentary analysis by Lab&Co laboratory placed in Bronte have been sided to the products to control their quality.

The distillates were produced thanks to the Soxhlet equipment which allows the extraction process with a continuous cycle solvent.

By carrying out a provincial market survey, the students found that these products are highly demanded by various lounge bars in order to give new flavours to their cocktails.

The competitors are the large distilleries in the area, which have a wide sales field and are really successful. According to the market launching strategy, the students are now planning to take part at local and regional fairs, to get to the nationally acclaimed one. Their product was advertised through the web site and Facebook pages.

The students then joined in the provincial competition and, as a business laboratory, presented their business plan selling their products.

They were evaluated by a jury and proclaimed winners for the "**Best Enterprise**" because of the rapidity of industrial production process. The local competition victory has allowed them to take part in the regional one. The fourth class of the school created a mini-company, **the Etna T-Shirt Ltd.**, specialized in the clothing industry sector.

The Etna T-Shirt S.p.a., located in Biancavilla, launched into the market new series of personalized T-Shirts under the "PLAYBACK" neo brand.

The technique used for the item personalization was **digital printing**, which also provided **high-definition prints**. The choice of the company's name came from its geographical location, on the Mount Etna slopes. Students initially wanted to sell the product through the Facebook page.

This following issues have set:

1) GENERAL OBJECTIVES:

- A. Promoting the enterprise culture, the spirit of initiative, and entrepreneurship.
- B. Learning about principles of an operational business
- C. Understanding the economical and social dynamics which develop within it
- D. Apply the formative competences in non-standard contexts, experiencing alternative didactics.

2) TRANSVERSAL OBJECTIVES:

- A. Learning how to work in groups
- B. Acquire interpersonal communication and organizational competences
- C. Develop problem solving skills
- D. Bring out vocations, develop potentiality, improve personal inclinations, make students responsible.

Organizational modalities of the project

Each course provided 20 hours of training, divided into a 2 hours weekly meetings at school, seminars and competitions.

The project involved three moments:

- it was held at the Technical Institute and has allowed young entrepreneurs to confront themselves with the market, for the first time, by presenting their own *business ideas*. it was the first time students looked outside their own group work to collect suggestions and verify the validity of their works within a small and known group of users.
- during this competition, the corporate laboratory connected with others joining in a formative program, setting up a space dedicated to their products. During this event students work was judged by a jury, which was called to express an opinion about the quality of what had been achieved.

Methodology

The methodology was the Jigsaw Classroom, used to demonstrate how each student can be essential in the creation and presentation of final works.

This was possible because, first of all, students were divided into groups and, at last, because specific tasks and determined responsibilities had been given to each one of them.

Evaluation

All corporate laboratories were involved in a positive and constructive competition. The evaluation focused on both the *business idea* and how students worked as mini-enterprises.

All of this enabled to compete in a genuine way, to confront each other, to improve, to work for common goals, to work in teams, and, eventually, to offer students the opportunity for meeting and being judged by a jury.

Project innovatives

The innovation of the proposed project is that the students felt particularly involved and motivated by an educational project which had not been imposed on them; on the contrary, they felt part of an active formation, all the way through the duration of the project.

"LEARNING BY DOING" MODULE

The "**Learning by doing**" module was carried out within the "realization of educational actions prototype in Areas of severe social and cultural exclusion, even through the existing networks *enhancement*" project, National Operational Programme 2007-2013, European social fund (ESF), "competences for development" on regions - cohesion action plan.

It was aimed at the prevention and early dropping-out and educational failure contrast within local contexts at higher of dropping-out risk.

The project, which lasted 120 hours, was conducted by the Dolfin S.p.a. company from Riposto (Ct) operating in the food sector.

Fifteen fourth-year class pupils of the Technical Institute of Technology in Biancavilla joined at the project.

Achieved competences:

- being able to describe the production process of certain foods such as ice lollies and granita;
- knowing how to make the packaging test and to test stress of new primary packaging materials
- being able to carry out HACCP, PH and °BX on syrup controls.

The formative project was articulated into:

- n. 20 hours of "welcome" conducted by an expert and coordinated by the project tutor;
- n. 40 hours of "training in situations" in classroom conducted by an expert and coordinated by the didactic tutor;
- n. 60 hours of "stage" in company coordinated by an educational tutor and company ones.

During the "welcome" phase, socialization activities, analysis of students' needs through tests of assessment of knowledge and skills held, shared objectives to achieve, meetings to identify pupils learning rhythms, need analysis, both in itinerary and at the end of the formative course.

The reception hours were followed by a period of "training in situation" in which aspects of social legislation and labor law were addressed.

This phase was followed by the **stage experience**. This has given students the opportunity to understand and observe the real operation of an operative cycle, to experience analytical methods used for the controlling of process parameters and to figure out how a company is structured and the professionals which are present there.

During the stage phase, the following issues were conducted:

- A. **microbiological controls** on raw perishable materials, on the finished product to validate process temperatures;
- B. **chemical-physical-sensorial controls** on Ph, °Brix having the help of the refractometer during the *preparation step*; on **pasteurization temperatures, filling and refrigeration temperatures, during the stuffing phase**; on **% color of post-filling anhydrous citric acid**.

Students have also performed support in ice lollies, sorbet and egg production lines.

A workshop type didactic was used, where pupils experimented, with motivation and participation, in order to build up their knowledge and to be able to acquire new learning styles and strategies.

This highly educational experience allowed students to learn new analytical methods, to observe equipment operation and to practice all their chemical acquired knowledges over the first four years of school. Thanks to the help of qualified staff, they were able to analyse existing products, to create new ones, to be hired in the raw materials analysis sector and in the "Easter Eggs" and summer products sectors, such as "polaretti", "granite" and "sorbet" production.

ALTERNATION EXPERIENCE BY THE CHROMIND

The recipients were the fourth and fifth year class pupils of the Istituto Tecnico Tecnologico of Biancavilla.

The pre-fixed and achieved objectives were the following:

- A. to introduce students to the use of high pressure liquid chromatography, already discussed about during the theoretical course;
- B. to guide the students in the use of software connected to the instrument, in data processing, and in critical evaluation of test results;
- C. to have the student developing the ability to exploit the potential of the used techniques.

The competence students achieved were:

- A. Knowing how to obtain data and express qualitatively and quantitatively instrumental analytical results through fundamental and derived sizes.
- B. to be able to identify and manage the information to organize experimental activities
- C. to be able to draw up technical relations and to document individual and group activities related to professional situations.

The contents that were faced were the following:

- HPLC theory and instrumentation (high pressure liquid chromatography);
- Software use linked to the instrument;
- Benzoic acid analysis in complex matrices such as foods and hygienic products;
- Acetylsalicylic acid analysis in complex matrices such as medicines

- Achieved chromatogram interpretation and data processing.

The observed positive elements were:

It was a very useful experience because, although this topic is usually studied in a theoretical way in analytical chemistry programs during the school year, it is impossible to carry out this type of analysis in school laboratories, even if they are provided with various instruments (HPLC). As a matter of fact, this kind of activity requires a consecutive number of hours markedly superior to two or three daily hours which generally a curricular timetable do not have. Likewise, analyses were conducted on complex matrices such as foods requiring the presence of experts in the food fraud field and the use of analytical instruments and special accessories which schools generally do not have. The only critical point found is: the experience was not carried out in a laboratory, but the firm had occasionally rented some premises generally used for meetings or trade exhibitions.

WBL EXPERIENCE OBSERVED BY THE LI-MONELLO COMPANY

The project was directed to fifteen students.

The objectives that were achieved were:

1. Identifying and applying the methodologies and techniques of chemical and/or biotechnological establishment management and to administrate laboratory activities;
2. Intervening in the various stages and levels of the production process from ideation to realization of products using the project tools, documentation and quality control of work in chemical and/or biotechnological processes;
3. Integrating competences about chemistry, systems and chemical processes, organization and industrial automation, contributing to the processes innovation and its procedures;
4. Checking the product's correspondence to declared specifications, applying the area of competence procedures and protocols;
5. Verifying the production cycle by using software used in both laboratory analysis techniques and the system control and management;
6. Applying principles and tools concerning the management of workplace safety, and the products, processes and service's quality improvement.

The discussed contents were the following:

1st presence phase

- Interactive lessons in classrooms and/or in equipped laboratories with expert teachers, concerning companies' productive aspects to visit;

2nd company phase

- Guided tour and lectures about technology and manufacturing processes present in a distillation company (distillation plants, drying, tartrates battery, boiler room, treatment plant) and concrete experiences of distillation and wastewater analysis in chemical laboratory inside the company.
- Guided tour and lectures on productive and technologies processes present in a liquor factory (raw materials arrival, alcohol, sugar, essences, aromas, storage, alcohol infusion with mixing, filtration, filling, capping, labeling, state mark application, packaging, storage of finished products in warehouse and subsequent sale)
- Lessons about safety in production and marketing of both alcohols and wine derivatives which have to be carried out in the companies.
- Lectures on authorization aspects and various local authorities controls regarding environmental safety.

The acquired skills were:

- A. Knowing how to work in analysis laboratories in the food industry; being able to assess the process problems, from sampling to the report;
- B. approaching the finished product's conduction and controls in the industrial or handmade production
- C. being able to enter both in a group of design for the realization of industrial synthetis, and in very differentiated production realities, which are characterized by a technological rapid evolution.

The positive elements are:

Students have shown great interest in what they have seen (machinery, structures, laboratories, materials)

- they understood what the production processes are (goods production or services) which characterize the two organizations visited - they identified the roles and the functions performed by each operator in companies.

Critical points:

- Insufficient financial resources to develop the project the same way it was designed, so it can not be considered a true WBL experience.

THREE YEAR EUROPEAN PROJECT "GO TO WORK IN EUROPE", EUROPEAN ERASMUS PROJECT PLUS KA2

This School has been taking part to the three-year project "**Go to work in Europe**" financed by the European Erasmus Project PLUSKA2 which started at the international meeting in Valencia.

A network of schools situated in Romania, Sweden, Bergamo's Paleocapa H.S., Dalnine's Marconi H.S. and Biancavilla's Techno-Tecnological H.S., were involved in an event called 'the week of mobility'.

The involved students experimented the ECLI 'Expert' phase, from the **17th to 22nd October 2016**, based on competences and pre-fixed activities agreed at the meeting and the International Seminar that had taken place in Catania. The latter had the task of spreading the results which were obtained in the first year of the project activity.

In particular, the meeting – concluded by the International Seminar- was considered as an event finalized at the diffusion of '*intellectual output*' whose creation is one of the main objectives of the project. The '*intellectual output*' was meant to test the WBL innovative didactic model; the latter, which was defined as **ECLI (Expert/Classroom/Laboratory/Individual)** was carried out during the school year 2015/2016 and was experimented in four different European countries by schools participating to the partnership (Spain, Romania, Sweden and Italy).

The whole project '**Go to work in Europe**' is coordinated by the FORMA corporation (Educational System Corporation Ltd.) which is an Italian Industrial Federation located in Bergamo that boasts the participation of both prestigious multinational companies and leading firms in their own different sectors, among which the ABB Group, the Tenaris, Dolfin and others. Considering the educational syllabus and curricular great importance given to WBL by the law L.107/2015 and, furthermore, considering the existing cultural gap comparing the Italian educational experience to that of other European countries, the project '*Go to work in Europe*' amounts to a strategic research/action aimed at creating a WBL model which can effectively integrate the different educational paths leading to developing competences, which represent the main principle of WBL. The students carried out their WBL experience working for two firms: Dolfin and IVS Sicilia.

At the Dolfin, the following topics, both theoretical and practical, were dealt with:

- Occupational safety, used within the company;

- Company organization held by a human resource Expert;
- Filing procedures of both quality and production data;
- Procedures for products' traceability;
- Procedures of sorting out different company problems, such as:
- Controlling the applied quality, during and after production;
- Sorting out of wastes
- Managing supplies.
- Practical application of the production control;
- Controlling "Temperature" and "Color" in order to detect any risk of bacteriological contamination;
- Being delivered a "Real Task" by the company and its eventual assessment.

At the IVS, the following topics, both theoretical and practical, were dealt with:

1. Occupational safety used within the company;
2. Company organization and arrangement;
3. IVS Productive process presentation;
4. How to upload a vending machine;
5. Risk factors regarding the construction and the inspection 'hot beverage' vending machines;
6. Determining water hardness;
7. Operation simulation of a vending machine;
8. One lesson in the control-room about 'Programming a remote supervision plan' on vending
9. machines;
10. Vending machines control;
11. Error-simulation test;
12. Test on electronic and mechanical components;
13. Sterilization of the machine;
14. Company management systems
15. Final stage assessment test, provided by the company staff and the Project Tutor.

The two specific competences that the students have achieved after the WBL were:

- a) To analyze the operational risks and to apply their preventive measures;
- b) To identify what made production more efficient and to become able to actually apply it.

Moreover, other competences have been achieved by the students:

- a) Personal and social competences, such as: communication, team-work, relational competences towards clients;
- b) General competences: project planning and problem-solving.

Strong points

- Being guided by qualified personnel;
- The possibility of easily achieving technical competences and real working procedures through learning, observing, doing and self-improvement;
- Developing positive attitudes in respect to work, including responsibility-taking; respecting due dates; the capacity of reacting within given situations (therefore, evaluating risks);
- The possibility of learning about the basis of socialization and improving students' motivation for work;
- The acquisition of proper practices in the work field.

Critical points

The company Tutors involved in the WBL project should spend more time on selecting accurately and planning the educational activities within the work context, as well as timing each activity.

Furthermore, whenever a large number of students are involved, a limited access into particular working spots could happen; this may interfere with the students' efficient learning. In this case, both the work spots and the practical activities should be better organized, so that the students can actually be witnesses to all the educational activities and be furtherly encouraged to take more responsibility and solve problems autonomously, even if supervised on.

MONITORING AND ASSESSING THE WBL ACTIVITIES THAT HAVE BEEN CARRIED OUT IN THE LAST THREE YEARS.

The different WBL experiences, in the last three years, have included both Monitoring and Assessment phases which can be identified in three parts:

1. Entry phase in order to verify the initial prerequisites;
2. In Progress phase, carried out at the classroom lessons;
3. Final phase, in the end of the project.

During the Entry and Final phases, the Experts respectively verified the students' initial and final levels, by giving out, soon after the Final phase, a project-appreciation survey and having the students take practical tests about the activities they had carried out.

The Activity-monitoring was always been given out by the following subjects who had constantly taken part to the project:

- a) The **Project group** who conducted the monitoring through questionnaires, having, thus, the possibility of reformulating the project in case of unexpected situations involving, sometimes, even the hosting companies;
- b) The **Class Council** who analyzed the acquired documentation, considering the WBL experience as a complete schooling activity so that the students' WBL participation to the project was to be assessed during both the first and final term report cards. Furthermore, the Class Council also expressed their assessment basing it not only on the disciplinary content but also on the students' maturing-factor achieved by their students;
- c) The **School Tutor** who carried out tests during the students' ongoing activity within the company in order to highlight problems or problematic situations that came out during that period, trying to find solutions that matched both hypothetical and real experiences. The Tutor carried out his task by using questionnaires and eventually pointed out, for each student: the student's acquired autonomy, amount of work done by the student, his commitment to the project, his acquired knowledge, including also the company's attitude towards the student;
- d) The **Company and its Company Tutor** who followed each student and checked out his relational behavior in terms of: his punctuality, his motivation, pragmatism, disposition to team-work, to listening and learning. During the Progress phase, the students took many 'pauses' in order to reflect on their ongoing experience in a wide range: from informal reflection in order to carefreely discuss about the project to more serious to sum up what they had done. The reports about the activities, the questionnaires and logbooks were very fundamental during the reflection 'pauses'.

PROJECT EFFICACY EXAMINATION

Both students and their families have had an active role in the monitoring of the educational repercussion of the WBL experience.

EXPECTED RESULTS OF THE WBL ACTIVITIES OF THE PAST THREE YEARS

The Istituto Tecnico Tecnologico has always had the aim of making students acquire both theoretical and practical knowledge to spend in different studying and working contexts. The WBL activity, carried out within the school, has allowed the students to potentiate their knowledge that have been acquired during the didactical activities. Students have had the opportunity to take part to the management of the hosting company's organization and production activities, to upgrade their previous specific knowledge and competences, evaluated by tests aimed at verifying their new acquisitions.

Students have participated to various WBL experiences, which have been organized by both the school and hosting companies in such a way to make the working context turn into an efficient field of 'learning' where the students have been sided by qualified personnel, who were adequately trained at dealing with young people, willing to follow them, to explain and to think over with them, to guide them from the very beginning to eventually and gradually let them proceed autonomously.

To let the working context look like a learning one, it was necessary to repeatedly intervene through activities that would help the student to reflect on what he had just observed and experimented during the course of the project.

CONCLUSIVE CONSIDERATIONS ON THE WBL ACTIVITIES CARRIED OUT IN THE LAST THREE YEARS

The WBL activities suggest that the "positiveness" students have noticed during the WBL educational path, can essentially be summarized into some characterizing aspects:

- A. **the contact with the reality of the working world** where students can learn concepts and behavior which are impossible and unthinkable to create within the school contexts, and in which the student's curiosity is stimulated by proposing them significant and not repetitive tasks;
- B. **the contribution of productive contexts to their own personal growth**, because of contacts with various players within a company which has brought them to improve their relational skills;
- C. the acquisition of **autonomy**; as a matter of fact, in the business world we face with problem situations in which you need to take initiatives; the autonomy exercise is closely connected to the taking on of responsibilities;
- D. students have declared they felt involved in a different way in the business world in comparison to school because they have felt the burden of personal responsibility in a more pressing way and they have subsequently behaved with more attention and reliability, by respecting punctuality rules imposed on them;
- E. acquisition of **flexibility**, because pupils have learned, observing several people's work, that there is not only one possibility of managing a certain situation, but there are more ways and methods to reach the final result;
- F. the results of teaching activities because the WBL experience, thanks to its learning through practice, has enabled students to better understand some theoretical contents discussed about in class and even deepen them.

The WBL, first of all, has contributed to show students a new meaning to school education and to adopt a more responsible attitude toward its.

As regards to critical issues faced by students, some are related with:

- A. to the organization, which was not always timely and effectively carried out in the workplace;
- B. to the logbook which has to be filled in daily. Some students have found it a very useful tool because it has led them to reflect and make sense of the activities they carried out that day; some of them,

however, have declared they found it a very meaningless tool because they were bound to write the same things.

The workplace is a significant learning context if you create series of conditions heading to learning. This doesn't mean reducing the work complexity, nor selecting structured pathways for the WBL student.

However, it is necessary to valorize the natural complexity of practical experience, its specificity and unpredictability, keeping in mind that, in order to learn from experience, students must have possibilities to live direct contacts and have action possibility ensured.

ROMANIA

NATIONAL LEGISLATIVE AND ORGANISATIONAL CONTEXTS

At the core of the Romanian Educational system underlie the following laws:

- *The National Education law no.1/2011*

The pre-university school units are organized and function based on pre-established principles according to the National Education Law no.1/2011 with the changes and subsequent supplements. The law regulates the structure, the organization of the national system of education, of the private and religious one.

- *The law no.5115/2014 on the approval of the regulations concerning the organization and function of the pre-university school units.*

ROFUIP – the code of practice concerning the organization and function of the pre-university school units within the educational system from Romania apply at the level of all school units: state, private or confessional ones. These regulations ensure the application of the law provisions no.1/2011, with the changes and subsequent amendments and of the other legal standards that establish the organization, functioning and assessment of the pre-university school units. The regulations are a unitary system of compulsory standards for the staff of the Ministry of National Education and for the institutions coordinated and subordinate to it, for the county board of education, for the teaching staff and auxiliary staff. It also applies to the primary beneficial owner of education and to the professional, technical education as well, for their legal representatives also.

ROI- the internal order regulations

The internal order regulations of the pre-university school units can be revised every year, within 30 days from the beginning of the school year. The proposals for its revision will be applied in writing at the school units with a registration number by the qualified persons who approved the previous one. These proposals will be submitted for approval to the procedures established within the school regulations. These suggestions for changes could come from other persons or group of persons as well according to the internal rules of each unit.

CASE STUDY: COLEGIUL TEHNIC "ALESANDRU PAPIU ILARIAN"

PRESENTATION OF THE SCHOOL

History

"Alesandru Papiu Ilarian" Technical High School is a pre-university educational institution. It has 79 teachers and 987 students. Furthermore, the school owns many laboratory classrooms, workshops, study rooms, and it also includes a canteen and a students' hostel.

In the last decade our school benefited from the following educational programmes:

- The Phare Programme TVET 2004-2006
- Regional Operational Programme for North Transylvania
- TenarisSilcotub's company STEP Programme, which gave us a modern electronics and automation laboratory.

Due to these educational programmes, we can offer ideal conditions for students' training. Students who love technology now have the opportunity be up-to-date with the latest technology in the field even at a high school level. Thus, they can integrate more easily into the labour market.

The quality of education is assured by RAQAPE, which is a public institution of national interest working under The Romanian Ministry of Education and Research, with legal personality and own budget, working in compliance with the Law no.87/2006 on quality of education.

The School Mission Statement:

“Alesandru Papiu Ilarian” Technical High School desires to achieve national and European acknowledgment in the public education. We are passionate about encouraging students to pursue high standards of academic excellence. Our mission is to ensure that our students explore and expand their interests, reach their fullest potential, develop the skills necessary to become responsible, and engaged members of the society. Our school encourages students to develop adaptation skills in order to succeed in the constantly evolving society.

The Vision of the School

The school's vision represents an ideal image what the school desires to fulfill in the near future. “Alesandru Papiu Ilarian” Technical High School as an educational unit proposes to accomplish growth of its prestige by offering a quality education which is flexible.

Current situation: specializations, education levels, number of students, classes, faculty, staff, building, laboratories, classrooms.

The schooling plan includes the following specializations:

- Sciences: Mathematics and Computer Science, 8 classes
- Economic Sciences: Technician in economic activities, 11 class
- Technological Sciences:
 - Technician in telecommunications: 2 classes
 - Technician in automation: 4 classes
 - Technician in Electromechanics: 4 classes
 - Technician on numerical control machine tools: 3 class.

This qualification is new in our school in response to TenarisSilcotub company's request. This profession is requested by a series of local economic operators such as TenarisSilcotub, Michelin, small firms and other little businesses who use this kind of machines.

- Electrical Technician: 2 classes
- Technician mecatronica: 2 classes

The representatives of our high school are willing to learn and share inspiring experiences. Last but not least, they wish to develop more school projects which enhance the entry of our students on the labour market.

Current situation: buildings, laboratories, classrooms

- 1 Physics laboratory
- 1 Chemistry laboratory
- 5 Computer labs
- 6 Technical laboratories:
 - mechatronics
 - electrical
 - electronic
 - technical measurements
 - automation
 - CNC machines

- 2 Technical workshops:
 - electric-electronics
 - CNC machines
- 1 Geography cabinet
- 1 Cabinet biology
- 1 Romanian language classroom
- 1 Cabinet English
- 1 German cabinet
- 1 School counseling office bde
- 1 Cabinet math
- 1 Library
- 39 Classrooms
- **Buildings: 8**

WBL ACTIVITIES DEVELOPED IN THE LAST THREE YEARS

How the school implemented the Legislative/regulatory framework

Romanian education is conducted according to the **national curriculum** in force issued by the Ministry of National Education and Scientific Research (MENCS) for each professional qualification. Depending on training **standards** (SPP) developed by a structure MENCS called the National Centre for the Development of Vocational and Technical Education (CNDIPT) is set **Education Plan** which includes Culture specialized and practical training weekly modules and the number of hours related.

Job description

Level 4 graduates from a technological high school with the specialization “Technician in automation” will be able to fulfill technical tasks, like installing, working, maintaining and repairing automated systems.

They will also test prototypes, conceive and make automation sketches, contribute to the estimation of quantities and costs of materials, estimate the necessary workforce. They ensure the technical control of the automation systems to make sure they function as they are supposed to.

Key competences:

1. Speak a foreign language
2. Think over and solve problems
3. Management of interpersonal relationships
4. Use the computer and process information
5. Communication
6. Career development
7. Process numerical data
8. Start a business

General technical competences:

1. Plan and organize production
2. Ensure quality
3. Projecting elements
4. Health and job security
5. Transmission systems
6. Use CAD applications

7. Manufacturing systems
8. Techniques of measuring
9. Planned maintenance
10. Automation systems
11. Electrical systems
12. Electrical circuits
13. Electronic circuits
14. Mechanic joining
15. Manufacturing flaw detection

Specialized technical competences:

1. Use circuits with electronic components in automation
2. Use electronic circuits made from logic circuits in automation
3. Present programmed automation machines
4. Analyze automation adjustment systems
5. Adjustment of manufacturing parameters
6. Computer systems

The key competences for long-life learning represent a combination of knowledge, abilities and attitudes which are adapted to every situation. These are necessary for personal development, social inclusion, active citizenship and employment.

The key competences are essential in a society based on knowledge and guarantee flexibility regarding workforce which can adapt more easily to the constant changes that take place in an interconnected world. These competences are a major factor in innovation, productivity and competitiveness and contribute to employees' motivation and satisfaction and also to job productivity.

The key competences should be acquired by:

- Youth towards the end of high school period; these competences should help them to prepare for adult life and especially for employment, being also the basis for learning continuation
- Adults, through a process of ability development and updating

Acquiring these key competences relate to the principles of equality and access for all the people. This framework also refers to disadvantaged groups whose educational potential needs support. Examples of such groups include persons with limited basic abilities, persons who drop school early, long time unemployed people, people with disabilities, migrants etc.

Type of activities realised

Number of students/classes involved each year in WBL activities:

Number of students: 738 involved each year in WBL activities

Number of classes: 28 involved each year in WBL activities

Hours planned in WBL

They planned hours in WBL is done according to the curriculum which depend on the study, as follows: Class IX 414 hours to 440 hours Class X, Class XI 513 hours of class XII of 491 hours.

Number of enterprises involved: 70

Description of WBL activities realised in relation with ECLI model:

✓ **Expert**

TenarisSilcotub laboratories funded company, comes a month performing expert activities two hours of practical technical qualifications for all students.

✓ **Classroom**

Professor working in the classroom, after planning done at the beginning of the school year which must be in accordance with the national curriculum. Such activities: teaching - learning - evaluation through exercises and problems, case studies, projects, worksheets, evaluation sheets, etc.

✓ **Laboratory**

Professor working in the laboratory, after planning done at the beginning of the school year which must be in accordance with the national curriculum. Such activities: computer simulations using programs, practical work on electronic modules using measuring devices, components and circuits, electrical drives. Students work on worksheets that include development work with workloads, electrical and electronic schemes, analysis and interpretation of results.

✓ **Individual**

Individual activity that takes place at school sign partnerships with businesses practice. Students will be coordinated by tutors practice groups of the firm. Student work is evaluated by tutors and monitored by specialist teachers from the school. Practice takes place on a timetable drawn up at the beginning of the school year.

THE GOVERNANCE OF THE SCHOOL RELATED TO THE WBL ACTIVITIES

- Tasks and responsibilities of the figures involved in the process in the school

The activities based on the learning activity within the school

- preparing the students with learning difficulties
- organizing, coordinating students to obtain good results at the baccalaureate exam
- preparing the students for the school contests and activities
- identifying students with great abilities and achievements
- workshops on different school subjects
- involving the students in extracurricular activities
- organizing stages of practical training in partnership with the economical agents
- activities with the parents in order to support the students
- using the laboratories

Position responsibilities:

- Responsibility for the organization, management, control, checking, communication, informal authority.
- Responsibility for the accuracy and applicability of the issued documents, the correct application of the provisions of regulations.
- Responsibility for solving conflict situations noticed expressed directly or through complaints.
- Responsibility for decision proposals.
- Responsibility for the management of budget funds and assets.

ROLE OF THE COMPANIES

Our partners practice form students in practical activities under the program of practical training received from specialist teachers from the school. Michelin TenarisSilcotub large companies and selects students based on tests of their European level. Tests applied in all countries where it has subsidiaries. Tenaris offers

technical scholarships to students who results highlights best profession in the academic year 2016-2017 offers 86 scholarships worth 400 euro / student / year.

ROLE OF OTHER PUBLIC/PRIVATE ENTITIES OF THE TERRITORY (SUCH AS INTERMEDIARY BODIES, ETC.) SPECIFIC DESCRIPTION OF PHASES, TOOLKIT AND RESPONSIBILITY IN:

- Planning

Analysis Plan for the next school year tuition is done in collaboration with local authorities, representatives of companies, the parents and teachers. Local authorities know the needs of the labour market professional qualifications requiring schools these needs.

- Implementation

Representatives from partner companies are part of examining boards at the school for certification of professional qualifications of graduates of vocational education, the role of monitoring the organization and conduct of the examination, and evaluation.

Practical training for classes IX and X to occur under a program developed by Professor specialist in collaboration with a company. These programs called locally developed curriculum (LDC) will be approved by the company (den practice partner), the educational unit, approved inspector for vocational and technical education and the Board of County School Inspectorate.

- Monitoring

Representatives from partner companies are part of examining boards at the school for certification of professional qualifications of graduates of vocational education, the role of monitoring the organization and conduct of the examination.

- Evaluation

Representatives from partner companies are part of examining boards at the school for certification of professional qualifications of graduates of vocational education, the role of monitoring the organization and conduct of the examination, and evaluation.

At events such as Days of Education and City days, local authorities' rewards students with good results obtained in national and international competitions.

STRONG AND WEAK ASPECTS IN WBL PROCESS

Strong aspects:

- Teaching technological Laboratory classes in specialized laboratories;
- Personal experience gained in individual projects we have carried out;
- Working with business partners
- Study tours / experience exchange with other countries (Portugal, Sicilia);
- Working in groups of students;
- Professional experience;
- Job training;
- Developing partnerships between schools and business partners;
- Developing the necessary skills for an employee who works in a dynamic market;
- Transition from school to work.
- Profile involve students in technical project POSDRU "PROinnovation by training firms – from the competitive school to competitiveness in labor" where they learned: to establish a virtual company, to conduct transactions between school and other companies in the country, complete accounting documents, participated in fairs and exhibitions with products made by them

Weak aspects:

- Curriculum is not completely covered by the company because of their own activities;
- The small number of tutors for student groups to practice;
- Teachers who teach subjects are close to retirement;

WBL CASE OF SUCCESS

- Students experience directly in the manufacturing process;
- Practice is the transition from school to active life;
- Application of theoretical knowledge learned in school to work;
- Skills training and practical skills

FURTHER ADVANCES IN WBL ACTIVITIES

Our school students have achieved very good results at national contests conducted on WBL structure, such as written test conducted in exercises and problems on electrical circuits and practical test by the practical realization of a functional circuit and measurement of electrical quantities. The results of the last three years on the national Olympics automation were: a first prize and two honorable mentions. Profile Services National Olympiad for our school won second prize and a mention.

In the "Contests technical field", the students of our school have won First Prize and Second Prize Competition organized by the Consulate of France in Romania, in which French companies were involved in the country, especially Michelin partner with us practice.

CASE STUDY: LICEUL TEHNOLOGIC "MIHAI VITEAZUL " ZALĂU

PRESENTATION OF THE SCHOOL

Technological High School "Michael the Brave" Zalau is located in the center of Zalau city, on Tudor Vladimirescu street, no. 5. The institution was named Technological High School "Michael the Brave" Zalau, in memory of the great ruler who made the first union of the Romanian Principalities and has won his last victory at Guruslău (in 1601), a village near Zalau city.

The current Technological High School "Michael the Brave" Zalau is among the largest in the county with 28 high school classes at day, evening and low frequency forms of education.

Technological High School "Michael the Brave" Zalau was the first industrial high school in Salaj County inaugurated on 09.15.1969 with the reestablishment of this county and worked, for a while, under the name Industrial High School of Civil and Industrial Constructions.

Over the years, its name has changed several times, as follows: Industrial High School no. 2, Industrial High School no. 3, High School of Constructions, Industrial High School no. 4, School Group "Michael the Brave" in 1993 and from 2012 its name is Technological High School "Michael the Brave".

Technological High School "Michael the Brave" is an educational institution that provides technical training to youth at European level, as well as their theoretical training. Technological High School "Michael the Brave" Zalau aims at training creative and autonomous personality of students, providing a high-quality training, knowledge-based general education and training of professional skills that enable students to pursue a profession in their field of training, continuing studies in higher education or pursuing their own business. The slogan of our school is "Together we build careers!"

At this time works with a total of 28 classes and 623 students:

- 18 day high school classes (IX-XII)
- 4 classes of high school with low frequency
- 2 evening high school classes

- 4 professional education classes

Areas of training include:

- real-natural sciences
- services - economic
- technical
- mechanical
- electronics and automation
- constructions, installations and public works

In the technical field, we are preparing students for the following professional qualifications:

MECHANICAL

- high school (level IV of qualification)
 - Mechatronics
 - Mechanical Technician Maintenance and repairs
- professional education (level III of qualification):
 - Welder
 - Mechanic
 - Mechanical hydraulic and pneumatic equipment

ELECTRONICS AND AUTOMATION

- high school (level IV of qualification)
 - Automation Technician

CONSTRUCTIONS, INSTALLATIONS AND PUBLIC WORKS

- high school (level IV of qualification - Draftsman technician for constructions and installations
- professional education (level III of qualification)-plumber, technical and sanitary installations and gas.

Human resources:

- 25 General education teachers;
- 16 Technical teachers, (11 engineers and 5 foremen instructors) ;
- 12 Auxiliary personal;
- 12 Non-teaching staff.

Those 16 teachers have competences in technical teaching-learning-assessment and they are in a permanent professional training to be up to date with new technologies. Foremen instructors have competences of coordinating and monitoring the students' practical activity to consolidate theoretical knowledge and skills training specific to each qualification.

The school has specific professional qualifications in the subjects that prepares students. In mechanical field we have a modern laboratory of hydraulic and pneumatic drives, welding workshop, a workshop locksmith and an auto mechanics workshop. (We note that the workshops are included in a project of rehabilitation and modernization).

To use school's equipment, technical staff has benefited of training in the last few years. Students are training in mechanical, where they are acquiring during four years of professional competence level IV of training standards indicated.

Thus, the students from the professional qualification mechatronics will be able:

- To perform technical tasks installation, commissioning, maintenance, operation and repair of mechatronic systems;
- To test the prototypes, to design and carry out mechatronics schemes of installation equipment;
- To contribute to the estimation of quantities and costs of materials, labor estimating necessary;.
- Technical supervision of installations;

- Mechatronic systems in order to maintain the operation, according to specifications and regulations.
- Although initially this high school had building classes, due to specific social context and development in our city represented by two multinational industry and thus the demand on the labour market of qualified staff in the fields of mechanics, electronics and automation classes ratio changed in favor of mechanics classes.

WBL ACTIVITIES DEVELOPED IN THE LAST THREE YEARS

In the framework plan are provided a number of hours/week) for practical training. It is made a semester appointment of weeks which runs the practical training. During this time student do not attend classes (they only make practice).

For high school classes there hours or days (depending on class) of technology labs, where students experience technological processes in school laboratories. The objectives of each project are set by the teacher/mentor/tutor, who need to ensure acquiring competencies stipulated in SPP's. Laboratory activities unfold the entire class and internships is done by groups of students (12-15 students) or individual (/trader).

Curricula - for technological pathway grades are:

1. Course hours - after a weekly schedule;
2. technological laboratory hours – with participation of economic agents' experts – according agreed schedule.
3. practice hours (hours of training activities):
 - Current- takes place during the week of study (depending by class - there are hours or days there of current practice).
 - Merged- practical training - students did not participate in classes or laboratory activities, practice will be scheduled quarterly or annually. It takes place during the school year. For these periods there are signed some training conventions with economic agents.

For example, the Ministry of National Education the la OMEdC nr. 3171 din 30.01.2006 present the SPP **(Standard Technological Training):**

LIST OF UNITS OF POWERS

- Domain: Technical
 - Qualification: mechatronics
- I. Units Of Key Skills
 1. Communication In Modern Language
 2. Critical Thinking And Problem Solving
 3. Management Interpersonal Relationships
 4. Use Of Computer Information And Processing
 5. Communication
 6. Career Development
 7. Digital Data Processing
 8. Starting A Business
 - II. General Technical Competence Units
 9. Production Planning And Organisation
 10. Quality Assurance
 11. Design Elements
 12. Health And Safety
 13. Transmission Of Movement Systems
 14. Use Applications Like Cad

15. Systems And Technology Manufacturing
 16. Techniques In The Field Of Measurement
 17. Planned Maintenance
 18. Automation Systems
 19. Electric Drive Systems
 20. Electrical Circuits
 21. Circuits
 22. Mechanical Assembly
 23. Fault Detection
- III. Units Specialized Technical Skills
24. Sensors And Transducers
 25. Electric Drives In Mechatronics
 26. Pneumatic Actuators In Mechatronics
 27. Hydraulic Actuators In Mechatronics
 28. Mechatronic Systems
 29. Plc

Title of 18. Automation Systems

Jurisdiction 18. 1: Characterize the automatic control systems.

Performance criteria:

- a) Schematic diagram representation of a system for automatic adjustment.
- b) Indication quantities involved in the schematic diagram of a system for automatic adjustment.
- c) Analysis of the functional role of the automatic control system components.

Applicability conditions Performance Criteria:

- Schematic diagram: a block diagram of the automatic control system
- Sizes the SRA scheme: input (reference) reaction command execution (control), output, faults
- SRA components: input transducers and reaction elements of comparison, automatic controls, actuators, controlled facility

Evaluation samples:

- Written evidence that demonstrates that the candidate is able to achieve a schematic diagram of an automatic control system, as outlined in the performance criterion (a), covering all the conditions of applicability of these criteria.
- Oral evidence which demonstrates that the candidate is capable of indicating the quantities involved in the schematic diagram of a system for automatic adjustment as detailed in performance criterion (b) and covering all the conditions of applicability of these criteria.
- Oral evidence which demonstrates that the candidate is capable of specifying the functional role of the automatic control system components as specified in the performance criterion (c), covering all the conditions of application of this criterion.

In the last **three** years, the school has been involved in two POSDRU, projects co-financed by the European Social Fund for the field of lifelong learning in correlation with the needs of the labour market (key area of intervention 2.1 called Transition from school to working life).

In the POSDRU project – “Road to success” unrolled between 2011 – 2014 were involved 205 students. In the POSDRU project “Road to success” were involved 25% from the whole school classes. During this project students have been involved in individual activities at a group of economical agents. In the POSDRU project “Road to success”, students had a number of about 150 hours/year (number of hours imposed by

legislation) according to curricula. In WBL projects we involved a number of 14 enterprises each year. Our WBL planned projects are one year projects. For each specialisation, we realise a convention between school and economical agents for practical activities.

In the POSDRU project "Road to success", students realised their internships at the economical agent, which was notified by the pedagogical Annex about the skills that students will need to practice and acquire. The organization and tutor's distributions was made by the economical agent. The teacher/the qualified trainer checks every day the students' activity and monitoring the activities made by tutor.

The laboratory hours are made in our school and sometimes with experts' participation from the partner's enterprises. At IX and X high school classes, practical activities are made in school workshops to give the students the possibility to accumulate the trade bases. The "ROAD TO SUCCESS project was initiated and coordinated by two private firms (enterprises) which coopted as partners ANESPO (National association of professional schools from Portugal) and four high schools (two from Zalau city and two from Targu Mures city)

The "ROAD TO SUCCESS" aimed and succeeded to make a bridge between the education system and labour market by implementing career counseling activities and practical training stages at European standards to ensure development of skills and work skills of students in order to improve entering and maintaining on the labour market.

Activities realized through the project:

- partnerships with economic agents;
- tutor training;
- crafts contests;
- participation in specialized fairs;
- the development, implementation, monitoring and evaluation of counseling and professional guidance services;

Arrangement and equipment of four career counseling centers (one in each project partner school) ;
Romanian-Portuguese experience exchanges for both students and advisors in the counseling centers;

- 1) visits to universities;
 - 2) job fair;
- monitoring the entering of young graduates in the labour market over a period of six months after graduation;
 - coverage of the project, dissemination of results and good practice examples

THE GENERAL OBJECTIVE OF THE PROJECT IS THE EFFECTIVE LINKING OF EDUCATION SYSTEM WITH LABOUR MARKET THROUGH COUNSELING AND PROFESSIONAL GUIDANCE ACTIVITIES AND PRACTICAL TRAINING STAGES.

The specific project objectives are:

- Developing the counselling and professional guidance centers in the four partner schools in the project Improving practical stages;
- Promotion and development of partnerships between businesses and schools;
- Monitoring the entering of young graduates in the labour market over a period of six months after graduation;

The school organised activities related to the WBL project through:

- Target group identification;
- Together with project's coordinator firms it identified the training partners partnerships with economic agents;
- established the periods for training with economic agents, monitoring the training activities through

qualified trainers.

In the project “Start up on the work market through exercise firms” were involved a number of 60 students during the 2014-2015 years. In the project “Start up on work market through exercise firms” activities were organised on groups (5 students on each group). In the project “Start up on work market through exercise firms” were involved 22% classes.

Through “Start up on work market through exercise firms” project, students had another 150 hours/year beside of those 150 imposed by legislation.

Our WBL planned projects are one year projects. For each specialisation, we realise a convention between school and economical agents for practical activities. The evaluation process for competences acquired during the projects was made by the qualified trainer and by the tutor practice from enterprise.

Activities realised in relation with ECLI model:

- **Expert in the class:** At “Michael the Brave” High School in pneumatic - hydraulic laboratory : Tenaris - Silcotub once/ month , Michelin once/month. The person who will communicate each month schedules is Rodica Damsa.
- **Class in the company:** Work visits in companies (for the industrial environment observation) and laboratory activities in the company.
- **Laboratory:** Laboratory activities in the school and XIth , XIIth grades and professional education - Internships in companies / economic agents.
- **Individual Experience on-the-job:** IXth and Xth grades - internships in school workshops and XIth , XIIth grades and professional education - Internships in companies / economic agents.

THE GOVERNANCE OF THE SCHOOL RELATED TO THE WBL ACTIVITIES

Tasks and responsibilities of the figures involved in the process in our school are:

	GENERAL PLANNING	IN DETAIL PLANNING	IMPLEMENTATION	EVALUATION OF STUDENTS	MONITORING OF THE PROCESS
Head Teacher	R	C	C	K	R
School Tutor	K	A,R	R	R	R
School Board	R	C	C	K	R
Person in charge for guarantee safety rules (SCHOOL TUTOR)	K	K	K	K	K
Technical and Scientific Committee	R	C	C	K	K
Company Tutor	I	A	A	A	R

Table agenda:

- R - RESPONSIBLE of the process,
- C - COORDINATOR of the process
- K - CONSULTED of the process
- I - INFORMED of the process
- A – ACCOMPLISHES specific tasks

Our most important partner is the Tenaris Silcotub company that:

- He sponsored our school with a modern Pneumatics and Hydraulics Laboratory where our students of mechanics and electronics automation profiles do some modules either the theoretical or the

practical side;

- Ensure the presence of students in his own company to see live processes of factory;
- Provide technical scholarships for 25 students from technical classes (about 340 euro);
- Sponsorises our school annually with about 4000 euro, to promote technical education in the terminal grades of secondary school.

Other companies with which we have practice conventions for our students and where they do practice directly to the factories concerned are: Michelin, Town's Water Company and many smaller companies in the construction sector. City of Zalau ensure payment of maintenance of buildings (water, sewer, gas facilities. Due to reduced funding from the City Hall allocates very little money for development of the material. We identify a WBL project by analyzing the material in school (to match the curriculum), identifying gaps ... seeking solutions through partner companies.

We have in our school a person which is responsible for each students class, but the activity of the entire school is coordinated by the manager which is dealing with technical issues. In the framework plan are provided a number of hours/week) for practical training. It is made a semester appointment of weeks which runs the practical training. During this time student do not attend classes. (they only make practice).

For high school classes there hours or days (depending on class) of technology labs , where students experience technological processes in school laboratories . The objectives of each project are set by the teacher / mentor / tutor, who need to ensure acquiring competencies stipulated in SPP 's.

Laboratory activities unfold the entire class and internships is done by groups of students (12-15 students) or individual (/trader) The raining partnerships is for a one year.

For all students skills must be the same, but the activities are different depending on student's interest, entity specific work of economic agent, etc. Skills that students should acquire are imposed by SPP 's (legislation).

In projects on European funds, were identified economic agents willing to cooperate with our institution. After the project's itself ending through direct agreement with the company, either by master instructor / teacher either executives or companies require collaboration (need skilled labor). We realized these activities during the academic year. Students from the same class do the training activities at the same time or all at the same company either in small groups or individually in several companies. The guarantee for respecting the safety rules are the enterprises where the students do training activities.

Each class has a qualified trainer who monitor the students' activity daily. We evaluate WBL activities through written evidence, oral evidence and practical activities. Key competences are essential in a knowledge society and guarantee more flexibility in the workforce, allowing it to adapt more quickly to the constant changes that occur in a world of increasingly interconnected.

These skills are also a major factor in innovation, productivity and competitiveness and contribute to employee motivation and satisfiSCBction, and quality of work.

The module evaluates only relevant competencies. A competency is evaluated only once. The assessment must be linked to performance criteria and the type of evidence evaluation are specified in the training standard (**STANDARD TECHNOLOGICAL TRAINING**).

At the end of four or three years of study each graduate student will create and sustain a paper work with a theme chosen from a list proposed by specialist teachers and will get qualifiers (satiSCBctory, good, very good, excellent) according to the score awarded by a panel of: coordinating teacher, another evaluator teacher and a representative of an economic agent. Such students get qualification level four and three.

Our school has a strong partnership with TenarisSilcotub and Michelin companies. In mechanical field (they equipped our school with a laboratory for hydraulic and pneumatic, and a welding laboratory -will be equipped this year).

Some of the weak aspects of our WBL projects are the following:

- Compulsory curriculum is quite bushy (too many requirements) .
- there are just few hours of CDL to meet the needs of local economic agents
- outdated technology
- Legislative barriers in terms of students 'age to work in companies
- Some improvements could be: signing partnerships with several firms.
- High school financing by the state.
- Requirements 'reduction of school programs

WBL CASE OF SUCCESS

From our school the case of success is the two POSDRU projects – “Road to success” and “Start up on work market through exercise firms”.

FURTHER ADVANCES IN WBL ACTIVITIES

In the last year the Minister from Education adopted the new law for WBL activities. Starting in this year, at the initiative of Tenaris Silcotub the mechanic and electronics curricula were changed.

SPAIN

NATIONAL LEGISLATIVE AND ORGANISATIONAL CONTEXTS

- National framework

Organic law 2/2006, of May 3rd, of Education

Organic law 8/2013, of December 9th, for educational quality improvement

- Regional or local framework

RESOLUCIÓN de 7 de julio de 2016, de la Dirección General de Política Educativa, de la Dirección General de Centros y Personal Docente y de la Dirección General de Formación Profesional y Enseñanzas de Régimen Especial, por la que se dictan instrucciones sobre ordenación académica y de organización de la actividad docente de los centros de la Comunitat Valenciana que durante el curso 2016-2017 impartan ciclos formativos de Formación Profesional Básica, de Grado Medio y de Grado Superior. (DOCV núm 7826 de 12.07.2016)

ORDEN 79/2010, de 27 de agosto por la que se regula la evaluación del alumnado de los ciclos formativos de Formación Profesional del sistema educativo en el ámbito territorial de la Comunitat Valenciana.

CASE STUDY: CIPFP CIUTAT DE L'APRENT

PRESENTATION OF THE SCHOOL

History

Our school is called CIPFP Ciutat de l'Aprenent, and it is a public school, belonging to Generalitat Valenciana (Regional Government). It was created by the decree 203/2005, on december 16th, by the Valencian Government. It is dedicated to teaching different educational levels: vocational training and higher education, in two modalities, face-to-face classes, and semi face-to-face classes. Since we are an integrated school for vocational training, we also offer *lifelong learning* and occupational (for unemployed) education. The activity in the school started on November 1958, and it has been changing since that moment to the present time, through various educational systems and legal frameworks. Right now, it is the biggest school of our characteristics in our province.

Mission

CIPFP Ciutat de l'Aprenent expects to give an answer to every formative, human, cultural and scientific-tecnic necessity of students, with the aim to provide an integral education, orientation, and recognition of competences throughout life. In order to achieve it, we intend to encourage the maximum personal development, using new techniques, and thus answering our students and families expectations. We try also to contribute to enterprises and institutions to the society development and progress, through the respect to our environment and the desire of the continuous improvement.

Our goal is to be a referent school in vocational training, and so we aspire to be recognized for:

- giving an education throughout life, comprehensive, continuous and flexible.
- giving a response to our students, families, enterprises and entities in our environment expectations, in a way that makes it easier the access to the work world, university, or other studies.
- improving our methodologies, implantation and use of new techniques, using TIC as an educational and learning resource, and permanent communication.
- permanently updating and managing our facilities and equipment

Current situation: specialisations, education levels, number of students, classes, faculty, staff, building, laboratories, classrooms

In our school there are: (The following data are been obtained from our School years 2015-2016 General Anual Program):

- 2100 Students.
- 49 Specialist Teachers.
- 103 Internal specialist Experts teachers.
- 11 Maintenance and administrative staff.
- 6 interpreters or Orientation specialists.
- 10 General subjects teachers.

1) Specialisations and education levels, number of students, staff,: (Teachers: PT=Expert + PS=Technicians; Students: 1º y 2º course)

a) Graphic arts

- Number of Teachers: $9+7 = 16$ (PS + PT)
Higher Technician in Design and Edition of Online and Printed Publications
- Number of students: $52+48 = 100$ (1º y 2º)
Higher Technician in Design and Graphic Production Management
- Number of students: $26+16 = 42$
Technician in Graphic Printing
- Number of students: $31+9=40$ (1º y 2º different specialities)
Technician in Digital Prepress
- Number of students: $32+26=58$

b) Edifying and civil constructions

- Number of Teachers: $5+4=9$
Technician in Interior Works, Decoration and Rehabilitation
- Number of students: $25+16=41$
Higher Technician in Construction Projects
- Number of students: $21+10=31$

c) Electricity and electronics

- Number of Teachers: $7+3=10$
Technician in Electrical and Automatic Installations
- Number of students: $31+12=43$
Higher Technician in Electrotechnical and Automated Systems
- Number of students: $54+49=103$

d) Mechanic manufacture

- Number of Teachers: $15+4=19$
Higher Technician in Metallic Constructions
- Number of students: $15+28=43$
Technician in Machining
- Number of students: $31+21=52$
Higher Technician in Mechanical Production Scheduling
- Number of students: $16+31=47$
Technician in Welding and Boilermaking
- Number of students: $33+25=58$

e) Hotel management and tourism

- Number of Teachers: $14+2=16$
Technician in Cookery and Gastronomy
- Number of students: $73+55=128$
Higher Technician in Kitchen Management
- Number of students: $26+43=69$
Technician in Catering Services
- Number of students: $30+16=46$

f) Personal appearance

- Number of Teachers: $4+4+1+2=11$
Higher Technician in Integral Aesthetics and Wellness
- Number of students: $23+33=56$
Technician in Beauty Therapy
- Number of students: $0+27=27$
Technician in Hairdressing and Hair Cosmetics
- Number of students: $0+24+27+25=76$

g) Food industries

- Number of Teachers: $5+3=8$
Technician in Bakery, Patisserie and Confectionery
- Number of students: 40
Higher Technician in Processes and Quality in the Food Industry
- Number of students: 52

h) Wood, furniture and cork

- Number of Teachers: $1+4+1=6$
Technician in Fitting and Furnishing
- Number of students: $31+23=54$

i) Health care

- Number of Teachers: $1+9+8=18$
Higher Technician in Pathological Anatomy and Cytodiagnosis
- Number of students: $33+31=64$
Technician in auxiliary nurser cares
- Number of students: $69+48=117$
Technician in Emergency Health Care
- Number of students: $168+167=335$

j) Textile industry, dressmaking and leather

- Number of Teachers: $6+3=9$
Technician in Dressmaking and Fashion
- Number of students: $35+25=60$
Higher Technician in Patternmaking and Fashion
- Number of students: $31+30=61$

k) Transport and vehicle mechanics

- Number of Teachers: $14+5=19$
Higher Technician in Motor Vehicles
- Number of students: $31+34=65$
Technician in Bodywork
- Number of students: $31+24=55$
Technician in Motor Vehicles Electro mechanics

- Number of students: $67+57=124$

Transversal departments:

l) Legal and Labour guidance department

- Number of teachers: $5+6=11$

m) General Subjects Department:

- Number of Teachers (English): 7
- Number of Teachers (Spanish): 1
- Number of Teachers (Maths): 1
- Number of Teachers (sports): 1

o) Laboral and Psychological guidance Department:

- Number of Teachers: 2

p) Signal language interpreters:

- Number of Experts: 3

q) Administrative Staff:

- Number of Staff (Administrative): 5
- Number of Technicians (Maintenance): 1
- Number of Staff (Subordinate): 5

2) Building, laboratories, classrooms

Our school is distributed in three buildings named North, Central and West. The different departments are located in these buildings.

Besides the laboratories, workshops and classrooms listed for the different departments, there are also multi-purpose classrooms, offices, warehouses, etc. They are consigned in the maps attached.

a) Graphic arts

Located in the Central Building, Flat 0, Corridor 4.

- Technical classroom
- Digital Prepress Workshop
- Physical essays laboratory
- Printing workshop
- Bookbinding workshop

b) Edifying and civil constructions

Located in the Central Building, Flat 1, Corridor B.

- Three Technical classrooms
- Drawing Workshop

c) Electricity and electronics

Located in the Central Building, Flat 1, Corridors C and D.

- Two Electrotechnical installations workshops
- Electronic equipment Workshop
- Technical classroom

d) Mechanic manufacture

Located in the Central Building, Flat 0, Corridors 1 and 2.

- Physical essays and metrology workshop
- Technical classroom
- Automatism Workshop
- Mechanic constructions execution workshop

- Machining workshop
- Special machining workshop

e) Hotel management and tourism

Located in the north building, floors 0 and 1

- Two Cooking workshops
- Restaurant workshop
- Patisserie and bakery workshop
- Management workshop

f) Personal appearance

Located in the west building, floors 0 and 1

- Characterization workshop
- Aesthetics workshop
- Hairdressing workshop

g) Food industries

Located in the north building, floors 0, 1 and 2

- Bakery, patisserie and confectionery workshop
- Food industry workshop
- Chemical Food Analysis Laboratory
- Microbiology Laboratory
- Technical classroom

h) Wood, furniture and cork

Located in the Central Building, Flat 0, Corridors 1 and 2.

- Technical classroom
- Wood machining workshop
- Fitting and Furnishing workshop

i) Health care

Located in the Central Building, Flat 1, Corridors A and D

- Microbiology Laboratory
- Pathological anatomy workshop
- Image processing workshop
- Infirmary Workshop

j) Textile industry, dressmaking and leather

Located in the north building, floors 1 and 2

- Dressmaking workshop
- Physical essays laboratory
- Technical classroom

k) Transport and vehicle mechanics

Located in the Central Building, Flat 0, Corridors 2 and 3, and Flat 1 Corridor B.

- Painting workshop
- Vehicle Mechanics workshop
- Transmissions workshop
- Lock and vehicle structure workshop
- Vehicle Electricity and pneumatic and hydraulics workshop

Our studies are usually divided in two years. At the beginning, students develop the basic skills in labs. They also develop and carry out documentary industrial projects in workshops and simulations. It is compulsory that during first and second year, teachers plan practices at the school for each specialty. Many of the specialties are mainly practical. After that they work in on-site labs simulating real industry or business situations to improve their advanced skills. During the last period of the second year students fulfill an on-the-job training period of 400 hours approximately in companies.

NUMBER OF STUDENTS/CLASSES INVOLVED EACH YEAR IN WBL ACTIVITIES

100% of the students (2200 students approx)

HOURS PLANNED IN WBL

20% of the students (400h) in companies, 60% (1200h) in workshops/labs

NUMBER OF ENTERPRISES INVOLVED

Around 120 enterprises every year in the different 11 specialities.

DESCRIPTION OF WBL ACTIVITIES REALISED IN RELATION WITH ECLI MODEL

- **Expert**

Visit of an expertise to reinforce knowledge or/and new technologies or skills

- **Classroom**

A specific class to reinforce knowledge or/and new technologies or skills. A specific class to reinforce knowledge or/and new technologies or skills

- **Laboratory**

A specific training to prepare the student for a real and specific task. Teachers from the school or/and Tutor from the company support the student when executing and developing the project.

- **Individual**

Real environment work. Student at company implements a solution for the project.

THE GOVERNANCE OF THE SCHOOL RELATED TO THE WBL ACTIVITIES (THE DOCUMENTS ATTACHED AS PDF ARE NAMED IN THE REFERENCES)

- Tasks and responsibilities of the figures involved in the process in the school
- Head Teacher: In charge of coordinating general planning and implementation of WBL projects, and is also consulted for the in detail planning.
- Contact Person of the school for WBL projects: responsible of in detail planning, and coordinates the monitoring of the process.
- School Tutor: Responsible of the implementation of the process and the evaluation of students.
- Individual Teacher: Responsible of implementation, evaluations of students and monitoring of the process.
- Departments: Coordinate the implementation of the project.
- The rest of the figures (Contact person of single departments for WBL projects, School Board, Staff boarding group, Class boarding group, Class coordinator, Person in charge for guarantee safety rules, Students board, Technical and Scientific Committee, Administrative Staff, Company Tutor and Administrative Office), are informed about all the previous items.
- Role of the companies
- When talking about students stays In the company, those companies involved with our projects are usually contacted by the school tutor, and both of them, always respecting the base stated in our

regulations, agree the practical contents of the student stay in the enterprise, always assuming that those contents are extremely related to the modules they have studied at school. The companies design a company tutor who will be in charge of teaching the students every practical aspect of the work he is developing, guiding him throughout all the process. This company tutor will also take part in the evaluation of the practice, together with the school tutor.

- Role of other public/private entities of the territory (such as intermediary bodies, etc.)
- Although chambers of commerce could deliver information related to enterprises, the most usual way to work involves searches made by the group's teachers. We also have a software called SAO, which is a database containing every enterprise that collaborates in such practice periods. It is fulfilled by teachers. Currently we are keeping in touch with several professional associations to improve this point.

Specific description of phases, toolkit and responsibility in:

Planning

- The activities related to WBL at school are determined by our regional regulations (from the regional government), and are planned in detail by the responsible teacher of each subject. We have tools to work in it, such as the annual programme of the subjects, that are fulfilled every school year by the teachers involved. These programmes are coordinated and agreed by the departments once a year.
- Tool: Annual programmes for the different subjects
- The previous contact with enterprises in order to join to the collaboration implies that both school and company sign an agreement for the collaboration.
- The activities that take place in the company are also determined by our regional regulations, and planned in detail by the school and company tutors. These programmes are revised and, if needed, modified every year.
- Tool: FCT Programme

Implementation

- The activities related to WBL at school are implemented throughout all the school year. According to the previous programme made by the teacher. Experts or company visits happen along the year, when needed, according also to these programmes.
- The activities in the company take place, usually, from March to June, although some students can accomplish it from September to December, depending on the cases. These activities are developed according to the previous programme by the school and company tutor.

Monitoring

- The activities related to WBL at school are monitored by every individual teacher. The degree of accomplishment is consigned in a document in which we compare the programme of every subject with the activities we have done at school.
- The activities that take place in the company are monitored by both the school and the company tutor, with several tools. The students and teacher have access to the software called SAO, which is a database that manages the whole process of the project. Both students and the school teacher have different ways to access. Students must fulfil a daily report of their activities, structured in weeks, and they have to get it printed and signed by the company tutor, in order to assure that everything is monitored by him/her. The school tutors have access to this tool, so he can follow the students activities, and in every face to face meeting with the students, he gathers the weekly documents. Besides, there are programmed visits of the students to the school to inform the school tutor about every aspect of the stay, and also there are visits of the school tutor to the company, to keep in touch with the company tutor, and also to be able to watch the student work in the company.

Evaluation

- The activities related to WBL at school are evaluated by every individual teacher in the school, according to the programmes established before. In these programmes we define the tools for the evaluation of every aspect of the subject, and also the way in which we obtain the qualifications for the students.
- Tools: exam and practical work qualifications. Each teacher/expert define yours.
- The activities that take place in the company are evaluated by both the school and company tutors, based in the programme they have established and agreed at the beginning of the process. They review a series of items related with the student work in the company, and fulfil an evaluation document, that is fixed by our regional regulations and is revised by both of them. The result of it is the qualification for the students, in the terms of **pass** or **not pass**.

STRONG AND WEAK ASPECTS IN WBL PROCESS

Strong aspects:

- Students learn to work in a simulated real environment.
- Students learn to work in groups as well as by themselves.
- Students learn to make decisions by themselves.
- Students improve their practical skills.
- Students discover how important is attitude for the work.
- Students discover how to learn from and with others comparing tasks and results.
- Students learn how important is to mark a real objective.
- Students learn how important is to follow a work and safe procedure.

Weak aspects:

- Work based learning sometimes is quite specific that means that it is difficult to prepare an student in all the whole opportunities that the work sector offer. It is needed a great number of trainers and experts to teach all the specialties in a deeper way.
- So sometimes, the field in the enterprises for on-the-job work is narrower, more specific than the studies we develop at school and students can't develop all their advanced skills in just one company.
- The resources that are needed in the school to use WBL sometimes are expensive and complex. The limited budgets of the schools are sometimes not enough to accomplish our goals.
- The administrative economical management conditions, norms and laws, according with funding from public budget, (as it occurs in Spain), is a real limit to reach freely some of these goals.

WBL CASE OF SUCCESS

Jose Baró Martínez was an Student of CFGS Design and furniture at CIPFP Ciutat de l'Aprenent. During his studies in the center he received the training of experts , the external companies expert's teaching , the external trainers of leading companies such as Bosch, Festo, Colas Ceass and ABC spax screws. He participated with excellent success in the "National projects championship of installation and development of wood and furniture *Ciudad de Irún (2013)*" obtaining the first prize in the project of installation ECORESIDENT. Also he participated by the specialty of cabinetmaking, in the Comunitat Valenciana Skills competition obtaining the first prize. He also obtained the gold medal in SpainSkills and it got the classification to represent to Spain in WorldSkills London 2011. In Euroskills 2013 He obtained the Silver classification in individuals and also silver in Teams.

During the training at the School he received external training in different visits to companies(PINASA timber factory in Cuenca which is an excellence in biomass management and production of boards, and ACM timber which is an excellence in forest resource management. Also He worked in the restoration project of " El

Caminito del Rey” in Malaga. He was decorated by the President of the Generalitat and also received the Extraordinary Prize of VET 2012/2013 for his excellent academic records.

During his internship (FCT) he collaborated with the company HERTALLA leader in the development of unique product and Reverse Engineering through the work of the wood in 5 axis CNC. He then developed his work experience independently (freelance) Restoring highly complex architectural carpentry and the work of a carpenter / cabinetmaker in his local area. During this period He also participated with the World Association of Timber, where young experts carpenters came to the Timber world convention after the earthquake in Katmandu to present projects and infrastructures for the restoration (renovation) of the furniture for the schools of Kathmandu. Currently, He has been hired by the town council of his native town (Guardamar de la Safor) to work as a maintenance technician for this municipality.

FURTHER ADVANCES IN WBL ACTIVITIES

- E - Expert:** the fact that an expert comes to teach theoretical classes is important for the students because allows them to see a real point of view of the theoretical aspects that they do not see in a normal class. Teachers can be closed to the work environment and in touch with real new technologies advantages. Reinforce the links between the school and the companies. Allows to exchange experiences, materials, procedures, etc. That is an opportunity for the company to show their products, services, ... Even get point of improvement for the future.
- C - Classroom:** The fact that the students visit the companies is an opportunity to observe real working environment. This experience is inspiring for the students and teachers. In addition, teachers can take some examples to link with the contents worked at school. The school can establish new collaboration agreements. Sometimes for the companies this experience suppose new ideas from an external source. Employees of the company can be motivated by this experience to recycle their knowledge coming back to school.
- L - Laboratory:** the fact that an external expert comes to teach in our workshops is important for our students, our teachers and our internal experts because allows them to practise with new materials, products, equipment, procedures, etc. Teachers can be closed to the work environment and in touch with real new technologies advantages. Reinforce the links between the school and the companies. Allows to exchange experiences, materials, procedures, etc. That is an opportunity for the company to show their products, services, ... Even get point of improvement for the future.
- I - Individual experience:** the fact that the student goes to work in a real environment implies the opportunity to get a job. In addition, this experience allows to evaluate the skills and knowledge acquired at the school and all the learning procedure. This means an opportunity to evaluate the teaching and learning system. The company can evaluate on a direct way a future employee. For the school to get new agreements with the best companies means prestige and renown.

SWEDEN

NATIONAL LEGISLATIVE AND ORGANISATIONAL CONTEXTS

In Sweden Work-based learning in upper secondary schools on a national level is mainly limited to vocational programmes in different sectors (vehicle technology, plumbing, industrial maintenance etc) Only a little more than 25 percent of all students at secondary level enter a vocational programme and the number has fallen drastically during the last decade. For these programmes the students have 15 mandatory weeks at a work place within their field. The aim is also to integrate school and work life. The remaining 75 percent enter university preparatory programmes in the fields of Social Science, Business, Science or Technology. For these programmes there are no requirements concerning work-based learning and for most schools students spend all their time at school without work practice or cooperation with companies. This is a problem since not all of the students go on to university and also because they do not get an adequate picture of what is required of them when they have left school and enter work life. However, it is an option for each school with university preparatory programmes to introduce work placement for certain periods and to practice more work-based learning. Very few do because no extra funding is allocated for this.

REGIONAL OR LOCAL FRAMEWORK

The framework for work-based learning is only regulated on a national level when it comes to legislation. In a lot of regions there is cooperation between certain schools and companies in organized forms, called "TeknikCollege". However, this is up to every school to be part of and ABB Industrigymnasium has decided to use its resources to cooperate more on an international level. We have already established a network of companies that we are working with within the region and we have ABB as our main partner. Being part of an external organization always requires work hours and we do not see this as the right way of using our resources since we cannot benefit from its work.

CASE STUDY: ABB INDUSTRIGYMNASIUM (INDUSTRITEKNISKA GYMNASIET I BERGSLAGEN AB)

PRESENTATION OF THE SCHOOL

History

ABB Industrigymnasium was founded by ABB as one of Sweden's first independent schools in 1994. The first school was established in Västerås and in 1995 another school was started by the company in Ludvika. In 2009 our third school was opened in Sala. In this specific project the school in Västerås is the main participant and it will be this unit that is described henceforth. After several years with ABB as owner the teachers took over ownership of the schools until 2015 when a local entrepreneur, Fredrik Svensson bought the school. In 2014 the school celebrated its 20th anniversary as one of Sweden's leading school in the field of Production Technology.

Mission

ABB started the school in 1994 to secure labour for their divisions in Västerås and Ludvika. Eventually the schools grew with an increasing number of students and the school also became very popular so that it is now tough to qualify for the school in Västerås and top grades are needed. Most of the students now aim at further studies at university even if the mission of the school still is to give the students insight into work life and to work as closely as possible together with technological companies in Västerås and around, ABB of course being our most important partner. The national reform that took place in 2011 forced the school to

limit the number of vocational courses and go for a more university preparatory programme. However, internships in Sweden and abroad are still made part of the curriculum even though it is not compulsory for a programme like this. We have also kept projects in collaboration with companies, experts lecturing for our students on a monthly basis, study visits and external advisors from companies and organisations. The focus on entrepreneurship has always been part of the school's mission and all our students run their own companies. Ultimately, our vision is "Educating for a Better World" and it is for the school to give the students the tools to realise our vision.

Current situation: specialisations, education levels, number of students, classes, faculty, staff, building, laboratories, classrooms

Currently, and as always, we are focusing on Production Technology and in Sweden there are few schools with this special branch. In fact for the Technology Programme there are a little over 1000 students that specialise in Production Technology and out of these there are 450 students from our school and 280 in Västerås. In Västerås there are 40 % girls and excluding our schools there are only 6 % girls on a national level. So, here we contribute to opening up this field of production technology for more women which is something ABB see as essential. The students start their education at our school when they are 16 and finish at the age of 19 and it is an Upper Secondary level programme. After school some of the students are offered one-year jobs at an ABB division and it could also happen that other companies offer them jobs since they have been working with the during internships or in some projects. It is also common that students are offered jobs over the summer. Altogether in Västerås there are 280 students divided in nine classes, three for each year. Excluding administration there are 18 full-time teaching positions in Västerås (around 28 for all schools). There is a full-time Head Teacher, one person working with administration, another for IT-administration and the company is run by CEO and a board. Every class has their own classroom where the teachers come to have classes. Beside this the students have an open landscape area where every student has a desk and a stationary computer. Here students can work on reports, do programming or CAD-sketches. At ABB Industrigymnasium students always work in groups when it comes to projects and very often also for other assignments. They are part of what we call a Base Group each semester, consisting of 5-6 people.

When a new semester starts they will be part of a new group constellation and at the end of their three years at school they will have worked with all the students in the class. This is one of the most important aspect of preparing the for future work-life. Therefore the seating in the classroom is in 6 islands where each group has a table. Their computer work-places are also organised so that they sit together as a group, and make collaboration easier. During a class students normally start out with their teacher in the classroom but then move out to work with assignments and projects by their computers and then they meet again to sum up and follow up together in the classroom. Even certain labs are carried out in the classroom when the teacher brings material and equipment to the classroom. But there is also a chemistry lab, and two technology labs with more stationary equipment for pneumatics, soldering, 3D-printing and circuit Board printing.

WBL ACTIVITIES DEVELOPED IN THE LAST THREE YEARS

Implementing legislative framework – Background/conditions for WBL at ABB industrigymnasium

It has been a challenge for our school to retain Work-Based Learning since the national reform in 2011 since there is more focus on theoretical subjects and also because the budget is a lot smaller today than before the reform. For Work-Based Learning you need resources and teachers taking time to collaborate with companies and in the new curriculum we also have less freedom compared to before. The trend would be that schools with university preparatory programmes find less space to collaborate with companies and to

develop projects with external partners but instead the course will be limited to school and the classroom, especially since teachers may find there is too little time to engage external partners. Instead, we try to stick to our model and keep as much of it as possible and you can say that WBL is an essential part of our way of working. For each student to have their own work-place and team (Base- Group) is in itself based on what work-life is like. So, even when companies or external experts are not involved we want to mirror work-life and prepare students for what await them when they have graduated. In the legislative framework one of the most important issues is that students are given a certain number of teaching hours. Therefore internships must be added on top of the hours the students are guaranteed and it comes as an extra cost.

This goes for internship in Sweden as well as the internship abroad. We have also added courses with content that we find particularly important that the students learn and that re not naturally part of a course in the curriculum. These mini courses include study techniques and computer science. These are partly integrated into other courses but we cannot do that entirely because then there would not be time enough to cover the entire curriculum for, say, physics (where students use excel from the computer course). With these extra courses we lay the foundation so that students can work more efficiently in their projects in work-based learning. Computer skills are essential for this type of work, for example. What this does altogether is of course making our programme more expensive but we have decided to take these costs and work to make ends meet.

TYPES OF ACTIVITIES REALISED

Activity: Individual – Internship in Sweden and abroad

We know that students improve their technological skills further when they can apply what they have practiced at school and also they develop social skills and understand what is asked of them in work life. In our version of work-based learning the most important part is having students spending 6 extra weeks practicing skills they have learnt in school at companies in Sweden and abroad. As stated before this is not at all required and it is something we do as an extra commitment. The internship covers a a lot of different tasks for different students and the student can ask to be placed at a company that specializes in something he or she is particularly interested in. Some work in a production line, others may do 3D-sketching and yet another may be working with LEAN improvements. Since it is not compulsory, the school has a lot of freedom to organize the internship and our only requirement is that it must be a technological company. During their internship the student also has an assignment from school as a part of the course in Production Knowledge. In this assignment the student has to make observations at the work place to see how they work with LEAN and to see if they can make improvements to become more efficient. T

his study includes interviewing several employees and the manager. Not only will the students then learn about the work place and make reflections on the organization but they will also have to challenge themselves discussing professional matters with managers and employees at the company. At the school they will have time to finish their reports and will discuss them with their classmates and other group members. Besides, they are giving presentations of their internship in English to all other classmates, as part of the course in presentational skills that run throughout their three years at school. Our students also carry out assignments at their companies and when back in school these are discussed in seminars with other students. So, the learning process continues in school, based on their work experience. In fact, the entire school is organized to be more like an ordinary work place than a traditional school and students systematically practice project work in groups put together by teachers.

Since the students go to very different work places and also carry out different kinds of jobs there is no specific grading of their performance related to a course in the curriculum. Instead the supervisor at the company and the student together evaluate the student's work and there is also a very general report sent

to the school specifying such aspects as the student's ability to take initiatives, responsibility and so forth. These are important parts of secondary education in Sweden and every school is encouraged to have strategies to make students develop these qualities. In this context the periods of internship are invaluable because the students realize it is for real. Every semester each student has a meeting with their school mentor to evaluate their work and then these more general aspects concerning student development are discussed. During their three weeks of internship every student gets a visit from one of the teachers at school, to discuss how things are going and if changes need to be made.

In their final year, all students are offered internship in another country outside of Scandinavia. We have built up a network of schools in Europe with which we have exchanges and students do internships at companies in the area nearby the school. Spain, Slovakia, Switzerland, Belgium, France and Italy are the countries we are cooperating with right now but we constantly try to find more partners. There is also cooperation with companies (not schools in this case) in other parts of the world, the US, China, Vietnam and Thailand where students can go on internships. When students go abroad we focus on culture in terms of business and society and all students take a course in cross-culture as part of their English studies before going abroad. Also in this case students go to technological companies but their work chores may look very different depending on their work placement. The internship abroad is followed up by a report in their English course and there are also presentations for the students in Second Year and parents. The students specifically study how the work – place is organized and how they communicate. The focus is naturally on differences between business culture in Sweden and the country they visit. They also look at safety work at their company and try to find measures for the company to improve safety for their employees.

As mentioned before all students do internship which amounts to 190 students annually (95 in Sweden and 95 abroad) and the number of companies that are working with us is roughly 80 technological companies (even though we do not use all of them every year) and ABB stand for half of all the internships in Sweden but not nearly as many abroad even though we have a permanent cooperation with certain ABB divisions in the US, China, Vietnam and Thailand. In Italy we also have students at ABB.

Activity: Expert – “Lecturer of the Month” and Experts in courses

At ABB Industrigymnasium we make sure to use our network of experts in companies and at universities that has been built up throughout the years. Experts are used in different ways and one is the monthly recurrence of “Lecturer of the Month”. Here all 95 students from one year are given a lecture by an expert in some field. On most occasions, the speaker is working for one of the technological companies around Västerås but it can also be a representative from university, an entrepreneur or politician. The idea is to give students knowledge from a specific field, often related to one or several courses in the curriculum but also to get an idea of different jobs that they can have in the future. We ask the speakers to not only speak about their specific field of expertise but also their life-journey. In this way we give the students insight into what is really important in their future lives and careers and that other skills than being able to pass tests in a course may be the key to success. Thus, the expert in the classroom fills a function similar to that of the internship, namely to connect school and the world outside and to give the students a possibility to see the links.

At other times experts are used in class for specific courses and one of them is production knowledge. Then we hire a person to give a lecture about LEAN and then a workshop continues and the students' work is finally discussed together with the expert. In fact, the lecturer is so happy about coming to the school and the input he gets from the students that he has not charged us for the previous two sessions. This day all the third-years attend the lecture and take part in the work-shops. Other fields where we have had experts is for maintenance in the industry and all the experts work in the area and the students then also visit the company

where the expert is working. When it comes to experts being involved in specific courses there is also a teacher to accompany the students, even though they may visit the companies in groups on their own.

Furthermore, experts are involved in the project Young Enterprise which all students take part in Year Two. This means that they run their own company for a year, and it is a process that starts year one with a project of product development. In Young Enterprise (part of the course Entrepreneurship) we let students meet experts in various fields such as communication, sales, webdesign, management and accounting. On top of this the students must have at least one external counsellor throughout the year. They then try to find a senior advisor with experience from a similar kind of business that they are running. It has proved valuable for the students to get contacts outside of school and it can eventually help them find a job or make it easier for them to start up their own business after school. The school was nationally awarded Best School for Young Enterprise a year ago and we see the value of students using their creativity and energy together with the support from experts that want to help our students develop, both personally but also their businesses. For Young Enterprise the students have 100 hours in school but normally they do more hours than that on a voluntary basis. Roughly 30 experts are involved in the project.

Activity: Expert and laboratory – Exam Project

During the last semester in Year Three our students do their exam projects and here there is a combination of different parts of the ECLI model. The project is specified by a company that wants help to solve a specific problem. It also happens that it is a research group at university that wants help, or the local authorities. There are three teachers in charge of the exam project and they keep in touch with the clients to find appropriate problems for our students to work with. The students are divided into groups, after having given their opinion on what company they would like to work with. Then the next phase can be very different for the groups as some will be and work on-site whereas others may be in school working and meeting with the representative from the company when there are issues they need to discuss. To get an idea of what kind of work the students carry out we list a few descriptions from companies in the past year:

- Creating 3D-animation assembly instructions for ABB to make assembly easier for their customers
- Route Optimization system for VAFAB Environments 30 cars transporting waste from companies and private households
- Automisation of plates and bricks at the central hospital kitchen. Creating a simulation of this in Robotstudio and also a calculation of costs
- Evaluation of Solar energy plants run by Västerås Municipality. The aim is to create a model that can be used when evaluating the plants and also to give recommendations for possible investments in the future.

This is a way of organising exam projects that is very common at university and we think it is a great way of summing up the three years and for the students to really use the skills they have acquired. They need to make use of technical, analytical and mathematical skills but also they need communicate with an external client who has specific needs and expectations on them and sometimes the students are the ones who need to push the company representative when they are not getting enough information. Other than this, they are working with real problems, collaborating and using their creative and analytical skills to reach a result. When their work is done they have to write a report, attend a seminar and give a presentation of their work in front of teachers, their client and students from Year Two. For this project they are given around 80 hours but some students of course use more time than this when they get going.

Activity: Expert, laboratory, Classroom – Other projects

We shall briefly mention our projects Year One when students work with environmental issues. In their first project they are given the task to reduce the negative impact of food production in a specific

country. In their second project, during their second semester they get a mission from local politicians to find solutions to reduce the ecological footprint in a certain sector in their home-town. For both projects there is a focus on technological solutions and other possible solutions. For these projects there are experts coming to lecture for our students but there are also researchers from the local university who have been helping students in the work process. Besides, groups of students visit different companies working with environmental issues, they also go to the local university to work in the energy lab, they visit a solar energy plant and recycling sites. For the second project they also give presentations for the politicians who give the students feedback on their work and the best solutions are later on presented by students at a ceremony in the Town Hall. As you can see, this way of working is preparing students for the more advanced projects that await them later on at school (and at work). There are not only external experts involved but teachers from different fields work as supervisors. Students are given specific lectures on project management and also certain computer programmes. Teachers working with the students in an interdisciplinary way is an important part of the school's basic idea of successful education

In total, the school is collaborating in various ways with 180 companies (not all of them engaged every year) and as we have described all students are engaged in all the WBL-activities throughout the three years.

THE GOVERNANCE OF THE SCHOOL RELATED TO THE WBL ACTIVITIES

At our school we regard all teachers as one team, and together they are responsible for having the students fulfil the goals of their secondary education. This means passing all the courses that the students take to get their 2500 credits. However, an important part is implementing WBL activities into the courses and in the interdisciplinary projects. There are diploma goals for the technology programme and in these a lot of qualities and skills are stated that require a certain way of working. To have the students achieve these teachers need to work together. The Head Teacher has an important role when it comes to encouraging team-work and also project work and the integration of WBL activities. The teachers have a lot of freedom to choose ways of teaching but for our school a lot of the bigger projects and WBL activities are scheduled at the beginning of the year to ensure that they will be carried out. For the projects there is one teacher responsible for summoning teachers to meetings and documenting decisions made. A little extra time is given for this task.

For our internship we have teachers specifically assigned for the tasks of student placement. For our national internship there is one person and for international placements there are two teachers. Then, of course, a lot of other teachers are involved as the internship is taken up in several courses at the school, Also, there are other teachers assigned to visit students at their work places.

The companies often express that they have very little time to plan projects and cooperation with the school so therefore we try to do as much work as possible to make it easier and worthwhile for the companies to engage in projects with us. But we should be honest and say that a lot of people take a lot of their valuable time to come and lecture at school, welcome students on study visits and give them appropriate work during their internships. But it is necessary to make them understand that we work hard and try to meet their needs in different situations. Then companies and representatives are more willing to help and take time to support our students.

One thing that could be more developed concerning WBL is evaluation but the fact is that everything that students do in projects and WBL activities cannot be measured and assessed in relation to grading criteria. Every teacher is responsible for the grading in their course and it is not guaranteed that the WBL activities are the ones that match the criteria for the specific course but we can be sure that they match the diploma goals which are the most essential goals for the entire Technology programme. Nevertheless, this is

one part where we can develop our practice and we have things to learn from our partners in the Erasmus KA2 project.

WBL CASE OF SUCCESS

We find that the WBL cases form a whole in the training of our students and therefore it is difficult to single out a certain case of success. Several cases of success have already been described previously in this report.

FURTHER ADVANCES IN WBL ACTIVITIES

We are constantly working to develop our WBL activities and we are now working on establishing more long-term cooperation agreements. This is in order to secure that we have enough places for the student's internships but also to guarantee that we can use the knowledge and expertise that the companies can offer. It will also save us work and teachers can focus more on content and evaluation. Besides, working with the same people and getting continuity will give us better opportunities to develop and refine our projects. We are also working with our international connections and exchanges and being part of the Erasmus project on WBL makes us focus on this aspect of our work. Learning new things from our partners in the project.

PART 2

INTELLECTUAL OUTPUT 2 - ECLI MODEL

INTRODUCTION

THE DEFINITION OF THE ECLI MODEL

The ECLI model intends to combine different types of already existing WBL experiences in an innovative way and in an organized framework, anticipating local and international needs and changes. It wants to overcome the traditional traineeship model, providing a set of activities in which school and company try to engage: school moves to company and company moves to school. The ECLI model provides for a close working relationship with a company called "sponsor company" which is committed to arrange three-year courses planned, implemented, verified and evaluated together with educational institutions. WBL activities are not only strategic and absolutely necessary, but also essential for a Technical high school, especially for the skills that can be field-tested. Students have the advantage of contextualizing their skills through the objectives agreed with the company and carrying out projects or training and orientation activities. Companies, for their part, have the advantage of gradually training those students as possible future technicians to hire.

HOW THE ECLI MODEL WORKS

The ECLI model provides sharing a technological field between school and sponsor company for the development of WBL activities, sometimes with the whole class, sometimes as an individual experience or in a small group. The steps are structured as listed below:

EXPERT: this step takes place when the company expert enters the classroom and helps students to understand specific production processes and professional profiles involved, as a standard practice;

CLASSROOM: this step takes place when classes have the opportunity to visit companies in order to have a better understanding of both production processes and professional profiles and tasks;

LABORATORY: this step takes place when the "company goes to school" in support of teaching and some production processes are reproduced in school laboratories and / or when companies provide schools with the access to their laboratories;

INDIVIDUAL EXPERIENCE: this step takes place when students carry out their traineeship experiences carried out in companies or partners from the same technological field.

HOW IT WAS DECIDED TO INTRODUCE THE ECLI MODEL INTERNATIONALLY

A team of teachers and headmasters from different countries have tested ECLI steps in their schools – also through institutional diversity – trying to create a model of WBL recognized and validated at transnational level. The flexibility of the model allows an international applicability, taking into account the specific regulations and needs of different schools.

ECLI MODEL APPLIED TO THE “GOTOWORK” PROJECT FOR THE MOBILITY STUDENTS OF THE PROJECT SCHOOL PARTNERS

In the project the ECLI model was applied to the students for the Blended mobility of VET learners. The students came from the 5 partner schools of Romania (2 schools), Sweden, Italy (Lombardy), Italy (Sicily). Overall the project involved 79 students and 16 accompanying teachers. The mobility was realised in 4 countries partner during 36 month of the project.

Each ECLI phase of the model was realised in steps:

- a) **PREPARATORY PHASE:** How did you select the referents who participated in E-Phase? What kind of agreement was there among the school and the teaching staff involved in preparation/realization of international mobility of E-Phase? Was this work considered part of curricular activities or was it considered an extracurricular activity? How was the school involved in term of class council and school board?
- b) **PLANNING PHASE:** How did you select the students involved in E-Phase? How did you manage the logistical aspects of transport/hospitality? How did you formalized the agreement between hosing and sending schools? (agreement model). How did you select the companies involved in international mobility of students? What kind of agreement did you stipulate with the companies?
- c) **REALIZATION PHASE:** Detailed description of the activities carried out during E-phase, description of main goals, description of developed programme and monitoring tools used.
- d) **MONITORING PHASE:**
 - Number of students involved (divided in local and international coming from other partner schools)
 - Age and educational path of students involved
 - Number of companies involved
 - Number of hours involved
 - Number of teachers/company experts involved
 - Number of accompanying teachers
 - Students satisfaction of the experience
 - Certificate of attendance
- e) **EVALUATION PHASE:** How was international WBL of E-Phase integrated in didactic programme of hosting school? How was the international WBL experience integrated in the educational paths of students? Was the evaluation of the international WBL communicated to class councils?
- f) **VALIDATION PHASE OF INTERNATIONAL EXPERIENCE:** Did the E-Phase produce any innovation of internal processes? Which are the relevant qualifying aspects of international exchange identified by the students involved? Number of students involved, classroom level and specialization. Which are the difficulties emerged?
- g) **TOOLKIT USED**
 - model agreements between schools and companies of E-Phase
 - register of presence
 - feedback questionnaire of students
 - feedback questionnaire of companies (if used)
 - evaluation of competencies models and level of evaluation.

The experiences realized are illustrated below, as hosting school, as sending school.

The schema of mobility is illustrated here

HOST COUNTRY		SENDING SCHOOLS						TOT
		Colegiul Tehnic Alesandru Papiu Ilarian	Liceul Tehnologic Mihai Viteazul	ITIS Paleaocapa – Bergamo	ITIS Marconi – Bergamo	IIS Rapisardi - Paternò	Industrietekniska Gymnasiet i Bergslagen AB	
c2E	PATERNÒ/SICILY (ITALY)	2s+1ac	2s+1ac	(extra project)	//	//	2s+1ac	6s+3ac
c3C	ZALAU (ROMANIA)	//	//	2s+1ac	2s+1ac	2s+1ac	2s+1ac	8s+4ac
c4L	VÄSTERÅS (SWEDEN)	2s+1ac	2s+1ac	2s+1ac	2s+1ac	2s+1ac	//	10s+5ac
c5I	BERGAMO (ITALY)	2s+1ac	2s+1ac	//	//	//	2s+1ac	6s+3ac
s= student; ac=accompanying person								30s+15ac

E PHASE – EXPERT: SICILY (IT), MOBILITY STUDENTS 17-22 OCTOBER 2016

HOSTING SCHOOL – ISTITUTO RAPISARDI PATERNO' (ITALY)

As part of Key Action 2 (KA2), VET section (Vocational Educational Training), IIS "Mario Rapisardi" of Paternò has started a project entitled "Governance and Tools for Work - Based Learning in Europe" (acronym: GO.TO.WORK.IN.EUROPE) in partnership with Technical and Professional Institutes of different European countries. This project was born to introduce our students in the world of work and to increase our Institute training offer.

"GO.TO.WORK.IN.EUROPE" project, as result of the Italian "Good School Law" (L. 107/20015), experiment a strongly innovative model of work based learning called ECLI. This model has been introduced in ECLI classes partnership members of four different European Countries: Spain, Italy Sweden, Romania.

For implementing the project, every partner member school was supported by prestigious companies like Tenaris, ABB and Dolfin SpA, a Sicilian company in food sector.

In close cooperation with these companies, project partners have experimented the ECLI model, acronym for Expert, Classroom, Laboratory, Individual Experience. This model is divided in four phases and takes origin from the synthesis of European partners good practices in work- based learning.

In E Phase each school has identified a ECLI class that, during the three-year project, has experienced the model. The ECLI classes have been divided into sub-groups (composed by students of the four nations involved) that have worked virtually on activities and objectives in order to promote an international cooperation approach, a model in use in world of work and above all in multinational companies.

In the first year the ECLI classes worked closely with the Expert for the realization of specific projects.

In E PHASE the expert comes to class and helps the students to calculate the risk analysis, implement preventive measures for safety in the workplace and understand particular production processes. During the experimentation 6 students for each school (2 per project year) has had the opportunity to take part to the ECLI project abroad in a partner school.

The experimentation engages teachers of ECLI classes who had planned their teaching activities in strong synergy with business. Also for teachers it was a mobility in order to prepare others for the creation of teaching and evaluation tools used for the recognition, evaluation and certification of students' skills acquired in working situations.

During E PHASE our Institute has realized activities involved in Dolfin companies, a Sicilian company that markets all over Italy and abroad and IVS Sicilia which operates in the foodservice sector and in particular in the market for vending machines for drinks and snacks.

The E PHASE in the period October 17-22, 2016, has provided mobility, both educational and locational, in Sicily for Romanian, Swedish and Bergamo students and teachers.

The students were hosted by students' families of Istituto Tecnico and the IIS "M. Rapisardi "; the accompanying teachers stayed in a B&B .

During the mobility, activities related to the following competences have been carried out:

- a) Calculating the risk analysis and applying the preventive measures for safety in the workplace.
- b) Identifying what makes production efficient .

The mobility week has been organized with the participation of educational tutors and company tutors and experts:

- October 17, 2016 - Activities at Dolfin Company on:
"SAFETY PROCEDURES FOR WORK APPLIED IN THE COMPANY "
"COMPANY ORGANIZATION" (Human Resources Expert)

- October 18, 2016 - Activities at Company IVS of Sicily:
SAFETY PROCEDURES FOR WORKS APPLIED IN THE COMPANY ";
"BUSINESS ORGANIZATION";
"PRESENTATION OF THE IVS PRODUCTION PROCESS".

In the afternoon, laboratorial experiments in chemistry were conducted by Institute teachers at school.

- 19th October 2016 - Activities of the company IVS Sicilia on:
Identification of a company specific area for conduction of exercises related to safety ;
The area was illustrated by a Canadese engineer in internship at Dolfin .
Laboratory tests on measurement temperature of quality product;
Laboratorial activities on food analysis.

- October 20, 2016 - Activities of the company IVS Sicilia on:
Meeting with an expert on cargo organization and on the risks related to components revision of a vending machine for hot drinks; Water hardness analysis; Simulation of loading a distributor.
Meeting with a technician on "CONTROL ROOM, REMOTE CONTROL PLANNING OF DISTRIBUTION OPERATIONS";
Testing of a distributor;
Error simulation testing of a distributor;
Review of electronic mechanical components;
Sanitation of distributors;

Procedures for managing various business problems;
Implementation of "Authentic task" by students and evaluation by company and the tutor.

- October 21st 2016 Activities at the Dolfin Company on:
Data storage procedures relating to quality and production;
Traceability and traceability procedures of products;
Procedures for managing various business problems:
on quality control applied during production and on finished products; on waste management;
on the procurement management.
Practical application of production controls;
"Temperature" and "Color" control to detect the possibility of risk derived from bacterial contamination;
implementation of "Authentic tasks" by students and evaluation by the company and the tutor.

- October 22nd 2016 - Activities at Technical Technological Institute on:
Report by students who experienced the "E" phase to classmates;
skills evaluation through the implementation of an observation form.

PREPARATORY PHASE

How did you select the referents who participated in E-Phase?

In E Phase the teachers who were responsible of Technical Institute were selected as referents for work based learning and, moreover, a coordinating teacher with documented experiences in Erasmus projects was selected.

What kind of agreement was there between the school and the staff involved in preparation / realization of the international mobility of E-Phase? Was this work part of an extracurricular activity?

In E Phase for the organization of international mobility the Class Council was involved in:
organizing the reception activity for guest students and teachers ;
establishing chemical laboratories to be presented to guest schools ;
sharing the skills to be acquired for guest students ;
ensuring that planned activities were relevant for individual participants in order to preserve learning quality.
This phase interested both curricular and extracurricular activities.

How was the school involved in the term of class councils and school boards?

Class Councils were engaged in different meetings in order to:

- a) organize the activity for every STEP of the ECL I Model ;
- b) identify transversal skills for WBL;
- c) evaluate skills identified by the organization together with partners.

School Council adopted and approved the organizational choices in terms of changes in the financial statements .

PLANNING PHASE

How did you select the students involved in E-Phase? How did you manage the logistical aspects of transport / hospitality?

Project group, in agreement with Class Councils , established to experiment the model during three years in third class of Biancavilla Technological and Technical Institute .

The students reached the companies by private bus and the activity in the company was organized in integration with competences projected by school partners.

How did you formalize the agreement between hosting and sending schools? (agreement model)

The agreement between host school and other schools involved in mobility was based on different points:

- a) information on legal representative and on contact-person in the host school;
- b) personal data on legal representative and on contact-person in the school involved in mobility ;
- c) information on students involved in mobility, their parents and on accompanying teacher ;
- d) information on the period of mobility and the competences to acquire.

How did you select the companies involved in the international mobility of students? What kind of agreement did you stipulate with the companies?

Companies were selected on the basis of their availability and training areas. An agreement between the School and the Company was signed in order to regulate the relationships and responsibilities of the subjects involved, including aspects related to the participant's safety .

Furthermore, a training project of organized activities of each student in training was created, defined by the school and shared by the host organization in relation to:

- student data;
- data of the host organization;
- trainees' goals and activities;
- experiences;
- time spent in organization and periods of activity;
- insurance policies;
- period and location of training experience in the company.

REALIZATION PHASE

Detailed description of the activities carried out during the E-phase, description of the main goals, description of the development program and monitoring tools used.

Mobility in phase E was realized with an experience of a one-week work based learning activity in Sicily and offered students the opportunity to know a different operational context and to collaborate with professionals.

MONITORING PHASE

For the E-phase :

- Number of students involved (divided into local and international from other partner schools)
- Age and educational path of students involved
- Number of companies involved
- Number of hours involved
- Number of teachers / company involved experts
- Number of accompanying teachers
- Students' satisfaction of the experience
- Certificate of attendance

In E phase n.14 local students were involved and ten international students from partner-schools; students between 14 and 15 years old were involved, which have joined to the initiative of WBL, signing an educational path in which they committed to respect certain obligations in WBL, to achieve the skills in the path, to carry out the activities according to the objectives, times and planned methods, following the directions of the external and internal tutor acting as a referent to them for any need or eventuality.

Two companies of the territory were involved, Dolfin and IVS Sicily, for a total of 234 hours.

n. 8 teachers of the Institute were involved and n. four expert of two companies.

Five accompanying teachers who performed internal tutor activity, came from the partner schools and other five alternated, one at the time, eight teachers from the host school.

The students involved showed remarkable participation-in-action and involvement towards the experience carried out.

As regard to certification of competences, the work based learning path was proposed to ascertain the following skills:

- Performance skills (inferred from the Ptof
- relationship and communication skills;
- ability to organize their work and manage their time;
- problem solving skills from context data;
- flexibility in operating in situations different from conventional ones at school;
- attitude to group -work;
- understanding the dynamics of the labour market and its regulatory foundations.
- general profiles (taken from Pecup)
- linguistic and communicative area
- methodological area
- logical-argumentative area
- historical - social area
- scientific - technological area

EVALUATION PHASE

How was WBL of E-Phase integrated into the didactic program of hosting school?

How was the international WBL experience integrated into the educational paths of students?

WBL communicated to class councils?

1. During E Phase, different competences determined by the partner-schools during the international meeting in Paternò at the Liceo Classico were identified:

- a) Two of them were about:1) risk analysis and application of preventive measures for safety in the workplace; 2) identification of what makes the production efficient and ability to apply this knowledge;
- b) The others, two transversal competences for the general disciplines and two transversal competences for the disciplines of direction by the Class Council to be achieved by the students.

The mentioned skills and related activities were included in the three-year Training Project of the School Institute host.

2. The experience of work based learning was integrated into the student's educational path , renewing and integrating the curricula offered by the current study programs and the Institute's PTOF with the acquisition of skills , and knowledge achieved through experience in production sectors of the territory and through additional knowledge necessary to the innovative needs of the job market.

3. The evaluation of work based learning path was finally communicated to the class councils in terms of skills and knowledge achieved. Based on this communication, the Class Councils organized specific didactic activities and carried out the relative evaluation.

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

Did the E-Phase produce any innovation of internal processes?

Which are the relevant qualifying aspects of the international exchange identified by the students involved?

Which are the difficulties emerged?

Participation in the project allowed:

- to develop knowledge and understanding European cultural and linguistic diversity and its value;
- to elaborate and appreciate various aspects of different scholastic realities, and of different business realities and to share methodological and didactic experiences and practices;
- to improve knowledge of the English language and promoting knowledge of other European languages;
- to develop a model of work based learning that integrated the curricular teaching;
- to experience and share new methodological approaches.
- WBL's experience in different European economic realities enriches student with the ability to know how to use other codes, to be able to recognize different rules and principles to orient themselves outside of their human and social environment, to learn useful skills to the world of work.

Moreover, WBL gives students new opportunities for mobility abroad, including the better chance of finding a job in the future through the development of language, professional and personal skills, which only the comparison with other reality can guarantee;

14 students of the third class at "Chemistry, Materials and Biotechnology" have been involved for three years in order to add theoretical and practical skills in chemical, biomedical and food sector.

The difficulties that emerged were: a little involvement of some Class Council members ; and connecting the activity of work based learning with the contents of all disciplines.

SENDING SCHOOL: INDUSTRITEKNISKA GYMNASIET I BERGSLAGEN AB (ABB INDUSTRIGYMNASIUM)

PREPARATORY PHASE

How did you select the referents who participated in E-Phase?

We have a core of staff who are involved in the project and we normally try to involve teachers of technology and industrial production in mobilities. This time they were involved in planning and evaluation but not in the mobilities themselves where we instead had the Head Teacher and a language teacher.

How was the school involved in term of class council and school board?

We have a small organization with weekly meetings and teachers, students and the management work closely together meeting on a weekly or sometimes even daily basis and at these meetings issues like these are discussed.

PLANNING PHASE

How did you select the students involved in E-Phase?

In all our classes we are working with work based learning in different forms and we wanted students from our second grade to have the opportunity to go to Sicily. We chose the second grade because they have then started their course in production knowledge and part of this course is training in companies. We simply asked the students in year 2 who wanted to go and then we had a lottery among the students who wished to take part in the project. The students will then be engaged in the entire project and the project week in Sweden.

EVALUATION PHASE

How was international WBL of E-Phase integrated in didactic programme of sending school?

Our students are taking a course in production knowledge and in this course they have been able to make use of their experiences during the E-phase. The teachers they have are involved in the program and can discuss the benefits of their WBL experience in the E-phase. They also write a special report and make presentations of their experience for other students

How was the international WBL experience integrated in the educational paths of students?

This question has partly been answered in the previous one but we should also take into account the importance of seeing a company abroad and the cultural experiences that students get. They see different company cultures and how they work with safety and the production process at different work sites. Understanding other cultures is a major aim in the Swedish national curriculum.

Was the evaluation of the international WBL communicated to class councils?

The participants have continually reported about their project to teachers and students alike. There has been a seminar where we have looked at the experiences gained during the E-phase in Sicily. The student and staff mobility have both been useful when discussing how we can work together with companies and how the conditions for this work differ between the countries.

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

Did the E-Phase produce any innovation of internal processes?

We cannot say that this particular phase has produced innovations in our internal process but it is ongoing and therefore it will surely play a part of our overall assessment at the end of the project. We saw a lot of commitment from the companies and it has been a source of inspiration, especially when having discussions with our partner companies here in Sweden.

Which are the relevant qualifying aspects of international exchange identified by the students involved?

Especially the opportunity to see and learn from differences and to realise that industrial companies act on a global market and that they are potential employers also for our students. Then cultural aspects are important. Number of students involved, classroom level and specialization.

Two students came from the 2nd grade at ABB Industrigymnasium and they specialise in production technology

Which are the difficulties emerged?

Occasionally there can be problems with languages but this was never a real problem, they learn how to solve it.

SENDING SCHOOL: COLEGIUL TEHNIC "AL. PAPIU ILARIAN"

PREPARATORY PHASE

The school principal has presented in the School Board details related to the project and, still there, it was voted for the 9th H grade (major in electronics- automation) to be involved in this project. Considering the school has an electronics laboratory (sponsored by Tenaris Company) and two labs obtained through a POSDRU project , students in this speciality have obtained good results in the olympics competition, national level.

Afterwards, there have been discussions held with the students and their parents. In these meetings, the school representatives detailed the project, emphasizing the rights and obligations of the participants.

PLANNING PHASE

Having consulted the students in the class and their parents, ECLI decided to have a selection for each stage and to organise it at the beginning of the project. Therefore, a procedure of evaluation has been drafted.

The student selection procedure was as follows:

the dates at which each sample will be held are established;

Parental consent was requested for students who wanted to participate in the selection;

an English test was given;

a specialized test (electronics);

a characterization of the school and extra-scholastic activities was made;

an interview was held.

At the end, a hierarchy was made and depending on the position occupied, each student opted for the phase and country he wished to participate in.

EVALUATION PHASE

Integrating the international WBL of E- Phase in the school educational program was accessible because our school holds an agreement with economic agents involved in the Romanian educational process.

The WBL international experience for our students was clearly beneficial since we do not have economic agents representing this field, in our area.

The WBL International Evaluation was transmitted to the School Board, Parents' Committee and to the students. In this case, every student present in the E-Phase of the project, presented his/her experience and feelings.

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

Our school participated with two students in the Xth grade of electronic-automation specialization.

The relevant aspects identified by the participating students were:

hospitality of host families

the activities carried out in each company involved

IVS company had the activity to dismantle and install a coffee machine.

I thank everyone who has the strength to support this project.

SENDING SCHOOL: ITIS PALEOCAPA BERGAMO

PREPARATORY PHASE

The project was shared with the School Board through a communication, at the beginning and at the end of each school year, containing planned or carried out activities, teachers and students involved.

In the Class boarding group first meeting (3rd class), the headmaster and the project responsible introduced the various phases that would be developed in the following years, in different countries; at the same time teachers were asked to apply to take students in their mobility.

EXPERT phase, scheduled for May 2016, did not include national mobility for students from Bergamo, but, considering the valuable training offered and to give a sense of coherence and cohesion to the whole project, the headmaster decided to invest from schools resources to offer ECLI class students (two from Marconi,

Electricity curriculum, and two from Paleocapa, Mechanical-Energy curriculum) an important training and experience.

Before each phase, the Class boarding group decided the accompanying teacher, keeping in mind the planned activity and the skill that students would develop; in E phase, focused on safety, technical subject teachers were involved as they normally deal with it, specifically Electrical engineering teacher from Marconi and Mechanics teacher from Paleocapa.

PLANNING PHASE

At first, the Class boarding group considered students' availability to travel and stay abroad. After that, the Class boarding group selected students with the best school results with a good motivation and level of English proficiency, also through a motivational interview in Italian and English.

EVALUATION PHASE

In the teaching plan of Bergamo schools all WBL activities are structured according to ECLI model: at the beginning of the school year each Class boarding group plans curricular activities, according to the different teaching methods foreseen by ECLI.

For the selected students it was planned that the Expert phase also took place through the activities of Erasmus+ project, as well as through those provided for the whole class. International experience of WBL has been very valuable for those students directly involved because activities have been shared with students from different countries, with different training and different cultural background, have requested the use of English in formal and informal context. The students became protagonists of experience dissemination, involving others in training they had previously carried out.

The accompanying teacher brought back the evaluation forms previously drawn up for the planned activities in Sicily with Dolphin and IVS companies; he shared them with the Class boarding group teachers in a special meeting. They have considered student's evaluation as an innovative tool through which it is possible highlighting reality check tasks skills in WBL activities.

INTERNATIONAL EXPERIENCE VALIDATION PHASE

E phase preparation meeting was innovative as it directly involved all the partners, identifying skills to be observed and with structured planning of five-day mobility. Proposals from companies at the meeting allowed a practical discussion between the world of work and the world of school for planning WBL activities. The same iter was then applied also in planning following WBL activities. The Class boarding group was able to reflect on the opportunity and the need to involve students more frequently on tests encouraging them to solve problems and to have a critical approach to situations.

Students were all in their third year, two from Marconi school, Electrical engineering curriculum, and two from Paleocapa school, Mechanical-Energy curriculum.

Students have been satisfied with the exchange experience and they would have repeated; activity with companies has improved their skills, responsible have been available to support them in different activities.

Some of them found it difficult to communicate in English with other partners because of a different level of knowledge; that hindered relationships between companies and foreign partners but the problem was solved thanks to Italian students who played the role of interpreters. The assigned tasks required a limited commitment considering their technical skills and the students would have gladly enjoyed a longer experience.

C PHASE – CLASSROOM: ZALAU (RO), MOBILITY STUDENTS, 8-12 MAY, 2017

HOSTING SCHOOL – COLEGIUL PAPIU ILARIAN AND LICEUL M. VITEAZUL (RO)

PREPARATORY PHASE

How did you select the referents who participated in C-Phase?

The referents (economical agents) who took part in the C Phase in Romania, were selected based upon discussion with our partners from the project. These were part of the meeting from March 2017, which was held by The Technological Highschool " Mihai Viteazul" from Zalau town, Romania.

We tried to involve in the project economical agents involved in different economical activities of mass and middleweight production. Thus, learners could witness how two competences from the project are applied and respected.

How was the school involved in term of class council and school board?

The School Board made a nomination decision for the teachers involved in the project, which is a labour contract for an undefined period, a contract approved by the Ministry of Education. This paper was considered part of the curricular activities. The school conducted the evaluation of the students involved in the project.

After a meeting attended by project team members and school leadership, it was established that at this meeting students would be accompanied by Rodica Steluța Damsa. The main reason for choosing the teacher being the language criterion, that is, the knowledge of the English language for the teacher which accompanies students in this mobility.

PLANNING PHASE

How did you select the students involved in C-Phase?

The students involved in the "C" Phase were selected in the beginning of the project.

There was organized a session with the parents of the students in the ECLI class. There were established the following: -the way to accommodate the foreign students.

In this way, it was reached the conclusion that the students selected to go to Sweden should host the students from Sweden those who should go to Sicily should host the students from there and, likewise, those planned to go to Bergamo-Italy should host the students from Bergamo.

- for the cultural activities in the free time, there were prepared visits to the touristic attractions from the area and also a picnic was organized with the host families, the students and the accompanying teachers.

The Agreement / Conduct drafted between the host school/ The technical College "API" and the partner schools was based on a model sent by the project coordinators from Italy.

The selection process was agreed with school management, pupils and parents of the class. Thus, it was established that the selection criteria would be two. The first established criterion was the average of the previous school year and the second was the average for English language. So, two of the best students based on the annual averages in the previous ECLI school year, participated on Phase C from Zalau (Romania).

REALIZATION PHASE

Monday-The first day-we went to the company Tenaris Silcotub – where we were presented and witness, from the entrance door, the application of safety rules in work.

The entrance in the company could be made solely by using an official document (ID or Passport) and none could enter unattended. We were accompanied to a room where we were presented the production processes and the safety and health rules applied to each production section. After wards, each student was assigned a computer in order to be tested from the safety and health rules previously presented. Then, we put on safety equipment and entered the factory. This visit helped us observe the way in which pipes were produced and how those rules were actually respected in the work field.

Tuesday – the second day – we visited the Michelin Company, which produces tyres. These also we were requested to identify ourselves (ID or Passport) and only after were we conducted to a course room to be presented the way to produce tyres and the safety rules in work, rules that are held for each operation/phase of production. After, we dressed up in the safety equipment (special boots, reflective vests, helmets, safety goggles and ear plugs) and we set on our factory visit. We stopped to observe each operation of tyre.

We set off from the warehouse – the phase of supply, where we could see the documents notes of merchandise reception storage, the section for rubber mixing. In the assemblage phase was observed that everything is automatized and monitored by a section supervisor. This employee assures the accomplishment of all quality characteristics for each employee/shift.

Wednesday - the third day - we went to the second company Michelin Cord where we were subjected to the same entrance procedure for the company. Then, we were informed about labour protection requirements through a power point presentation. We were divided into four teams. Each group received a task to be solved by students. After we visited and observed each department with its specific from production. For example, here we observed the enamelling of a copper thread.

Thursday – the fourth day visit to firm Grov Invest

Friday – the fifth day – was the evaluation day. The involved companies decided in the planning phase to make a non-formal evaluation. The teachers from The Technical College 'Alesandru Papiu Ilarian' made a practical notebook and a daily schedule for each company together with a technical vocabulary.

4

MONITORING PHASE

For the C-phase: For the C-phase:

Number of students involved (divided in local and international coming from other partner schools), age and educational path of students involved:

- 2 students (age 18), Mechanics from ITIS "P. Paleocapa", Bergamo – ITALY
- 2 students (age 17-18), Electrotechnology from ITIS "G. Marconi", Dalmine (BG) - ITALY
- 2 students (age 17) Technical Gymnasium, from ABB Industrigymnasium, Västerås - SWEDEN
- 3 students (age 18), Chemistry and Materials, from Technical Institute, Biancavilla - ITALY
- 2 students (age 16), Mechanics, – from Liceul Tehnologic "Mihai Viteazul" Zalău Romania.
- 6 students (age 16-17), Electronics-automation, – from Colegiul Tehnic „Alesandru Papiu Ilarian” Zalău Romania.

Number of companies involved and number of hours involved:

- Tenaris Company 6 Hours
- Michelin Company 6 Hours
- Michelin Cord Company 6 Hours
- Grov Invest Company 6 Hours
- Colegiul Tehnic „Alesandru Papiu Ilarian” 6 Hours

Number of teachers/company experts involved

- Tenaris Company 5 company / tutor experts
- Michelin Company 4 company / tutor experts

- Michelin Cord Company 4 company / tutor experts
- Grov Invest Company 10 company / tutor experts

Number of accompanying teachers

- 5 teachers accompanying
- Students satisfaction of the experience

Satisfaction:

- 17/17 students affirm to be from satisfied to very satisfied of the mobility.
- 17/17 students affirm their level of satisfaction about the project is medium (6)/high (11)
- 15/17 students hope to have a similar experience again.
- 14/17 students affirm that their internship in Romania was quite or very helpful; 3/17 a few helpful
- certificate of attendance

EVALUATION PHASE

Following the student mobility in Romania, the evaluation of the international WBL was communicated by the participating students and the accompanying teacher to all ECLI students. This was done during a meeting attended by members of the project team such as school principal and technical staff who teach in that class.

6. VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

The relevant aspects of the international exchange identified by the students involved were as follows:

- how to organize business activities;
- evaluation by carrying out practical activities;
- feedback test;
- social side, communication in English.

In phase C from our high school, 2 students were directly involved and 17 students were disseminated in this activity. All 19 students in that class were involved in C-type activities organized by TenarisSilcotub and Michelin Companies in 2016.

As a result of discussions with the students directly involved in the project, so they were in Romania, they said they sometimes had difficulty understanding the message because they do not master English well. This was, however, remedied by the presence of the teacher in this mobility.

SENDING SCHOOL - IST. RAPISARDI (IT), IST. MARCONI (IT), IST. PALEOCAPA (IT), IND. GYM. AB (SE)

PREPARATORY PHASE

Industritekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

We have a core of staff who is involved in the project and we try to involve teachers of technology and industrial production and this time we selected a teacher of technology together with the school's Head Teacher. We try to select referents so that we have continuity throughout the project.

IIS Mario Rapisardi Paternò Italia

The referents in phase C were chosen within the Class Council of Class IV A, involved from the first year in the project activities. Particularly, Mr Michele Bianca, a chemistry teacher, who followed the project in all its phases. was selected as the tutor.

How was the school involved in term of class council and school board?

IIS Mario Rapisardi Paternò Italia

The whole project was, since its start, evaluated, approved and monitored by all the collegial bodies of the school. In particular, the school board approved the Institute's candidacy for the project with a positive evaluation of its objective. Once approved, the project has been included in the Three-Year Plan of the Educational Offer and in the same way the Institute Council accepted the project in the Annual Program. The Class Council constantly included in its agenda the programming of the activities to be carried out both at school and during national and international stages as well as monitoring and evaluation the various activities.

MARCONI AND PALEOCAPA

Project manager and accompanying teacher are responsible in C phase. The project manager was in charge of preparing documents, organizing trip and keeping in touch with the hosting school; while the accompanying teacher took two students, was in charge of document submission, local travelling and activities supervision.

We chose a technical subject teacher from the class boarding group as accompanying teacher, so he could support his students in different activities, emphasizing technological aspects.

C phase was carried out in May 2017 when ECLI class were in their fourth year. The project had already been approved by School Board and by Teaching Staff in 2015, the same year of funding, as well as by ECLI Class boarding group that had decided to join the project for three years.

In 2016/2017 school year we shared the activities, planned or carried out, with the Teaching Staff at the beginning and at the end of the school year with all the teachers and students involved.

The School Board and the Teaching Staff approved all the activities at the beginning of each school year.

The Class Boarding group has collected availability from teachers and has chosen the accompanying teacher, keeping in mind the planned activity and the competence that students would have developed.

PLANNING PHASE

Industritekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

In all our classes we are working with work based learning in different forms and we wanted students from our second grade to have the opportunity to go to Romania. We chose the second grade because they have then started their course in production knowledge and they have also had an internship so they are more aware of safety issues at a work place. We simply asked the students in year 2 who wanted to go and then we had a lottery among the students who wished to take part in the project.

IIS Mario Rapisardi Paternò Italia

The class involved in the project consisted of fourteen students. Thanks to a transparent and inclusive selection, eight students at a time were alternatively involved in the internship activities at the other partner-schools of the project; while the whole class participated in all the activities carried out at school. The selection criteria, were: the school average reported in the last evaluation (as 3/10) , the English assessment mark (as 3/10), the possible possession of linguistic certifications (as 2/10) and availability to host (as 2/10) .

MARCONI AND PALEOCAPA C PHASE SENDING

At first the Class boarding group considered students' availability to travel abroad and after that, selected the students with the best school results, with a good motivation and level of English proficiency. Students who had already taken part in other phases abroad were excluded.

MONITORING PHASE

How was international WBL of C-Phase integrated in didactic programme of sending school?

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

Our students are taking a course in production knowledge and in this course they have been able to make use of their experiences during the C-phase. The teachers they have are involved in the program and can discuss the benefits of their WBL experience in the C-phase.

IIS Mario Rapisardi Paternò Italia

Not only the class directly involved in the activities of the various phases of the ECLI model, but also the entire Institute "Mario Rapisardi", benefited implementation of the ECLI model in the Institute teaching methodology. In particular, in the E (Expert) phase, the Institute was encouraged to promote the meeting between students and professionals of the world of work and culture, for bringing their expertise at school and provide students a different and qualified point of view on the world of work.

How was the international WBL experience integrated in the educational paths of students?

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

This question has partly been answered in the previous one but we should also take into account the importance of seeing a company abroad and the cultural experiences that students get. They see a different company cultures and how they work with safety and the production process at Romanian work sites. Understanding other cultures is a major aim in the Swedish national curriculum.

IIS Mario Rapisardi Paternò Italia

The "Mario Rapisardi" Institute organized , during 2015/2016 school year, the first year of the project implementation , with a series of training activities, some of which specific for the Class Council directly involved in the project and others for the entire teaching staff. This allowed the entire School Board to have a good knowledge of the ECLI model and its four phases. As a consequence, starting from 2016/2017 ,all the School WBL projects have been designed by the Class Councils in line with the ECLI format, to ensure methodological, didactic uniformity, as well as monitoring and evaluating the entire activity. It can therefore be said that the ECLI model is destined to survive the project itself and to become an integral part of the Institute educational offer also for the coming school years. Our Institute was, together with the "P. Paleocapa "of Bergamo and" G. Marconi "of Dalmine, the promoters of ECLI school network to enhance its diffusion.

Was the evaluation of the international WBL communicated to class councils?

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

The participants have continually reported about their project to teachers and students alike. There has been a seminar where we have looked at the experiences gained during the C-phase in Romania. The student and staff mobility have both been useful when discussing how we can work together with companies and how the conditions for this work differ between the countries.

IIS Mario Rapisardi Paternò Italia

For each project phase , the student involved in international experiences were assessed by the class tutor and the company tutor, who assigned a score to each skill. These assessments were taken into account by the Council Class aiming at the students' overall evaluation.

MARCONI AND PALEOCAPA C PHASE SENDING

In teaching plans of Bergamo schools all the WBL activities are structured according to ECLI model, that is, in 2015/2016 school year, all third classes have carried out ECLI phases, as well all third and fourth classes in 2016/2017 school year and the third, fourth and fifth classes in 2017/2018 school year. In three years 60 classes have been involved, with a total amount of about 1,200 students in both schools. Selected students ran out Classroom phase through the activities of Erasmus project, as well as through those planned for the

whole class. Evaluation was shared with Class boarding group, confirming how much the foreseen methodology for C phase is effective for skill learning.

At the beginning of each school year, each Class boarding group plans curricular activities, including WBL activities; so, Classroom phase has been planned for the selected students through Erasmus + project activities, as well as through those planned for the whole class. International experience of WBL has been very valuable for those students directly involved because activities have been shared with students from different countries, with different training and different cultural background, have requested the use of English in formal and informal context. The students became protagonists of experience dissemination, involving others in training they had previously carried out.

The accompanying teacher brought back the evaluation forms drawn up for the planned activities with Tenaris and Michelin companies; he shared them with the Class boarding group teachers in a special meeting. They have considered student's evaluation as an innovative tool through which it is possible highlighting reality check tasks skills in WBL activities.

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

Did the C-Phase produce any innovation of internal processes?

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

We cannot say that this particular phase has produced innovations in our internal process but it corroborates our main ideas as to how we can work together with companies in order to prepare our students for work-life and further studies. We saw a lot of good examples in Zalau and a commitment from both school and company representatives.

IIS Mario Rapisardi Paternò Italia

The elements of the C-phase that have had a greatest impact on the Institute internal organization with regard to the WBL activities are : a) a better synergy between the company and the school in the organization of business visits; b) accurate business visits planning , with the determination of precise and quantifiable objectives; c) attention to technical aspects and related skills acquired during the business visit.

Which are the relevant qualifying aspects of international exchange identified by the students involved?

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

Especially the opportunity to see and learn from differences and to realise that industrial companies act on a global market and that they are potential employers also for our students. Then cultural aspects are important.

IIS Mario Rapisardi Paternò Italia

On the basis of the satisfaction tests given to students, the most qualifying aspects of the international activities were: possibility of comparison with students belonging to different realities; 2) possibility to visit large industrial plants and multinational companies such as Tenaris, ABB, Michelin; 3) possibility to use English as a vehicular language ; 4) opportunities to compare management and organizational systems, both for school and business.

Number of students involved, classroom level and specialization.

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

Two students came from the 2nd grade at ABB Industrigymnasium and they specialise in production technology.

IIS Mario Rapisardi Paternò Italia

In consideration of the project three-year duration , the class identified was a 2015/2016 third year class of the Technical Technological Institute. The specialization of students is Chemistry, Materials and Biotechnology.

Which are the difficulties emerged?

Industri tekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium) Sweden

Occasionally there can be problems with languages but this was never a real problem, they learn how to solve it.

IIS Mario Rapisardi Paternò Italia

The project has fully achieved the objectives proposed. However, during the course of the year some difficulties emerged, linked in particular to creating a continuum between the project activities, especially the international ones, and the normal curricular ones. In the same way it was not always easy to get the involvement and participation of the entire teaching staff of the Class Council.

MARCONI AND PALEOCAPA C PHASE SENDING

C phase preparation meeting was innovative as it directly involved the company representatives in the activity planning. Proposals from companies have allowed a practical discussion between the world of work and the world of school for planning WBL, a model that has been replicated for most of activities of schools in Bergamo. The Class Boarding group was able to reflect on the opportunity and the need to involve students more frequently on tests encouraging them to solve problems and to have a critical approach to situations.

Students have been satisfied with the exchange experience and they would have repeated, tasks assigned were easily solved and students would have gladly enjoyed a longer experience abroad. Use of English was a real challenge for some of them: students were asked to learn some specific technical vocabulary before each activity in order to allow them to understand what was explained and required; communication between peers, with different levels of knowledge of English, has been solved through an informal language.

NEW COMPETENCES FROM C PHASE

DEFINITION OF COMPETENCES

The competences for “C” Phase were selected during the international meeting from March 2017, held in Zalau – Romania.

The meeting was attended by: selected companies, the hosting school and international partners.

They were defined the competencies that had to be attained, respecting the professional standards of preparation PSP and all the European partners with their specific specialization (mechanics, chemical, electronics-automation, electric-electrotechnic).

There appeared difficulties in correlating the specific of specialisations from the project, but there were established competencies to be common and adaptable to each specialization.

EVALUATION PHASE OF COMPETENCES

We have decided to make the evaluation altogether with the tutor from each involved company. There have been made a non-formal evaluation where the level of knowledge was checked for each student. Here I attach photos from the Tenaris evaluation, held in the company’s lab of instruction. The evaluation was related to the safety and health rules in the work field. Also, there are proofs from the Michelin testing.

ANNEXES:

TOOLKITS USED

description form of C-Phase target competences .

COMPETENCIES CONCERNED

HEALTH AND SAFETY OF WORK

- Apply health and safety at work, fire prevention and extinguishing.
- Planning actions to avoid and reduce the risks identified at the workplace

PLANNING AND ORGANIZATION OF PRODUCTION

- Analyze production as a result of the production process.
- Analyzes aspects of organization and production planning.
- Schedule job-specific activities.

Thematic content related competencies

HEALTH AND SAFETY OF WORK

1 Apply health and safety at work, fire prevention and extinguishing

- Workplace risk mitigation measures: training, use of the legislation in force specific to the field
 - initial, current and periodic training
 - Information documents: sheets, posters, films, catalogs, brochures, leaflets, working instructions.
- Hygiene measures and work safety
 - the individual instruction sheet
 - work equipment and individual and collective protective equipment
 - first aid kit
 - hygienic-sanitary materials
 - materials and means of extinguishing fires
- Protection systems and devices.
 - individual and workplace specific collectives.
- Materials and means of preventing and extinguishing fires: water, sand, blankets, hydrants, foam extinguishers, dust, CO2

2 Planning actions to avoid and reduce risks identified in the workplace

- Special situations and workplace risk factors
 - risk situations: functional disturbances, machine failures, non-compliance with ergonomic principles, inappropriate worker behavior at work, inappropriate physical and mental state of the worker
 - work accidents
 - occupational diseases
 - damage
 - fires and explosions

Work equipment and workplace specific protective equipment.

PLANNING AND ORGANIZATION OF PRODUCTION

1. Analyzes production as a result of the production process.

Production process: industrial and non-industrial processes

Classification criteria: how to participate in product execution, how to build, how to get products

Finished materials, the technological nature of the operations carried out, the nature of the activity carried out

Components: input sizes, production steps, output sizes

2: Analyzes aspects of organization and production planning.

Types of production: individual, serial, flow, mass, automated, into production cells

Methods of organizing a

Production: linear programming, PERT method, CPM method, "Just in time"

Trends: Flexible manufacturing system (integrity, suitability, adaptability, structural dynamism), advantages of the flexible system

3: Schedule job-specific activities.

Ways:

- classic
- using software

Requirements for materials:

- raw materials and materials
- semi-finished products
- working tools

Workforce: .

- Professional
- Qualified
- Unqualified

Documents:

- product / service launch card
- Technological cards
- charts, charts
- plans

4. Establishes the link between manufacturing systems and planning and control aspects.

Processes: processing, control, storage, handling, transport, command, driving

Aspects of planning

And control: production planning, production control, quality control, occupational health and safety, information technology in manufacturing systems

evaluation form of C-Phase competences.

Evaluating EQF levels

Level 1:

Under direct supervision the student recognizes the main concepts of production processes and quality theory

The student studies the legislation on management and documentation.

The student recognizes the contract and the figures they work with.

Level 2:

The student is able to analyze the operation of a production process by listing basic components and documenting for analysis from sources (internal or external).

Level 3:

The student accepts responsibility for analyzing and documenting production processes by naming them and the products involved; To manage a simple production process; Managing relationships with partners in the company

Level 4:

The student is able to lead a small group in implementing the main marketing techniques to identify and define the type of product that meets the needs of the markets.

Based on the results of the previous analysis, the student is able to plan and document a production process taking into account its complexity and the necessary relationships with the outside environment.

L PHASE – VASTERAS (SE), MOBILITY STUDENTS, 12-16 FEBRUARY, 2018

HOSTING SCHOOL – INDUSTRITEKNISKA GYMNASIET I BERGSLAGEN AB (SE)

PREPARATORY PHASE

How did you choose responsible (class boarding group, class coordinator, project coordinator, headmaster) who took part in the L phase ?

The headmaster of the school and project coordinator Stella Moberg Paganelli are running the project throughout the three years. This time, considering the theme of the week, the headmaster and project coordinator worked together with two teachers specialized in technology and industrial production processes. The reason why these teachers were engaged is that they have been active in the project before and we see the importance of continuity. Besides, they have been involved in the planning during the transnational meetings in Sweden and abroad. The assisting headmaster has also been involved in the project, mainly during the week of planning in October when all schools met in Västerås. During the L phase we realized the need for English teachers when preparing presentations and the project coordinator is also a teacher of English.

As for student participation the students (now in their final year) who had been to Sicily and Romania during previous phases were invited to the L phase project week. We also informed all classes in year 1 and 2 about the project and offered students to participate. There were three who volunteered and they all got a place in the project.

As for the staff boarding group (class boarding group, class coordinator, project coordinator, headmasters, administrative staff) involved in the preparation / implementation of the international mobility in the L-phase, what kind of work was carried out?

The staff involved in the project worked closely together and had several meetings to discuss how to implement the L-phase. Since it is difficult to do laboratory work with the equipment or machines in companies we needed to think outside the box. Headmaster, project coordinator Paganelli and the teachers were all involved. We also made visits to a couple of ABB divisions and Bombardier to discuss our project week. Eventually, we also met the students who were going to work in the project to get their opinion.

The work group had to establish competences and learning outcomes to be discussed at the transnational meeting in October in Västerås. Also, the company representatives were invited to present the suggested cases. One important aspect in the project was to have the ABB representatives to give feedback to the students after their presentations. With the students we specifically wanted to discuss the level of difficulty and how they thought the groups of students from all countries would be able to solve the cases,

based on their experience in previous phases. We got valuable input helping us design the project week and the goals and learning outcomes.

It was a challenge for the group to find time during the preparations of the project week and during the project week itself even though we had planned the normal schedule to fit the project week. We also had extracurricular activities every afternoon/night to get the groups together.

Has it been integrated into teacher's curriculum activity or have extra-curricular hours been spent?

As stated above some extra hours were spent but we tried to accommodate most of it in the teacher's normal curriculum. As for the organization there were extracurricular hours since teacher involved in the project had temporary exemption from teaching duties. Some preparations for classes the week after had to be done during the weekend and also for the headmaster there was a bit of catching-up to do the following week. In the evenings we organized some activities where extra hours had to be spent. But all in all it worked well and it was worth all the effort and gave us extra energy since the outcome was so good. Finally, our school admin had to do a few extra hours in connection with the project.

How were the Class boarding group and the School boarding group involved?

We have a small organization with weekly meetings. Teachers, students and the management work closely together meeting on a weekly or sometimes even daily basis and at these meetings issues like these are discussed. All students were informed about the project via e-mail and they were also given the opportunity to sign up to join the project. In the planning phase of the project week students have been asked to give feedback and suggest possible changes. As for staff we have had meetings to discuss what teachers would be the most suitable for the project, taking qualifications and work situation into account. We have also informed staff and students in our school newsletter

PLANNING PHASE

How was the ECLI class for the L-phase identified?

We see the value of continuity and therefore wanted students who had participated in previous mobility projects/phases. Therefore the students (now in their final year) who had been to Sicily and Romania were invited to the L phase project week. However, since we had the opportunity to include more students as we were the hosting school we also informed all classes in year 1 and 2 about the project and offered students to participate. There were three who volunteered and they all got a place in the project.

The reason we can really pick students from any class is the fact that we are working loosely along the lines of the ECLI model with all our classes. Of course, we made sure to discuss the students' situation with their teachers so that it would be possible for them to join the project week instead of following the normal curriculum. The students who took part in the L-phase project needed to do extra work to catch up with their classmates since they were missing out on regular classes but they all handled the situation well and did a great job with the project and contributed with enthusiasm and a great attitude.

How have you combined the logistical arrangements – travelling and hosting – with school curriculum?

Visiting students have been staying with students from our school. The families have either made sure to drive them to school or they have been given bus passes to get to school. Teachers have been staying at a hotel in the city centre and they have used bus passes to get to school. The first day we picked everyone up by car to transport them to school. Everything has been arranged by project coordinator in cooperation with the school admin, teachers and headmaster.

How have agreements between hosting and sending school been formalized?

We used the agreement forms that have been worked out (see the Annex). They were an excellent support in the process. We filled in all the information necessary for us as hosting school and sent them by e-mail to the responsible person at each sending school so they could fill their data, with the accompanying teachers and the students involved. After the headmaster and the students signed it, the original document was brought by the accompanying teacher so it could then be signed and stamped by the hosting school. The leading partner keeps the original documents.

How have the companies involved in international student mobility been identified?

The companies involved in the L- phase are ABB and Bomardier Transportation. Bombardier Transportation has a site next to the school and we have a former student who is now responsible for the production process at this factory. They have been working successfully with the implementation of LEAN production and therefore we made a visit there to learn more. However the main partners of this project week were two ABB Divisions; ABB Grid Automation and ABB Robotics. The school has a mutual agreement with ABB and they are our most important partner overall. Also, where the school is situated we have different ABB divisions within walking distance. Every year we have a lot of students who do their internship at different ABB divisions and employees from different areas of expertise are part of projects and come to lecture for our students. ABB has a sharp focus on improving production processes but also on safety and health for their employees. Therefore ABB was the perfect partner for our project week.

When it comes to LEAN production we wanted a case where the students needed to solve a problem that was real and that the company was also working actively with. After visiting ABB Grid Automation Products in connection with a student internship we learnt that they were reconstructing their production line and that they were faced with a few problems that they thought students could work with.

Since we also wanted a partner and a case to work with concerning health and safety we had a meeting with the ABB management and they told us about their work on improving the health situation for their employees and they gave us a couple of names in the HR department at ABB Robotics. We then had a meeting with Johan Eriksson and Åsa Rylander who agreed to be part of the project and construct a case. From ABB Automation we have warehouse manager Fernando Duran who is an expert on LEAN and he gave an introductory lecture on LEAN.

Peter Strömberg working at ABB Marine and ports division was invited to join the presentations and to give the students feedback on their work. We thought that it was a good idea to have several company representatives from different divisions present to give their view.

Finally, Maria Nordin has been working with the ABB occupational health care and we discussed with her the option of having a session with the students concerning crisis management and CPR. Since focus had been on preventive measures we also wanted the students to be able to handle the situation when an accident has actually occurred.

Main partners in the project:

ABB GRID AUTOMATION PRODUCTS

This division is responsible for developing, marketing, selling and producing products/solutions for generation and transmission applications among other things. The product that was made here is part of the IED Relion 670/650 series. Erik Strömberg, Logistics manager is our contact person here. Also involved in the project were Jani Uutela and Martin Zetterqvist who are responsible for the production line in the factory.

ABB ROBOTICS

ABB is a leading supplier of industrial robots and robot software, equipment and complete application solutions. In this case we were working with their HR Department where Åsa Rylander and Johan Eriksson are occupational health care and safety specialists. They have been working actively to develop ABB's strategies concerning health and safety.

What kind of agreements have been formalized with the companies?

We have an overall agreement with ABB concerning internships and projects. For this particular project week there is no separate agreement. We have had planning documents that we have shared with each other during the process. Otherwise a lot of work has been done via e-mail but we have also had a couple of meetings. You could say that mutual trust has laid the foundation for this project and the way we have been working with it.

IMPLEMENTATION PHASE

A detailed description of the activities actually developed for the L- phase, objective description, description of developed program, monitoring tools used.

The actual programme is enfolded in the annex but here we will give a more elaborate description of all activities. During the first day we wanted to make sure that all students had an understanding of the concept of LEAN. We started out by a lecture by warehouse manager Fernando Duran from ABB Automation who gave an overview of the concept of Lean and introduced the students to some basic concepts and principles. Fernando was not only lecturing but also discussed certain aspects with the students.

After lunch all the students were engaged in a Lean game at school where we had a simulation of a production line. The students were at different positions in the assembly line and different problems arose that they needed to solve. This is a very hands-on approach where you can easily understand the principles of Lean and what problems can occur in a production line where different parts are assembled. During the game the students need to make changes to get a more efficient process. We also thought this exercise was good because it forced students to discuss different problems and collaborate. There were responsible teachers available all the time making sure that the process moved forward and that students learnt from the game and highlighted the essential principles.

So, if day one was preparing students and giving background knowledge, day two meant using this knowledge and working directly with a real problem presented by ABB Grid Automation Products and their Logistics Manager Erik Strömberg. At their site they have realized that they need to reconstruct their production line to become more efficient. In the morning we divided the students into three project groups and then we walked over to their site just across the street from the school and we were given an introduction by Erik and his crew. The students were given a guided tour in the production area and they were also showed the assembly station that they were going to work on to suggest to the company how they should arrange it. The questions they were faced with were:

How should we kit our station with casings to make it optimal in terms of
Ergonomics
Material flow
Avoid stock out in station that affect our pace

How can we feed the casings into the line in an ergonomic way?

Department: Global Project Management

a more detailed description with illustrations we refer to the enfolded case description (see annex). Before leaving the site students met with the employees that were going to work in the new production line and also their manager. They could then ask questions about things they had not understood or needed to know more about.

Then the students had the afternoon to work at school with their solutions and they had the possibility to send questions via e-mail to Erik and his crew. Technology teachers were of course also available. Other than

just finding a solution to the problem and figuring out how to organize the assembly station they needed to prepare the presentation at the end of the week. Here the students used their computers to make illustrations for the presentations. It was actually our intention to make the students use digital support in the process and we could see at the presentation that it was something they managed well and it raised the level of their work.

Wednesday morning we went to Bombardier transportation to have a guided tour in their factory with special focus on Lean in their production. The idea here was to see yet another production line but with a different product and on a larger scale. We simply wanted to widen the horizon and give students more input in the Lean area now that they had learnt and worked with the basics.

In the afternoon the whole group moved on to ABB robotics to meet health and safety specialists Åsa Rylander and Johan Eriksson. First, the production manager on the site introduced ABB Robotics and their organization but then Johan and Åsa went over to focus on ABB's work to improve safety and health for all employees. They talked about ABB's strategies and how they are working to invest in the health of the employees, because this will also lead to ABB becoming more competitive on the market. Then the students were introduced to their second case and they went on to work in the same group as with the previous case at ABB Grid Automation. The scenario was that they were working as Senior project managers at the Global Department:

Your are a Senior Project Manager managing projects in a global environment. Your are responsible for running ABB's larger and more complex projects; ensuring scope, safety, schedule, cost and quality are met according to global KPI measurements. You are working in a high-paced, global environment, solving complex problems in a rapidly growing business.

At your department you have during some weeks observed that your project leaders are working a lot and are struggling to meet deadlines and expectations. One of your employees is on sick leave due to stress and you can see stress signals from other employees as well.

As responsible managers they were asked to deal with the following issues:

How do we decrease sick leave and how do we secure a healthy working environment at the department "Global Project Management"?

How can we work smarter and more efficiently, and feel better at the same time in a global digitalized working environment?

Identify and suggest three to five actions per question. The actions could be both short term and long term actions.

Then, for the presentation they were given the following instructions:

Your goal is to present your suggested actions to the management team on Friday February 16. Document your actions in a report and handle it in after the presentation.

You are free to choose how to present your actions but you must do it in a way that convinces the management team that they should implement your actions.

As you can see this task is not only a matter of finding the right ideas but there is also a lot of focus on how to express the ideas of the project in a convincing manner. It is a very realistic context in work life and therefore suitable for the project. It is a challenging task to perform in English and the level of language skills varied a lot between the members of the group. However, all students took part in the final presentation and delivered their part. It was very rewarding to have groups with mixed nationalities to discuss these topics and the students had ideas that Åsa and Johan found very interesting.

Thursday morning until lunch the students worked with their case and in the afternoon Maria Nordin from ABB occupational health care introduced crisis management with the students. In their groups they were presented with different scenarios and had to discuss how to handle the situation. For example, what

do you do if a co-worker suffers a severe injury and is bleeding a lot. You could say that these were mini-cases for the students to discuss. After this part all students practiced CPR on dolls and they got feedback via I-pads that were connected to the CPR dolls. When this session ended the groups had some time to continue their preparations for Friday morning and the presentations.

The final day of the project started with the three groups presenting their solutions to the cases. There were six representatives from ABB present and an equal number of teachers. All students were very serious and as groups it was obvious that they had rehearsed beforehand to ensure that the presentations went well. The company representatives asked a lot of questions and gave feedback to every group. They also asked specifically to have reports and illustrations sent to them. There were interesting points the students made that they wanted to discuss with their colleagues.

After the presentations all students and teachers had an evaluation that concluded the project week. Students were asked about their overall satisfaction with the project but also about the development of specific skills. The week after the project we had an evaluation with the ABB representatives who were very satisfied with the outcome. In fact, they wanted to recruit students in the project week for job positions over the summer and in one case for an entire year.

The participants from Italy left to go home in the afternoon on the Friday and the Romanian students and teachers went home early Saturday morning. For specific times for each activity we would like to refer to the programme that is in the annex.

MONITORING PHASE

For L phase:

- students involved (Swedish, Italian, Romanian)
- Experts involved (see program)
- accompanying teachers (2 from Marconi and Paleocapa + 1 from Rapisardi + 2 from Romania)
- student satisfaction survey (summary)
- certificates issued

Swedish students involved: six students. Three from year 3, two from year 2 and one from year 1

Italian students involved: two students from Marconi school, two students from Paleocapa school, two from Rapisardi school.

Foreign students from partner schools involved: three Romanian students – two from Colegiul Ilariu and two from Liceul.

Participants age was between 17 and 20 years old, and the study courses ranged from Mechatronics and Electricity for students from Bergamo, from Chemistry for Sicilians, to Production Equipment, Production Knowledge and Mechatronics for Ipa production Equipment, Production Knowledge and Mechatronics for Sweden, to Technology for Romanian Colegiul and High School.

ABB and Bombardier transportation were involved in the project but as outlined before there were several divisions within ABB involved, mainly ABB Grid Automation Products and ABB Robotics plus their occupational health care.

During the week 10 people from the schools were involved: school headmasters, project coordinators and class boarding teachers. In the preparations a greater number of staff were involved.

The results of the satisfaction survey show that the students were generally very satisfied with the activities, and that almost all the students improved their skills. This is regardless of their country of origin. Some of them also found the tasks very challenging.

The students say that they learnt a lot about LEAN during the week and that they also practiced and developed their collaborative skills.

The hosting school issued participation certificates for students and accompanying teachers.

EVALUATION PHASE AND LEARNING RESULTS

How WBL activities developed in the L-phase were integrated in the school curriculum of hosting schools in an international perspective.

ABB Industrigymnasium has been working with work-based learning from the very day the school started in 1994. Working together with several European schools using project weeks to look at different aspects of the ECLI model has been very rewarding and it has given us a more international focus. At first we thought that it would be very difficult to get the groups of students to work together with different levels of English and also different fields of study, even if all were related to technology and science. We were wrong and the students have proved how flexible they are and how they are able to cooperate with others even if there are language barriers.

The strength of this project is that it enhances both soft and technical skills and it encourages us to take part in more international projects in the future. We also have established links with the schools in the project and we will have student exchanges for internships in the future. The students who have been part of mobility weeks and involved in the entire project think that it is rewarding and are asking for more projects to take part in.

We will continue to implement the ECLI model and we think it will need to be a flexible model but we think that the week in Sweden shows how this flexibility can be used in an effective way, to create a good learning outcome and train students for real work life. At the same time the companies think the model for the week works well with the school clearly asking what they want, helping the company representatives in their planning since time is very limited for them.

How did students joining the experience integrate the L-Phase with their school curriculum?

In the national documents in Sweden all the ingredients in the project week are listed as major learning goals: Problem-solving, collaborative skills, presentational skills, understanding for people from other countries/cultures, communicative skills. It is obvious that the project week has helped these students develop all these skills. Since the students come from different years their experience and knowledge of industrial production differs a lot. However, the course of production knowledge runs over the two final years so all students but one still haven't finished it. And the student in year one will be able to use his acquired knowledge when the course starts next year. As for crisis management and CPR these are part of the physical education course. So, for our students all the different parts of the project week are easily integrated in their normal curriculum even if they have had a different time-table during the project week. Most of all we think that they have developed their social skills and learnt more about how to work together with people with a different background and school system.

Have school organisations (class boarding group) transposed the final evaluation?

We have given feedback to the companies involved and also to the entire staff at a staff meeting. Students have been given an overall summary of the evaluation and we have also sat down to discuss the outcome of the evaluation and what could have been improved.

INTERNATIONAL EXPERIENCE VALIDATION PHASE

How did the L Phase produce internal process innovations?

We have a lot of collaboration with ABB and other technological companies in the local area. We have internship for students, we make visits to companies and we also have experts from companies lecture at our school. Besides, some of our major projects are carried out together with companies who give the students a real problem to solve. You could say in other words that all our classes are ECLI classes throughout the three years at school.

However, working for an entire week with total focus on a few cases is something new to us since we have before spread it out over a longer period with other subjects running parallel. Here we had different phases (ECL) combined during a very short period which gave a really good focus for the students. Surely this is something that has given us inspiration to go on working with project weeks solely focusing on one or two cases and we are looking at the set-up of this week (see annex) as a model for future weeks in our new program that is launched next year. The company representatives have also given their approval and the final presentations where the companies attended and saw the potential of the students was a success. In fact, a couple of them wrote back to us and wanted to recruit some of the students for the summer and in one case for an entire year.

What were the qualifying aspects for students concerning the international exchange of the L phase?

Number of students, class, level and specialization. What difficulties did they face?

There were six students from our school and three of them had been attending previous phases in Sicily and Zalau. These students had a solid knowledge of the area we were working with but the other three students did not. From the sending schools there were students who had all been part of previous phases. Whereas the students from ABB Industrigymnasium have a broad technological programme aiming for university the students from sending schools are more specialized in certain fields such as mechanics, electricity, chemistry. However, the mixed groups of students managed their work really well and were all able to come up with solutions to the problems they were faced with in their cases. We also found that the more experienced Swedish students could support the other members in the group who did not have as much background knowledge.

Initially, there were some language problems and some students needed extra support and training before their presentations. With joint efforts from teachers and fellow students everything went well and the company representatives who attended the presentations and gave feedback were thoroughly impressed.

IO 3_ DEFINITION OF COMPETENCES AND LEARNING OUTCOMES IN L-PHASE

How were the skills in the L-phase identified during the international meetings?

The skills were identified above all during the international meeting in Sweden in Västerås from 23rd to 25th October 2017. Identifying skills suitable for all schools and participating students is always challenging and we also wanted to find aspects that had not been covered before. We had been in touch with different divisions within ABB before the meeting to discuss with them possible goals and tasks within the field of safety and the production process. Then we actually let them design cases that could be used during the

project week. These were presented to the other participating schools during the meeting in Västerås and discussed with the company representatives. We then decided on the following competences:

3.1 DEAL WITH CRISIS MANAGEMENT AND APPLY PREVENTIVE MEASURES FOR PHYSICAL AND MENTAL HEALTH CARE AT THE WORK PLACE

3.2 APPLY THE LEAN METHODOLOGY IN SIMULATIONS TO UNDERSTAND THE DEVELOPMENT OF THE PRODUCTION PROCESS.

Closely connected with these are the learning outcomes:

3.1 The student will acquire competences in crisis management and in establishing and applying preventive measures for physical and mental health care at the work place.

3.2 The student will acquire competences in identifying what makes production efficient and he/she will be able to apply this knowledge, with focus on the LEAN production methodology.

3.3 He/she will also improve his/her technical language skills in the manufacturing sector and soft skills in team working.

When planning the week and activities we were faced with some difficulties:

- How do we set up the L-phase when we know that the companies find it difficult to let students use the machines and equipment for several reasons? One being safety, another that they need time and equipment for their own production.
- Students taking part in the project have very different backgrounds and levels of knowledge.

When it came to sorting out the first issue we realized that we could not be on site to do the actual “laboratory” but that it still was possible to relate it very closely to the actual company environment. This is where the cases come in. The company representatives built real cases based on dilemmas/problems in their organization or production line and let the students work with these. The cases were introduced on site and the students were given the background by the employed and also given a tour of the production area to look at the production problem that they were going to solve.

When it comes to the second issue we made sure to have a day of introduction with an expert from ABB lecturing on LEAN production and there was also a LEAN simulation carried out together with the production knowledge teachers at our school. Also when it came to the area of safety and health the students had an introduction by ABB representatives and they worked together with the company health service to practice crisis management and CPR.

One could say that the project week with the L-phase contained all the letters ECL in the ECLI model. We had Experts from ABB in the field of safety, CPR and LEAN. The Class also made visits to two ABB divisions and the Bombardier site close to the school where they could see the different production of Robots, trains and grid automation products. Then they also worked on their cases where they solved real problems (Laboratory phase) that were then presented before company representatives.

Have they been agreed with the company?

In fact, the entire week has been designed closely together with the company representatives and their daily work and problems on site have been the starting point for the L-phase. The companies have presented cases that have been discussed with teachers and headmaster and then after some slight modification they became part of the project week.

How have they been compared with the target competences of the national skills system?

From a Swedish perspective it has been important to work with skills and learning outcomes that are in line with the national documents. We can certainly say that the project week has been a perfect match in this sense. One goal for us as hosting school has also been to introduce our way of working to all the

international participants and it is of course important for them too that the skills practiced are in line with their goals and from judging by the evaluations we have been successful. Most of all we think that it is the method that has been very rewarding for the students. They have practiced problem-solving working with real problems where there is no set answer. They have had to collaborate and use presentational skills in English and the audience has consisted of experts in leading positions at different ABB divisions. All of these latter aspects have not been an explicit part of the skills described but they are indeed central parts of the national skills/competences.

How did the definition of common competences at European level come about?

What difficulties did you have ?

As expressed before the definition of competences and learning outcomes were agreed upon during the transnational meeting that preceded the project week. Then we put together the agreement where all aspects were listed for everyone to sign. It was difficult to find competences that could be embraced by all schools since the national systems and documents differ a lot. However, we think that the final outcome was a success and the impression during the project week was that both students and teachers found the work meaningful and rewarding. Initially, there were some language problems and some students needed extra support and training before their presentations. With joint efforts from teachers and fellow students everything went well and the company representatives who attended the presentations and gave feedback were thoroughly impressed. The evaluations proved that our impression was the right one.

INDIVIDUAL SKILLS ANALYSIS

Have the competences identified been reached?

Yes, the results from the student evaluation clearly indicate that the students have developed the competences listed. Regardless of their previous level of knowledge all but one also stated that the project week and the cases have been challenging. The essence of the challenge differs however, where some of the students who are well familiar with LEAN and production knowledge thought that getting the team together and reaching a good result was the most difficult part. Whereas some students who were not used to giving presentations in English and definitely not used to the technical vocabulary thought this was the toughest part.

SENDING SCHOOL - COLEGIUL PAPIU ILARIAN AND LICEUL M. VITEAZUL (RO), IST. MARCONI AND IST. PALEOCAPA AND IST. RAPISARDI (IT)
COLEGIUL TEHNIC "AL. PAPIU ILARIAN"

PREPARATORY PHASE

The class has been selected at the start of the project.

Class and teacher council of the school have been informed in 2015 at the beginning of the project, when the means of selection of the participants have been chosen.

PLANNING PHASE

Students for every stage have been selected at the beginning of the 2016-2017 school year, after a procedure agreed by the parent council of class ECLI and teacher council.

EVALUATION PHASE

Experience and activity from the ECLI model have been chosen by our schools' teachers and parent councils.

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

The elements of stage L have an impact towards students that take part of class ECLI with a wish to get a program for a better experience of doing the objectives of the project.

The way of organising and functionally has been chosen by the school council of Sweden that took part of the project, and possibility of upgrading linguistic skills.

Our school took part with two students from class XI H specialization electronics-automation . This WBL international experience was very beneficial for our students because in our regions we have no economical agents in this domain. They could observe and compare different aspects of organisation and management of different economic agents.

ITIS MARCONI AND ITIS PALEOCAPA- SCHOOLS L - PHASE SENDING

PREPARATORY PHASE

Project manager and accompanying teacher are responsible in L phase. The project manager was in charge of preparing documents, organizing trip and keeping in touch with the hosting school; while the accompanying teacher took two students, was in charge of document submission, local travelling and activities supervision. We chose an English teacher from the Class boarding group as accompanying teacher so that she could support her students in different activities enhancing their communication skills.

L phase was carried out in February 2018 when ECLI class were attending their fifth and last school year. The project had already been approved by School Board and by Teaching Staff in 2015, the same year of funding, as well as by the ECLI Class boarding group that had decided to join the project for three years. In 2017/2018 school year we shared the activities, planned or carried out, with the Teaching Staff at the beginning and at the end of the school year with all the teachers and students involved. School Board approved all the activities at the beginning of school year. The Class boarding group has collected availability from teachers and has chosen the accompanying teacher, keeping in mind the planned activity and the competence that students would have developed.

PLANNING PHASE

At first the Class boarding group considered students' availability to travel abroad and after that, selected those with the best school results, motivation and level of English proficiency. Students who had already taken part in other phases abroad were excluded.

EVALUATION PHASE AND LEARNING RESULTS

At the beginning of each school year, each Class boarding group plans curricular activities, including WBL activities; selected students ran out their Laboratory phase also through the activities of Erasmus+ project, as well as through those planned for the whole class for technical subjects.

WBL international experience was enriching for students directly involved because of an issue, *lean production*, actually already well known in their English curriculum. Students were able to compare, supported by companies, what they had already learned at school with the real business world.

Safety issue had already been addressed by students, but practical exercises and reality tasks allowed them to understand how safety and well-being are also functional to improvement of production processes. Therefore, students were able to see how important is safety in the workplace and also quality of work through relationships and collaboration.

Activity has been shared with students from different countries, with different training and background, has requested the use of English in formal and informal situations, with different cultural identities.

The students became later protagonists of experience dissemination, involving others in the training they had carried out.

The accompanying teacher brought back the evaluation forms drawn up for the planned activities with ABB and Bombardier companies, she shared them with teachers of the Class boarding group in a special meeting.

They have considered students' evaluation as an innovative tool through which it is possible highlighting skills and competences in reality check tasks skills.

INTERNATIONAL EXPERIENCE VALIDATION PHASE

L phase preparation meeting was innovative as it directly involved the company responsible in the activity planning who were always available for a discussion on logistic and teaching issues.

The Class boarding group was able to reflect on the opportunity of involving students more frequently on reality task tests encouraging them to solve problems and to have a critical approach to situations.

The students have been satisfied with exchange experience and they would have repeated; activity with companies has increased their problem solving skills developing the awareness that process crises are not exceptional but ordinary events.

Assigned tasks were dealt through team working and that consolidated the idea how important is collaboration and interaction for problem solving. Students would have gladly enjoyed a longer experience abroad.

NEW COMPETENCES FROM L PHASE

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I PHASE – BERGAMO (IT), MOBILITY STUDENTS, 5-9 MARCH 2018

HOSTING SCHOOL – IST. PALEOCAPA AND IST. MARCONI (IT)

How did you choose responsible (class boarding group, class coordinator, project coordinator, headmaster) who took part in I phase ?

IIS Paleocapa school - There are three project responsible: the headmaster, the project coordinator and the class coordinator, as well as the class teachers. The headmaster has been the project promoter, has worked on its developing and has identified a teacher from a 3rd class for mechanics as the project coordinator. Afterwards, another teacher was identified as class and activity coordinator, involving teachers and students. Since it was a new class, with students from three different ones, teachers have been identified on the basis of interest and involvement in a European project requiring greater availability of time and contribution. The first step has involved four teachers from ECLI class boarding group.

IIS Marconi school - There are three project responsible: the headmaster, the project coordinator and the work- based learning coordinator, as well as the class teachers. The headmaster was the project promoter together with Paleocapa headmaster and worked on its developing. The project coordinator is the same who deals with the exploitation of excellences and, of course for the subject covered, the work-based learning responsible. The headmaster has identified a third electrical engineering class as ECLI class, for 3 years. The class was chosen taking into account the availability of class teachers to join a European project requiring a greater availability of time. The first step has involved four teachers from ECLI class boarding group.

As for the staff boarding group (class boarding group, class coordinator, project coordinator, headmasters, administrative staff) involved in the preparation / implementation of the international mobility, I phase, what kind of involvement did the school include?

In the preparation and implementation, I phase, the two schools in Bergamo worked closely together. The staff especially involved for each school consisted of: the project coordinator and work-based learning responsible for Marconi and the project coordinator and the class coordinator, as well as the work-based learning responsible for Paleocapa. The responsible involved designed and implemented the mobility through regular meetings, providing times, methods and partners for the activities.

The didactic area defined indicators and a scoreboard: starting from a comparison with those already used at school for planned activities and taking into account all the variables in the project (lack of homogeneity in learning level, different courses, different level of English language).

The organization area was involved because the teachers who attended the activities needed to be replaced by other teachers in carrying out their daily activities. The Technical Office and the Administrative Office have also been involved in the 5-day trip.

Has it been integrated into teacher's curriculum activity or have extra-curricular hours been spent?

For the five day activities, I phase, both curricular and extra-curricular hours were integrated: in the morning, activities involved the staff from 8:00 a.m. to 13:00 p.m., when classes usually take place at school. We spent extra-curricular hours in the afternoon, in the first two days, until 18:00 p.m., as planned. As for organization, we spent some curricular hours, with a temporary exemption from teaching duties, and several extracurricular hours, for about 60 hours. We met the company responsible or contacted them by e-mail or phone: Mrs. Nicole Derelli, Development and Marketing Manager for Sei Consulting, Mr. Perani, Strategic Business Development Manager for ABB; Mrs. Gabriella Amboni, President assistant and Mr. Matteo Ghisaberti, Logistics Manager.

How were the Class boarding group and the School boarding group involved?

The activity planning has been shared and approved by the Class boarding group involving two students from ECLI class, selected according their present and past academic results, as well as their fluency in English. We e-mailed activities scheduling to teachers and later with a school newsletter official document. At the beginning of the school year, the teaching staff was informed about the activities planned for the current year. The School boarding group was no longer called to approve because the project had been entirely approved in 2016 and no changes required an official correction.

PLANNING PHASE

How was the ECLI class for I phase identified?

The class involved in I phase is the same that has been carrying out the project for two years and has been involved in the other mobility phases. At the beginning all the students from ECLI class were invited to fill in a form (see in the Annex) of expression of interest and self-assessment in which everyone explained his favourite place of mobility and motivation, education level and knowledge of the English language, as well as personal considerations. Later, some class teachers interviewed the students in order to investigate motivation, experiences and their autonomy and responsibility skills. For each mobility, we identified two students as to involve eight students in all.

How have you combined the logistical arrangements – travelling and hosting – with school curriculum?

The activities were organized both at school, thanks to support of Technical office and Organization area, and outside, as for travel and accommodation booking in Bergamo. As for meals, we asked a catering that provided most of needed meals. These logistical issues did not request any charge for mobile students. The accompanying teachers have independently chosen to stay in the same structure provided for students.

How have agreements between hosting and sending school been formalized?

We used the agreement forms prepared and agreed at the beginning of the project activities (see in the Annex). In those documents we included a new competence to be developed during the mobility week in Italy, related to I Phase: Learning from experience to develop planning skills by partnering with peers and mentors. The document, already filled with data from hosting school, was sent by email to sending schools so they could fill their data, the accompanying teachers and the students involved. After the headmaster and the students signed it, the original document was brought by the accompanying teacher so it could then be signed and stamped by the host school. The leading partner keeps the original documents.

How have the companies involved in international student mobility been identified?

The companies involved in I phase are: Sei Consulting, ABB S.p.a. and Barcella Elettroforniture, which our schools have been cooperating with for many years.

Sei Consulting, involved in the first two days, is a company from Brescia that carried out with Paleocapa, in the school year 2016-17, a mini factory project for mechanical third classes. Recently it has open a technological Hub, a mini factory on enabling technologies, in which, through innovation programs and experiential training, companies and schools deal innovation in Industry 4.0.

ABB S.p.a. is a world leader for energy and automation technology and was chosen as the sponsor company of Marconi ECLI class. This company has worked for Erasmus+ project and the class has been involved in various phases very often since the beginning.

ABB S.p.a. also organized, in addition to Erasmus+ project, a week of training on soft skills for Marconi and Paleocapa ECLI classes. Training took place in 2016 developing communication and team working skills. ABB S.p.a. also join the Training teacher week which took place from 7th to 12th March 2016 and provided a training period for teachers involved in the project.

Barcella Elettroforniture, which hosted the Romanian and Sicilian students on Thursday and Friday, cooperates with Paleocapa for many training activities for students, as well as hosting trainee students. I phase also provided a practical activity, so the company identified a task that would allow students with different levels and different communication skills, to cover a specific role and a specific task. At first tutors helped them and later they worked on their own.

The companies that hosted Swedish students have been identified among those which Marconi and Paleocapa have already on-going agreements with for traineeships and with English speaking tutors, in order to support students during their activities.

What kind of agreements have been formalized with the companies?

In I Phase agreements were formalized with all companies involved through specific documents (shared planning and timing of activities); many documents are concerned on-going agreements with these companies.

IMPLEMENTATION PHASE

A detailed description of the activities actually developed for I phase, objective description, description of developed program, monitoring tools used.

The competence identified for I phase focuses on the student's ability to learn through experience and through collaboration between peers and mentors. We have taken into account that in planning each activity. This objective has then declined with specific indicators that allowed observation and evaluation of parts of activities (communication, team working, autonomy, responsibility, problem solving, critical skills and compliance with regulations).

Twelve students were involved for three days: three students from Sicily, from Rapisardi school who joined the mobility even if the project had not been planned; five students from Romania - one had not been planned - and four students from Marconi and Paleocapa ECLI classes.

The activities on 5th and 6th March at Sei Consulting took place from 9:00 a.m. to 5:00 p.m., both in Italian and English, and involved the enabling technologies of 4.0 industry, the lean production and the tools to improve production. The activities carried out by students who have covered different roles in the production of a real wooden mini-bike for children, a product actually on the market, used as a tool for the explanation and experimentation of lean production. For the Italian phases, collaborators of the company were involved who supported the Romanian students in explaining the activities in English. At first the company representative Mrs. Nicole Derelli screened some English slides on Industry 4.0, but she spoke in

Italian, so for Romanian students it was necessary to translate it: two members from Sei Consulting staff with an excellent knowledge of English supported the Romanian group for all the activities that required a translation. After a first phase of introduction of the minifactory and explanation of the machines, they raised the traditional production of a bicycle and the lean production: the students listened to the company expert. Later they started practical activities: volunteers were asked to start the production of a bicycle and cover seven different roles including a customer, a salesman, a fixer. They have continued with the same roles for the lean production. The most reluctant students were those who spoke little English; but later even those have gradually interacted more with their peers and interlocutors.

Students were also asked to carry out interviews that will later be used for other school projects such as a Web TV, a school paper, as well as being included in GoToWorkinEurope folder of school website. The students who played the role of interviewers used their own tools (camera, mobile); the interview was addressed both to other students (in Italian and English) and to company tutors (in Italian and English); the questions focused on the added value of such a project in a student training and on the administration of an activity that requires soft and technical skills for students with different training. Two students from Information Technology course filmed the interviews; they were not in GoToWorkinEurope project but always available to share this experience with peers they did not know. A teacher from Paleocapa school but unrelated to the project also joined: supported the students with videos and interviews.

On 7th March 2018 the activity at ABB S.p.a. took place from 9:00 a.m. to 2:00 p.m. in English and provided a presentation of the company, an introduction to energy and industrial trends, including Industry 4.0 applications and a virtual reality demo involving the students in a close-up. During the company tour they showed a collaborative robot, among the first in the world to be tested. Mr. Perani, an engineer and tutor for that day, was interviewed in English by a Romanian teacher; the interview focused on the skills requested to a student for a European work context and on the future developments of automation of industry and particularly of ABB. These materials will also be used for other school projects such as a Web TV, a school paper as well as being included in GoToWorkinEurope folder of school website.

The activities at Barcella Elettroforniture S.p.a. took place on 8th and 9th March, from 8:30 a.m. to 12:30 p.m. and concerned the organization of a warehouse, withdrawals on automated warehouses, the preparation of goods for shipping and the behavioral rules to be followed during work activities. Teachers were not involved but only mobility students (three from Sicily and five from Romania) for security and privacy issues. The company tutor, Mr. Ghisalberti, explained to students the tasks they would have to perform, as a pair work, if possible, with a Romanian student and an Italian one who translated information. Once explained the behavioral rules and worn protective gloves, the tutor then assigned them to four different tutors who initially gave them operational indications and then assisted students in acquiring the necessary skills to perform the task.

On 9th, the Sicilian students came back home while the Romanians continued their activities carrying out different tasks: from organization to withdrawal of a warehouse, for example.

The monitoring tools are those also used in other phases: an evaluation form of the company tutor and the supervisor teacher, a satisfaction survey. (see Annex)

The activities were carried out following some steps: one or more meetings with company to define activities times, methods, instruments and duration, considering group heterogeneity. Schools and companies always got through in the preparatory phase to plan the details (times, tutor, daily logistic). The tools used by companies are those normally used for activities with other schools (machines, computers, interactive whiteboards).

(Pictures)

MONITORING PHASE

For I phase:

- students involved (Italians or from foreign countries and partner schools)
- lecturers / business experts involved (see program)
- accompanying teachers (5 from Marconi + 4 from Paleocapa + 1 from Rapisardi + 2 from Romania)
- student satisfaction survey (summary)
- certificates issued

Italian students involved: two students from Marconi school, two students from Paleocapa school, three from Rapisardi school.

Foreign students from partner schools involved: five Romanian students – three from Colegiul and two from Liceul. Swedish students joined I Phase last November for logistic reasons.

Participants age was between 17 and 20 years old, and the study courses ranged from Mechatronics and Electricity for students from Bergamo, from Chemistry for Sicilians, to Production Equipment, Production Knowledge and Mechatronics for Ipa production Equipment, Production Knowledge and Mechatronics for Sweden, to Technology for Romanian Colegiul and High School.

The companies involved were five and the total amount of activity hours was forty for Swedish students and between twenty-six and thirty for the others.

Fourteen people were involved: school headmasters, project coordinators and class boarding teachers.

The results of the satisfaction survey show that the students were generally satisfied and very satisfied with activities, and that almost all the students improved their skills.

The survey shows the high level of student satisfaction for the activities planned with ABB and Barcella and a slightly lower level for the activities developed with Sei Consulting. Although no student considered the activity difficult and the satisfaction was high, the level of involvement was average for everyone. The strengths were: developing relationships, organization, accommodation. The weaknesses concerned technological knowledge and performance, but most of them asked for help and were supported in solving problems. In general the result was positive so that most of them would repeat the experience or dedicate more days to this type of experience (see Annex).

The host schools, Paleocapa and Marconi, issued participation certificates for students and accompanying teachers from host schools.

EVALUATION PHASE AND LEARNING RESULTS

How WBL activities developed in I phase were integrated in the school curriculum of hosting schools in an international perspective?

The two schools in Bergamo have been active in work-based learning for decades, before WBL was required by law, as domestic or international internship. This international project has implemented the ECLI methodology as a model of WBL for all classes and courses in both school, encouraging greater preparation and awareness of working world in students. Furthermore, the involvement of international partners highlighted the feasibility and replicability, both nationally and internationally, of a process that trains students with different specific knowledge and with a different level of knowledge of the vehicular language. Being a project that equally enhances soft and technical skills, it has encouraged to experiment new international projects through Erasmus and through the specific facilities of each school.

How did students joining the experience integrate I Phase with their school curriculum?

I phase has integrated students' curriculum enhancing some skills provided in their professional profile, for example communicating in their native language, communicating in English, working in groups,

developing autonomy and responsibility, as well as working on a matter of such importance, lean production, already developed in English with the whole ECLI class.

Communicating in English between peers and mentors was an encouragement to implement, in a working environment, what they had learned at school, highlighting strengths and weaknesses.

Sharing accommodation has strengthened communication skills, enhancing, as well as communication in English, social skills, making comparisons between different cultures, and autonomy, getting independently around the city. The students have met the deadlines and have been actively involved in proposed activities, understanding the given tasks and achieving better results.

A student from Bergamo decided that his WBL experience in Erasmus+ and the issue of lean production will be the subject of his term paper for the high school final exam.

In conclusion they enhanced their learning skills through an innovative and international perspective.

Have school organisations (class boarding group) transposed the final evaluation?

The present teachers expressed their assessment with the company tutor about the activities attended: a single evaluation then transposed as WBL skill evaluation and shared with the class boarding group.

Italian teachers asked for a complete report on WBL activities and ECLI project. The final evaluation will be both for Italian language and then shared with the Class boarding group.

INTERNATIONAL EXPERIENCE VALIDATION PHASE

How did I Phase produce internal process innovations?

The innovative impact on WBL activities in both schools is related to involving external business partners with different knowledge and skills; the companies, belonging to different technological sectors, have planned activities together with schools. Many company tutors have been involved (five tutors from Sei Consulting for twelve students, one every two students from Barcella, a trainer and two interns from ABB as guides for Smart Lab) and have supported them throughout the morning. The class group was heterogeneous as students came from different courses - mechanics, electricity, chemistry, technology - but all of them developed new skills and knowledge. The competence developed through experiences not directly connected to their course will be useful later also in a different context. Through the interviews, students were asked to reflect on what they had experienced and satisfaction surveys are a useful tool for schools and for companies in order to improve and update the role of their trainers and their mutual collaboration.

What were the qualifying aspects for students concerning the international exchange of I phase?

Number of students, class, level and specialization. What difficulties did they face?

The number of involved students ranged between eight and twelve, depending on the days; they were all students from ECLI class who attended the 3rd level in 2015, at the beginning of the project, and now, in 2018, are attending the 5th level, coming from different courses (mechanics, electricity, chemistry, technology).

Some students, especially those from Romania and Sicily, have faced some difficulties with theoretical issues in English; on the other hand, they have all been equally active in practical experiences, further demonstrating that learning can also take place through gestural communication.

SENDING SCHOOL- COLEGIUL ILARIAN AND LICEUL VITEAZUL (RO), IND. GYM. AB (SE)

Sending school: COLEGIUL TEHNIC "AL. PAPIU ILARIAN"

To hosting school: IST Paleocapa+IST Marconi – Italy Bergamo, Mobility students 5-9 March 2018

PREPARATORY PHASE

The class has been selected at the start of the project.

Class and teacher council of the school have been informed in 2015 at the beginning of the project, when the means of selection of the participants have been chosen.

PLANNING PHASE

Students for every stage have been selected at the beginning of the 2016-2017 school year, after a procedure agreed by the parent council of class ECLI and teacher council.

EVALUATION PHASE

Experience and activities of all the project stages will happen in 25.04.2018 starting at 15:00 by all the teachers from every subject (electronics-automation) from Salaj.

The project is going to take place at the Tehnic College "Alesandru Papiu Ilarian".

This project is going to be presented by all the teachers and students that take part in each stage (ECLI).

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

The elements of stage I have an impact towards students that take part of class ECLI with a wish to get a program for a better experience of doing the objectives of the project.

The way of organising and functionally has been chosen by the school council of Italy that took part of the project, and possibility of upgrading linguistic skills.

Our school took part with three students from class XI H specialization electronics-automation.

This WBL international experience was very benefic for our students because in our regions we have no economical agents in this domain. They could observe and compare different aspects of organisation and management of different economic agents.

Sending school: Industritekniska Gymnasiet I Bergslagen AB (ABB Industrigymnasium)

To hosting school: IST Paleocapa+IST Marconi – Italy Bergamo, Mobility students 7-11 November 2018

PREPARATORY PHASE

How did you select the referents who participated in I-Phase?

This was settled during a meeting with all the staff involved in the project.

How was the school involved in term of class council and school board?

We have a small organization with weekly meetings and teachers, students and the management work closely together meeting on a weekly or sometimes even daily basis and at these meetings issues like these are discussed

PLANNING PHASE

How did you select the students involved in E-Phase?

All our students go abroad for internship during their final year and students who wanted to do so within the Erasmus framework could wish to be part of the project. One of them was also involved in the E-phase week in Sicily

EVALUATION PHASE

How was international WBL of I-Phase integrated in didactic programme of sending school?

Our students are taking a course in production knowledge and in this course they have been able to make use of their experiences during the I-phase. The teachers they have are involved in the program and can discuss the benefits of their WBL experience in the I-phase. They also write a special report and make presentations of their experience for other students. We also try to connect the I-phase experience with our most advanced course in English and before going abroad the students were given a course in cross-culture to be prepared for an International environment.

How was the international WBL experience integrated in the educational paths of students?

This question has partly been answered in the previous one but we should also take into account the importance of seeing a company abroad and the cultural experiences that students get. They see different company cultures and how they work with safety and the production process at different work sites. Understanding other cultures is a major aim in the Swedish national curriculum.

Was the evaluation of the international WBL communicated to class councils?

The participants have continually reported about their project to teachers and students alike. The most important way of communication in this project is the report that the participating student produces and which other students take part of and there is also a presentation for students and actually also parents.

VALIDATION PHASE OF INTERNATIONAL EXPERIENCE

Did the I-Phase produce any innovation of internal processes?

We cannot say that this particular phase has produced innovations in our internal process but it is ongoing and therefore it will surely play a part of our overall assessment at the end of the project. This part of the project is something we are already implementing. So you could say that it means a consolidation of our current practice.

Which are the relevant qualifying aspects of international exchange identified by the students involved?

This week there was a specific focus on cultural differences in the workplace. The students realize the importance of flexibility and that organizations can be built differently and still be functioning. It has been particularly rewarding for them to be able to compare the production process in an Italian company with their experience in Swedish company and the work market is becoming increasingly global so this is very valuable.

Number of students involved, classroom level and specialization.

Two students from the 3rd grade at ABB Industrigymnasium and they specialise in production technology. One of them previously involved in the E-phase.

Which are the difficulties emerged?

Occasionally there can be problems with languages but this was never a real problem, they learn how to solve it.

INTELLECTUAL OUTPUT 3 - NEW COMPETENCES

Do you have integrate the 4 new competences identified in this Erasmus Project in the panel of competences of your school?

- NC1: MAKE RISK ANALYSIS AND APPLY PREVENTIVE MEASURES FOR SAFETY IN WORKPLACE

Yes, this competence is included in our national and Regional Curriculum. So it is already included in specifically in a subject called FOL (Laboral formation and orientation) and also in a transversal way in the others subjects included the trainee module..

- NC2: DEAL WITH CRISIS MANAGEMENT AND APPLY PREVENTIVE MEASURES FOR PHYSICAL AND MENTAL HEALTHCARE AT THE WORKPLACE

We manage these aspects our groups have a group tutor and a subject called "tutoria". In this subject coordinated with the Orientation department are planned activities to deal with physical and mental needs of the students and also preventive measure are planned.

- NC3: PLANNING AND ORGANIZATION OF PRODUCTION

In our curriculum we have aspects related with the planning and organization of the production. In most of our titles we have a subject called 'Gestion' which deal with this knowledge. Aspects as Quality, Gant, procedures, Pert, and so on are teached in that subject...

- NC4: APPLY THE LEAN METHODOLOGY IN SIMULATION TO UNDERSTAND THE DEVELOPMENT OF THE PRODUCTION PROCESS

The students receive formation with savings in manufacturing processes. Also in saving materials, process timing, ergonomy, efficiency... In addition new methodologies like Poka-Yoke, 5-S, and so on...are also included in the programs of "Gestion" subject...

In subjects related with production management, students get in contact with lean production, and Just In Time production systems, in order to make production and materials management and control more efficient. Since it is a transversal matter for us in industry, we deal with it in several subjects that complement each other.

Do you find the toolkit and forms of this project useful for your school?

Yes, in some aspects it could be useful for us. However we already have some similar tools as our FCT platform tool or some procedures make by our quality department. Our quality department will discuss and analyse, about some aspects of these project toolkit to improve our own tools, documents and procedures..

Which are the relevant qualifying aspects concerning the competences?

We consider that these competences are important in the curriculum of a professional profile. (Este tipo de competencias complementa mucho a un futuro buen profesional.)

We consider that nowadays aspects such as health at work, Safety, cost savings, ergonomy, equipment, tools, and installation design, work procedures, and so on are crucial.

The management of a well designed manufacturing process suppose savings and improvement of the quality of the product. Also, processes tend nowadays towards standardization. This kind of techniques help us to achieve this goal, that is extremely important for industries and clients.

The knowledge about new productive processes management tools is something that is needed at the manufacturing factories. It is well known that most of the modern and leading companies apply them at their processes. It is important for us that our students arrive to the job market as prepared as they can, in order to adapt to every possible situation, although we know that it will keep changing, but we think that applying the last techniques helps them to achieve that adaptation.