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USING BUSINESS SIMULATION TECHNOLOGY TO IMPLEMENT VIRTUAL DUALITY IN VET

Action Guideline 5:
Policy paper

Dr. Kosmas Kosmidis, Scientific Coordinator
Dr. Konstantinos Terzidis
Dr. Vasileios Chatzis
Dr. Vasileios Mardiris
Dr. Wolfgang Wittig
Gabriel Dobrescu
Carmen–Elena Marica
Maricica Herghelegiu

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Editor
TEI of Eastern Macedonia and Thrace (EMaTTech)
Ag.Loucas
65404 Kavala
Greece
www.teiemt.gr

Authors
Dr. Kosmas Kosmidis, Scientific Coordinator
Dr. Konstantinos Terzidis
Dr. Vasileios Chatzis
Dr. Vasileios Mardiris
Dr. Wolfgang Wittig
Gabriel Dobrescu
Carmen–Elena Marica
Maricica Herghelegiu

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1. Introduction

The present policy paper is the fifth and final intellectual output of the Erasmus+ project "InnoVET", which piloted a concept for supporting the transition from largely school-based vocational education and training (VET) to dual VET, i.e. the systematic combination of theoretical instruction in class and work-based learning in an enterprise. Dual VET, which is best known by the apprenticeship systems in the German-speaking countries, is commonly regarded as the key factor behind a successful school-to-work transition and low youth unemployment figures. In the course of the InnoVET project, partners from Greece, Romania and Germany identified examples of good practice with regard to the institutional conditions for this type of collaborative training and explored ways to enhance the delivery of training by integrating realistic learning experiences derived from the business processes of real enterprises into the training process.

The innovative content of the InnoVET project rested on two pillars. The first one consisted in the exchange of experiences, methods and instruments to support the process of adapting largely school-based VET systems as in Greece and Romania to the requirements of the labour market. These methods and instruments included train-the-trainer concepts, instruments for analysing the training demand, models of cooperation between the stakeholders (e.g. regional VET committees) or tools for practical tuition (e.g. in-company training plans). These instruments were investigated by means of desk research, and their adaptability in the Greek and Romanian VET contexts was explored by means of expert interviews and stakeholder workshops. The second pillar consisted in the design and implementation of an innovative modular VET IT tool in order to model and simulate business processes of real enterprises. Modelling and simulation of business processes and the subsequent establishment of a virtual learning lab, which was tested with two groups of trainers in Greece and Romania, aimed to serve the purpose of a better match between company needs and educational output, thereby facilitating the transition of VET students from education and training to the world of work and business.

The fifth intellectual output is the synthesis of these efforts and discusses the perspectives of dual VET at two levels that correspond to the two "pillars" mentioned above. The first one is the content level, which refers to the institutional arrangements that need to be in place for the regulation and governance of dual VET and for ensuring that training curricula actually meet the demands of the labour market. The involvement of stakeholders and the feedback from the labour market are the key elements that were investigated during the project. The second level is the actual implementation or delivery of training programmes. The Business Simulation Tool that was developed and tested during the project enables trainees to become acquainted with the business processes of real enterprises, and to exercise and developing their professional skills by carrying out, in a simulated environment, the same professional tasks as they would in a real workplace. Accordingly, the Business Simulation Tool allows for "virtual" duality within school-based VET programmes.

In the following, the main conditions and challenges for dual VET in Greece and Romania are summarised (section 2) before the findings of the project with regard to the two levels mentioned above are presented. In section 3, strategies for the involvement of stakeholders in the creation and management of training programmes that respond to employers' needs are outlined. Section 4 presents the InnoVET Business Simulation Tool and its application in Greece and Romania.

2. Framework conditions and challenges for dual VET

2.1 Greece

As it is well established, the region of Eastern Macedonia and Thrace is one of the eight poorest regions of the European Union, with main feature the existence of high youth unemployment rates. The reinforcement of vocational education and training (VET) in benefit of the young people of this region is expected to help mitigate unemployment and tackle mismatches witnessed between the vocational skills acquired by young people and the needs of the regional labour market.

Vocational education and training in Greece is considered as the tool that can help address the aforementioned youth unemployment phenomenon through the provision of the appropriate capabilities and skills that the world of the market is in pursuit. Vocational education and training in Greece is provided by both formal and non formal structures. The formal vocational education is provided by EPALs. The daily EPAL has duration of three years while in the evening EPAL the tuition lasts four years. Upon the successful completion of the third year, the graduates have the following options. The first option is to give examination in order to enter in Tertiary Education (University and TEI). The second option is to enrol in SEK (former EPAS) or IEK while the third option which is the innovation of the last educational reform (Law No 4386/2016) to attend a fourth year of apprenticeship called "mathitia". The graduates of this fourth year of apprenticeship gain a certificate as well as a discipline of EQF5 level.

On the other hand, the most popular non-formal provider of VET is OAED. The OAED apprenticeship program is based on the model of the corresponding German example, combining in-school education with paid in-company training for 4 days a week. Employers are selected by VET schools. The second non-formal VET provider is the Vocational Training Schools - SEK of the Ministry of Education and Religious Affairs which provide three years of initial vocational training. The last year is an apprenticeship year. The programs are developed and supervised by the General Secretariat for Lifelong Learning of the Greek Ministry of Education and certified by the EOPEPP. The rest of the non-formal VET providers include SEK, IEK, Colleges and Continuous Lifelong Learning (CLL) and adult learning (AL) Centers. They are also supervised by the Ministry of Education and Religious Affairs, which determines the disciplines of the VET schools in accordance with the local necessities and the proposals of the regional authorities, participating ministries and social partners. The curricula are formed according to the relevant professional profiles and the required qualifications.

Taking into consideration this fragmentation of VET to many heterogeneous entities with different operational and regulatory framework, the present study finds (see intellectual output 2 (IO2), section 3.1.3 and 3.4.3.) that VET in Greece suffers from inherent weaknesses that can be summarized in the lack of coordination among VET providers and also between VET schools and employers. This lack of coordination refers to the establishment of the curricula content and the revaluation and anamorphosis of the training programmes (existence of outdated programmes), as well as diversifications regarding among others, the compulsory character of apprenticeship, the required qualifications of trainers, the availability of operational equipment (e.g. in the discipline of confectionery profession offered by Kavala's SEK, the practical training is performed by demonstration due to lack of appropriate laboratory equipment), the quest for suitable work placements, the recruitment process, the selection of vocational and training disciplines, the employers' culture towards apprenticeship placements, the first approach of trainee families and the timing of the announcement of the available disciplines offered in the following year, the starting date and ending date of apprenticeship, the remuneration of trainees. The study highlighted the absence of a holistic regulatory framework for VET provision and witnessed a non-friendly culture towards VET. The preceding factors are prerequisites along with the cooperation

with the recipients of the final 'product' to ensure valuable synergies.

However, the effectiveness of VET was not evaluated solely in terms of effective operational competence of the relevant VET providers. In order to formulate policies to be adopted, it is important to take into consideration some independent variables highlighted in the study. One of these policies refers to the quality of inflows vis-à-vis the human resources. Who are the recipients of VET and how are they recruited? Despite the fact that VET offers a critical alternative to stakeholders in this crucial period of time, it remains a secondary option with low rates of attractiveness. In general terms, limited interest for VET is due to the low esteem enjoyed by both school community and society. It has been established in the Greek society that general education is superior to VET providing high social recognition and appreciation while the latter is addressed to people who can not meet the demands of the former because of cognitive deficiency (often even on issues that are taught at elementary school) and learning difficulties faced. Deficiencies of this kind affect the interest and performance of trainees, but they also reflect the effort made by trainers, who are rarely led to an internal resignation considering that it is useless to show particular zeal in their work. This vicious circle is also exacerbated by the absence of a healthy career orientation for graduates of compulsory education, and by the persistence to stereotypes that lead to the devaluation of technical professions.

Another issue raised by the study is the lack of constructive cooperation between educational institutions and employers. The problem lies in the absence of a link that will assess the needs of the employers' organizations and match them with the disciplines offered by VET schools. In some cases, there is a discrepancy between the skills demanded by labour market and those offered by local VET providers. For example, the needs of the hotel industry labour market are not fully satisfied (there are no training opportunities for lower-level posts, such as maids), as the choice of disciplines lies to the discretion of VET school managers. At the same time, the establishment of consistent curricula seems problematic since they offer a great deal of theoretical and not practical knowledge (for example, a waiter should not take lessons about the history of wine, but which wine is served with every kind of food, and how it is served). Indeed, this knowledge is often not accompanied with sufficient complementary skills to adapt it to modern requirements, such as foreign languages (Russian, Turkish, Bulgarian), basic knowledge of the applications of the accounting practice, sufficient knowledge of the written commercial jargon, etc.

As a result of all these is the paradox where employers face difficulties to find staff with sufficient substantial qualifications while high rates of unemployment are witnessed. Therefore, they are focused on selecting staff based on the candidate's character, ability to adapt, ingenuity and social skills, so that they can then retrain them internally. In a specific case, a director of a large hotel unit argued that he only recruits trainees from the relevant tourism VET schools and not those of the formal system as he does not trust the quality of their skills. Of course, the representatives of the tourist sector are massively self-cancelling, as they usually resort to unskilled low-paid staff while projecting the alibi of economic crisis.

Another issue of crucial importance is the implementation period of apprenticeship. Given that many economic activities such as tourism are seasonal, the most appropriate time for the implementation of apprenticeship is the peak season, i.e. July and August. However, the apprenticeship program provides trainees to enterprises only during the school year in which these months are excluded and consequently VET stakeholders are excluded from the process. In addition, there is a problem concerning the undeclared and at the same time unfair rivalry among VET schools of the various forms vis-à-vis work placement positions. The result of this competition is the phenomenon of the employers' preference for IEK trainees, as they do not imply any financial burden, over OAED SEK trainees, for whom employers are financially burdened. It is also problematic that the search for apprenticeships is not performed by vocational schools (IEKs). Instead, trainees are responsible for work placements on the basis of personal acquaintances or their families, leading in a high percentage of inappropriate choices. An inhibiting factor in rationalizing the trainees' choice of disciplines is also the late announcement of the offered disciplines by the IEKs in the forthcoming school year, usually only a few days before the start of the program, when the potential candidates have already finalized their plans.

2.2 Romania

The dual vocational education and training in Romania faces a number of **problems** that make the system to not have the expected results and properly trained graduates for labor market requirements. To find out those future, realistic and sustainable solutions involves not only the identification and analysis of all problems, but also the positive aspects of the technical and professional education system. The ways to combine the two major types of learning – in school and at work – are the essence and starting point of reform in this area.

The existence of graduated young people that can integrate socio-professional quickly after completing the studies means the acquisition of both theoretical and practical knowledge and not in the least of the transversal competences.

The mechanisms to assure the quality in Dual VET education aim at all those aspects that allow the existence of graduates trained in accordance with labor market requirements – the existence of mechanisms for anticipating the skills required by the labor market in establishing profiles, providing guidance and counselling services for pupils, school infrastructure, content of study programs, didactic materials, teaching staff, practical training of pupils.

The mechanisms for anticipating the competences demanded by the labor market and the definition of profiles presuppose the existence of analysis and forecasting tools, enabling the development potential of certain economic activities in the medium and long term and especially to meet these potential needs of the business environment or companies.

Here are a lot of problems found after analyzing the Romanian vocational and technical education system as it follows:

• The lack of analyses and forecasts of the development degree in economic areas and the evolution of the labor market.

• The lack of valid mechanisms to anticipate labor market requirements-there are only discussions within the Local Committee for Social Partnership Development (CLDPS) with the economic agents.

• Difficult institutional mechanisms and difficult procedures for obtaining qualifications-daunting factors for schools in their steps to adjust the educational offer

• Resistance to changing the vocational education system (e.g. the adapting of the qualifications to the labor market requirements).

• Most of the time, the criteria behind the establishment of specializations are:

a) estimates/assessments of pupils ' preferences (which grades would be the most sought);

b) Teachers ' specializations;

c) The educational institution's credentials for a specialization or the other.

3. The content level: Arrangements for the organisation of dual VET

3.1 Involvement of stakeholders

A typical feature of an established dual VET system like the one that exists in Germany is that stakeholders (in particular, chambers of industry and commerce) are responsible for the control and assurance of high quality standards in apprenticeship (see intellectual output 1, section 2.2). These stakeholders come together to negotiate the (re-)regulation of apprenticeship occupations in a consensual manner. This quality assurance is provided by a joint responsibility of representatives of employer associations, the chambers, trade unions, the federal government, state governments, and vocational training experts (Euler 2013).

The main characteristic of the dual system in Germany is the cooperation between mainly small and medium sized companies and public vocational schools, regulated by law. Amended in 2005, the Vocational Training Act of 1969 introduced this strong cooperation between Federal Government, federal states (*Länder*) and companies with the aim of providing young people training in such occupations that are recognized nation-wide and documented accordingly through certificates.

Drivers for updating and creating new training regulations and occupational profiles or modernizing further training regulations are employer organizations and trade unions. In the end, training, testing and certificates are standardized in all industries throughout the whole country. This assures that all apprentices receive the same training regardless of region or company. Employers trust in these certificates as they express what an individual knows and is able to do. Furthermore, Dual VET is based on the principle of strong involvement of the business community because companies know best which competencies they demand and need. One example for this is the large share of in-company training itself (70 per cent). Through strong company involvement in Dual VET in Germany, companies find the VET graduates with the competencies which closely meet their needs (BMBF, 2015).

As described in the first intellectual output, the social partners, i.e. employer associations and trade unions, participate in the governance of dual VET at the national, regional and local levels and are the main drivers in the definition of occupational profiles and training curricula. The advantage of this structure is that the contents of vocational education and training reflect the authentic requirements and demands of the employment system. The social partners have responsibilities at four levels (BMBF 2011):

1. National level: participation in developing training programmes / standards, recommendations in all areas and aspects of VET.

2. Regional level: » “Land” level – recommendations in all areas of VET in respect of coordination between school and enterprise; » Level of the competent bodies – advice, supervision of training provision in enterprises, implementation of examinations, award of qualifications.

3. Sectorial level: negotiations on provision of training places; collective agreements on remuneration of training.

4. Company level: planning and implementation of in-company training.

An example of the participation of stakeholders at the regional level is the **VET committee**, i.e. the main advisory and decision-making body within the competent body (chamber of industry and commerce, chamber of skilled crafts etc.) that is responsible for supervising vocational education and training in a given region. Members of the VET committee are volunteers and the committee depends on the commitment of each individual member. By law, the VET committee includes 18 elected members and is composed of

- six employers' representatives,
- six employee representatives and
- six professional school teachers.

Only the 12 representatives of the employers' and employees' side are entitled to vote. Teachers have only an advisory function.

The VET committee shall be involved in all important matters of vocational training. These include all aspects of vocational training preparation, vocational training and retraining. Examples which may be mentioned are:

- The adoption of administrative principles on the suitability of training and retraining facilities, the management of written training certificates and the reduction of the duration of training.
- The construction of own over-the-job vocational training centres.
- Resolutions in certain budgetary questions.
- The adoption of legislation for the implementation of vocational training.

The committee can influence the field of auditing, in particular, by its participation in the adoption of the auditing regulations.

Another important task of the VET committee is to work towards a steady development of quality in VET. This means that the concept of quality assurance and development is the benchmark for the work of the VET committee and should always be involved in fulfilling the tasks entrusted to it.

For this purpose, the VET committee may:

- instruct the competent authority to carry out training for examiners,
- get regularly an insight-view into the reporting on the examination results,
- participate to examinations,
- establish subcommittees for quality assurance in examinations.

3.2 Adaptation in the partner countries

3.2.1 Greece

In the light the findings of the study, it is essential to formulate policies to be adopted both at the level of central administration and at school level.

It is necessary to establish channels of communication among the various stakeholders. It is essential to develop communication networks between schools and employers' organizations in order to develop a constant and creative dialogue towards a coherent design the content of the curricula so that they can successfully meet market needs. Similar propositions are made by the VET stakeholders regarding the in time selection of disciplines to be offered by IEKs in the forthcoming year. Strengthening the infrastructure of advanced forms of electronic communication (creating an online platform for VET schools and businesses communication, setting up a website by schools and businesses) will strengthen cooperative ties with employers and other social partners. Two-way and direct communication via teleconferencing will allow both sides to communicate each other's needs. The VET school units can report their needs for apprenticeship positions and enterprises for updated disciplines and training needs. These needs can also be met by VET providers as well as distance learning when employers are in immediate need.

The re-activation of the career offices at school or regional level as in the example of good practice provided by the effective operation of OAED schools can help to identify appropriate businesses and to exclude those that provide poor training services. These offices may also organize events (seminars, workshops, exhibitions) to inform other interested parties, such as enterprises, parents, local social partners, etc. Such activities establish a collaborative culture that encourages cluster synergies between complementary activities. For example, a café, a bus and a travel agency can work together for a common purpose. Or the presentation of local products that could be offered at a Mediterranean breakfast can create synergies between local producers and VET schools, with extensions to students' perceptions towards undertaking creative initiatives. Such collective strategies can be extended to the city level as well as to wider regional level.

The realized workshops with the participation of the various stakeholders revealed the need to develop more effective mechanisms for tracing the trainees' skills required by the local labour market. A coordinating body, which will be the link between the two sides, is necessary for this purpose. This role can be served by the relevant chambers and other social partners as in the German example of the VET Committees. Objections that are raised during discussions regarding the suitability of chambers to play this role can be alleviated at regional level by the intermediation of EMaTTech as a valid and neutral special mediator in cases of disputes between participants in the relevant processes. The participants emphasized on the point that a frequent meeting with the participation of all stakeholders should be regulated at specific intervals, even with a round table arrangement to prevent any prevailing leadership ambitions at their birth.

According to the findings of the study, it is necessary to create a single regulatory framework for the operation of the VET schools. This framework should regulated uniformly all types of VET, the frequency of the review period of the VET curricula (updated curricula and the employment of contemporary VET Tools like InnoVET Business Simulator can serve that purpose), the authority to determine the content of the curricula, the compulsory character of training/ apprenticeship, the required qualifications of trainers, uninterrupted and sustainable financial support of VET schools for the procurement and continuous maintenance of the appropriate equipment, the timing of the announcement of the disciplines to be offered in the forthcoming year, the starting and ending date of the apprenticeship, the compensation of trainees etc. And also, the way and the level of compensation for trainees should be defined at a national level. The same applies regarding the starting and ending date of the apprenticeship period which should be released from the duration and limitations of the school year.

A good example is provided by EPALs with their new beginning. Their graduates can continue their work based training for one year, enrolled in an apprenticeship class with a specific curriculum (4 days in the workplace and 1 day at school). In this type of school, VET students gain full employment and social security rights and they are entitled to a salary up to 75% of the minimum wage, and after successful exams they gain a certificate as well as a discipline of EQF5 level.

As for the time interval in which apprenticeships should occur, it should be agile especially for tourism work placements, the proposed starting date is March in order the trainees to have an initial training in low workload period and then be prepared to offer their services in the peak season (July-August). Alternatively, it was suggested that apprenticeships should start in the first year, so that young people can see at an early stage whether the profession they follow satisfies their interests and expectations.

It is also suggested that the apprentices should be mentally and scientifically supported by dedicated mentors, in order to supervise the correct implementation of VET and to prevent the phenomenon of inappropriate or low quality training. At the same time, it is proposed that the company should be able to provide feedback to the mentor on whether the trainees meet their obligations towards the employer. In order to simplify bureaucratic procedures and to achieve flexibility, it is desirable that the decision-making power of operational nature matters should be assigned to VET schools. Such decisions relate to issues about the search for work placement

positions, the selection of candidates, the choice of VET qualifications, the approaching culture of employers' bodies that provide apprenticeships and the approach of perspective trainees' parents etc.

Professional experience relevant to the taught discipline should become mandatory for all VET teachers in line with standards provided by OAED schools. Also, in order to select only those enterprises that exhibit true interest and commitment to practical training of VET students, it is appropriate to introduce a bonus for such enterprises when assessing proposals submitted in development and investment programmes for funding.

A fundamental pursuit of policies should be to raise the low esteem of VET. This can be pursued by gradually reversing VET conditions. The education and training provided must be of such prominence. This can be achieved by improving the teaching conditions concerning the qualifications of educational staff, educational infrastructure and equipment in general, curricula, teaching methods and the content of courses, which is ultimately not enough just to respond to the requirements of the labour market, but it should as much as possible excite the trainee. It should also lead to the establishment of professional ethics that will ensure a high level of professionalism for graduates. In this way, the esteem of VET will be enhanced to the perception of society and will attract more capable candidates.

Only then the authorities will set a barrier to preserving and reproducing the educational inequalities identified by the study, which eventually lead to social inequalities and loss of employment opportunities. Without neglecting the adoption of good practices concerning the implementation of dual education (school and apprenticeship / practice in the enterprise), it is appropriate for the reasons mentioned above to "vaccinate" this model with actions for the development of "basic and transversal skills" (EUROPE 2020). Such skills can make trainees able to learn, create, invent, develop, in other words participate equally in a rapidly evolving society.

3.2.2 Romania

The following areas have been identified where measures should be taken to improve the involvement of stakeholders and the overall organisation of dual VET:

1.*Counselling and professional guidance services for pupils and parents*-these are extremely important for the establishment of the pupils ' professional journey must be aimed at both pupils and their parents, and be carried out by specialized personnel applying various tests, or other ways of identifying the development potential of the future students, such as discussions with them and their parents, systematic observation of student behavior over a longer period of time. But we really face the insufficient coverage with school counsellors in secondary education: the legislation allows 1 counselor at 800 students. In addition, from those 18 hours of psycho-pedagogical assistance activities, 4 must be for teaching, which further reduces the time spent on counselling and guidance activities.

• The low level of wages makes many of the positions of the school counselors not occupied by qualified personnel, the problem being much more serious in rural areas.

• Frequent changing of the purpose of this activity: Counselors often manage emotional and behavioral problems of their students.

• Most of the guidance and counselling activities are made by class teachers/masters, who occasionally carry them

• The absence of parental advisers/parents ' education on their child's competences and opportunities for their valorization after the completion of the gymnasium. Parents have a negative perception over the VET education, because of the ignorance of the opportunities offered by this area to their children

• The selection of the pupils does not take into account their development potential, but their level of knowledge at some point. The computerized distribution system of the pupils after the

graduation of the VIII form that do not ensure the congruence between the pupil's skills and abilities and the specifications of the area in which they are to specialize. The distribution in the VET system is made only on the basis of the school results (average of the marks of the years of study and the results of the National Assessment Exam) and does not contain any aptitude test. The access in the VET system is rather the result of a negative selection process, students arriving in professional schools and technological high schools being, as a rule, those who obtain the weakest school results.

"Professional counselling and guidance should be made in the VI-th form. In parallel with the counselling of the pupils, the counselling of the parents should be done, so that they understand what opportunities the child has , what capacity he has, why it is good to learn a job or why it is good to follow a theoretical faculty. Parents 'education is the essence of this adviser "(a representative of a recruitment company).

"All the parents want to see their children in the suit at an office, without seeing that they have no skills, do not have the ability to get there I understand that they want the child's good life, but they also need to understand that it's better to have a job and not everyone has to finish a college. There are graduates in production who have faculty and work as skilled workers "(an education institution representative)

2. *The school infrastructure* is essential for conducting quality educations process-even if we have a big workplace for learning, but this does not eliminate student training. The accumulation of basic knowledge by pupils is carried out mainly in school, and for this, it is necessary to have a minimum material base for allowing practical applications to be done. Unfortunately, there are a lot of problems concerning the school infrastructure:

• The quality of the infrastructure is heavily dependent on partnerships with economic operators: the best is where there are strong partnerships with economic operators with financial capacity and a great desire to invest. This fact determines that, in areas where educational establishments have contracts with economic operators that do not have very high financial capacity (small companies), the endowment of the schools to be under the training needs of the pupils.

• The most investment in the modernization of school infrastructure was carried out by local public administrations by accessing funding through European programs (Posdru, POR, PNDR), but in some cases there were problems in implementing the various projects, which didn't complete the modernization works

• Unfortunately, in most cases, the educational institutions do not have the capacity to access European funding, depending on the local public authorities (including the county and the County Council). This fact does not allow them to access European funds for vocational training programs or to increase the quality of the educational act. For the modernization of the work, the local administrations are the ones that need to develop and implement the projects.

• The investments in the modernization/endowment of the units are done, after the process of administrative decentralization, by the local public authorities who, in many cases, do not have the necessary funds. The decentralization process involved greater responsibilities for local authorities, without allocating them the financial resources needed to achieve them.

3. *The content of the curriculum*- has all the content of the teaching-learning process, its reform being essential for the efficiency of the system. At the moment:

• The content of the curriculum is not adapted to the requirements of the labor market (including local specifics) and developed without an involvement of the business environment. Although there is a curriculum in local development that has a share in the learning process, it is not always established on the basis of a structured dialogue with economic agents.

• The curriculum depends on redefining professional standards, which is a difficult and lasting process. For some of the professional training standards existing in some of the qualifications of the National Qualifications Framework, this update was carried out being approved by OMENCS No. 4121/13.06.2016. Thus, starting with the 2016-2017 school year, the professional training standards for professional qualifications of level 3 and 4 of the National Qualifications

Framework were used, for which training is ensured through vocational education and technology.

• A new Curriculum is also introduced for certain subjects-educational plans and curricula for specialty and preparation weekly practice in the curricular area of Technologies, as well as for the practical training traineeships-curriculum in local development CDL, for the ninth grade, high school for technological education and vocational education.

• There is a discrepancy both in the quantitative and qualitative aspect between the students of the technological high schools, who make fewer hours of practice (1000 hours) and the vocational school, who in 3 years do a double number of hours of practice. At the same time, although the students of the professional schools are much better prepared from a practical point of view, their level of qualification is considered 3, as a simple worker, and the technological high schools offer 4, a better level as a technician.This discrepancy creates dissatisfaction among pupils, but also of economic operators who believe that graduates of professional school are much better prepared for labor market requirements

4. *The didactic materials*-are important tools for sharing knowledge to pupils, their quality being relevant to the formation of their competences. The updating of the didactic materials is carried out in close connection with the changes of the curriculum, being dependent on it. Knowing the problems raised by the curriculum, the following issues appeared in relation to the didactic materials:

• The teaching materials are not updated according to the labor market requirements, their content is often far behind technological changes. Having the lack of current content of textbooks and didactic materials from specialty disciplines in the field, there is a risk that students ' knowledge does not correspond to the requirements of employers. In the absence of these updated teaching materials, teachers must find new ways of sharing the information .In most cases, however, the curricula are carried out in accordance with existing manuals and thus we discuss discrepancies between the competences held and those required by the labor market .

• The lack of standard practice notebooks for pupils so that there is a unified assessment of them.

•. The lack of modern computer applications for specialty subjects.

5. *The Teaching Staff*

The training of the pupils 'competences depends on their teachers: their level of vocational training, learning methods used. The field research has highlighted the following, as main issues, regarding the teaching staff :

• Insufficient teaching staff for specialty subjects and lack of practical skills. Low financial motivation is one of the main causes of lack of qualified teachers.

• The teachers cannot adapt to new technologies and job requirements: vocational training for teachers is better where there have been training programs for employers or exchanges of experience in other countries.

• The lack of the mechanisms for retraining teachers in the context of abolition of the qualifications and introducing new ones. For this reason, the establishment of specializations offered by the educational institution is often based on the assurance of the didactic norm

• The reduced institutional capacity of schools: management is not always ensured by specialized staff "Vocational and technical education is highly fragmented from the point of view of its vision, inoperable from the point of view of the labor market, unrelated to the need of the labor market and based on the availability of teaching staff "(as a decision-maker).

6. The practical training of the students -

One of the main problems facing VET education right now is the inefficiency of practical training, explained by at least three factors: an improper report between theory and practice (especially

for the technical high school), the lack or poor quality of endowment in-school workshops, training specialized personnel modest specialized schools and the absence of clear contractual relationships between the school and the potential companies. There are both types of learning of practical knowledge:

• Learning in school: either for reasons of work safety or because of the lack of business partnerships with economic agents for specific specializations or very recent partnerships.

• Learning at work: involves additional costs for employers (tutors of practice, didactic materials). Tutors for practice exist only in large companies. If it is a small company, the student supervision is done either by its own staff or by teacher of practical training.

• Teachers inability to coordinate a classroom under performing practice to more companies

7. Financing mechanisms for the VET system

The VET system depends largely on the level of funding. At the moment funding is from two sources: the central level provides funding for payment of human resources (teachers, non-teaching and support staff), textbooks, utilities (25%), transport facilities and scholarship for students at vocational education and from the local level infrastructure investments are financed, the local pupils and teachers transport. At this time we are witnessing an underfunding of the entire educational system and also the VET one because some problems:

• The funding per student is considered to be insufficient in many cases and leads to the lack of performance. Many teachers choose to give students passing grades in order to keep them in the system as long as possible to maintain their funding received for each of them. The situation is even more difficult for the XI-th and XII-th forms when education is not compulsory and many students would drop out of school if their school results do not allow them to graduate.

• The current funding does not take into account of the real needs, but it is calculated on the basis of its cost. At establishing the funding per student it was not made a real analysis of needs to ensure a proper dimensioning of the budget

• The local funding is fragmented and non-unitary at the national level, depending on the level of economic development of the community. Administrative decentralization has assumed new responsibilities providing local government, without guarantee and financing it all.

•.The additional funding is provided from other sources - employers (school equipment, sponsoring); European funded projects (eg. Erasmus for non-formal education activities, mobility). This depends much on the ability of schools to develop projects, availability of local authorities to co-finance projects, existing partnerships with businesses

• Lack of funding for disadvantaged children and communities. Although there are scholarships for students (professional scholarship or scholarships offered by the "Money for High School" program). It is reduced compared to the needs of the children. It should be accompanied by other measures of financial support (transport settlement money for supplies) for students coming from disadvantaged communities and to attract them to continue their studies.

"Responsibility is for everyone and for no one. The school has to respond to public policy requirements, to have a good relationship with the local public administration and to respond to requests from the County School Inspectorate, which does not always respect the policy of the Ministry "(a decision-maker)

To adequate the skills to labor market requirements is the most important outcome of the educational process carried out within the VET school units in some steps: the need of the existence of those mechanisms to anticipate the labor market needs, for monitoring the graduates' insertion in the labor market, adapting training standards and qualifications, permanent revision of the curricula and the teaching materials.

There are a number of problematic issues to mention:

• Low level of the development of both specific competencies (sometimes basic skills are

lacking: eg reading a drawing sheet, using measurement tools), as well as transversal pupils / graduates vocational and technical education

• In some cases, because the school does not develop transversal skills, the employers need to be involved in this. Thus, either within professional practice or extracurricular activities (summer schools, camps thematic weekend school, study visits, etc.) there are encouraged teamwork, communication, creativity

• The lack of mechanisms for monitoring the graduates' insertion in the labor market to provide information both on areas where graduates of VET is committed, but also specific skills or transverse graduates believe they have acquired in school or during professional practice, so that the curricula can be improved. These studies are extremely useful in the reform of the VET sistem.

Many employers prefer to train employees in the workplace (eg. Apprenticeships) than to invest in VET, because they are clear procedures that may require certain qualifications

• Integration into the labor market is easier where the role of employers (generally large companies) in defining partnership is stronger and in areas where human resources are rare (construction) or where demand and fluctuation of staff is high (tourism and public catering) . "25% of graduates go to college, 25% work in the field, 25% excel in the field, but the rest ... either do not practice in the field or abandon. That's why, 75% of the graduates are employed immediately after graduation in the companies they practiced "(representative of an educational institution)

There are some *problems* related to the *development of this type of vocational education*, such as:

•The dual education is not just a technical matter, but a cultural one as well. It involves a type of society in which stakeholders (eg, businesses and government institutions) are willing to share responsibility for training young people and invest in the process, on the one hand at the school, on the other hand at the company. Unfortunately, in Romania this premise is fulfilled only in economically developed regions where there are employers with foreign capital from countries, where economic agents involved in vocational education became a tradition. The development of the vocational education in the dual system depends on the existence of large businesses will be difficult in poor areas where they are lacking.

• The consideration of the dual education by decision-makers as the only solution to make VET more effective is not a viable option even at European level. This form of organizing VET education should represent an alternative to the classic because large economic dependence may hinder an economic crisis or bankruptcy / restructuring businesses. This system can be a major problem for schools located in economically less developed regions, where little companies predominate. Quitting the current form of vocational education could cause major risks to provide the labor market with qualified level 3 in less developed regions, as happened previously by abolishing school of arts and crafts in Romania.

The problems in the dual VET system are generated by:

►*Quality of curriculum and learning tools*. The dual VET training standards are not upgraded according to labor market requirements, both in the description of the job and in the presentation of competences that should be held at the end of the studies by graduates. These standards are the basis for training and qualifications and extremely important, especially for employers who have interest to work in support of certain specializations in the VET system necessary for their work. Some employers complained that requested certain qualifications for VET institutions which were not able to organize classes as these standards are missing and the development of new ones takes more than two years.

The manuals are updated only after changing the curriculum. Some employers have been involved in updating textbooks and developed learning tools (books of students, evaluation sheets), but the process of recognition at national level is highly bureaucratic and lengthy. "On admission the students do not even know how to express themselves, to formulate a simple answer“. (an employer)

► *The young people's attitude towards work* is an important problem reported by employers - young people have increased access to technology and information, have higher mobility and are less willing to make the effort (comfort, expect high wages for minimum effort).

"Poor professional preparation, communication and adaptating problems are unstable in terms of job, leave the job fast, leave without announcing, without warning, if something does not fit them the next day they are at not coming at work, do not have the sense of responsibility, delay at the program, argue with colleagues and superiors, refuse to perform certain tasks while entering the job description, demanding an unreasonably high salary compared to what they actually know how to do "(an employer)

► *Partnership with VET Institutions* • In most cases, there is no real consultation of economic agents sites, many of them don't know of the existence of these advisory bodies at county / regional level. The economic agents who knew of the existence of these structures either were not invited to participate, whether their opinion was not respected. An active involvement of business in these structures occurs where there is a strong partnership between local government and companies.

4. The delivery level: Enabling virtual duality

4.1 The Business Simulation Tool

4.1.1 Description

Globalisation, economic pressures, and the changing nature of work are a number of emerging challenges which have combined to create a changing business environment that demands innovative and flexible training solutions. Business simulation information technology tools are promising for creating more realistic, experiential learning environments in order to help organisations meet these emerging training challenges.

Modern educational systems use information technologies to increase their immediacy and their efficiency. Business simulation information technology tools as a form of experiential learning are focused on improving business decision making skills by using the students' natural capacity for technology. Business simulations provide a space in which learning is an outcome of tasks stimulated and executed by the content of the simulation, and skills are developed by playing the simulation game. A modular tool for the simulation of production planning and control processes is a significant step towards dual training. The computer-aided planning and processes simulation makes the trainees face the main problems of control in industrial production.

The InnoVET Business Simulation Tool (see IO 3 and IO 4) provides a simple model of a factory in which decisions regarding purchase orders, production orders and production capacities have to be made. The production output of the factory model has to be adjusted to the market requirements by the trainees through selected variables such as throughput time, delivery capacity, loading, inventories, manufacturing costs etc. The main objective of the software tool called Business Simulator is to promote better understanding of educational theories concerning the production process incorporated in a business environment. Moreover, these objectives entail business processes optimization and redesign, minimizing the cost of production through the minimization of the cost of materials, human resources and idle time due to inappropriate schedules and restructuring of orders and inventories in accordance with business needs.

For these reasons a process model is adopted according to which each trainee is acquainted with the most significant business operations and processes of the various departments and becomes capable of identifying business weaknesses faster and more efficiently. In conclusion, trainees acquire administrative decision skills concerning business operations and processes for the future optimization of the economic organizations they are employed by.

The InnoVET Business Simulator is a free, web-based software tool that features a modular structure with four subsystems, namely Design Mode, Simulation Mode, Results and Administration (see the following figure). The first three of these are the ones actually used by the learners while the fourth subsystem is designated to the management of application data and user accounts. The modular design of the tool enables the system's administrator to plan and simulate any production line he or she thinks most suitable for a given VET programme.

Figure 1: Components of the Business Simulator

The Design Mode enables the user to model any production or service process by creating a Design that describes the machines, tools, materials and human resources involved as well as the connections between them. The user can also modify existing Designs.

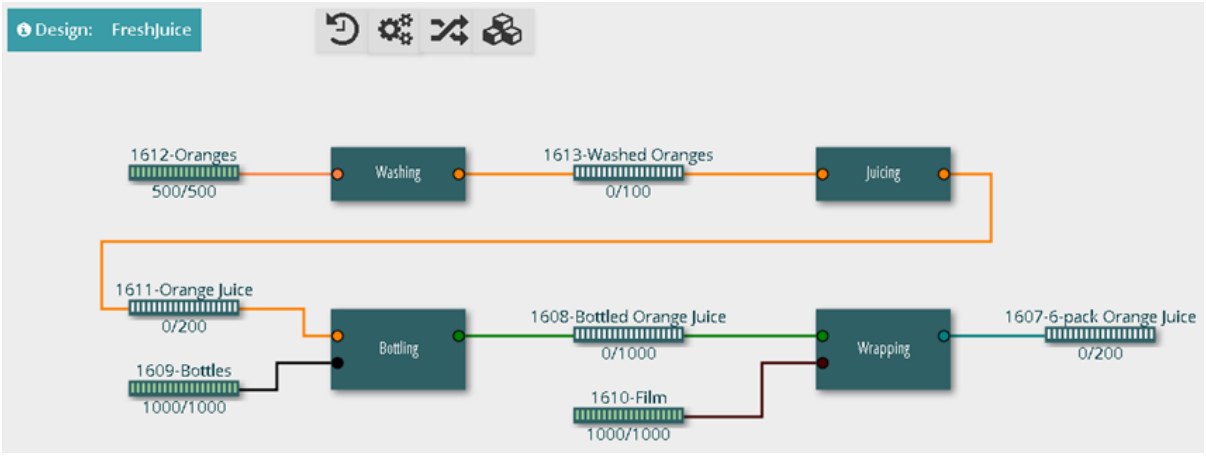
In the Simulation Mode, the user can specify the specific parameters of the process such as working schedules for machines and humans, quantities of materials and products to be processed etc. The actual simulation, i.e. the experimental run of the process with the parameters defined by the user, also takes place within this subsystem.

The Results subsystem enables the user to review he results of any completed simulation. The results are displayed by graphs, lists or tables presenting data such as machine and human idle time, material usage, production schedules, sales, etc.

The Business Simulation Tool represents the manufacturing or service processes in a company by means of different classes of objects, namely Products, Machines, Carriers and Human Resources, which can be defined and arranged so as to cover a wide range of business processes in different economic sectors. The term **Product** refers to any material that is being processed during the production of goods, which means that it covers not only final products but also raw materials and semi-finished products. The term **Machine** corresponds to any form of process that receives raw materials from at least one input and produces products at at least one output. Generally, a Machine is able to have multiple inputs or outputs, depending on the number of different raw materials at the input and the different products in the output respectively. Finally, for each product or raw material involved in the model, a procedure of transfer or distribution or simply waiting for a next stage of processing is required. This procedure is described by the term **Carrier**. Such a procedure can be carried out either from or to a product storage site or in a temporary gathering of products between processing steps.

The user sets up a model of a particular business process by creating the necessary components (Products, Machines etc.) and defining the relevant parameters such as capacity of the Machines, amounts of raw materials and products etc. The process model is represented by a so-called Design that gives an overview of all the components and the connections between them. An example is given in the following figure.

Figure 2: Design of a business process (example)



After running the simulation, the user is able to display the results in a variety of formats such as the instant view or the product view. While the former lists the quantities of all materials and products at a specific time, the latter displays the change of quantity for a specific material or product over the entire simulation period or a part thereof. In addition, data on specific variables of the process such as incoming and outgoing stocks or underutilised resources (idle machines and idle humans) can be retrieved. These results not only give evidence as to whether the process has achieved the theoretically expected outcome but also help to identify weaknesses and shortcomings of the process. Examples of the presentation of results are given in the following two figures. Figure 3 shows the development of the quantity of a sample product during the process and Figure 4 shows the breakdown of the operating time of one of the machines. The red bar indicates that due to poor scheduling, the machine has been out of operation for lack of input over several hours.

Figure 3: Simulation results – product view (example)

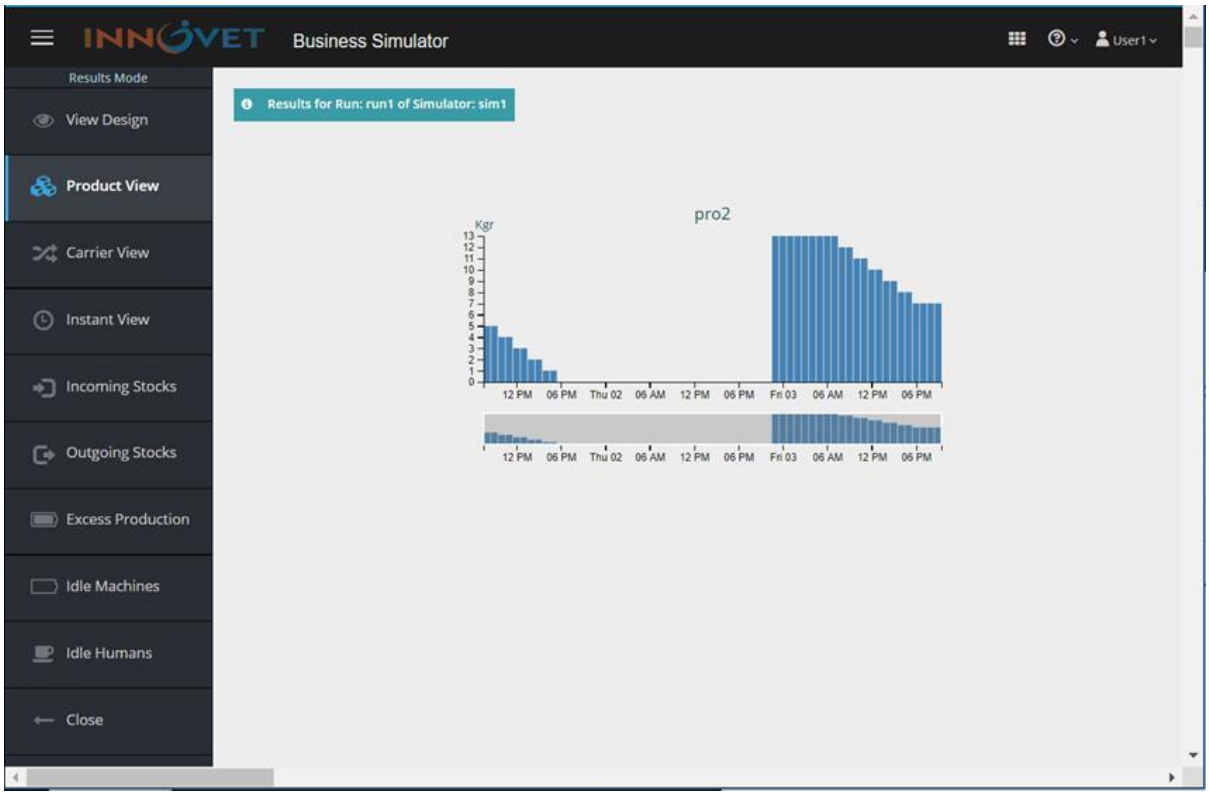
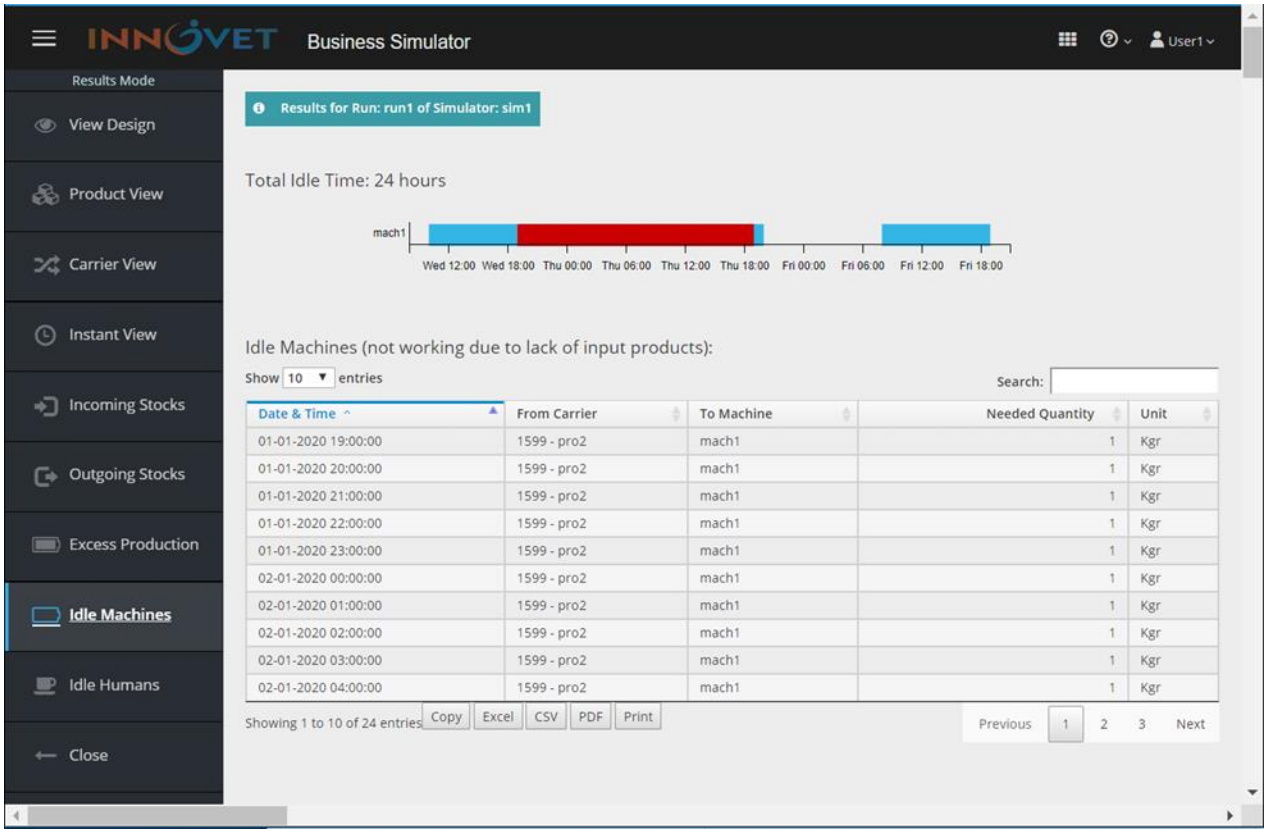


Figure 4: Simulation results – idle machines (example)



4.1.2 Advantages

Business simulation information technology tools are an effective method of learning hof ot manage the business processes in a modern enterprise. These kinds of simulation tools may also help to form and develop entrepreneurship and to learn the methods of modern management. Trainees are active participants in the learning process, and learning should occur in a meaningful or relevant context, developing this adaptive expertise.

A major advantage of the modelling and simulation process of a system is the ability to analyse and study various alternatives to a problem and to evaluate their implementation, without requiring the actual (even pilot) implementation of these alternatives. In addition to modeling, another important stage in the simulation process is the validation of the model, where its behavior is controlled against the real situation it imitates and involves comparison with the theoretically expected or actually observed results. Moreover, the simulation may also indicate shortcomings and redundancies in materials, machine failures, undue delays, redundancy in human resources, and many other details that can not be identified theoretically.

Simulations can be extended in time and enriched with purchases of raw materials or sales of final products. The system can be controlled at its limits and the maximum ability to satisfy sales orders for specific periods of time could be estimated. In addition, better scheduling of machine operation can be made to reduce idle time and also better job scheduling for exploiting company's human resources.

A number of options present the results of simulations in various forms so that conclusions can easily be drawn. In addition, it is possible to modify the model. For instance, a simulation may lead to the result that an additional Machine would improve the performance of the production process. But at what rate? A new version of Design with two parallel Machines, possibly with different operating characteristics, is a challenge to study.

This makes it easy to see that simulations give the possibility to analyze and study various alternatives to a problem. A simulation can essentially replace the experimental approach and addresses the potential problem of being unable to access a system. It leads to a better understanding of a system, it is a prediction tool but can also be used as a training mechanism. The simulation returns realistic data related to the various stages of the business process and thus creates the same kind of feedback and learning experience as the exposure to a real-life business process. Using the Business Simulator within a predominantly school-based VET programme may therefore allow for a virtual form of duality.

4.2 Adaptation in the partner countries

The strategy for the implementation of virtual duality involves a concept for the training of trainers in companies, which was successfully tested in the partner countries Greece and Romania. Given that trainers are persons who directly supervise and look after the trainees, they need specific competences which are based on two sources.

The first source is the in-company training plan, which builds on the experiences of the German dual VET system. This component responds to the fact that the identification of training content which is to be imparted at the workplace in correspondence with what is provided at school can be a particular challenge for companies. The in-company training plan, which in the German context has the status of a mandatory annex to any training contract concluded within the dual VET system, defines an individual and company-specific training programme for the apprentice in order to implement the training curriculum at the micro level. It covers the entire training period and specifies the **content** and the **time schedule** (i.e. which learning objectives have to be achieved by what date). It is suggested that a similar breakdown of a given training programme can be derived collaboratively by schools and companies from existing VET curricula in the partner countries.

An in-company training plan should include the following key elements:

- Specification of learning venue(s), contents, measures and dates
- Coverage of all learning objectives according to the training curriculum
- Stages of the training process should be specified – which contents are trained in which workplace?
- Duration of each training unit or module should be specified in weeks or, if applicable, months (recommendation: no module should take more than six months)
- Pedagogical approach should be described
- Assessment methods (e.g. tests) should be specified

Examples of the generic structure of an in-company training plan are given in the following two tables. The first one is an excerpt from the list of modules that make up the training programme and correspond to the units of the official VET curriculum. The second one is an excerpt from the appendix that usually accompanies the training plan and further specifies the implementation of the single modules.

Table 1: In-company training plan (example)

N.N. Company – Training plan for the occupation of IT specialist specialising in systems integration	
Name of trainee:	Trainer:
Year 1	

Knowledge and skills to be imparted	Duration in months	Timeframe according to curriculum (min-max)
Areas of activity and current trends, learning objective a Systems architecture, hardware and operating systems Applications Installation and setup	4	3-4
Productivity, learning objectives a, c and d ...	4	3-5
...		

Table 2: Appendix to an in-company training plan (example)

Year 1				
Knowledge and skills to be imparted	Contents	Remarks	Department/ Trainer	Date
First module (4 months)				
Areas of activity and current trends, learning objective a		Exploration	Training department/N.N.	3.8-7.8.
Systems architecture, hardware and operating systems		Seminar included	N.N.	10.8.-9.10.
Applications			N.N.	...
Installation and setup			N.N.	...
Second module (4 months)				
...				

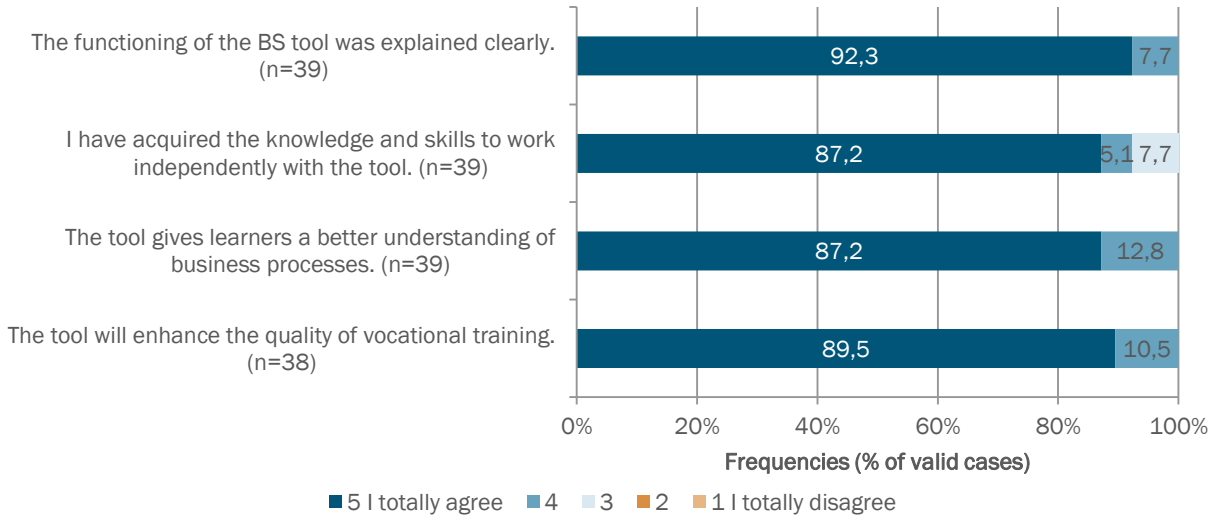
The second component of the train-the-trainer concept is a virtual lab in which the trainers are familiarised with the application of the Business Simulation Tool. The virtual lab serves the purpose of a better match between company needs and educational output and thus supports the transition of VET students into employment.

The implementation of the virtual lab must take into account that people in an organisation such as a company or an educational institution are occasionally resistant to change and avoid venturing into an unfamiliar area. Therefore the deployment phase should start with training classes for the most enthusiastic software users in order to build excitement and confidence. This should be followed by shifting the training towards the neutral users intermixed with the avid supporters. Finally, the rest of the organisation should be incorporated into adapting the new software. During this process, users will have a lot of questions and encounter problems, which will in turn stimulate the further development and improvement of the software.

The methods and instruments were tested in practice in two regions in the partner countries, namely in Kavala and Calarasi. The training events were attended by 16 participants in Kavala and 23 participants in Calarasi. In order to assess the quality of the training concept and to identify opportunities for adaptations or modifications, the training events were evaluated by means of a participant satisfaction survey in which participants were asked to complete a short questionnaire by rating several statements on the activities and outcomes of the event on a five-point Likert scale.

The following figure presents the overall estimation of the training event and virtual lab by the participants. It is obvious that the objectives of the training event have been fulfileld as shown by the approval ratings of approximately 90% or more for each of the items. In particular, the ratings confirm that the Business Simulator serves its purpose of improving the understanding of business processes and has the potential of enhancing the quality of vocational training.

Figure 5: Evaluation of the training events/virtual labs in Kavala and Calarasi



On the whole, the training events can be considered a success since the participants in both workshops were very satisfied with the activities and also rated the learning outcomes quite positively. The training events succeeded in familiarising the participants with the technique of business process modelling and with its application in vocational education and training. The immediate applicability of this knowledge in the trainers' practical work, however, remains subject to the conditions in their respective working environments.

List of Literature

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