

Report on university-industry educational and training initiatives

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including Commission services and projects reviewers)	
CO	Confidential, only for members of the consortium (including EACEA and Commission services and projects reviewers)	

Summary:

This deliverable describes a series of activities regarding university-industry educational and training initiatives. Starting from reviews of existing literature and previous project reports up to summarizing the current state of industry-university interactions and joint educational and training activities and identification of skills needed by the project target groups. Finally the learning outcomes, the layout and implementation plan of activities for student and teachers have been defined.



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1 Introduction

The main aim of WP4 is to harmonise, improve and modernize Food study programmes with respect to the industry-oriented professional skills. Moreover, a series of activities will be addressed to integrate science and technology skills into industry and to develop a guideline for the implementation of a joint “Industrial Master” curriculum.

This implies a series of actions that include the identification, selection, setting, design and development of educational and training activities with a novel training approach to food processing and engineering education by integration of education, research and innovation will be developed in a close industry-academia collaboration.

Task 4.2 and 4.3 will be properly designed in terms of contents and learning outcomes based on the results of the initial survey carried in WP1. A close interaction with WP5 for the development of technology-enhanced teaching tools and materials (e-learning, webinars, virtual industry tours) as well as WP3 with whom some activities could/would be shared is expected.

The WP4 activities will be carried out jointly developed by representatives of the industry and universities partners of the project consortium and are targeted to students, HE teachers and industry professionals.

Specifications (learning outcomes, evaluation criteria for accreditation, layout and planning of the activities) of activities in close collaboration with WP5 (tools) will be developed.

This deliverable is expected to be as a report of forums developed within the project to implement and set the WP4 activities. For sake of clarity the term “forum” will be intended here as all the activities considered within the project aimed to identify the skills need, to set and implement the planned WP4 tasks, including among others, the analysis of the state of the art on the topic, the analysis of the WP1 report, development and analysis of specific questionnaires, meetings and conferences (included virtual).

This deliverable is aimed to report a series of activities that are aimed to:



1. Review the state of the art of the current skills needs for practitioners and professionals in the food sector and activities currently available to implement them including
 - a. Analysis of existing literature
 - b. Analysis of reports of previous projects on the topic (e.g. Erasmus ISEKI_Food 4, FP7 Track_Fast)
2. Current state of the industry-university interactions and joint educational and training activities (outcomes of the Task 4.1. activities, Virtual conference)
3. Identification of the skills needs of the targeted project users of the WP4 activities and in particular the transversal (soft) skills and technical based on project activities of
 - HE graduates in Food studies (D1.2. – report on Findings and Recommendations)
 - HE teachers (Survey of teachers)
4. Definition of learning outcomes, layout and planning of the activities for students and teachers

2 Review the state of the art of the current skills needs

2.1 Analysis of existing literature and forums

It has been widely recognized that Higher Education is a key player and of main importance for the innovation systems in EU and worldwide. In this framework is increasing also the relevance of the academia-industry partnership aimed to develop knowledge based economies where the creation of knowledge and the translation of the research into economic value, wealth, health and social equality is the central aspect. In many sectors, included the agri-food one, knowledge transfer tools and players between university and industry are appearing in the research landscape with the aim to bridge the research outcomes (academia) with the end-users (industries) (Schofield, 2016). This is leading changes in both the industry sector that is adapting to an open innovation and partnership with universities and the academia that is progressively moving from a science-based towards a professional-oriented player in the society. Several projects, networks and



platforms are also supporting the university business interaction, some of them set and developed also with EC funds. The Knowledge and Innovation Communities (KICs) of the European Institution of Innovation and Technology are examples of international networks in this framework where stakeholders from higher education, research and business collaborate in research and training towards innovation and a knowledge based society.

These changes and trends require however, new skills from university researchers to support their interactions with industry and to achieve a successful collaboration.

The collaboration in research has generally been a main area of research-industry interaction. However, academia is also playing a main role in the knowledge-based society also thanks to its commitment in the education and transfer of knowledge to the students that will become the future workforce in our society. In this context the setting and development of successful collaboration strategies requires a systemic, long-term, two-ways partnership (UBU, 2016) where each of the parts should get benefits.

Collaborations in the education with industry and business more in general start from (lower impact-short term up to strong and long term interaction levels by including:

- the involvement of professionals and industry representatives as guests in teaching and class activities
- recognition and mutual understanding of curricula (most of the EU countries is somehow compulsory in some areas)
- one-way transfer of knowledge/information (courses, modules) from HE institution to industry and viceversa
- strategic partnerships in the development of joint curricula and study programmes
- dual study programme that combine learning at HEs and learning at workplace. This is an educational approach typical of some German countries /vocational education systems and increasing with strategies in various others (e.g. Italy with the Istituto Tecnico Superiore programmes)

In these last decade a number of questionnaires have been or are frequently carried out by many organisations in various field included the food processing/technology sector dealing with the skills required by the job market and many reports and papers are currently



available and/or published in magazines and peer-reviewed journals. These information is then transferred to HE institutions for both internal evaluation of their study programmes and their modernization and upgrading. Main attention is nowadays given to those generally termed as entrepreneurship where the notion of “entrepreneurial mind-set” involves a series of broad and transversal skills and attitudes important for the career path of the graduates, in any field. These include the ability to work in a team to address complex tasks, openness and ability to be receptive to new ideas in dealing with customers, solving problems, communicating, and negotiating.

These skills could be improved, developed in students by changing the teaching approach from the teacher-center to a student-centred approach and informal and innovative educational activities included cross-disciplinary and practice-based learning, games, simulations and project-work in curricula as well as student internships or theses tutored by a business partners. However, universities can support students beyond traditional teaching though facilitating access to enterprise clubs, prizes and business incubators, and providing networking opportunities (UBU, 2016).

The EC has promoted this new educational approach by the setting of a platform, the University-Business Forums (UBForums) to promote good practice exchange, mutual learning and networking and to inspire further activities across the Member States, and favours the partnerships between higher education institutions (HEIs) and businesses and the bridge within the knowledge triangle, i.e. across education, research and innovation and the modernisation of Higher Education across Europe. In this framework the Knowledge Alliance strategic partnerships between universities and business with an emphasis on innovation and knowledge exchange have been launched, now funded through the Erasmus+ Programme – and HEInnovate (<https://heinnovate.eu/>) an online self-assessment tool developed in cooperation with the OECD for entrepreneurial higher education institutions looking to bring about change and improvement.

In the more specific food science and technology sector the ISEKI-Food Association (www.iseki-food.net) originated from the Erasmus Thematic Networks ISEKI-Food and ISEKI-Mundus projects supported by EC since 2000. ISEKI_Food is the name of an international and inter-sectorial network, originally standing for Integrating Safety and Environmental Knowledge Into Food Studies towards European Sustainable Development, that was then



changed to mean Integrating Food Science and Engineering Knowledge Into the Food Chain. The mission of the network, organized in the ISEKI-Food Association (IFA), is to promote a responsible approach towards research and innovation in the food chain, involving all the stakeholders in relation with the food sector, particularly educational organizations, researchers and industry, with dialogue with consumers and for the society all over the world (https://www.iseki-food.net/webfm_send/1005). IFA has been contributing along the years for training, education and mobility in the food sector, taking into consideration industry and society needs, making the bridge with the research community, and sharing outcomes and procedures with related organizations in all world continents. Outcomes and products of all the activities developed and currently ongoing could be found at the IFA webpage.

The ISEKI_Food Association organizes an international conference that started in 2008 and in the past was organised every three years; the next edition will take place in Vienna (4th edition, 6-8 July 2016, www.isekiconferences.com/vienna2016).

The general aims of the ISEKI_Food conference series are to contribute to the creation of an "open" international forum for researchers, education scientists, technologists and industry representatives as well as food consumers, to promote a constructive dialogue and collaboration between Industry and Education on topics relevant to Food Science and Technology. The 4th ISEKI_Food Conference will be held under the theme Responsible Research and Innovation in the Food Value Chain. In this framework, this 4th ISEKI_Food conference is expected to favour a discussion on the main aspects of research and innovation as well as on ethical behaviour and responsibility that all actors of the food chain are expected to have towards our society and its future sustainable development. The role of education and training on a responsible research and innovation in a lifelong learning perspective will be also discussed and case studies presented.

2.2 Analysis of reports of previous projects on the topic

The evaluation of the needs in terms of skills for the current and future generation of graduates in food studies have been carried out in some previous projects and in particular:

- FP7 Track_Fast (<https://www.trackfast.eu/>), WP1. Results have been published in a series of papers in peer-reviewed journals and/or presented in international conferences including:



- Flynn K., Wahnstrom E., Popa M., Ruiz-Bejarano B., Quintas M. 2013. Ideal skills for European food scientists and technologists: Identifying the most desired knowledge, skills and competencies. *Innovative Food Science and Emerging Technologies* 18 (2013) 246–255
- Giannou V., Lakner Z., Pittia P., Mayor L., Costa R., Silva C.L. M. and Oreopoulou V.. 2015. Qualifications of Food Science and Technology/Engineering professionals at the entrance in the job market. *International Journal Food Studies*, 4, 173-187.
- Mayor L., Flynn K., Dermesonluoglu, Pittia P., Baderstedt E., Ruiz-Bejaramo B., Geicu M., Quintas M., Lakner Z., Costa R. (2015). Skill development in food professionals: a European study. *European Food Research Technology* 240 (5), pp. 871-884. (doi: 10.1007/s00217-014-2400-z)
- Oreopoulou V., Giannou V., Lakner Z., Pittia P., Mayor L., Silva C.L., Costa R. 2015. Career path of food science and technology professionals: Entry to the world of work. *Trends in Food Science and technology*, 42 (2), 183–192.

Erasmus TN, ISEKI_Food-4 (www.iseki-food.eu). The main objectives of the ISEKI_Food 4 (**IFood4**) Thematic Network (TN) project were: (i) to contribute to the development of quality lifelong learning and to promote high performance, innovation and a European dimension in the field of Food Studies and (ii) to support the achievement of a European Area of Higher Education. Within this frame, the ISEKI_Food-4 TN project developed a framework of stakeholders aimed (i) to lead innovation in Food studies education and training by matching the needs of enterprises, (ii) to promote innovation in the Food Science and Technology academic sector and (iii) to favour the internationalisation of the European Food studies. The workplan was fostering in particular the modernization of the education and training of students in Food studies, by the development of guidelines to upgrade HE courses and training programmes by comprising advanced scientific disciplines as well as soft skills for the future generation of Food Scientists and Technologists. The WP3 was in particular dealing with „New skills for new jobs“ and a survey was carried out addressed both to industry and professionals and students in Food Studies. Results are reported in the deliverable D3.1.4.(<https://www.iseki-food4.eu/deliverables/wp3>). In particular in this survey were respondents were asked to indicate on a scale of 1 to 5 how important certain



skills, knowledge and competences would be for their job in the years to come, the Personal Management skill of *Thinking & Solving Problems* was number one rated as “Very Important” by 64% of respondents, followed by *Being Responsible*. Among the technical skills, the Food Safety & Quality skill of *Food Safety Management, Food Hygiene & Food Safety Control* was on top with 50% of respondents finding it “Very Important” for the future and *Product Development* was second with 44% of respondents.

One publication published from the results of the survey carried out to define also the important skills for PhD students is the following one were, again, personal skills became of main important for the future professional career.

- Gonzalez-Martinez C., Ho P., Cunha L., Schluter O., Pittia P. (2015) Identifying most important skills for PhD students in Food Science and Technology: a comparison between industry and academic stakeholders. *International Journal of Food Studies*, 4, 163-172.

3 Current state of industry-university interactions and joint educational and training activities

EU frameworks and programmes (e.g. Europe 2020 strategic plan, the Lisbon agenda, the modernisation agenda of European Universities) have recently recognized the underpinning role of Higher Education Institutions in the transfer of knowledge to society and their vital contribution to Europe’s economic competitiveness.

Academia has a key societal role by the development of research, the generation of knowledge and its transfer as well as by the training and education of highly skilled individuals and workforce including professionals, practitioners, employees and entrepreneurs at various levels and sectors.

Societal issues and economic constraints, however, are progressively leading a shift of the primary function of the universities that are moving from that mainly aimed to the education of human resources and the advancement in knowledge, science and technology, towards a more societal- and business-oriented role and mission. In these last decades this has led university to the promotion and development of new initiatives along with training and research activities aimed to better contributing to the increase of the economic



performances, employment, productivity and social cohesion. This is occurring not only in EU but it is a process comprising the Higher Educational Institutions all over the world.

Actually, this concept is also well described in the “*Knowledge Triangle*” model that highlights the importance of an interplaying link and cooperation of the university, with its role in research and education, and business as ideal driver of knowledge-based economies and societies.

In this framework various could be the cooperation activities that Universities and Industries may plan and develop to answer to the societal and economic needs. This has been mostly developed as joint collaborations in the area of research and innovation while it has been explored and exploited to a only to a limited extent in the field of education despite its potential positive societal and economic impact.

Collaboration between university and industry/business in the field of education cannot be limited on a knowledge transfer focused on cooperation of research outcomes as well as on students start-ups.

Innovative type of collaboration need to be implemented that provide increasingly-recognised value for stakeholders that could be realized by the development of joint teaching and training activities that may require different level of interactions, comprising the more simple students and staff exchange (including teachers and employees), but also bespoke course development joint design and collaboration of professional curriculum and educational study programmes, continuing education and lifelong learning, entrepreneurship and entrepreneurial education, and eventually and indirectly through ‘spill-over effects.

The need of a closer interaction between the academia and industry or, in a larger perspective, the business area involves also the food sector with specific reference to the education in Food Science and Technology/Engineering disciplines, the food manufacturing sector and the food value chain.

The food system is currently challenged by ever-growing societal needs due to significant changes occurring at several levels (economy, society, technology, environment) that require increasing investments in R&D along with proper actions able to promote innovation and to develop a sustainable and “knowledge-based” society.



Educational and training approaches and methodologies for the 2.0 young generation of food scientists and technologists need to be updated and upgraded to achieve a successful modernization of the HE Food Studies and enabling sustainable societal and economic growth. However this requires the implementation of adequate academia-research-job market interactions and their improvement in a wider societal framework also with the involvement of policymakers and other stakeholders to promote flow of knowledge and innovation as well as to design and develop an adequate training of a modern workforce able to meet the real expertise and competences needs.

The recently ended FP7 Track_Fast (www.trackfast.eu) and Erasmus TN ISEKI_Food-4 (www.iseki-food4.eu) projects via the information gathered through questionnaires and surveys delivered to employers and employees of the food sector have highlighted the importance of a modernization of the current study programmes by the implementation of educational activities that may allow to accomplish the job market needs in terms of technical/professional and non-professional skills. As regards the latter ones, it has been pointed out the growing relevance and role of soft or personal skills (transversal skills) including communication, problem solving critical thinking and foreign languages. Moreover, main outcome of the ISEKI_Food-4 project activities is that personal skills training needs to be developed by actions and tools embedded in the more “technical” disciplines and, more than this, in collaboration with the job market stakeholders thereby allowing a better qualification and enhancement of the professionalization at the end of the study programme.

Within the two projects it has been also pointed out there is a rather diverse status of the university-industry collaboration in the food sector in the various EU countries as well as in the universities within a single EU country. This confirms the actual need to develop new tools and frameworks to favour the knowledge about the potential collaborative activities between academia and business and to enlarge the societal and economic impact by the relevant skills developed and the conditions for future innovation and economic growth.

In recognition of the potential benefits that could be achieved by an increased cooperation between businesses and Higher Education Institutions in the field of education the European Commission launched the Knowledge Alliance initiative to create new multidisciplinary



curricula to promote entrepreneurship within education as well as developing other transferable skills.

The European Food-STA project is an ERASMUS+ Knowledge Alliance project that is aimed via various activities to establish an independent “EuFood-STA Centre” (virtual platform plus physical hubs) as a legal and organisational frame for international and sustainable collaborations between industry and academia in the food sector.

Within the various planned activities of the project, a virtual conference titled "University-Industry educational and training initiatives" has been organised with the aim to share best practices of university-industry educational and training initiatives for food study programmes and CPD (continual professional development) (<https://www.food-sta.eu/2015-05-07>). This conference was an event not only for the project partners but open also to any interested party (industry, research, higher education institution) from all over the world. Twenty-five oral and poster contributions have been included submitted and delivered during the two days of the event that have highlighted the growing interest to implement the academia-industry interaction via diverse tools and activities.

The contribution from the participants was fruitful as only six out of the presentations were related to research results and outcomes, the most common way to develop university-industry interactions.

Best practices and successful experiences of joint study courses, modules and programmes jointly developed between university and industry were presented, e.g. the Savange academy (Spinnler), the Knowledge Transfer partnership at the university of Plymouth (Kuri), the food eco-innovation training (Baglieri), summer labs (Decloux, Thomann).

Changes in the study programmes with a higher and/or more close collaboration with the job market (industry) (Ertan) along with the availability at the HE institutions of pilot plants (Silva) to develop specific professional skills has been evaluated positively by students as this also meets the expectations of the food industry.

Best practices of positive and fruitful interactive strategies and actions have been presented by BOKU (Schleining), Hoheneim (Braun) and University College of Dublin (McKenna).

The need to set, to implement and/or to improve an entrepreneurial mindset was highlighted and the development of specific technical and soft skills will enable students and



researchers to be more aware of business development fundamentals and therefore contribute to the valorisation of individual knowledge assets (Cardoso, 2015).

Overall the virtual conference highlighted the need to develop strategies and actions that could able to improve the bridge between university and industry along with the need to enhance the skills and expertise of both Higher Education institution and industry representatives that enable a more close interaction, collaboration and cooperation between the two main stakeholders of the food chain towards innovation and a knowledge-based society.

4 Identification of the skills needed by targeted project users

Within the EuFoodSTA project, WP1 has developed a series of activities that were aimed to identify skills needed by the project end users: i.e. industry and their corresponding workforce (practitioners, food technologists/engineers, professionals, teachers).

End users of this project are however also Higher education institutions teachers and staff that require proper skills and competences to positively and pro-actively interact with the industry.

For the future generation of food technologists/engineerings that will enter in the job market the outcomes of the needed skills from the industry perspective has been carried out in WP1 via the analysis of the outcomes of European and national projects as well as the EuFoodSTA survey carried out in 2015 coordinated by the food industry federations and collected in the deliverable D1.2.

In this respect WP4 has set and developed a survey to identify the state-of-the art of the current approaches of the HE institution and teachers in the development of the collaborative, joint educational activities with food industries and more in general with the job market and the missing competences to implement and/or to improve them.

The questionnaire, mainly addressed to teachers and educators on the HE of the EU_FoodSTA project, was launched in December 2015 and closed 30th January 2016. To enlarge the significance of the results, the survey was also open to other participants outside the project consortium in EU and worldwide and the survey was disseminated via

email to all the members of the ISEKI-Food Association as well as social tools (Facebook, LinkedIn, etc.).

110 responses were collected with the geographical distribution reported in Figure 1. The majority of them as expected are from the countries the partner institutions belong to. Interestingly 22 contributions (20%) come also from respondents from countries not belonging to the consortium EU, and non-EU including among others, Romania, Greece, Brasil (**Figure 1**).

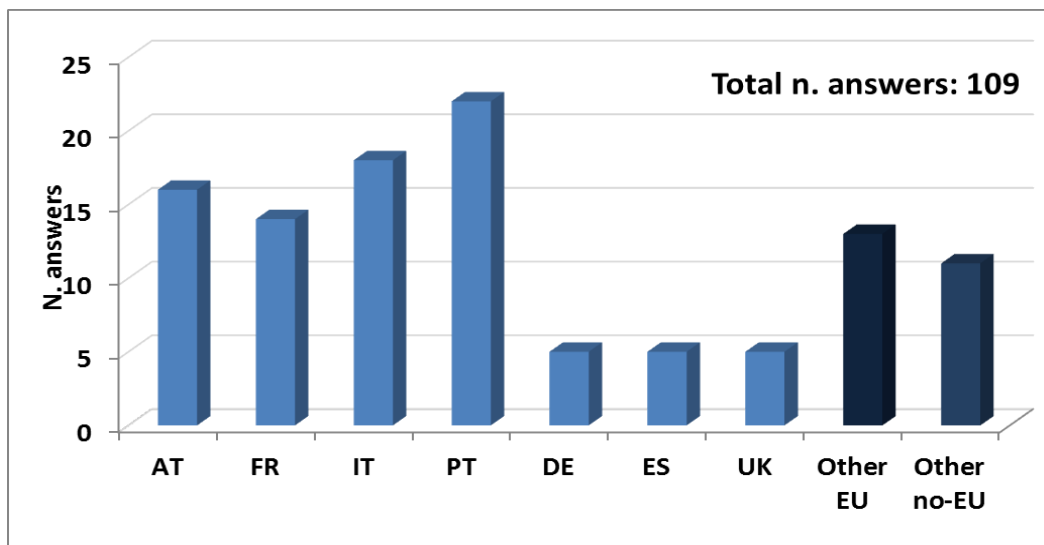


Figure 1: Geographical distribution of respondents to the questionnaire

Overall almost 50% of respondents rated their competences on professional/industry/business-oriented activities between high and excellent and only few (< 5%) state their low expertise (**Figure 2**). This could be likely related to post-doc involved in educational programmes in HE institutions and/or young lecturers.

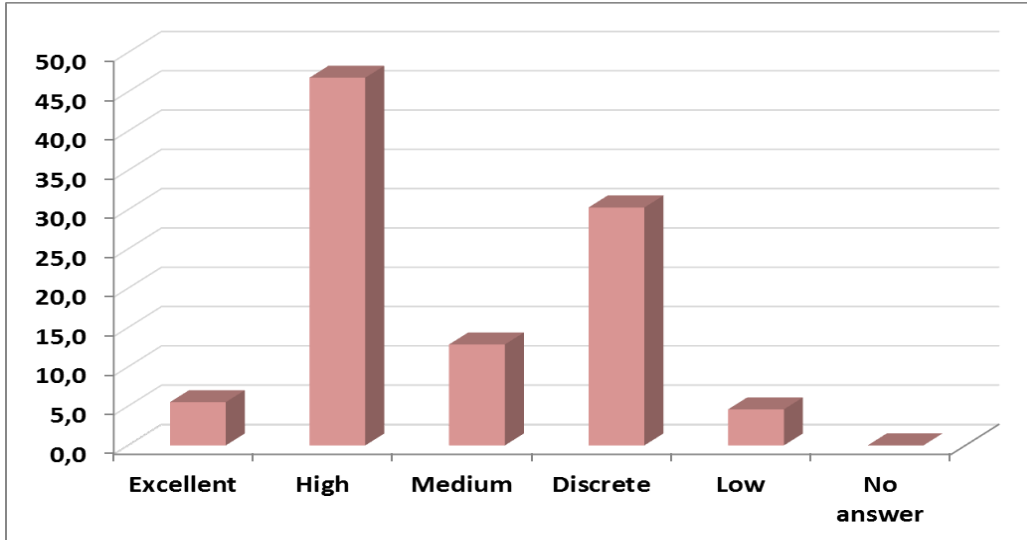


Figure 2: Responses to Question n.2: How do you rate your skills and competences on professional/industry/business-oriented activities?

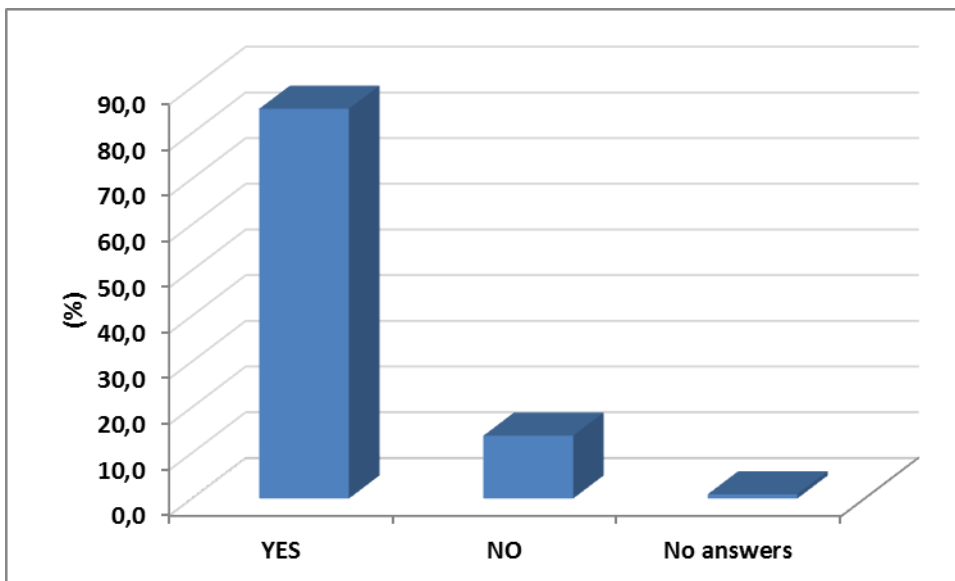


Figure 3: Responses to Question n. 3: Do you commit yourself to keep updated on professional/industry-oriented activities?

HOW?	% (out of YES answers)
Reading articles	75,2
Visiting websites	49,5
Interaction with associations/industry organisations	72,5
Regular meetings with industry representatives	38,5
Organisation of seminars	40,4
One-day visit	45,9
Consultancy	40,4
Regular internships	2,75
Students internship tutoring	44,9
Industrial PhD	18,3
Other	0

Table 1: Responses to Question n. 3: Do you commit yourself to keep updated on professional/industry-oriented activities? If YES, HOW

The required continuous updating on specific knowledge and competences to face the interaction with industry and related activities is recognized as important by the majority of the respondents while 15 % of them declare their no commitment to this activity (**Figure 3**). In general this is performed by reading articles on journals and magazines, visiting industry-related websites and news, followed by specific interaction activities with food industry organisations (associations, federations) and individual companies (e.g. attending meetings, seminars) including consultancy, one-day visits and the tutoring of the students internships that are, thus considered important in a development of “problem solving” skills (**Table 1**).

	N. answers	%
Technical scientific	94	86,2
Quality assurance	75	68,8
Logistics and distribution	29	26,6
Legislation	51	46,8
Business	41	37,6
Entrepreneurship	63	57,8
Financial	27	24,8
Marketing	57	52,3
Governance	24	22
Other	0	0

Table 2: Responses to Question 4: Which are skills and competences you recognise as important as higher education teacher to implement and develop a more close university-industry educational and training bridge (multiple choice)?

The activities that require a higher commitment either of the HE institution in terms of internal/national study rules (i.e. Industrial PhD) or working time (i.e. teacher internship) are scarcely investigated and/or adopted in this framework. To this purpose, this last point was also discussed in the project meeting held in April 2016 (Porto, 30 March-1st April 2016) and industry participant disclosed the issue that it is not easy that companies accept HE teachers (both, young lecturers and senior professors) for internships and that only large enterprise undertake specific projects for visiting professors in their companies. On the other side, university may also obstacle the internships of the educators in industries activities especially those institutions where this activity may require special permissions and/or are evaluated out of the scope of the lecturer activity.

In terms of knowledge and skills, respondents judged more important to develop interaction activities with industry those technical and scientific one (food processing, legislation and

marketing) giving a main importance also to the entrepreneurship while less importance is given to those related to financial and governance (**Table 2**).

	N. answers	%
Technical scientific	17	15,6
Quality assurance	14	12,8
Logistics and distribution	27	24,8
Legislation	39	35,8
Business	52	47,7
Entrepreneurship	51	46,8
Financial	49	44,9
Marketing	36	33
Governance	44	40,4
Other	Human resources	

Table 3: Which are the skills and competences that you recognise as missing in your expertise as higher education teacher to implement a more close university-industry educational and training bridge (multiple choice)?

On the other side, respondents recognized their lack of knowledge in these areas (**Table 3**) and this likely due to the fact that the respondents are mostly teachers in Food science and technology/engineering areas while this knowledge comes from economic and financial areas and disciplines. Respondents are, on the other side, interesting to “fill the gap” in terms of knowledge and skills towards a better interaction with industry (**Figure 5**) mainly by using modern and innovative teaching tools like e-learning modules and webinars followed by topic specific workshops (**Table 4**).

While the industry visits were chosen by a relatively high number of respondents, contrary to the expectations the internships of the teachers and educators in the industry has been selected by a relatively lower number of respondents (ca. 60%) and this point likely need some additional analysis to have a more clear explanation. Some causes may be due to the

higher commitment of the industry practitioners and technologists to their every-day working activities that may limit the training ones towards the “senior trainees” (i.e. teachers, lecturers) with a limited impact on the effective improvement of the desired “professional” skills. The lack of time and higher commitment of the HE teachers and lecturers in both study programmes and research in their institution could be also considered in this framework and more easy, less time-consuming training tools and activities especially if carried out on virtual basis (e-learning, webinars), could be a valid alternative and justify also the higher preference given.

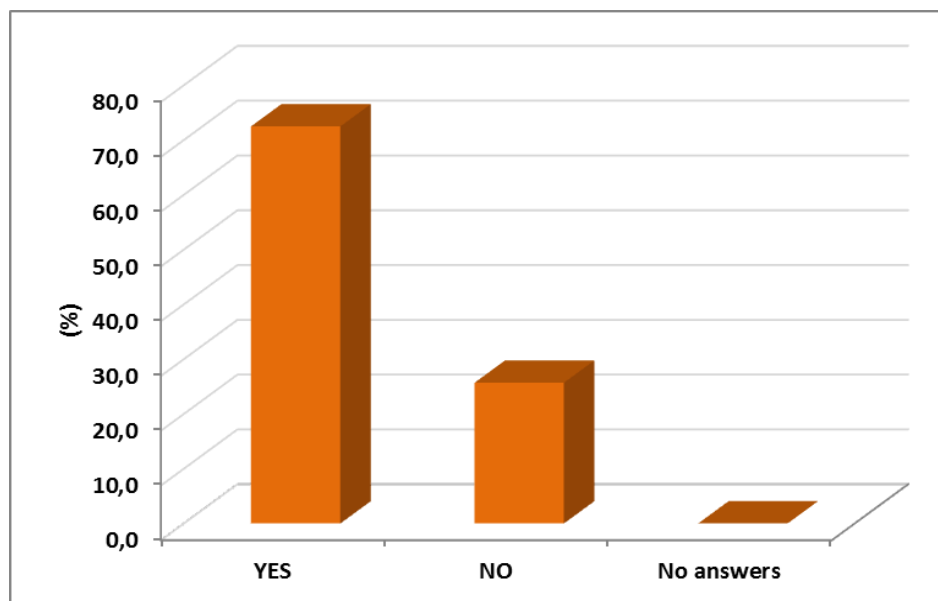


Figure 4: Responses to question n.6: Are you interested to participate to training initiatives aimed to implement your industry-oriented skills and competences?

	N. answers	% (out YES)
Webinars	45	78,9
E-learning	40	70,2
Training workshops	45	78,9
Summer school	27	47,4
Industry internship	34	59,6
Industry visits	40	70,2

Table 4: Responses to question n. 6a: Are you interested to participate to training initiatives aimed to implement your industry-oriented skills and competences? If yes, how

The organization of specific summer schools, while evaluated of interest received the lowest preferences, likely confirming the interest to training tools and activities that could be developed more freely and depending on the time and funds availability.

Interestingly, around 15 respondents that likely stated their high-to-excellent expertise on industry-university interaction activities and skills, claimed their availability to share their knowledge and competences for the benefit of the colleagues and of the project participants. This point will be then, further explored in the future steps of the project.

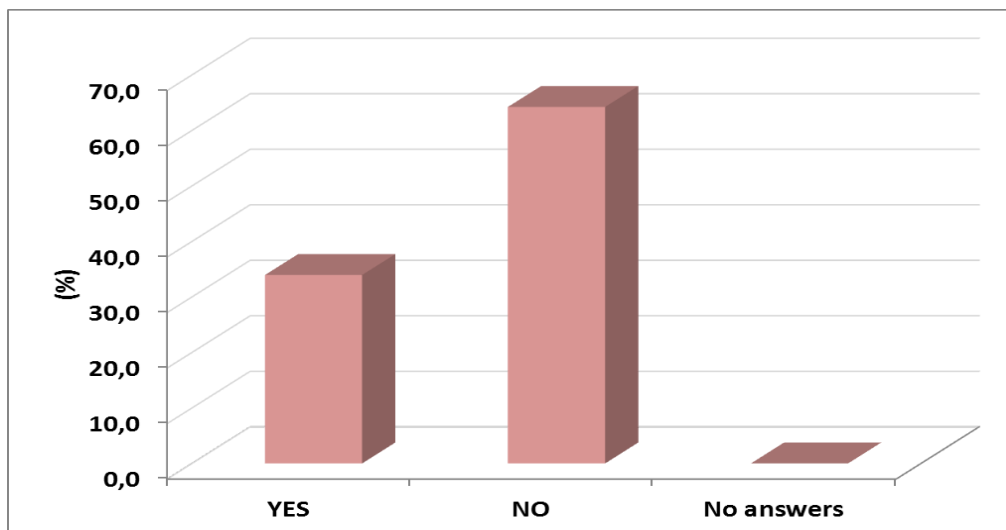


Figure 5: Responses to question n. 7: Do you have skills and competences on industry/business oriented sector and/or successful industry-university case studies that you would like to share within the European Food-STA project?

5 Definition of learning outcomes, layout and planning of the activities for students and teachers

The analysis of the surveys and the state of the art on the knowledge and skills needs to favour the development of skills and competences of students in Food studies and of HE teachers/trainers/educators overall has led to the following main conclusions

5.1 HE students

Learning outcomes (LO)

In D1.2. it has been highlighted that to drive competitiveness and allow innovation food industry has need to hire employees who are adaptable as (i) food engineers (ii) high quality managers and (iii) supervisors to implement new production techniques and food processing.

The workforce has to be able to face the progressive changes and understand how best to adapt and optimise the production processes, both to meet the needs of customers and ensure sustainability.

There is also a need to develop basic skills as managers and supervisors, business negotiation, internationalization, leadership, project planning and communication.

This require the need to educate the HE students on basic and applied food sciences and technologies/engineering, on soft and entrepreneurial skills at different levels depending on the degree. These include:

- Technical and sector specific skills include the following disciplines: food processing, food technology and other related disciplines with practical skills and expertise and competences on development and optimisation; Food law, Food safety management, food hygiene & food safety control; marketing and agrobusiness. While not recognized as of main importance by the respondents to the EuFoodSTA respondents, the Italian CLUSTER project based on an EU survey identified also as relevant the availability of professionals with expertise on food design and formulation and development of foods with high nutritional value along with experts



on nutrition, oriented to formulation and development of foods with high nutritional value from innovative functional ingredients.

- Soft skills include in particular 'leadership' and 'people management', 'Problem-solving capacity', 'organisational' and 'communication ability.

The skills has to be provided somehow during the HE studies that will develop specific Learning Outcomes depending on the different level (1st, 2nd, 3rd) and in order to progressively improve and deepen the specific knowledge in the aforementioned disciplines. The close interaction with industries of any size (small, medium, large) is of relevance to allow the improvement and/or implementation by specific internships of practical expertise as well as soft skills.

Finally, while this skills have been recognized as important for HE students, they could have also as target group and end-users also employees of the food industry with both a low HE degree level (1st) and higher HE degree in a life-long learning perspective in view of a continuous update and upgrade of the individual technical and professional knowledge as well as of a career development. In this respect a previous survey carried out within the TRACK_FAST project has highlighted that there is a large percentage of 1st level degree graduates that decide to undertake 2nd level degree studies while working as employees in food companies (*Giannou et al., 2015*)

Layout:

Innovative teaching tools and activities could and will be designed and developed to fulfill the LO. These may include among others: seminar/webinars, modules on innovative/hot topics in food science and technology/engineering, entrepreneurship and agro-food business and economics presented by either industry trainers/representatives and professionals (preferential) or by scientists/researchers.

Specific activities will be designed to develop critical thinking and problems solving abilities of the HE partner institutions while improving their knowledge on specific industry related topics. This activity, however cannot bear in mind that the EuFoodSTA project has no specific budget to allow student exchange between the partner institutions of the consortium for the training activities and low/no-cost alternatives have to be identified and



developed. On this point at the project meeting in Porto some ideas were proposed by the WP4 coordinator that are then described in D4.5. Besides this project promoted and developed activity, each HE institution and industry partner will be supporting activities within the Food Study courses with its own finances and depending on the specific local organization.

A post-graduation curriculum (60 ECTS) aimed to improve skills on food innovation development and management will be organised by the University of Teramo.

Implementation plan

- Seminars and webinars that meet the LO above: already started within the FoodSTA project since the beginning of 2016
- Visits, internships that meet the LO above: already started within the FoodSTA project since the beginning of 2016
- Other activities: design: started in April 2016; development and plannings May-July 2016; start and development: September-October 2016

5.2 HE teachers/educators/trainers

Learning outcomes (LO)

The survey highlighted the need to support the update and upgrade of the teachers on technical and scientific knowledge on Food sciences/technologies to face the specific requests of food industries on solving problems, optimizing and innovating processes and development of products to meet the consumers and market expectations.

While this is mainly relevant to favour the conventional industry-university interaction by research and project development could be also interesting to collaborate on the joint development of educational and training curricula, modules, courses.

Additional skills required by HE include those related to the area of business and entrepreneurship.



Layout

In general teachers/lecturers keep updated their specific research/discipline of interest by reading papers, attending specific trainings and/or topic-specific or wider food science conferences while the opportunity to receive some updated information about innovations and developments on different and various food science and technology as well as industry-oriented topics could occur only if specific financial support and enough time is made available.

Innovative teaching tools and activities that could contribute to fulfil the need of knowledge and skills required to a better interaction with the industry and business need to be designed and developed to fulfill the LO also for HE teachers and trainers more in general at the lower cost.

These may include among others: seminar/webinars, training modules on innovative/hot topics in food science and technology/engineering, entrepreneurship and agro-food business and economics presented by either industry trainers/representatives and professionals (preferential) or by experts scientists/researchers.

Internships and one-day visits organised with the aforementioned LO could be in food companies (for HE teachers) or in university (for industry trainers).

The project and WP4 coordinator are also under discussion with the ISEKI-Food Association about the possibility to develop a second edition of the “Training the trainer” module “Introduction to teaching and learning strategies applied to food studies” designed and developed within the Erasmus TN project network ISEKI_Food 4 (www.iseki-food4.eu) that will be improved in order to meet the LO identified within the EuFoodSTA project. This module had a blended teaching approach (10 modules by distance/e-learning + related activities + 1 practical session) and was held from December 2013 till May 2014 with the participation of 15 lecturers from all over the world. The 2nd edition will be likely proposed with low/no costs for the partners of the project.

Besides this project promoted and developed activity, each HE institution and industry partner will be supporting additional activities with its own finances and depending on the specific local organization.



Implementation plan

- Seminars and webinars, training courses that meet the LO above: already started within the FoodSTA project since the beginning of 2016
- Visits, internships that meet the LO above: already started within the FoodSTA project since the beginning of 2016
- Other activities including the “training the trainers”: development and planings May-July 2016; development: September-October 2016; start (estimated): December 2016.

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