





Discrepancies between formal training provisions and workplace requirements

(ChemTube deliverable IO-1) (Erasmus+ 2018-1-NO01-KA202-038885)

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Background and aims of IO1

The ChemTube IO1 targeted the identification of possible discrepancies between formal training and workplace requirements in laboratory environments and process operation in European VET, primarily with EQF level 4 in focus. This analysis of the situation in the industry has been undertaken as a comparative study based on defined ECVET units of learning outcomes.

The analysis has been based on a previously developed qualification matrix elaborated as project result from the ChempharmVET Erasmus KA/2 strategic partnership (2015-1-NO01-KA202-013278). This matrix was based upon a review of the Pile Up matrix and the simultaneous development of additional units of learning outcomes for operators in the pharmaceutical industry. The Pile Up project was a transferred application of a proven method for developing units of learning outcomes from the European ECVET pilot project CREDCHEM. In this way the ChemTube has served as the fourth generation of ECVET developments since the first piloting phase of EQF/ECVET implementations.

IO1 of ChemTube has been directed towards workplace competence requirements taking into account dual learning (alternating school and work) and work-based learning. It has identified needs for learning outcomes to be added to the matrix, or to be reworked, after a comparison and review of the matrix of learning outcomes stemming from ChempharmVET developments. This has been done to facilitate workbased learning.

Selected VET providers and industry companies (associated partners) in the Czech Republic and Norway provided input as well as quality and relevance checks of competence definitions and learning outcomes.

The IO1 has addressed a mapping of existing VET provisions (EQF level 4) by expected learning outcomes in partner countries with a special attention to critical skills and tacit knowledge elements. with level of competences requested by the industry represented by selected companies linked to partners as external associate partners/stakeholders. This process resulted in an identification and specification of learning outcome gaps in VET (EQF level 4) for operators in the industries.

Stakeholder feedback

Results from IO1 were presented to the partneship meeting of ChemTube in Dresden (2019-03-18) by Silvia Surová, director of the ZCHFP SR - The Association of Chemical and Pharmaceutical Industry of the Slovak Republic.

The qualification description from ChemPharmVET, in complete EQF/ECVET format, was used as a template for analysis and feedback when approaching the stakeholders in Norway and the Czech Republic.

Norway

Kristiansund videregående skole presented the Learning Outcome matrix from ChemPharmVET to GC-Rieber Oils, and Shell Norway where there has been a close cooperation between teachers and companies as part of dual training.

- GC-Rieber Oils, is a Norwegian and world-leading producer of marine derived Omega-3, high level concentrates. Located in Kristiansund, 60 employees.
- Shell, Norway is linked to the Ormen Lange gas facilities and process plant. An onshore process plant with 250 employees, located in Aukra.

The companies were selected based on experience from collaboration (School – Industry) with the local process industry. No pharmaceutical or food industry, because the local industry nearby Kristiansund is more traditional process industry, although GC-Rieber, are in the borderline against pharmaceutical.

The matrix was sent out in advance for review. Phone contact afterwards to uncover the biggest challenges with this complex qualification description. Meeting at the school (31-01-19) with all the people involved and where all the points in the matrix were discussed and evaluated.

CZECH REPUBLIC

SPŠCB presented the matrix to Synthol Blansko (pharmaceutical company), Gumotex and Gumotex Coating (rubber, coating industry) and a VET school

- Synthol Blansko is a pharmaceutical company generating effective substances of medicaments (research and production). It has subsidiary companies around the world. The role is cooperation with professional experience, coordination of the school curriculum and experience training.
- Gumotex Břeclav rubber, coating industry produces plastic components for car industry (e.g. seats, sun visors etc.) and supplies them to Audi, VW, Škoda etc. It also produces rubber boats - rafts, kayaks - which are supplied to the USA market.
- VET school Střední škola informatiky, poštovnictví a finančnictví Brno, příspěvková organizace

Extracts from the stakeholder feedback

						1
				UNI	2 Conduct Processes	
	Information about the testing compa			Learning outcome	Rating (1 to 7)	
	Company:	Shell, Norway. G		2.1 Process preparation	7 7	
	Sector/Area of activity:	Oil and gas Mari		2.1 Process preparation	Use of GMP	
	Contact person (name)		g Monica Strand	2.1.1 Basic process understanding	7 7	- 7
	Contact person (position)		ining leaders. HR	2.1.1 Dasic process understanding	USE OF P&ID	
	Contact details (e.g. email	Oddvar.Seljehau	ug@shell.com	2.1.1.1 Production process	7 7	-
	address)			2.1.1.2 Equipment	6 7	-
	dualessy	Monica.strand@	gcrieber.com	2.1.1.2 Equipment	0 /	D
	0				Death and the second	
	1. Please identify possible gaps an				Put these two together to a point 7 7	- 7
		nowledge elements in	1	2.1.1.3 Equipment setup	/ /	
					Detailed and the second second second second second	
			Perform operational logistics		Put these two together to a point	_
				2.1.2 Instrumentation and control	7 7	
	UNIT 1 P	Perform operational lo	Rating (1 to 7)	2.1.2.1 Calculation	7 7	_
	1. Preparation		1.	2.1.2.2 Instrumentation diagrams	3 3	
				2.1.2.3 Mode of operation	7 7	_
	1.1.1: Prerequisite : Foreign language		3	2.1.3 Equipment operation	7 7	
< - N	1.1.2: Prerequisite : Digital tools and s	oftware use 2	2	1.3.1: Quality standards and	7 7	
	1.1.3: Production planning		2 2	assessment		
			Dont want the operator to	2.1.4 Software	2 2	
			have contact with the		REMOWE from list, not relevant.	
			customer .		Not relevant.	
\frown		Do	not take part in the planning of new	2.1.5 Procedures	7 7	-
		pro	oducts.	2.1.6 Contamination	7 7	-
				2.1.7 Handling of raw material	7 7	_
	1.1.4: Logistics		2 4	2.2 Handling of machinery in	7 7	-Y
	1.1.4: LOgistics		Z 4 This is a separate subject	process		
			area, does not want	2.2.1 Production process	7 7	-
			interference from the	2.2.1.1 Preparing production	7 7	0
			operator.	2.2.1.2 Starting production	7 7	- M
Πſ	1.2: Execution			2.2.1.3 Closing down	7 7	-/
	1.2.1: Health and safety		7	2.2.2 Production quality standards	7 7	-
	1.2.2: Process control	· · · · · · · · · · · · · · · · · · ·	7	2.2.2.1 Purification and	7 7	-
	1.2.3: Products and packaging	2	4	contamination		0
	1.3: Monitoring			2.2.2.2 Product characteristics and	7 7	- ``
	1.2.1: Quality standards and according	ant 7	7	Elenene in oddot, characteristics and	, ,	

	UNIT 3 Participate in q	uality control	UNIT 4 Participate in maint	tenance and repairs
Learni	ng outcome	Rating (1 to 7)	Learning outcome	Rating (1 to 7
	ods of sampling	2 6 7 7 2 6	4.1. Operating permit (required to start working on the site)	77
equipment	Sampling and of samples from	2 6 2 6 The production of gas makes this superfluous	4.1.1: Safety precautions in maintenance	77
3.1.2.2: Packagin transfer of samples		2 6 The production of gas makes this superfluous	4.1.2: Maintenance preparation	7 7
3.1.2.3: Do samples	cumentation of	2 6	4.2. Lock out and tag out of installation	/ /
3.2: Sample analys 3.2.1: Procedure a	is and process	2 6 2 6	4.3. Maintenance and repair	7 7
3.2.3: Result 3.3: Participating i	n quality control	2 6 2 6	4.3.1: Specific conditions	77
3.3.1: Quality cont 3.4: Feedback and		2 6 2 6	4.3.2 Feedback and improvements	77

Information about the testing company/training institution

 Company:
 Synthon Blansko

 Sector/Area of activity:
 Pharmaceutical company

 Contact person (name)
 Renata Šebelová

 Contact person (position)
 HR Generalist

 Contact details (e.g. email address)
 Renata.Sebelova@synthon.com

ChempharmVET-U1	Chem	pharm	VE	T-U	1
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- Student can follow the safety and environmental requirements regarding the given task.
- Student copes with the danger when loading and removing materials according to the safety and environmental rules.
- Student follows the regulations regarding dangerous situations, working with dangerous materials, first aid and evacuation plan.
- Student can correctly inform the department, colleagues or customers about some deviations.
- Student can test, assess, document and create the obligatory labelling.

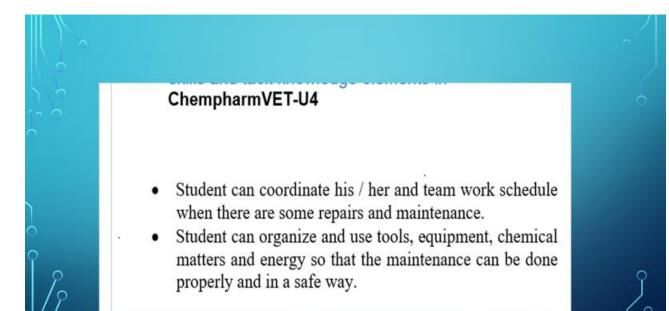
ChempharmVET-U2

Conduct processes

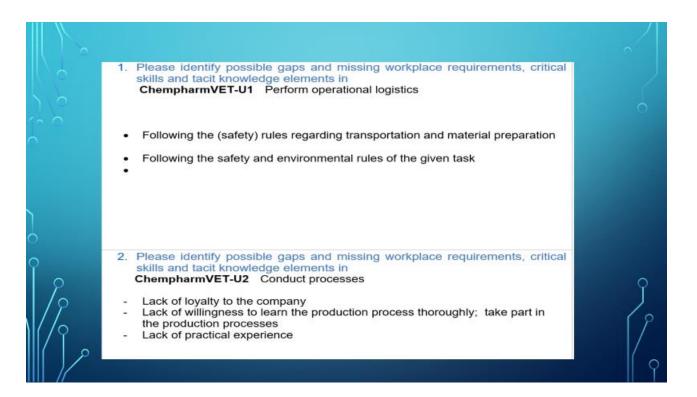
- Student can choose proper tools according to the process.
- Student manages to install the apparatusses.
- Student manages to handle with the tools.
- Student works precisely.
- Student follows the safety rules and uses the protective aids.
- Student can clean the apparatus according to the safety and company regulations.
- Student can clean / finish the product well.
- Student realizes dangerous situations and malfunction in the production process (due to automatically generated datails as well) and deals with it in an appropriate way.
- Student takes samples by certain tools.
- Student can define the main problems and suggest some solution.

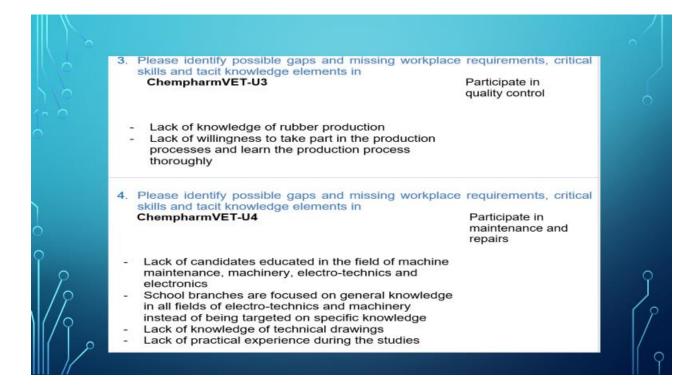
ChempharmVET-U3

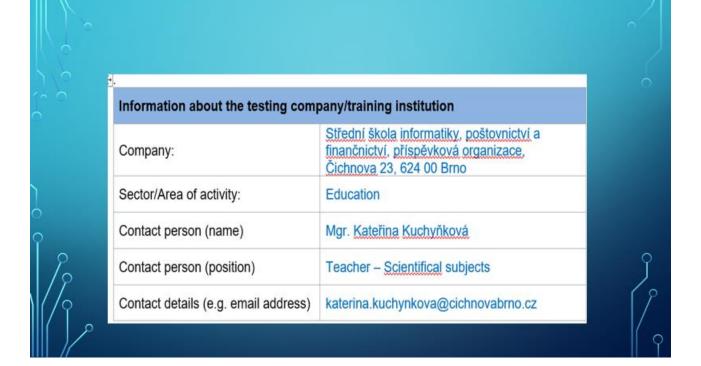
- Student can apply methods and regulations regarding the sampling according to quality and safety rules.
- Student prepares the samples and apparatuses for sampling while being aware of the specific equipment and safety rules.
- Student samples well.
- Student can wrap and store the samples.

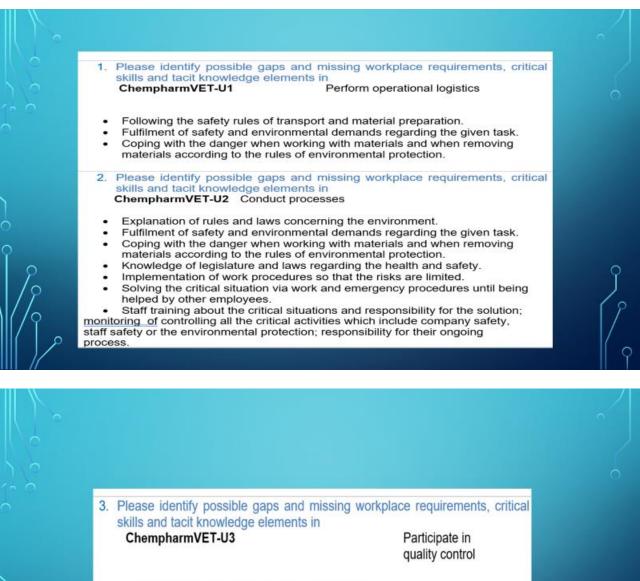


Information about the testing com	pany/training institution
Company:	Gumotex coating, s.r.o.
Sector/Area of activity:	Company
Contact person (name)	Jolana Strakušová
Contact person (position)	Business Partner
Contact details (e.g. email address)	jolana.strakusova@gumotex.cz









- Organization of quality assessment according to defined standards.
- Supervising the team when working to use the proper material of a good quality.
- · Providing the quality check-up before transfer.
- Defining the chemical and pharmaceutical material specifications.



Partners' synthesis of possible themes for video production to cover discrepancy gaps between school education and workplace requirements

Czech Republic - SPŠCH Brno

Critical Laboratory Operations -

- 1. weighing (weighing vs. analytical weighing)
- 2. preparation of solutions in a volumetric flask
- 3. heating in water / oil bath
- 4. checking the bath temperature
- 5. heating while using a magnetic stirrer
- 6. stirring while using a magnetic stirrer
- 7. setting up a reaction apparatus with a paddle-wheel stirrer
- 8. drying in a desiccator
- 9. drying liquid products of organic synthesis
- 10. drying gases
- 11. working with a pressure bottle (gas withdrawal)
- 12. working with cryogenic liquids and solid matters (dry ice, liquid nitrogen)
- 13. simple filtration
- 14. low-pressure filtration (glass filter / Büchner funnel)
- 15. decantation
- 16. recrystallization (complex)
- 17. working with a rotary evaporator
- 18. simple distillation (complex)
- 19. low pressure distillation (complex)
- 20. liquid-liquid phase extraction
- 21. setting up an apparatus for a Soxhlet extraction (percolation)
- 22. determination of the melting point
- 23. determination of the boiling point
- 24. measurement of the refraction index
- 25. thin layer chromatography
- 26. preparation of a sample for GC/LC
- 27. mineralization of a sample (complex)

Italy- Istituto Tecnico Superiore per le nuove tecnologie della vita:

Critical Production Operations

CANDLES IN A CONTAINER

- 1) How to make the proper choice for a suitable wick
- 2) How to prepare a wick for a candle
- 3) How to place a wick in a candle
- 4) How to straighten a wick in a candle

LABORATORY TESTING OF LEATHER CHEMICALS

Fat Liquering Agents

- 5) How to prepare samples of skins
- 6) How to set up the necessary equipment (barrel)
- 8) how to prepare the test solution
- 9) how to carry out the test on samples
- 10) how to evaluate the results

Slovakia - ZCHFP SR - The Association of Chemical and Pharmaceutical Industry of the Slovak Republic:

1. Mechanické separačné metódy MECHANICAL SEPARATION METHODS FILTRATION FILTRATION AT ATMOSPHERIC PRESSURE 3.1A FILTRATION AT REDUCED PRESSURE 3.1B CENTRIFUGATION Proper handling of the centrifuge

2. Meranie fyzikálnych konštánt MEASUREMENT OF PHYSICAL CONSTANTS: BOILING POINT 2.1A Determination of boiling point by capillary method DENSITY

Determination of density using pycnometer DETERMINATION OF DENSITY BY PYCNOMETER 2.2 REFRACTIVE INDEX DETERMINATION 2.3 REFRACTIVE INDEX Determination of refractive index using refractometer

3. Odmerná analýza

VOLUMETRIC ANALYSIS VOLUMETRIC ANALYSIS - GENERAL 5.1 VOLUMETRIC ANALYSIS - SOME EXAMPLES OF VOLUMETRIC ASSAYS 5.2

5.1 TITRATIONS GENERAL
5.2 SOME EXAMPLES OF VOLUMETRIC MEASUREMENTS
5.2.A ACIDIMETRY
5.2.B IODOMETRY (IODOMETRIC TITRATION)

4. Príprava roztokov

PREPARATION OF SOLUTIONS:

Solution of solid in liquid with approximate composition Solution of two liquid substances with approximate composition Solution of solid in liquid with approximate composition Solution of two liquid substances with approximate composition

Syntéza

SYNTHESIS

SIMPLE SYNTHESIS WITH FAST RUN IN A BEAKER - PRECIPITATION ORGANIC SINGLE-DOSE REACTANT SYNTHESIS ORGANIC SINGLE-DOSE REACTANT SYNTHESIS

Vákuová odparka Rotary vacuum evaporator

Germany - SBG Dresden:

List of Tacit Knowledge and Critical Skills

Tacit Knowledge:

Common competences:

- Determining densities via areometers in various solutions
- Determining densities of solids via pycnometer
- Bacteriological examination of water in the technical center
- Changing a flanged valve

Specific competences:

- Taking samples from vessels with Bürkle MiniSampler
- Commissioning practice of the Ultra Centrifugal Mill ZM200

Critical Skills

- Commissioning of the twin-screw extruder Brabender TSE20 x 40D
- Starting process of the semi-technical distillation DN 80

Norway - Kristiansund videregående skole:

Proposed list based on the Matrix from the ChemPharmVet project:

	ChempharmVET-U1	Perform operational logistics
	ChempharmVET-U2	Conduct processes
Aggregated Units of Learning	ChempharmVET-U3	Participate in quality control
Outcomes.	ChempharmVET-U4	Participate in maintenance and repairs

- Perform operational logistics -> Specific competence
 The work tasks in this unit are to prepare, execute and monitor a logistic plan.
- Conduct processes -> Specific competence
 The work tasks in this unit are to conduct psysical processes (thermal, mechanical, EI&C), chemical processes, biological processes and pharmaceutical processes.
 The technological context consists of:
 - 1. Preparation of the process
 - 2. Handling of machinery
 - 3. Control of working processes.

3. Participate in quality control -> **Common competence** The work tasks in this unit are

- 1. Taking samples
- 2. Sample analysis
- 3. Participating in quality control

The technological context consists of taking samples, methods of analysis and quality management.

- 4. Participate in maintenance and repairs -> **Common competence** The work tasks in this unit are
 - 1. Working permits
 - 2. Lock out and tag out of installation
 - 3. Maintenance or repair

Mapping of Tacid knowledge, Classroom Kristiansund Videregående Skole.

	Take responsibility	for the correct installation of	
2.1.1.2 Equipment	the equipment use	the equipment used by the team	
	Name equipment	Clarify equipment parts	
	that is needed to	and describe their function	
	conduct the proces	s correctly	

- Low pressure in the DP-cell
- Air trapped in centrifugal pump

	Assume responsibility for fellow workers and their safety during the processing
2.1.2 Instrumentation and control	Describe fundamentals of process control and instrumentation technologies Explain the operation mode of scales

- Pressure release for maintenance.
- Pressure release for start-up and shutdown of the plant.
- DB&B of valves and pumps

2.1.2.2 Instrumentation diagrams	Take responsibility for t documentation of pipin diagrams	he proper presentation and g and instrumentation
	Identify symbols and	Read the piping and

their meaning in a piping and instrumentation diagram	instrumentation diagram
Name rules concerning the compilation of a piping and instrumentation diagram Identify points of measurement in a	Compile an instrumentation and piping diagram abiding by the used standards into a given matrix Marks points of measurement in a piping
given piping and instrumentation diagram	and instrumentation diagram abiding the used standards
Name regulations on marking E/I & C technology in a piping and instrumentation diagram.	Enter standardized points of measurement into a piping and instrumentation diagram correctly

- Use and understand of P&ID.
- Use and understand of P&ID legend.
- Use and understand of PFD.
- Use and understand of block form.

	Take responsibility for operating software s	or the processes and the ystems
2.1.4 Software	Describe processes and explain operating software systems	Describe and explain processes and their visualization on the screen

- How to communicate with other operators
- How to orientate on the screen
- Understand the process medium
- Understand what comes in and out of the plant
- Understand the main components of the plant
- Understand chemical and physical changes
- Understand regulation and regulatory principles

- Understand alarmslevels, security systems and interlocking system
- Understand C&E.

2.2.1.2 Starting production	Autonomously decide on ramifications to start and stop the process safely		
	Identify basic operations and basic functions of the software	Instruct fellow workers on the ramifications Use correct materials and hardware according to situation Assume responsibility for his and his colleagues' safety	
	Identify specific conditions of the start process according to current situation	Handle machinery manually (and via screen) according to process specifications Operate it-equipment like pcs, touch screens, joy sticks, printers	

• How to communicate with other operators

		Take responsibility for the closing and the required	
		documentation	
		Explain the operation	
2.2.1.3 Closing down		mode of the	Write an appropriate
		equipment and know	protocol containing all
		how to shut it down	results
		appropriately	

• How to communicate with other operators

Attachment – Survey questionnaire from ZCHFP SR (2018-12-10)

From ChemPharm to ChemTUBE

QUALIFICATION PROFILE TESTING

Process operator in the European Chemical and Pharmaceutical Industry

European Qualification Framework Level: 4

The ChemTube Project aims to identify possible discrepancies between formal training and workplace requirements in laboratory environments and process operation in European VET, EQF level 4.

We would like to ask your professional opinion, to improve:

In this phase we would like to test if the qualification profile is comprehensive and suited for the chemical/pharmaceutical industry's needs, by involving stakeholders.

In the testing we involve

- 1. Companies from the chemical/pharmaceutical industry
- 2. Vocational training providers.

Please take a look at the profile and help us to identify the competence gaps, the necessary adjudments and possible discrepancies beetween formal training and workplace requirements in laboratory and process operation with a special attention to critical skills and tacit knowledge elements.

QUALIFICATION PROFILE TEST QUESTIONNAIRE

Information about the testing company/training institution		
Company:		
Sector/Area of activity:		
Contact person (name)		
Contact person (position)		
Contact details (e.g. email address)		

Identification of possible gaps

Feedbacks about the professional profile

 Please identify possible gaps and missing workplace requirements, critical skills and tacit knowledge elements in ChempharmVET-U1 Perform operational logistics
 Please identify possible gaps and missing workplace requirements, critical skills and tacit knowledge elements in ChempharmVET-U2 Conduct processes
 Please identify possible gaps and missing workplace requirements, critical skills and tacit knowledge elements in ChempharmVET-U3 Participate in quality control
 Please identify possible gaps and missing workplace requirements, critical skills and tacit knowledge elements in ChempharmVET-U4 Participate in maintenance and repairs