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TRAINING MODULE, USING VIDEO IN TRAINING



ChemTube

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1. DOCUMENT OVERVIEW

1.1 Purpose

The purpose of the training module is to show activities necessary to achieve the desired learning outcomes with the use of video and film during the implementation of each unit of learning outcomes (ULO) in the ChemPharm matrix.

The training module, with its video examples, shows a clear approach to the exercise to get that understanding defined in the OLU, thus providing end users with the knowledge, skills and / or capabilities required to gain the expertise of the chemical and pharmaceutical industries. In several learning outcomes in the matrix, video has been created to showcase best practices.

In this training module we show examples of good videos of learning outcomes, and some recommendations on how the student / apprentice can use video as documentation of their skills. In particular, video is a great tool for displaying tacit knowledge as part of their skills.

The film medium is part of the students' way of learning to express themselves in areas outside the school. The degree to which video is a good teaching method / method depends, of course, on the educational context. Video can motivate, concretize, facilitate custom training (repeat, rewind, stop), instruct, actualize problems, visualize and support different learning strategies.

Tacit knowledge.

Can be defined as skills and know-how, ideas and experiences that people have in their minds and are, therefore, difficult to access because it is often not codified and may not necessarily be easily expressed. [1]

With tacit knowledge, people are not often aware of the knowledge they possess or how it can be valuable to others. Effective transfer of tacit knowledge generally requires extensive personal contact, regular interaction and trust. [2]

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[1] Chugh R. (2015). "Do Australian Universities Encourage Tacit Knowledge Transfer?" In Proceedings of the 7th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management, pages 128-135. Retrieved October 2016:

https://www.researchgate.net/publication/286920454_Do_Australian_Universities_Encourage_Tacit_Knowledge_Transfer

[2] Goffin, K.; Koners, U. (2011). "Tacit Knowledge, Lessons Learnt, and New Product Development". Retrieved October 2016:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1540-5885.2010.00798.x/abstract>

1.2 Audience

This document is intended for use by:

- *learning candidate*
- *process manager*
- *Training Lead*
- *Teacher*

1.3 Training Objectives

Outline of what the objectives for the Training module are:

- Ensure that all training in the chemical and pharmaceutical industries have a common understanding
- to show examples of good behavior, work method, accuracy and confidence in execution

1.4 Assumptions

The following prerequisites apply to the training module:

1. The exercise is based on the school or company having available laboratory and related equipment
2. that the exercise can be carried out without affecting the activities of industry or school
3. that your business or school has knowledge of ChemTube's structure and purpose

1.5 Dependencies

Successful training is dependent on the availability of:

- *that the exercise can be completed in full and for a short period of time*
- *that responsible training officers are present*
- *Availability of training facilities including rooms, flip charts, whiteboards, etc.*

1.6 HSE

The following considerations for HSE must be taken:

- High temperature, high pressure, dangerous process medium, warm surface, explosion/ex-area and hazard area.
- Personal protection. Use of personal protective equipment for persons in front of camera, and behind the camera. Look at national guidelines for using these and look at corporate best practices when it comes to personal equipment.
- Those involved must read through the datasheets for the products and chemicals used in the videos. The use of data sheets should always be emphasized at the beginning of the film.
- If it is filmed in the production premises, all clarifications must be made about this.
- See if a work permit must be applied for before start filming or doing other preps.

1.7 Training video examples

In this description, we have used 2 videos as a starting point to show examples of how we can use video to document knowledge, or, to show the best method of implementation. These videos can be found on the Skillsbank and implemented in the ChemPharm Vet matrix; <http://skillsbank.eu/pages/in/home.aspx>

1. Video TAG; DE01-AVO; Dismantling valve
2. Video TAG; SK01; Solution of solid in liquid with approximate composition

Note that you must log in and register an account to access the featured videos.

1.8 Duality between Companies and schools

Why is duality so important for education and vocational education? EQF level 4.

A well-functioning collaboration between schools / educational institutions and companies can be of great value to apprentices / pupils, teachers and workers in the companies.

The contact between companies and schools may also have benefits associated with the personal meeting between students and representatives from the business community. Through such meetings, the students get an impression of different people working in the process industry. Representatives are given a valuable opportunity to show off and can thus become role models. Their behavior, what they talk about and how they meet the students, helps shape the youth's ideas about whether they could fit like this. In other words, potential benefits from increased contact between school and business are not limited to students. Businesses also benefit from this contact.

Students' enthusiasm can spread to employees. In addition, it is good to take part in what can be regarded as an important day job - to help young people get to know the working life. Furthermore, contact with the schools is an opportunity for dissemination training and competence building. Employees must think through their own professional practice and communicate this to the students. Through the students' curiosity, they may have to become familiar with aspects of their work that they would not otherwise have done.

The importance of having pupils / apprentices and educational institutions' employees for the opportunity to operate and study process equipment and machines that naturally do not have other places in the companies will provide a positive form of training situation. How process equipment is managed, see the connection between individual process steps and see the entire production process is crucial for development and learning. The same goes for video and film. Getting this in business is an advantage. Filming training situations or using a pre-produced film in a company, in collaboration with corporate employees we give the apprentice great advantages over doing this in isolation at a school or in a training institution, where the task can be somewhat artificial and isolated.

It is possible for companies and schools to try out video as a tool. Not all curriculum goals are equally suitable for all businesses and may not be at all. Each individual must evaluate the need based on factors that influence the outcome, such as human factors, framework factors and time perspective. We must consider the purpose of using video and what experiences the apprentice has left, what effect the videos have on the training situation, and how this fit into the apprenticeship.

The preparation of this document has been done in collaboration with companies in Norway to ensure that there is a duality between school and business. One of our collaborating companies, GC-Rieber, is looking forward to using videos in their apprenticeship training at EQF Level 4. The challenge is possibly the extra time it takes the apprentice to plan and start their own video production (of ULO topics). In this

context, relevant question may be; Will this extra time be adapted to the training situation? Is expertise in video as a tool what the company is willing to focus on?

This text is very much based on our experience in Norway. In Austria or Germany apprentices are both in a school and in a company during their apprenticeship. In Austria it is usually 1 day per week in vocational school and 4 days in the company. This duality between schools and companies is in other countries already very much established, and therefore the success factor will be with the companies if they manage to have a pedagogical approach in their training of the students

2. Before making video

2.1 Preparations

Use the curriculum (describe as "Training Curriculum" in this document) as a base for all training activity and video filming. This is the basis for all training and development of professional qualifications.

2.2 Learning situation

The videos are meant to support daily training in companies and the students in their learning processes. For this purpose, the work situations for learning purposes have to be chosen carefully.

Typically, a work situation will cover several learning outcomes. Thus the total number of learning outcomes can be covered by fewer work situations and video recordings.

The respective learning outcomes must be clearly allocated to the work situations and easily recognizable in each of the final videos. Use TAG on videos and use the curriculum.

2.3 Ethical

When working with media, especially virtual media, fundamental considerations should be taken into account:

- Product protection -> OBS: Very important in Company
- Personal protection
- Data protection

Various material and immaterial rights and ownership

Regards to mental and physical limitations of the persons to be recorded, as well as child protection

There has to be made agreements with the training companies, with the persons involved in the videos and with the organizations, which will be the owners of the data (= videos). Also, parents can be involved, if underage young people or children act in the videos. A formal document of consent should be used in this situation. When planning a video, it has immediately to be considered, how this data material can be archived, published and maintained after the end of the production.

The planner has to bring ethical agreements to be signed by the involved persons. Consider also cases, when persons with needs for special regards are recorded, such as elderly or sick people, children, persons with language limitations etc.

The European "General Data Protection Regulation" (**GDPR**) was ratified and finally implemented in national contexts (May 2018). National rules and regulations should be examined for their impact on producing and publishing videos. Please follow the guidelines in GDPR before filming. When the apprentices are under eighteen, a signed form of consent from parents will be required? For more

information, log on to Skillsbank and find more information about using GDPR in this project. Reference to privacy requirements can be found in the document; WP11, annexes 4.7. (Work based learning in the duality between school and enterprise in accordance with EQAVET principles, WIAB)

3. Making videos

3.1 Storyboard

The storyboard defines the location and its fittings, instructs the authentic “actors” and directs the cameraman and the technicians. The storyboard must be as precise and predictive as possible:

“Who does and says what and when, in which position, together with whom, with which props and in which technical setting for light and sound?”

Thus, the storyboard is about:

- Work flow
- Dialogues
- Props, persons
- Light, sound
- Permissions
- Practical preparations

As far as possible, each work situation should be recorded several times and from several angles. This will assure the quality and make it possible to edit the video more varyingly. Varying angles in the video make the final product much more interesting and authentic to watch.

Thus, the recording of each work situation must be repeatable, as far as possible. Not in all occupations, situations can be exactly repeatable, as they can depend on unique human behavior, on accidental persons or events, on very costly procedures or other unpredictable situations. Furthermore, the repetition of recordings can feel awkward and exhausting for the “actors”. To avoid that important details in dialogues get lost, at least the key words should be handed out to the actors. It’s also possible to use several cameras, e.g. smartphones from the apprentice and trainer and movies from different angles. It will provide more options to remove distracting audio and video during editing.

3.2 Technical preparation and recording.

3.2.1 Equipment

The equipment encompasses camera, sound, tripod, memory card and computer hardware for edition. On location there is typically need for light a possibly extraordinary devices.

The technical requirements and recommendations for the equipment are highly dependent on the topical technical development in general and, of course, the ambition level. It has become rather usual for almost everybody to record “pocket videos”, thanks to devices like smartphones and cheap digital cameras. Only very few of these videos can match professional quality, but with a few advices, some of these videos may become useful for professional purposes in the context of in-company learning.

3.2.2 Sound

It can be necessary to improve the sound quality of the video camera with an external voice recorder or an additional microphone. An ordinary smartphone can be used, when recording in a studio. For amateur level, it is sufficient to record voice with a phone.

3.2.3 Light

Light in video is very important. For outdoor shooting, check from which direction the sunlight comes. The sunlight must come from the back of the camera man. Be aware of that weather can change quickly, and sometimes it is preferable to avoid natural light. If this is not possible, be prepared on what to do, if the sun is hidden behind huge clouds.

3.2.4 Locations

It pays off to have made considerations for the needs on location:

The naturally available materials, persons or objects are not always sufficient or suitable. You may have to update to the newest technologies or add props. It can be necessary to find actors or puppets, if filming with authentic persons is too sensitive.

Recording in authentic work places/production plant is desirable for these kind of learning videos. But this can be challenging technically, and extra light may have to be added, too.

3.2.5 Ownership

The ownership must be clear for all material and publications uploaded in Skillsbank. Questions that need to be answered; Who is the legal owner of the videos? Do the recorded persons agree in future editions or use of the same recordings for other videos or PR materials in future?

Who owns the equipment, and where is it stored safely? What to it, if things disappear or get destroyed?

4. TRAINING MATERIALS & CURRICULUM

4.1 Training Curriculum. ULO

The curriculum defines the training courses to be developed and delivered, including associated learning outcomes, purchasing options, delivery methods and course owners.

The European curriculum is built up by ULO1, ULO2, ULO3, ULO4. These ULOs are very good tools for the operator who is undergoing training. It provides an accurate, systematic and logical connection between training and the use of a curriculum.

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

Table based on the Matrix from the ChemPharmVet project.

ULO 1. Perform operational logistics -> **Specific competence**

The work tasks in this unit are to prepare, execute and monitor a logistic plan.

ULO 2. Conduct processes -> **Specific competence**

The work tasks in this unit are to conduct physical 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.

ULO 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.

ULO 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

Example of using **ULO 2:** with reference to video DE01-EVO; Dismantling valve

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

Example in ULO 3

SK01; Preparation of solution of solid in liquid with approximate composition.

Use example in table (Attachment no 4; Table 3– Training Curriculum), to help you plan and manage your training module.

The respective learning outcomes must be clearly allocated to the work situations and easily recognizable in each of the final videos. Use TAG on videos and use the curriculum.

4.2 Training Materials

Use the following table for an overview of the exercise with explanation and which equipment should be used. See attachment No 01 "Procedure for the exercise; Solution of solid in liquid with approximate composition". For Exercise DE01-EVO, use related equipment described in the procedure of each respective company / school

5. TRAINING EVALUATION

When evaluating the effectiveness of training, information should be obtained from the following areas:

1. Is there a match between the title and the content of the video? **TAG** on video important.
2. Does the content / instructor seem credible?
3. Does the video / director show good and concrete examples? And does he / she get in good contact with the person watching?
4. Is there a good balance between talking and practical exercises?
5. Duration and quality of film and sound.

Example SK01; Solution of solid in liquid with approximate composition. Familiarize yourself with what will be considered in the exercise so that this is clearly evident in the video and throughout the exercise.

Task in ULO 3.2.1: Procedure and process

- Autonomously and safe handle with chemicals
- Describe and explain the working principles
- Select appropriate glassware
- Recognise unsafe or critical situations and explain appropriate measures
- Carry out the operation at laboratory level
- Perform related calculations

Challenges with using video:

- Some students prefer to read text, perhaps because it is feasible to read, easier to make notes / annotate / scribble within the text, and not least, easier to search text.
- It can be said that video helps to make learning accessible because the video can be viewed at any time, over and over, and with the option of pressing pause. But one can also say that video helps make learning less accessible. Watching a video can be annoying.
- Another element is size and cost. Large video files can incur costs if they need to be downloaded / played over mobile networks.

- Universal design and GDPR impose new requirements on teachers in the development of video.

6. Literature

#1 Chugh R. (2015). *"Do Australian Universities Encourage Tacit Knowledge Transfer?"* In Proceedings of the 7th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management, pages 128-135. Retrieved October 2016:

https://www.researchgate.net/publication/286920454_Do_Australian_Universities_Encourage_Tacit_Knowledge_Transfer

#1 Goffin, K.; Koners, U. (2011). *"Tacit Knowledge, Lessons Learnt, and New Product Development"*. Retrieved October 2016:

<http://onlinelibrary.wiley.com/doi/10.1111/j.1540-5885.2010.00798.x/abstract>

7. Attachments

Attachments No 01; Solution of solid in liquid with approximate composition

Task;

Video TAG; SK01; Solution of solid in liquid with approximate composition

Comments: A solution with approximately known composition of a solid substance in liquid.

Checklist with feedback		
Assessment point	<input checked="" type="checkbox"/>	Formative feedback
He / she has been planning the job about HSE, staffing, equipment	<input type="checkbox"/>	
Autonomously and safe handle with chemicals	<input type="checkbox"/>	
Describe and explain the working principles	<input type="checkbox"/>	
Select appropriate glassware	<input type="checkbox"/>	
Recognize unsafe or critical situations and explain appropriate measures	<input type="checkbox"/>	
Carry out the operation at laboratory level	<input type="checkbox"/>	
Perform related calculations	<input type="checkbox"/>	
He/She Follows the procedure for the exercise	<input type="checkbox"/>	
He/She are able to handle tools and equipment in a considerate manner	<input type="checkbox"/>	
He / She works systematically, accurately and has good cleaning	<input type="checkbox"/>	
He / she can evaluate his / her work	<input type="checkbox"/>	
He / she are able to conclude and report	<input type="checkbox"/>	
Completion of the exercise and clearing	<input type="checkbox"/>	

OLU and task reference in ChemPharm matrix

LO	Competence	Knowledge	Skills
2.1.5 Procedures	Executes and controls respective process preparation autonomously and verifies quality and safety of the process	Relate standard operating procedures (sop)	Work accurately and precisely

Procedure for the exercise; Solution of solid in liquid with approximate composition

	COMMENT	ACCESSORIES
General view of the accessories	Prepare the solution by mixing the calculated and weighed amount of solid and the calculated and measured amount of liquid	
Weighing on accurate scale	<ul style="list-style-type: none"> When preparing the solution in the laboratory, the accuracy of weighing to one hundredth of a gram is sufficient. <ul style="list-style-type: none"> Digital lab scales are used. First, make sure the scales are clean. Weigh a suitable dish, such as a watch glass Using a laboratory spoon, carefully add the calculated amount of solid Write down the weight of the solid 	digital scales, watch glass, brown glass bottle, spoon, notebook
Volume Measurement	<ul style="list-style-type: none"> The calculated volume of solvent is measured in a graduated cylinder: <ul style="list-style-type: none"> Remove some solvent from the storage bottle into the beaker Using a funnel, pour the solvent into the measuring cylinder level the surface so that the bottom of the meniscus matches the specified line 	measuring cylinder, funnel, beaker, stock bottle or a spray bottle
Mix	<ul style="list-style-type: none"> Mix both components of the solution <ul style="list-style-type: none"> Pour a little solvent into the beaker Add the solid while stirring Add the remaining solvent Homogenize thoroughly 	beaker, stick, weighed material from point 1 liquid from point 2

Attachments No 02; Dismantling valve.

Task; Dismantling valve. Ref; Video TAG; DE01-EVO

Checklist with feedback		
Assessment point	<input checked="" type="checkbox"/>	Formative feedback
He / she has been planning the job about HSE, staffing, equipment	<input type="checkbox"/>	
Prepared the task with the team and follow the procedure for the operation.	<input type="checkbox"/>	
He/She are able to handle tools and equipment in a considerate manner	<input type="checkbox"/>	
He / She works systematically, accurately and has good cleaning	<input type="checkbox"/>	
Describe and explain the working principles	<input type="checkbox"/>	
He / she is able to inspect and assess the condition of the equipment	<input type="checkbox"/>	
Take responsibility for the correct installation of the equipment used by the team	<input type="checkbox"/>	
Is able to clarify equipment parts and describe their function correctly	<input type="checkbox"/>	
Name equipment that is needed to conduct the process	<input type="checkbox"/>	
Explain the operation mode of the respective equipment	<input type="checkbox"/>	
Function testing and Leakage testing	<input type="checkbox"/>	
Reporting and clearance	<input type="checkbox"/>	
He / she can evaluate his / her work	<input type="checkbox"/>	
He / she are able to conclude and report	<input type="checkbox"/>	
Completion of the exercise and clearing	<input type="checkbox"/>	

OLU and task reference in ChemPharm matrix

LO	Competece	Knowledge	Skills
2.1.1.2 Equipment	Take responsibility for the correct installation of the equipment used by the team	Name equipment that is needed to conduct the process Explain the operation mode of the respective equipment	Clarify equipment parts and describe their function correctly

Attachments No 03; Example of Storyboard for Video TAG; DE01-AVO; Dismantling valve

For further information, use “*ChemTube Handbook for students filming their vocational skills*” as a guide in video production. The document can be found in Skillsbank.

- ☐ Check function of your video equipment
- ☐ Is the light ok around your working area?
- ☐ Make the working area clean with no disturbing factors
- ☐ Make sure you have all the equipment available
- ☒ Make sure the object is always in focus, without hands or other objects coming between the object and the camera
- ☐ Control how to take videos from different angels

Divide the entire task into sub-goals or into a stage. It makes it easier to remember what to say, and you can change the angle of the camera. Think about what you are going to present, what you are going to tell and in what order you want to show the work tasks.

Stages No;

1. Say what you are going to do and what task you are going to perform, fig 1
2. Say what you do. Fig 2-3
3. Tell why and how you clean the equipment, **and why**. Fig 4
4. Tell what you what parts and area you inspect, **and why**. Fig 5
5. ..and so on,



Fig 1



Fig 2



Fig 3





Fig 4



Fig 5

Remember that, with this video you going to show your competence. It's better to tell too much, than too little.

Attachment no 4; Table 3– Training Curriculum

Task 3.2.1: Procedure and process				<div>ChempharmVET</div> <div>Process Operator in the European Chemical and Pharmaceutical Industry</div> <div>2015-1-NO01-KA202-013278</div>			
Generic Title of the Unit:		ChempharmVET-U3: Participate in quality control					
ChempharmVET SQF Level:							
ECVET points:		(if applicable)					
ECTS Credits:		(if applicable)					
EQF(NQF) Level		DE	NO	PT	SI	SK	
Learning outcomes							
ChempharmVET-U3-Label of Learning Outcome		Training Module Code	Competence				
			Knowledge		Skills		
3.2.1: Procedure and process			Autonomously execute analyses and supervise the working process				
			Describe methods of analysis for determining parameters	Execute analysis at production process level			
				Autonomously execute task			
				Take responsibility for the evaluation of the results			
				Evaluate results of the analyses			