

# CREATE



## MODEL FOR VALIDATION OF SELF- ACQUIRED LEARNING IN WEB DESIGN AND COMPUTER ANIMATION

Guidelines for Vocational Education Organisations

## **Project Information**

CREATE

Validation of self-aCquired learning and cREdits trAnsfer in web design and compuTEr animation

Lifelong Learning Programme

Sub-programme: Leonardo da Vinci

Action: Transfer of Innovation

Project number:

<http://create-validate.org>

Workpackage 3: Product Development

Deliverable 9: Self-acquired learning validation model

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## INTRODUCTION

Recognition is a process by which prior learning is given a value. It is a means by which prior learning is formally identified, assessed and acknowledged. This makes it possible for an individual to build on learning achieved and be formally rewarded for it. The term 'prior learning' is learning that has taken place, but not necessarily been assessed or measured, prior to entering a programme or seeking an award. Prior learning may have been acquired through formal, non-formal, or informal routes.

The aim of this document is to review and assess different validation methods available and make recommendations towards the best practice of validation of informal learning in the fields of Web Design and Computer Animation.

## CREATE PROJECT OVERVIEW

**Reason for the project:** Often people engaged in creative fields such as web design (WD) and computer animation (CA) have gained their knowledge, skills and competence through a kind of informal learning (IL). Gradually validation of IL has become a EU priority in the field of VET being "seen as a way of improving lifelong and life-wide learning". Although addressed to a different extent in various EU countries, the issue of validation of IL is still insufficiently explored and undeveloped in Europe. In Bulgaria a system for validation of IL is still in the process of development, in Ireland there is some tradition in the field but not in creative professions, in Germany there are minor steps undertaken and some existing tools for validation of IL but these are rather insufficient. That's why the project proposes to develop a model for validation of IL that can be applied to WD and CA outcome-based modules. Since ECVET facilitates the development of flexible and individualized pathways and recognition of learning outcomes acquired through IL, project seeks to allocate ECVET points to the modules in WD&CA making their recognition possible in EU states.

**Aims and objectives:** to propose methods and tools for validating IL in WD and CA. As an integral part of the validation methods, ECVET points will be allocated to the modules in WD and CA to make the recognition of the learning outcomes of IL possible. Thus the project will use the WD qualification standard from the "Embedding Standards" project as a basis for the WD sample qualification and update it by assigning to it methods for the validation of IL. The project will develop a training toolkit with theory, interactive tools/games with procedures for validating the IL and credits transfer. The project will train VET practitioners how to implement the validation of IL.

**Target group:** trainers, policy makers, instructional designers in VET, managers of VET Centres.

**Target sector:** VET in ICT/Multimedia.

**Potential users:** youth (16-25) & youth with special needs (early school leavers (ESL), long-term unemployed) who acquired learning in WD and CA informally and wish to validate it.

Consortium comprises newly established and long-term partnerships. It engages partners of 3 European regions: Eastern Europe-Bulgaria, Central Europe-Germany, Northern Europe-Ireland. Partnership is of cross sectoral nature-state agency for VET (NAVET), an educational institution (DEKRA), curricula developer in ICT (FIT), developer of innovative training content (SCAS), centre for vocational guidance (NSICC).

**Outcomes:**

- IL assessment methods & outcome-based modules in WD and CA,
- Model for validation of IL,
- Toolkit for validation of IL,
- Report on the allocation of ECVET points to the modules,
- Manual for VET practitioners describing how the products can be used.

**Impact:** increased capacity of VET providers, recognition of IL of youth, IL validation model to be used by institutions, more opportunities for qualification of ESL.

## INFORMAL LEARNING / SELF-ACQUIRED LEARNING

The knowledge-based economy, new technologies, the growing speed of technological changes and globalisation all influence the needs to improve the population's skills and competences. In general, change has become a core concept in today's working life. Lifetime employment becomes an exception, the majority of employees will, voluntarily or not, change job and career several times in their work lifespan.

Validation of non-formal and informal learning is very much related to this. The purpose is to make visible the entire scope of knowledge and experience held by an individual, irrespective of the context where the learning originally took place. For an employer it is a question of human resource management, for individuals a question of having the full range of skills and competences valued and for society a question of making full use of existing knowledge and experience, thus avoiding waste and duplication.

The glossary (Cedefop, 2000) and the Communication (2001) give the following definition of formal, non-formal and informal learning:

- Formal learning consists of learning that occurs within an organised and structured context (formal education, in-company training), and that is designed as learning. It may lead to a

formal recognition (diploma, certificate). Formal learning is intentional from the learner's perspective

- Non-formal learning consists of learning embedded in planned activities that are not explicitly designated as learning, but which contain an important learning element. Non-formal learning is intentional from the learner's point of view.
- Informal learning is defined as learning resulting from daily life activities related to work, family, or leisure. It is often referred to as experiential learning and can to a certain degree be understood as accidental learning. It is not structured in terms of learning objectives, learning time and/or learning support. Typically, it does not lead to certification. Informal learning may be intentional but in most cases, it is non-intentional (or 'incidental'/random).

These definitions insist on the intention to learn and the structure in which learning takes place. The intention to learn explains the centrality of the learner in the learning process and the structure refers to the context in which learning takes place.

The Cedefop glossary (2000) and the Communication on Lifelong Learning (European Commission, 2001) define validation as the process of identifying, assessing and recognising a wider range of skills and competences which people develop through their lives and in different contexts, e.g. through education, work and leisure activities. In lifelong and life-wide learning, 'validation' is a crucial element to ensure the visibility and to indicate the appropriate value of the learning that took place anywhere and at any time in the life of the individual.

## OVERVIEW OF METHODS USED FOR VALIDATION OF INFORMAL LEARNING

European countries have developed and applied a number of methods to validate non-formal and informal learning, for different functions and purposes. A great rate of progress has been achieved in recent years in this area. While a large variety of validation initiatives have been established in Europe, a closer look shows that their underlying methods, principles and purpose is often similar. Based on these criteria, the sections below give seven main categories of validation approaches:

- Tests and examinations
- Declarative methods
- The portfolio method
- Observation

- Simulation
- Evidences extracted from work practices

#### TESTS AND EXAMINATIONS

This category comprises methodologies that identify and validate non-formal and informal learning through or with the help of examinations in the formal system. Thus, an individual enters examinations of the formal education system and by passing them; his or her competencies gained through non-formal and informal learning are validated. This process also formalises an individual's skills as the end-result is a formal and usually generally recognised diploma or certificate. Validation with the help of examinations of the initial vocational training system is the most frequently applied approach. In many EU countries proof of several years' work experience in a particular occupation normally grants access to the final examination of the relevant occupation even if the individual has not been formally enrolled in the relevant training programme. The type of examination can be a mix of written and practical tests. This method can be characterised as being the most important (in terms of acceptability and take-up) of the validation methods in these countries. These countries have in common a training and employment system which places great emphasis on state recognised qualifications as proof of competence.

#### DECLARATIVE METHODS

As the title of the category suggests, declarative methods are based on individuals' own identification and recording of their competences. Normally a third party counter-signs the declaration, which may take the form of a so-called "competence handbook", in order to verify the self-assessment. Declarative methods may involve a self-assessment against given criteria or none at all. This validation process is simple because it involves the use of only one instrument. It is a recording process because the purpose of validation is purely the identification of skills gained through non-formal and informal learning.

#### THE PORTFOLIO METHOD

Competence portfolios have proved a popular methodology to validate non-formal and informal learning in Europe. Examples can be found in many countries and competence portfolios are being developed and employed by the public, private and voluntary sectors. The distinguishing feature of competence portfolios is that they tend to use a mix of methods and instruments employed in consecutive stages to produce a coherent set of documents showing an individual's skills in different ways. In the most general of senses, competence portfolios tend to involve a self-assessment based

on a questionnaire or a set of given criteria, interview(s) with a third party and / or an assessment centre. Because the approach is very versatile, it is being employed by a variety of organisations for a large range of purposes. The portfolio method tends to be process orientated. Often it is used as a tool to help the further academic or career development of an individual. The portfolio method addresses the questions of validity, reliability and authenticity by combining a variety of methods as well as “internal” self-assessment with external assessment. This reduces the subjectivity of the assessment.

#### OBSERVATION

As the title suggests, this method for validating non-formal and informal learning involves extracting evidence of competence from an individual while they are performing everyday tasks at work. Evidence extracted from work practices relies on observation by a third party for the judgement of the competence level acquired.

#### SIMULATION

According to Colardyn and Bjornavold, simulation means that competences are not tested in real life (because, for various reasons, they cannot be), but that an individual is placed in a situation that fulfils all the criteria of the real-life scenario in order to have their competencies assessed.

#### EVIDENCES EXTRACTED FROM WORK PRACTICES

Validation methods falling into the category “evidences extracted from work (or other) practices” have in common that a candidate collects physical or intellectual evidence of learning outcomes. This may relate to work situations, voluntary activities, family or other settings. This evidence then forms the basis of a validation of competences by a third party.

#### SELECTION OF METHODS FOR VALIDATION

Allocation of the proper method(s) for validation of self-acquired learning could be performed in several ways:

- From the existing practice (from formal learning, for example), some of the units are more practically oriented and the respective skills and competencies could be validated by games/simulation based methods, some units are including more “knowledge” requirements and the tests could be more adequate method;

- Taking into account the opinion of the stakeholders (focus group of stakeholders); For example, the working group of stakeholders (employers, trainers, experts from VET centers etc.) could suggest a proper type of tool for every unit;
- Taking into account the vision of the employer; If the validation tools are dedicated to a specific employer than the selection of methods for validation will depend of the vision of the proper employer; In this case, the consultation with pedagogic experts will contribute the quality of the methods selection;

If we are speaking practically, the way of methods selection could be as follows: a/ exploring the required knowledge, skills and competencies, estimating which dominates, more knowledge or more skills? b/ selection of proper tool or combination of tools with clear relation to the mentioned knowledge, skills and competencies; the selection could be according to the above mentioned ways; c/ testing and adjusting the selected tools to ensure they cover the mentioned knowledge, skills and competencies;

For the purposes of the project, we have debated each unit with respective stakeholders and we have proposed some example of methods which could be applicable;

## OUTCOME-BASED UNITS IN COMPUTER ANIMATION

### DESCRIPTION OF OUTCOME-BASED UNITS - AIM

The main aim of compiling this description of units of learning outcomes is to use it as a basis for assigning to these units methods for assessment of the results of self-acquired learning (or “informal learning”). Each unit is assigned with such methods and also each unit is assigned with the respective ECVET points depending on the unit’s relative weight with regard to the whole description. As a further step to the developed description – interactive tools for validation of the results of informal learning are developed.

There are two such descriptions of units of learning outcomes developed in the frame of this project – one for **web designer** and another one for **computer animator**. The aim of choosing exactly these two fields was that they are highly creative fields where most of the learning outcomes are achieved through certain kind of informal learning – during work; through daily interactions, sharing among peers etc.

Thus these two descriptions of units of learning outcomes and the methods for assessment of the results of informal learning can be used as an example for the development of other such descriptions with a special part for assessment of the results of informal learning included in them.

## CONTEXT AND FRAMEWORK

This description of outcome-based units is not only a result of CREATE LdV-TOI project, but also is one more step in line with EU policy in VET, namely validation of the results of informal learning. In this respect it contains two important elements: first concrete methods for assessment of the results of informal learning and second ECVET points assigned to those units making it possible that learning outcomes can be identified, validated and recognized. In this train of thought approaches and methods recommended during EQARF – ECVET Launching Conference Moving from Principles to Implementation /November 2009/ have been taken into consideration when compiling the descriptions.

Except for the EU policy in VET outlined also in the conference materials mentioned above this document also takes into account previous projects that have been dealing with the topic: “Embedding Standards” project /Coordinator – DEKRA Akademie, No: D/04/B/F/PP-146 192/ that gave the basis for CREATE project, a German-Israeli project called “IT-Skills”, to name a few. The partnership has carefully explored and discussed the results of such former projects and extracted some best practices related to the structuring of the description, to all the issues that should be included in it, principles of assigning ECVET points to units, etc.

Descriptions of Outcome-Based Units are also designed in accordance with descriptions of national qualifications and VET systems in Bulgaria, Germany and Ireland. Prior to compiling the descriptions partnership has thoroughly discussed also the following:

- “Structure of the Advanced IT Training System” in Germany;
- Recognition of Prior Learning (RPL) in Ireland;
- Standard qualifications (computer animator and web designer if they exist or other similar to those fields) in Bulgaria, Germany and Ireland;

Concerning the assessment process and the structure of the assessment organizations, the ISO 17024 standard should be explored.

## TARGET GROUP

Target group includes: trainers, policy makers, instructional designers in VET, managers of VET Centres.

VET centres and organizations willing to assess results of informal learning in web design and computer animation and provide certification for this assessment can use the document for this purpose. However, in order that the process of assessment is complete, such organizations should complement this document by also using the interactive tools for validation of the results of informal learning and the manual, containing necessary guidelines (also developed in the frame of the current project).

Policy makers and instructional designers in VET can use this document as an example for the development of units of learning outcomes in other creative fields. Second, they can also use it as an example for the means of assigning ECVET points to units in view of credits transferability. Last but not least, they can use this document as an example of the methods that can possibly be used for validation of the results of informal learning.

Potential users: youth (16-25) & youth with special needs (early school leavers (ESL), long-term unemployed) who acquired learning in WD and CA informally and wish to validate it.

## STRUCTURE AND LEVELS

This document consists of three parts:

1<sup>st</sup> part – general introduction about the project, the context, target group, the descriptions of units as well as job description.

2<sup>nd</sup> part - Description of Outcome-based Units in Computer Animation Part I – EQF Level 4 (more basic level)

3<sup>rd</sup> part - Description of Outcome-based Units in Computer Animation Part II – EQF Level 5 (more advanced level)

For more information on EQF Levels, please see:

[http://ec.europa.eu/eqf/compare/eqf\\_en.htm#comparison](http://ec.europa.eu/eqf/compare/eqf_en.htm#comparison)

This description is divided into two EQF Levels because this way it is possible for a person's outcomes of informal learning to be assessed and recognized:

- a. if these are at a lower level (EQF Level 4) only;
- b. if this person can cover both levels;

## TERMINOLOGY

There are several basic “terms” that need to be clarified when working with this document:

- **Unit** – also called “unit of learning outcomes”. A unit is a component of a qualification, consisting of a coherent set of knowledge, skills and competence that can be assessed and validated. Units in the case of CREATE project are grouped into so-called working fields.
- **Working field (Module)** – a working field groups two or more units together. The working field puts units that are thematically related under a common denominator.
- **Learning outcomes** – learning outcomes are statements of what a learner knows, understands and is able to do on completion of a learning process. The European definition of learning outcomes uses the terms knowledge, skills and competence for describing learning outcomes.
- **ECVET points** – ECVET points are the numerical representation of the overall weight of learning outcomes in a qualification and of the relative weight of units in relation to the qualification.
- **EQF level** - EQF describes levels of qualifications in terms of learning outcomes. The eight levels cover the entire span of qualifications from those achieved at the end of compulsory education to those awarded at the highest level of academic and professional or vocational education and training. / [http://ec.europa.eu/education/pub/pdf/general/eqf/leaflet\\_en.pdf](http://ec.europa.eu/education/pub/pdf/general/eqf/leaflet_en.pdf) /
- **Self-acquired/informal learning** – it includes learning at home, work, during daily interactions or by sharing knowledge in communities.

Definitions for “unit”, “learning outcomes”, “ECVET points” are taken from “Get to know ECVET better: Questions and Answers”, EQARF – ECVET Launching Conference Moving from Principles to Implementation /November 2009/.

#### PREREQUISITES

Knowledge, skills and competence necessary prior to obtaining EQF Level 4 of Computer Animator:

Knowledge	Skills	Competence
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## JOB DESCRIPTION

This part of the Description of Outcome-Based Units contains the work elements, responsibilities, personal characteristics, work conditions, equipment and tools which are a part of the job of the computer animator. The job description is divided into two for the two EQF levels (4 and 5 respectively) as is divided the description of outcome-based units below. One should apply only 7.1. or both 7.1. and 7.2. depending on the level covered.

### **Job Description for EQF Level 4**

(Here some abstract of the job requirements should be included)

#### a. Work elements

*From each unit there are a number of work elements extracted. For example, from unit "Scripting" in computer animation below the following work element can be extracted: Elaborate the script for a computer animation movie or contribute to elaborating the script as a part of a team.*

#### b. Responsibilities

*For example, the responsibilities of a computer animator can be: the computer animator uses specialized software to create computer-generated images and moving images by using a computer.*

#### c. Personal characteristics

*These are characteristics that are a part of one's personality and are essential for performing the work of a computer animator. For example, the computer animator has to be patient, apply imagination, be concentrated, etc.*

#### d. Work conditions

*For example, the computer animator can work in an office or in a studio depending on his/her role and the type of animation.*

e. Equipment and tools

*For example, computer animators need a computer and animation software.*

### **Job Description for EQF Level 5**

(Here some abstract of the job requirements should be included)

a. Work elements

b. Responsibilities

c. Personal characteristics

d. Work conditions

e. Equipment and tools

### **Description of Outcome-Based Units in Computer Animation Part I – EQF Level 4**

<b>Title of description:</b>	Computer animator
<b>EQF level:</b>	Level 4

<b>Title of working field 1:</b>	Fundamentals and initial steps in the animation process
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<b>Title of unit 1:</b>	Principles of traditional animation		
<b>Learning outcomes 1: Using principles of traditional animation</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	To be familiar with the 12 basic principles of animation: anticipation, squash and	Applying the principles in every step of the animation process.	

	stretch, staging, straight ahead and pose to pose animation, etc.		
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Declarative method</li> <li>• Simulation</li> <li>• Observation</li> </ul>		
<b>Title of unit 2:</b>	Idea and scenario		
<b>ECVET points:</b>			
	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
<b>Learning outcomes 1: Presenting your idea</b>		Formulating in a written format an annotation of your idea.	Organising and presenting the idea in a comprehensible way.
		Being able to relate and describe your idea in details to your co-workers, clients etc.	
<b>Learning outcomes 2: Developing a scenario</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	To be familiar in general with different types of scenarios.	Dividing your plot into distinctive scenes (key scenes).	Producing an understandable and structured text of your scenario.
		Giving a description of each of your characters and environment.	
		Writing and grammar.	
<b>Learning outcomes 3: Storyboarding</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>

	To be familiar with the basics of Cinematography. - Point of View - Alternating different plans.	Drawing, sketching	Presenting the scenario in a visually appealing and understandable way (preparing storyboard sheets).
	To be familiar with perspective and 3-dimensional space.	Choosing key moments to put in the storyboard.	
		Ability to visually interpret other people's ideas.	
<b>Learning outcomes 4: Creating the characters of your story.</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Types of characters (styles).	Making model sheets (view of your character from different positions).	Being able to present the characters in a way that their appearance corresponds to their description in the scenario.
	General knowledge about anatomy of the human body and face.		
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Declarative method</li> <li>• Simulation</li> <li>• Portfolio</li> </ul>		
<b>Title of working field 2:</b>	Modeling		
<b>Title of unit 3:</b>	Environment and Object Design		

<b>ECVET points:</b>			
<b>Learning outcomes 1: Structure of 3D objects</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Types of 3D object models (polygonal, surface, solid, parametric etc.)	Being able to build a wireframe of the object.	
	Polygons and topology, facets.	Object surface editing (vertexes and edges).	
<b>Learning outcomes 2: Modeling techniques</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Polygonal Modeling	Being able to work with the menus for object creating and editing (Maya or 3ds Max).	Using the different modeling methods in a specific software to create and manipulate objects.
	Curve Modeling		
	Digital Sculpting etc.		
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> <li>• Portfolio method</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Simulation</li> </ul>		
<b>Title of unit 4:</b>	Human Character Design		
<b>Learning outcomes 1:  Creating a character in a specific 3D Software</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Body proportions, skeleton and muscle structure.	Ability to create surface structures of characters (e.g. 3ds Max or Maya).	

<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Portfolio method</li> <li>• Tests and examination</li> </ul> <p style="text-align: center;"><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Simulation</li> <li>• Declarative method</li> </ul>			
<b>Title of working field 3:</b>	Rigging and animation			
<b>Title of unit 5:</b>	Rigging			
<b>Learning outcomes 1: Creating basic animation controls</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>	
	Forward and Inverse Kinematics basics.	Creating the bone hierarchy.	Creating the skeletal structure of the object or the basic animation controls.	
	Understanding and applying weights.	Working with the specific menus in 3ds Max/Maya, related to rigging.		
	Manipulators, nulls and parameter wiring.	CAT System in Autodesk 3ds Max		
		BIPED System in Autodesk 3ds Max or Maya		
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> </ul> <p style="text-align: center;"><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Simulation</li> </ul>			
<b>Title of unit 6:</b>	Animation			

<b>Learning outcomes 1:</b>  <b>Basic animation of a character</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Keyframes and Key Poses	Creating a walk/run cycle.	Animating your character and scene.
	Inbetweens	Editing the animation curves.	
	Interpolation	Using the Dope Sheet and Curve Editor in Autodesk 3ds Max.	
	Arcs and Paths of Action	Using constraints.	
		Camera movement.	
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Simulation</li> <li>• Declarative method</li> </ul>		
<b>Title of working field 4:</b>	Texturing, Lighting and Rendering		
<b>Title of unit 7:</b>	Texturing and Lighting		
<b>Learning outcomes 1:</b>  <b>Adding textures to your objects</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Mapping	Using the Unwrap UVW Modifier in Autodesk 3ds Max.	Applying texture and materials to your objects.
	Colours and textures	Using different maps (Diffuse, Bump, Normal, Displacement, Opacity, Ambient Occlusion, etc.)	
<b>Learning outcomes 2:</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>

<b>Lighting your scene</b>	Colour Temperature	Adjusting different lights and working with menus in 3ds Max or Maya.	Lighting your scene corresponding to your concept ideas.
	Reflection and Refraction		Making a Studio Lighting to preview your 3D Models.
	Types of lighting objects		Lighting interior and exterior scenes in Autodesk 3ds Max / Maya.
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Portfolio</li> <li>• Tests and examination</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Declarative method</li> </ul>		
<b>Title of unit 8:</b>	Rendering		
<b>Learning outcomes 1: Finalizing your animation</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Rendering processes - raster graphics, z-buffer, shading.	Setting up the camera in 3ds Max / Maya.	Creating the final rendering.
	Rendering options - global illumination, etc.	Changing image resolution, image sampling, lighting adjustment in 3ds Max / Maya.	
	Raytracing and Radiosity	Adding Environment and Atmospheric effects	
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Declarative method</li> </ul>		

### III. Description of Outcome-Based Units in Computer Animation Part II – EQF Level 5

(WORK IN PROGRESS)

<b>Title of description:</b>	Computer animator
<b>EQF level:</b>	Level 5

<b>Title of working field:</b>	Advanced aspects of computer animation		
<b>Title of unit 9:</b>	Advanced character design		
<b>Learning outcomes 1:</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
<b>Modeling details of surfaces</b>	Detailed anatomy of human body parts.	Advanced editing of surfaces and usage of editing tools and methods.	Being able to model a human face and body parts.
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Portfolio method</li> <li>• Evidence from workplace practices</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Simulation</li> <li>• Declarative method</li> </ul>		
<b>Title of unit 10:</b>	Advanced animation techniques		
<b>Learning outcomes 1:</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
<b>Using different types of animation</b>	Types of animation – soft objects, particles, fluids, procedural animation, behavior animation.	Applying different types of animation and using the respective menus in 3ds Max / Maya.	Animating scenes using different types of animation – morphing, particle animation, etc.

<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Portfolio method</li> <li>• Evidence from workplace practices</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Simulation</li> <li>• Declarative method</li> </ul>		
<b>Title of unit 11:</b>	Advanced Texturing and Lighting Techniques		
<b>ECVET points:</b>	<i>/do not fill in at this point/</i>		
<b>Learning outcomes 1:</b>  <b>Advanced usage of different maps and options</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Detailed understanding of different types of maps and parameters – diffuse, displacement, bump, specular, etc.	Profound usage of Material Editor options and menus of 3ds Max / Maya.	Creating objects with advanced textures and materials.
	Mapping methods and coordinate system		
<b>Learning outcomes 2:</b>  <b>Advanced lighting</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Understanding anti-aliasing and shadows.	Using the respective menus for antialiasing and shadows configuration in 3ds Max / Maya.	
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Portfolio method</li> <li>• Tests and examination</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Simulation</li> <li>• Declarative method</li> </ul>		

<b>Title of unit 12:</b>	Advanced rendering		
<b>Learning outcomes 1:</b>  <b>Raytracing and radiosity details and usage</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	Understanding the detailed parameters of raytracing – raytracing tree, backward raytracing, etc.	Working with the rendering options and adjusting raytracing and radiosity options.	Rendering a 3D scene with raytracing or radiosity method.
	Understanding the detailed parameters of radiosity – radiosity matrix and form factors.		
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examination</li> <li>• Portfolio method</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Observation</li> <li>• Simulation</li> <li>• Declarative method</li> </ul>		

## OUTCOME-BASED UNITS IN WEB DEVELOPMENT

<b>Title of description:</b>	Web designer
<b>EQF level:</b>	Level 4

<b>Title of working field 1:</b>	Preparation and design based on standards defined by the software industry (W3C)
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<b>Title of unit 1:</b>	Planning
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	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
<b>Learning outcomes 1: Preparation</b>	<p>Basics of project management;</p> <p>Basics of communication;</p> <p>Fundamental understanding of IT-Systems;</p> <p>Basics of law in the field of activity (property rights; contracts, privacy);</p>	<p>Is able to manage the project in a proper customer-oriented way;</p> <p>Is able to communicate with the customers on a bidirectional open-minded way;</p> <p>Is able to present the project;</p> <p>Is able to identify the customers' needs;</p> <p>Is able to define the specifications for further development;</p>	<p>To be in close contact with the customers and their requirements;</p> <p>Is able to manage the finally described project independently with the support of specialists;</p>

<b>Learning outcomes 2. Accessibility</b>	<p>Being familiar with different types of disabilities and understanding the unprecedented access to information;</p> <p>Existing accessibility support in web technologies including interoperability with</p>	<p>Is able to identify the various factors to make a website easy to access on the basis of the customers' requirements;</p> <p>To improve the measurable access to the website;</p>	<p>To guarantee the access of people with disabilities;</p>
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	<p>assistive technologies; and WAI guidelines;</p> <p>Understanding basic specifications including for example WCAG;</p> <p>Knows the HTML features for easy access</p>		
<b>Learning outcomes 3. Internationalization</b>	<p>Unicode-based encodings;</p> <p>To know the writing systems which require special support;</p> <p>The risks of different symbol use;</p>	<p>To be able to build specifications and content that avoid barriers to the use of the technology or content for many people around the world;</p>	<p>To be able to design or develop the content, application, specification, and so on, in a way that ensures it will work well for, or can be easily adapted for, users from any culture, region, or language.</p>
<b>Learning outcomes 4. Usability</b>	<p>Knowing the ISO Standards (ISO/TR 16982:2002, ISO 9241);</p> <p>Iterative design,</p> <p>Knows the different development phases of the usability engineering;</p> <p>Knows basic test features;</p>	<p>Identifies the core features of usability in relation to the target group;</p> <p>Is able to identify the best test procedure;</p>	<p>To design the product that can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use;</p>



		Illustrator;	
<b>Learning outcomes 3. Audio and Video</b>	Audion and Video Codecs; Media Storage; SMIL; Timed Text; Media Fragment; Media annotation;	Is able to develop the access by implementing audio and video technolgies for different user needs and expectations	To handle different and complementary audio and video technologies
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examinations</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Simulation</li> <li>• Declarative method</li> </ul>		
<b>Title of working field 2:</b>	Development of the web site based on standards defined by the software industry (W3C)		
<b>Title of unit 3:</b>	Development		
	<b>Knowledge</b>	<b>Skills</b>	<b>Compete nce</b>
<b>Learning outcomes 1: HTML/CSS</b>	HTML:  Introduction to HTML; HTML Document ; Embedded content; Hyper Links; Tables; Forms; Sections; Style	Publish online documents with headings, text, tables, lists, photos etc.  Retrieve online information via hypertext links, at the	To make use of the scope of HTML/CS S in fast, efficient and error-

	<p>and Script;</p> <p>CSS:</p> <p>Introduction to CSS; Styling, Box model; layout; advanced CSS</p>	<p>click of a button;</p> <p>To design a form for conducting transactions with remote services, for use in searching for information, making reservations, ordering products etc.;</p> <p>Include spread-sheets, video-clips, sound clips, and other applications directly in their documents</p>	<p>free way;</p> <p>To cooperate with specialists ;</p>
<p><b>Learning outcomes 2:</b></p> <p><b>CMS</b></p>	<p>Overview of the core features of a content management system;</p> <p>Knows basic features of at least one CMS (e.g. Joomla)</p>	<p>Is able to identify the customers' requirements;</p> <p>Is able to define data standards and interfaces;</p> <p>Is able to implement the selected CMS features;</p>	<p>Is able to define the scope of the CMS-features and to integrate it to the website</p>
<p><b>Learning outcomes 3: Web-Performance Optimization</b></p>	<p>Browser rendering efficiency, protocol options;</p> <p>Response-request cycles;</p> <p>Caching;</p> <p>Multi-server content and byte range requests;</p> <p>Measuring internal applications;</p>	<p>Monitoring of internal applications, first mile performance, and measuring of quality and reliability of streaming media the way users view;</p>	<p>Monitoring and testing of websites to achieve optimum performance under given constraints;</p>

<b>Learning outcomes 4: Debugging and Analysis</b>	Knows the typical debugging process: problems with different browsers;  CSS and HTML validation;	Is able to debug in a fast and efficient way;	Handling various common debugging and analysis techniques;
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examinations</li> </ul>		
<b>Title of unit 4:</b>	Management		
<b>Learning outcomes 1: Content updating</b>	<b>Knowledge</b>	<b>Skills</b>	<b>Competence</b>
	User interface;  Newsletter technologies;  Documentation technologies;	Is able to establish procedures for content updating and customer comments;  Is able to communicate with a content developer;  Is able to document the development process;	Update the technology and the content regularly;
<b>Learning outcomes 2: Managing social networks</b>	Facebook; Twitter, Xing; Youtube, Flickr, Twitter;  Blogs;  Knows the privacy regulations;	Has an overview at the recent status;  Is able to identify the risks and chances of social networks;	Has an overview about existing social networks, their strengths and their weaknesses

<p><b>Learning outcomes</b></p> <p><b>3: Using statistics</b></p>	<p>Basic knowledge of statistics;</p> <p>Presentation techniques;</p> <p>Data collected by the website;</p> <p>Logfiles, google analytics;</p>	<p>Is able to interpret the data collected and more proposals for optimization;</p> <p>Is able to present the data;</p>	<p>Using the statistics data for increasing the access rate;</p>
<p><b>Methods for assessment of self-acquired learning:</b></p>	<ul style="list-style-type: none"> <li>• Tests and examinations</li> <li>• Evidences from work place practices</li> </ul> <p style="text-align: center;"><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Declarative method</li> </ul>		
<p><b>Title of unit 5:</b></p>	<p>Optimization</p>		
<p><b>Learning outcomes</b></p> <p><b>1: Search engine optimization</b></p>	<p><b>Knowledge</b></p>	<p><b>Skills</b></p>	<p><b>Competence</b></p>
	<p>Knows relevant engine and their technologies:</p> <p>Implementation procedures</p>	<p>Getting indexed;</p> <p>Preventing crawling;</p> <p>Increasing prominence;</p>	<p>Is able to use the SEO for improving the access rate of the website</p>
<p><b>Learning outcomes</b></p> <p><b>2: Mobile Web</b></p>	<p>Knows the difference between making a web site for a mobile phone and for a PC;</p>	<p>Understanding the strengths and their limitations, and using technologies that fit</p>	<p>To improve the access</p>

	<p>Mobile web authoring guidelines;</p> <p>Device independent guidelines;</p> <p>Web 3.0 standards for mobiles;</p>	these conditions are key to create success mobile-friendly Web content.	and the optimize customer relations by using new customer-oriented devices
<p><b>Learning outcomes</b></p> <p><b>3. Semantic Web</b></p>	<p>Has an overview about W3C – Standards:</p> <p>Resource Description Framework (RDF) Core Model, the RDF Schema language, the Web Ontology language (OWL), and the Simple Knowledge Organization System (SKOS)</p>	Understands the components and the standards;	Making use of the semantic web;
<p><b>Methods for assessment of self-acquired learning:</b></p>	<ul style="list-style-type: none"> <li>• Tests and examinations</li> <li>• Evidences from work place practices</li> </ul>		

### III. Description of Outcome-Based Units in Web design Part II – EQF Level 5

<p><b>Title of description:</b></p>	Web designer
<p><b>EQF level:</b></p>	Level 5

<p><b>Title of working field:</b></p>	Advanced aspects of web design
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<p><b>Title of unit 6:</b></p>	Interactivity and animation
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	Knowledge	Skills	Competence
<b>Learning outcomes 1: Adding interaction with Adobe Flash</b>	<p>Fundamentals of object-oriented programming.</p> <p>Understanding the concept of symbols and their different types.</p>	<p>Is able to use AS2.0 or AS3.0.</p> <p>Working with components.</p> <p>Working with timeline, key frames and tweens.</p>	<p>Creating interaction using Adobe Flash.</p>

<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Tests and examinations</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Simulation</li> <li>• Observation</li> <li>• Declarative method</li> </ul>
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<b>Title of unit 7:</b>	Introduction to database systems
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	Knowledge	Skills	Competence
<b>Learning outcomes 1: Implementing a database in a web site</b>	<p>Understanding connections (how to connect PHP to a server) and queries.</p>	<p>Working with PHP – establishing a database connection, adding and using forms, etc.</p> <p>Working with MySQL – selecting, writing and deleting information</p>	<p>Creating dynamic web sites.</p>

		from tables.	
<b>Methods for assessment of self-acquired learning:</b>	<ul style="list-style-type: none"> <li>• Portfolio method</li> <li>• Tests and examinations</li> </ul> <p><b>Additional methods:</b></p> <ul style="list-style-type: none"> <li>• Simulation</li> <li>• Observation</li> <li>• Declarative method</li> </ul>		

## CONCLUSIONS AND RECOMMENDATIONS

Having conducted research into the available methods of validation, some recommendations can be made. Methods considered to be less advantageous include the declarative, observation and simulation methods. The declarative method is heavily reliant on self-assessment which is largely subjective and vulnerable to exaggeration, omission or error. It also lacks a practical or tangible exposition of skills which is vital for creativity based disciplines such as WD and CA. Whilst observation and simulation are effective methods of confirming ones practical skillset and competencies, they are somewhat deficient in terms of measuring the creative ability of the learner. They also fail to assess the learner's theoretical knowledge on the subject.

Evidences from workplace practices come in two forms; physical and intellectual. While the collation of physical evidence of learning outcomes is methodologically and practically effective, the intellectual evidence alone can denote merely a theoretical rather than practical knowledge of a particular discipline. However, if assessed in conjunction with each other, this could be a viable measurement method. Test and examination is unequivocal in its efficacy to measure prior learning accurately and thoroughly, so much so that it warrants a generally high level of certification. However it is recommended that a strong emphasis is put on practical examinations in order to cater to traditionally non-academic learners who can be intimidated or lack self-confidence regarding written exams etc. It is also advisable that examinations are presented to the students in a less formal manner than traditional or academic exams. Similarly the portfolio method provides the learner with an opportunity to showcase their skills and creativity in a very tangible and personal manner. In order to examine the knowledge outcome, it is recommended that a brief interview be held with the student during which they may be asked in more detail about different aspects of their

work i.e. theory, skills used etc. In conclusion the methods we consider to be most viable and effective are the test and examination and portfolio methods

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