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Contribution of the project partner University of Kassel

MANUAL for the development of OER

IO.3

TVET system should not be limited to being a mere supplier satisfying economic demands It also has a responsibility and opportunity to help generate a new generation of workers and entrepreneurs willing and able to frame an economic model adhering to the principles of sustainable development, in a way that fits the national political orientation.

UNESCO-UNEVOC
Advancing Green Human Capital
A FRAMEWORK FOR POLICY ANALYSIS AND GUIDANCE
P 12

Henrik Peitsch - The Attribution-NonCommercial-ShareAlike, or **CC-BY-NC-SA**, license combines the non-commercial restriction with the requirement to share new material under the same conditions, all with due credit.

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Introduction

This manual is a main part of the GreenSkills4VET project. It summarizes the work on IO1 and IO2. In IO 1 each partner undertook desk researches in specific occupations in the field of Logistics and Health care. According to the aims of the project the curricula and teaching materials had to be evaluated concerning Education for Sustainability (ESD) and Open Education Resources (OER). The results are documented in the *Comparative Analysis Report (CAR)*, done by BFI, Linz. The essential elements of the CAR, which include the most import criteria which led the research in IO1, were used as the basis for the *Reference Framework*, created in IO2. The compilation of this Framework was done by ASPETE, Patras.

This manual is one of the tools to enhance the impact of ESD and OER in VET. As the outcomes of IO1 shows, there is a lack of specific elements of ESD and OER in the existing curricula and teaching materials.

What is the manual for?

The main aim of this Manual is to empower teachers and trainers as well as students to reach the ESD competencies and get used to new teaching and learning methods. Methods which are more orientated to enhance the activities of the students and to concede the student a bigger space to self-organised learning within the learning process. The students have to take care of their learning process and take over the responsibility of this process.
This includes the following sub goals:

- Enhancing the thinking and acting in the sense of the SDGs in the aim of promoting prosperity while protecting the planet in order to achieve sustainable development.
- Integration of ESD in teaching arrangements and learning arrangements for occupations in Logistics.
- Improving the knowledge, skills, attitudes, values and ethics of teachers, trainers and students for living in a digital, knowledge-based economy and globalized world
- Enhancing the challenges of digitization for education and new (interactive) and co-operative teaching and learning methods, in particular Open Educational Resources – OER

According to the main aims with this manual we will provide a short but sufficient overview of the SDGs and ESD as documented by the UNESCO as well as some important elements of OER. This manual also includes the main aspects of OER and some examples easy to use for teaching and training. Some teaching units for Logistics (Kaufmann/-frau fur Spedition und Logisitkdienstleistung) will follow.

Two megatrends

Knowledge-Based Society/Economy

Daniel Bell dated the beginning of the so called *Knowledge Based Society* back to the 18th century. He wrote, that the first edition of the Encyclopaedia Britannica was written only by one or two scientists. They could overview the whole knowledge at that time. From the third edition on, more experts were needed. In the 1967th edition at all about 1,000 experts were involved. He marked *knowledge* strictly from *information. Knowledge* are new judgments (from research and science) or new exposure of old views (in books and lectures) (Bell p 180).

In the Lisbon strategy for 2010, announced on the meeting on the 23rd and 24th of March in 2000 and held by the European Council, they emphasised the development for the next ten years.

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"8. The shift to a digital, knowledge-based economy, prompted by new goods and services, will be a powerful engine for growth, competitiveness and jobs. In addition, it will be capable of improving citizens' quality of life and the environment. To make the most of this opportunity, the Council and the Commission are invited to draw up a comprehensive eEurope Action Plan to be presented to the European Council in June this year, using an open method of coordination based on the benchmarking of national initiatives, combined with the Commission's recent eEurope initiative as well as its communication «Strategies for jobs in the Information Society«." (Lisbon European Council, 2000)

Digitization – Industry/Logistics 4.0

The fast changing world of Information and Communications Technologies (Computers, the Internet, mobile phones, texting, social networking) pushed the impact of *knowledge* in all spheres of the economy, society and policy.
The term Industry 4.0 are most common used as a cypher for the three main alterations of modern industry: automation, decentralization and networking, "which we call generally digitization and which will dramatically change our economic life and working life." (Buhr, p 357). The phenomenon is also named fourth industrial revolution.

In 2016 PWC made a survey on the impact of digitalization on industrial companies. The state "that their biggest implementation challenge isn't the right technology, it's a lack of digital culture and skills in their organisation. This finding is also consistent with our Digital IQ research. While investing in the right technologies is important, ultimately success or failure will depend not on specific sensors, algorithms or analytics programmes, but on a broader range of people-focused factors." Companies have to form a concept of "a robust digital culture and to make sure change is driven by clear leadership from the C-suite. They'll also need to attract, retain, and train digital natives and other employees who are comfortable working in a dynamic ecosystem environment." (PwC)

The computerization has not even already taken over most of the manufactory processes but it has already substituted manpower in administration and management. A survey made by Dengler and Matthes shows, "that 15 per cent of employees subject to social insurance contributions have a high substitution potential in the year 2013 in Germany, i.e. they are employed in an occupation in which more than 70 per cent of the tasks could already be substituted by computers. (Dengler/Matthes, p 4) Verkehrs- und Logistikberufe ca. 40 % (p. 14).

A survey done by Kersten, Wolfgang at al stated that "Digitalization of business processes and transparency in the supply chain are the most important trends, and ones that companies will need to develop considerably in the future." (Kersten, p 14)

Most of the attempts on the field of digitalization are mostly focused on the implementation of ICT reorganizing all the processes within the companies, procurement, distribution and supply chain. The impact on skills are mostly restricted on employability in a very narrow sense.

It is expected that in Logistics in office jobs will suffer from the digitalization. It is estimated that about 38 % of the work to be done by a forwarding clerk (Kauffrau-/mann für Spedition und Logistikdienstleistung) could be substituted by computers. (https://job-futuromat.ard.de)

Joachim Möller, director of the IAB (Institute of labour market research) argued "that cannot be altered by humans. It can be shaped by, for instance, social partners within the firms; the employers and employees should work together to try to shape this new development and find compromises, because the interests of both sides are of course affected. But if there is a well-functioning system between the social

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partners, I think, compromises can always be found … we need to consider the interests of both parties, and there are so many possibilities of shaping the new development that it is in the end to the benefit of people." (iab-forum.de)

The Need for Educational Reform

Siemens describes the impact of new technologies on learning and learning theories and postulates a fundamental chance in teaching and learning. Knowledge is not anymore clearly defined and stated in restricted subjects. "*Behaviourism, cognitivism, and constructivism are the three broad learning theories most often utilized in the creation of instructional environments. These theories, however, were developed in a time when learning was not impacted through technology. Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes, should be reflective of underlying social environments." (Siemens 2005).* Hi stated, that constructivism viewed learning as a process of inputs which is *"managed in short term memory, and coded for long-term recall."* And later he said: *"Behaviourism and cognitivism view knowledge as external to the learner and the learning process as the act of internalizing knowledge. Constructivism assumes that learners are not empty vessels to be filled with knowledge. Instead, learners are actively attempting to create meaning. Learners often select and pursue their own learning. Constructivist principles acknowledge that real-life learning is messy and complex. Classrooms which emulate the "fuzziness" of this learning will be more effective in preparing learners for life-long learning."* (ibid.) The new technologies enforce the need to revise learning and learning theories and adapt them to the efforts of the digital age.

The main principle within the new learning is "connectivism". "*Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing."* (ibid.)

A change in education enforces also changes on the systemic level. That means the system itself has to be open for changes, autocritique and more keen to learn. (Seufert/Meier, p 561). This includes reforming the training of teachers and trainers. New learning and teaching needs *appropriate support* by the educational system.

The four main Elements of the project of GreenSkills4VET

- **SDGs and ESD competences – Shaping the Future**
- **Open Educational Resources - OER**
- **EQR/NQR**
- **ECEVET**

SDGs and ESD competences – Shaping the Future

In the literature are many different terms of *Sustainability development* to be found – nation- and worldwide. The translation of the term in different languages is another problem. In Germany exists a wide range of interpretations, including some misinterpretations? (Hölz, p 145)

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Despite of this, Hölz arguments that the term has to be vague and abstract in order to fulfil its function as a guiding principle for the future. It has at any time to be discussed and renewed according to new experience and scientific findings. (Hölz, p 195)

The most common one from Brundlandt et al not sufficient defined, so you cannot deviate competencies from it directly.

Since 1987 ("Our Common Future") there have been eight International commitments relevant to ESD till 2015. Five form 2012 to 2015 this is a considerably indicator for the increasing international recognition "of ESD as an integral element of quality education and a key enabler for sustainable development." (UNESCO 2014, p 9).

The members of the General Conference of UNESCO agreed in 2013 at the 37th session the *Global Action Programme (GAP) on ESD* as the follow-up to the Decade of ESD. (UNESCO 2014).

The following **Dimensions** of ESD are stated in the GAP (UNESCO 2014, p 12):

Learning content: Integrating critical issues, such as climate change, biodiversity, disaster risk reduction (DRR), and sustainable consumption and production (SCP), into the curriculum.

Pedagogy and learning environments: Designing teaching and learning in an interactive, learner-centred way that enables exploratory, action-oriented and transformative learning. Rethinking learning environments – physical as well as virtual and online – to inspire learners to act for sustainability.

Learning outcomes: Stimulating learning and promoting core competencies, such as critical and systemic thinking, collaborative decision-making, and taking responsibility for present and future generations.

Societal transformation: Empowering learners of any age, in any education setting, to transform themselves and the society they live in.

- Enabling a transition to greener economies and societies.
  - Equipping learners with skills for "green jobs".
  - Motivating people to adopt sustainable lifestyles.
- Empowering people to be "global citizens" who engage and assume active roles, both locally and globally, to face and to resolve global challenges and ultimately to become proactive contributors to creating a more just, peaceful, tolerant, inclusive, secure and sustainable world.

The authors of the "Education 2030 Framework for Action" emphasise, that

> *"ESD is holistic and transformational education that addresses learning content and outcomes, pedagogy and the learning environment. Thus, ESD does not only integrate contents such as climate change, poverty and sustainable consumption into the curriculum; it also creates interactive, learner-centred teaching and learning settings. What ESD requires is a shift from teaching to learning. It asks for an action-oriented, transformative pedagogy, which supports self-directed learning, participation and collaboration, problem-orientation, inter- and transdisciplinary and the linking of formal and informal learning. Only such pedagogical approaches make possible the development of the key competencies needed for promoting sustainable development."(UNESCO 2017, p. 7)*

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Cross-cutting key competences for achieving all SDGs

At the UN General Assembly on the 25th September in 2015, the 2030 Agenda for Sustainable Development was adopted. (UNESCO 2017). The formulated competences include cognitive, affective and volitional and motivational elements. They involve knowledge, capacities and skills, motives and affective dispositions and their interdependences. This cross-cutting key competences have to be integrated into the competences discussed above.

(1)	**Systems thinking competency:** the abilities to recognize and understand relationships; to analyse complex systems; to think of how systems are embedded within different domains and different scales; and to deal with uncertainty.
(2)	**Anticipatory competency:** the abilities to understand and evaluate multiple futures – possible, probable and desirable; to create one's own visions for the future; to apply the precautionary principle; to assess the consequences of actions; and to deal with risks and changes.
(3)	**Normative competency:** the abilities to understand and reflect on the norms and values that underlie one's actions; and to negotiate sustainability values, principles, goals, and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions.
(4)	**Strategic competency:** the abilities to collectively develop and implement innovative actions that further sustainability at the local level and further afield.
(5)	**Collaboration competency:** the abilities to learn from others; to understand and respect the needs, perspectives and actions of others (empathy); to understand, relate to and be sensitive to others (empathic leadership); to deal with conflicts in a group; and to facilitate collaborative and participatory problem solving.
(6)	**Critical thinking competency:** the ability to question norms, practices and opinions; to reflect on own one's values, perceptions and actions; and to take a position in the sustainability discourse.
(7)	**Self-awareness competency:** the ability to reflect on one's own role in the local community and (global) society; to continually evaluate and further motivate one's actions; and to deal with one's feelings and desires.
(8)	**Integrated problem-solving competency:** the overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive and equitable solution options that promote sustainable development, integrating the abovementioned competences.

Tab. 4 (UNESCO 2017: 10)

Within the SDGs ESD is explicitly recognized as part of Target 4.7 of the SDG on education, together with Global Citizenship Education (GCED). This prominent rang underlines the very importance of ESD in context with civic education for a global world.

ESD is a holistic, dynamic, approach that also goes far beyond the conventional definition of technical and vocational education and training. All efforts in education should keep in mind that ESD must not be reduced of only one aspect of the concept. The coherence of each SDG has to be maintained as far as possible. Teaching ESD in the context of VET has to enrich the traditional teaching contents and the teaching and learning methods. It has to be a step for transforming education and the whole society. That means a transformation of all functional parts of the whole society (politics, economy and justice) in the sense of the SDGs (s. SDGs and ESD competences above).

Greening TVET aims to promote creativity, innovation, critical thinking and the ability to recognize opportunity and stimulate social awareness around the central issue of environmental protection. It helps learners acquire skills, knowledge and attitudes needed to address environmental issues as these issues relate to their field of work.
Schlömer summarized related to the aimed competences "that the key probably lies to enhance the learner's consciousness about the effectiveness of his own acting. This consciousness is a part of the perception of professionally acting, that the environmentally responsible behavior within their company or

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action field donates a positive effect and, in addition, also delivers sustainable achievements and social benefits to the social enterprise sphere. This consciousness is relevant where professionally actors hit barriers in implementing their conception of sustainability in social areas or systems." (Schlömer 2011, p 138)

Open Educational Resources - OE

Open Educational Resource Types and Formats

Open Educational Resources are teaching, learning or research materials that are in the public domain or released with an intellectual property license that allows for free use, adaptation, and distribution. This open license permits authors to choose freely which rights they want to grant users. OER include individual material, course material, Videos, pod-casts or complete books. Any medium can be used to create OER. (UNESCO)

Resource **types** of OER are OER courses, learning objects, digital library collections, OER-Encyclopaedia, open text books, images and OER online archive.

OER resource **types** integrate of a variety of **format**, for example, text, video, images (e.g. graphic, charts, tables and photos) audio, animation, quizzers and games, multimedia in a combination of formats which may be interactive. Often the **resource types** overlap and fit loosely rather than rigidly into one or more categories.

License Conditions

A main aspect of OER are the conditions of licences. There are seven different forms of conditions.

PUBLIC DOMAIN	Authors wishing to place works completely into the public domain can do so with the CC0 mark. In such a case, all rights are surrendered, and the image can be used in any legal way.
BY	The least restrictive Creative Commons license, the Attribution or **CC-BY**, allows any user to "distribute, remix, tweak, and build upon your work," provided that they credit the original authors in all cases. This license would allow not just for downloading and copying something, but for textmining and other automated processes.
BY SA	The Attribution-ShareAlike, or **CC-BY-SA**, license builds upon the CC-BY by requiring that the user license any new products based on the original under identical terms (in addition to crediting the original author).
BY NC	The Attribution-NonCommercial, or **CC-BY-NC**, license allows for others to remix or otherwise alter the original material (with proper attribution), provided that they are not using it for any commercial purpose. There is no restriction on how the new material is licensed.
BY NC SA	The Attribution-NonCommercial-ShareAlike, or **CC-BY-NC-SA**, license combines the non-commercial restriction with the requirement to share new material under the same conditions, all with due credit.
BY ND	The Attribution-NoDerivs, or **CC-BY-ND**, license likewise requires proper credit for the original authors but also that the material be passed along in its entirety without any alteration.
BY NC ND	Finally, the Attribution-NonCommercial-NoDerivs, or **CC-BY-NC-ND**, license only permits users to download and share the original work (provided they credit the original source), without any alterations or commercial use. This license is the most restrictive of Creative Commons' offerings.

Table 1: License Conditions - UNESCO 2015

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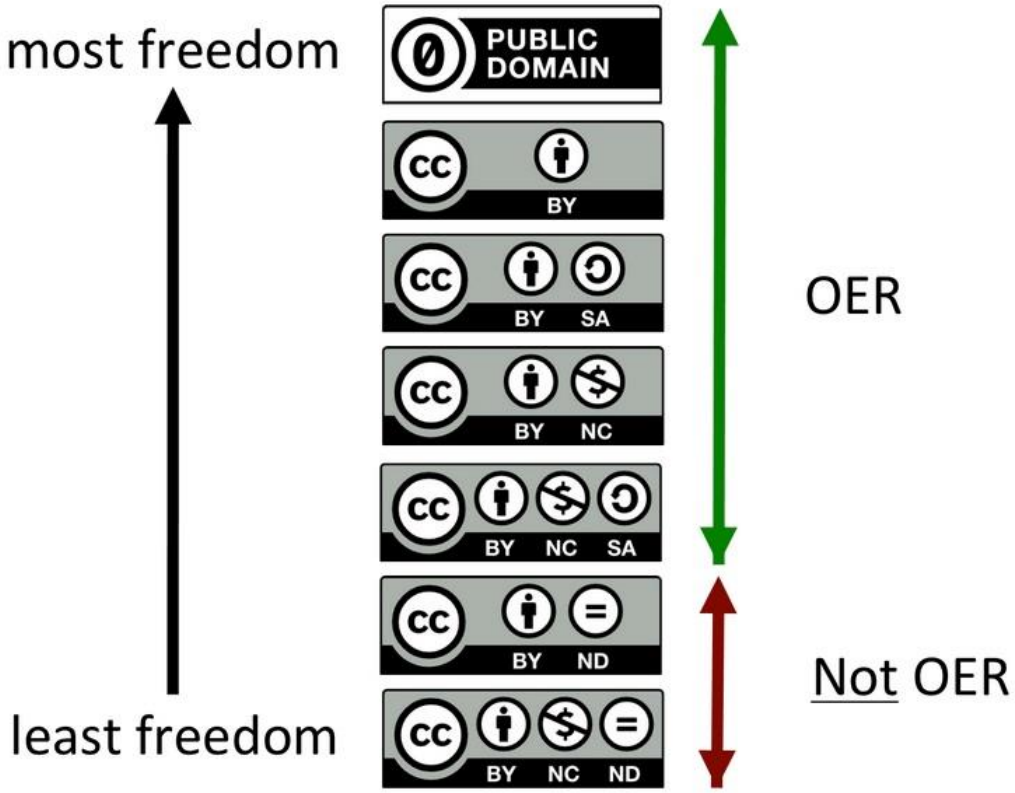

Table 2 – University of South Africa

The work on and with OER within the GreenSkills4VET project should be reduced to a practical level in order to avoid any denial by the teachers and trainers. Teachers and trainers will be confronted with embedding ESD, so it would arise a lot of obstacles confronting them with OER more than necessary. For teaching and training of OER experts should be involved. For this, the work on teaching material is one step to more cooperation within the staff in VET and a step on the transformation at the systemic level.

The teachers and trainer should be able to

- know the **resource types** and **formats** of OER
- know the different **licences** and der conditions
- use existing OER for teaching and training units

OER Competency Framework

D1 Becoming familiar with OER D1.1 Distinguish an OER from another resource D1.2 List some factors in the emergence of OER **D2 Searching for OER** D2.1 Use a search tool to find OER D2.2 Select appropriate OER **D3 Using OER** D3.1 Distinguish between the different types of Creative Commons licences D3.2 Respect the terms of Creative Commons		**D4 Creating OER** D4.1 Design OER D4.2 Revise OER D4.3 Remix OER D4.4 Co-create OER **D5 Sharing OER** D5.1 Choose a licence for an OER D5.2. Assessing a licence to an OER D5.3 Publish an OER D5.4 Promote an OER

Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR)
http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp

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Criteria for assessment of OER

1. Comprehensiveness
2. Content Accuracy
3. Relevance/Longevity
4. Clarity
5. Consistency
6. Modularity
7. Organization/Structure/Flow
8. Interface
9. Grammatical Errors
10. Learner's autonomy, independence, learner resilience and self-reliance
11. License clarity
12. Accessibility

(eLearning Papers - ISSN: 1887-1542 - https://www.openeducationeuropa.eu/sites/default/files/legacy_files/old/Assessment%20certification%20and%20quality%20assurance%20in%20open%20learning_40_0.pdf – 19.11.2017 - See also Saylor.org)

EQR – Level 4

	KNOWLEDGE	SKILLS	COMPETENCE
Level 4	Factual and theoretical knowledge in **broad contexts** within a field of work or study	A range of cognitive and practical skills required to **generate solutions** to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predict-table, but are **subject to change**; supervise the routine work of others, taking some responsibility for the evaluation and **improvement** of work or study activities

Tab. 3 Descriptors defining level 4 of EQF according to European Commission (2017)

ECEVET

Learning outcomes are described using the terminology and descriptors existing in the qualifications system (s. EQR above). The European definition of learning outcomes, which uses the terms of knowledge, skills and competence (see the EQF Recommendation), is the common denominator that fits with the diversity of existing approaches to describing learning outcomes.

ECVET does not provide a template or a taxonomy concerning the format of learning outcomes descriptions. Such templates or classifications may exist at national, regional or system level (for example as part of national qualifications frameworks). (ECEVET p. 14)

Learning outcomes

Statements of what a learner *knows*, *understands* and *is able to do* on completion of a learning process defined in terms of knowledge, skills and competence. (ECEVET p. 10)

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Useful tools/instruments to implement ESD and OER in VET

Reference model for professional action and competencies for sustainable economics.

In this model the differentiation of Chomsky between *competence* and *performance* is taken as its basis. (Chomsky, Noam: Aspects of the Theory of Syntax. 1970). The term *competency* is here understood as a cognitive construct that can produce a contingent behavior: *performance*. Both are not the same. To make this differentiation is quite important to format learning processes. In this sense, *competence* is seen as "an individual potential whose varying applicability is decided on by the learners themselves. This assumption can also be found in Weinert's (2001, p. 27) often-cited definition stating that competencies are 'the cognitive abilities and skills that are available to or learnable by individuals to solve certain problems. They also include the associated motivational, volitional, and social willingness and abilities to successfully and responsibly apply these problem solutions in variable situations.' (Rebmann, p 4)

	Perspective of the commercial model development	Perspective of the competence development
Result level	**Dimension of Performance:** – Sustainable development as a social and political model – Sustainable development as a business model in logistics	**Dimension of Competences:** Competence for sustainable management of the teachers, trainers and trainees **Recognising - Assessing - Acting** – Professional competence – Method competence – Shaping competence – Ethical-moral competence – Social competence – Abstraction competence – Civic competence / active citizenship in a local and global manner
Activity und learning level	**Dimension of activity:** – Employer-employee relationship – Working system – Job requirements and qualifications – Collaboration and teamwork **Action premises:** – Workers' Participation – Value creation on the company level - Corporate Social Responsibility (CSR), Sustainability – Lifelong learning – Digitization – Industry 4.0 – Job market – VET-system	**Dimension of learning:** Didactic and curricula for sustainable economic in VET **Learning premises:** – Learning to know – Learning to do – Learning to live together – Learning to be – Self-organized learning – Participating in the learning and teaching process – OER competences

Table 3: Model of competences for sustainable economy adapted from Schlömer (2009: 104)

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10 steps for creating competence oriented teaching material

A strategy for planning the development of the teaching material is necessary to enhance the quality of the results.
Schott et al. (2012: 161) worked on this matter based on a large empirical research and developed a pattern for compiling teaching lessons. It goes back to the concept of "GovI" – "Goal-valid Instruction" from the same authors.
The scheme (s. Tab 2) can also be used for the development of teaching materials. The structure consists of three phases and four modules with ten steps. This instruction should be the guideline for the development of the aimed outcomes of the project.

10 steps for creating competence oriented teaching material, separated in 3 phases and 4 modules		
PHASE 1: Objective	**MODULE 1: Concretion of the learning target in accordance to the aimed competences**	
	STEP 1:	Defining the general learning target and sub-goals according to a demand analysis and their embedment in concerning subject areas as well as consideration for transfer
	STEP 2:	Specification of the sub-goals and identifying the relations between them
	MODULE 2: Competence-oriented lessons/teaching materials	
	STEP 3:	From the gross teaching subjects to the net teaching subjects [1]
PHASE 2: Analysis of the scope of design	STEP 4:	Analysing the shaping possibilities concerning the needs of the learners, the net teaching subjects, the boundary conditions and the possibilities to arrange the learning environment
PHASE 3: Construction of teaching materials	STEP 5:	Construction of the reconstructed, situationally learning tasks
	STEP 6:	Construction of the reconstructed, situationally learning environment
	MODULE 3: Competence oriented assessment	
	STEP 7:	Construction of *relevant* tasks
	STEP 8:	Considerations of *formative* learning assessment
	STEP 9:	Construction of the *summative* learning assessment
	MODULE 4: Quality assessment	
	STEP 10:	Quality assessment of the lessons
10 steps for creating competence oriented teaching material, separated in 3 phases and 4 modules		

Competence-Template

[1] Net teaching subjects: the increasing part of learning – behaviour modification. Gross teaching subjects: the whole amount which has to be learned

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The following chart shows an exemplary compilation of competences, tasks, operators, performance and an expected level of solving the tasks.

VET competences EQR 4 The trainees/students are able to (…)	Core competences ESD (Objectives)	Tasks	Opera-tor	Cross-cutting key compe-tences ESD	Performance ECVET	Level
acquire information about political, eco-nomic, social and eco-logical developments and decisions at na-tional, European and global level	1. Acquisition and processing of in-formation (…) acquire information on issues of globalisation and development and process it topic-relatedly.	State the limitation of CO_2 emission on the national and European level. Name at least three impact of a high emission on CO_2 on the global climate.	name	(1), (6)	The actual limits are named. Three im-pacts are named (global warming, sea-level rise, desertifica-tion)	at least 50 % of the tasks have to be solved

ILIAS

The following image shows the screenshot of ILIAS. ILIAS can be used for interactive *eLearning*. It provides a wide range of useful tools to develop and manage learning units and courses.

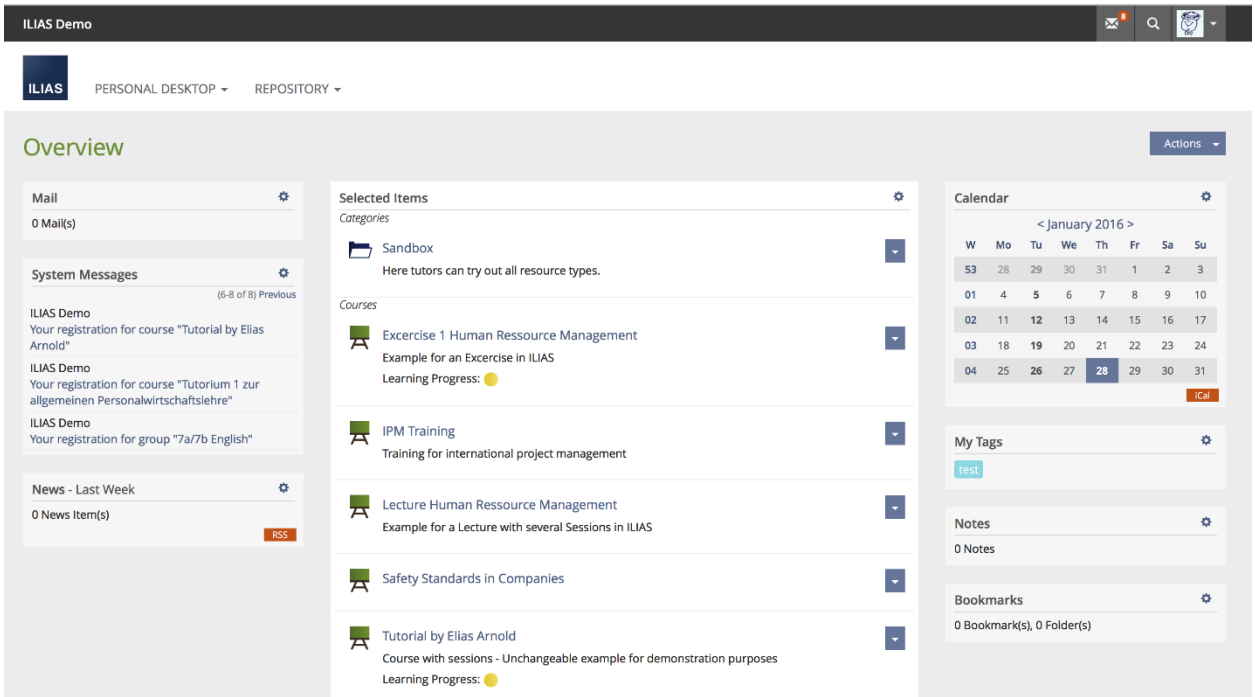

Image 1: https://www.ilias.de

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