Learning outcomes in ESCO

QUATREC 2 international conference

Francesco Losappio
EMPL ESCO Secretariat
European Commission
DG Employment, Social Affairs and Inclusion
Unit E1 – Labour Mobility, Public Employment Services, ELA

EU policies promoting learning outcomes

- ***European Qualifications Framework (EQF):*** *driver of the learning outcomes approach – enhances transparency and comparability of qualifications – opens the path to validation*
- *Learning outcomes are increasingly used, but challenges still persist (e.g. teaching, assessment).*
- *Currently, work is on-going work on developing* ***Guidelines*** *for* ***short description of learning outcomes*** *for their publication in databases/registers.*
- *ESCO: a tool to enhance common understanding of concepts when drafting learning outcomes.*

Why is ESCO relevant for qualifications?

ESCO is a common reference language that supports:

- transparency
- comparison,
- identification and
- analysis of the content of a qualification.

Describe & understand Learning outcomes of qualifications

Skills & knowledge as common factor

Enhance personalised career guidance services

Recommend personalised career paths & learning

Support validation of informal/non-formal learning

Digital badges/micro-credentials

How to use ESCO for qualifications/training?

- Use the occupational profiles as a starting point
- Get inspiration from the skills and competencies described in ESCO
- Make use of the IT tool (soon to be provided publicly) on referencing learning outcomes of qualifications to ESCO skills
- Use ESCO skills for developing skills intelligence (skills in high demand) & use the results to inform curricula reform

0 - Armed forces occupations +
1 - Managers +
2 - Professionals +
3 - Technicians and associate professionals −
31 - Science and engineering associate professionals −
311 - Physical and engineering science technicians +
312 - Mining, manufacturing and construction supervisors −
3121 - Mining supervisors +
3122 - Manufacturing supervisors −
3122.1 - dairy processing technician
3122.2 - food production planner
3122.3 - industrial assembly supervisor +
3122.4 - production supervisor +
3122.5 - waste management supervisor
3123 - Construction supervisors +

industrial assembly supervisor

Discuss in the forum
Download

Technicians and associate professionals ›
Science and engineering associate professionals › Mining, manufacturing and construction supervisors ›
Manufacturing supervisors › industrial assembly supervisor ›

Description

Code

3122.3

Description

Industrial assembly supervisors are in charge of organizing, planning and coordinating assembly operations. They keep track of all the work activities and manage the process for efficient functioning in order to tackle problems such as production loss. They answer to the industrial production and the manufacturing manager.

Alternative Labels

production assembly supervisor | assembly forewoman | assembly foreman
assembly controller | assembly line supervisor | goods compliance supervisor
assembly chargehand | assembly co-ordinator | quality control supervisor
assembly planner | assembly overseer | goods production supervisor
assembly team leader | quality supervisor | industrial assembly supervisor

Skills & Competences

Essential Skills and Competences

manage budgets | oversee assembly operations | manage health and safety standards
adjust production schedule | create manufacturing guidelines
provide department schedule for staff | meet deadlines | develop manufacturing policies
create solutions to problems | report on production results
wear appropriate protective gear | liaise with managers | train employees
plan shifts of employees | follow production schedule | manage resources
read standard blueprints | oversee quality control | optimise production
supervise work | manage staff | control production
cope with manufacturing deadlines pressure | analyse production processes for improvement
define manufacturing quality criteria | oversee production requirements
keep records of work progress | communicate production plan | meet productivity targets

Essential Knowledge

manufacturing processes | industrial software | industrial engineering
quality standards | industrial design | production processes

Optional Skills and Competences

perform data analysis | follow manufacturing work schedule
manage manufacturing documentation | disaggregate the production plan
arrange equipment repairs | adapt production levels | advise on machinery malfunctions
evaluate employees work | apply control process statistical methods
monitor manufacturing quality standards | ensure finished product meet requirements
communicate problems to senior colleagues | analyse the need for technical resources
recruit personnel | plan manufacturing processes | check material resources
liaise with quality assurance | motivate employees | use CAM software

Why linking qualifications to skills

Enrich information on qualifications: linking their learning outcomes to skills allows to directly identify relevant qualifications for missing skills.

Promote transparency of information on qualifications: employers grasp qualifications' labour market value in a cross-border context, thus supporting labour mobility.

Individuals improve chances on labour market through better skills-based job matching.

Support upskilling-reskilling by matching individuals with the right training.

ESCO Linking Pilot: Background

2018 study recommended testing an automated approach based on Natural Language Processing with an initial degree of human intervention.

COM presented the study outcomes during the 2019 EQF AG/MSWG joint meeting and proposed to pilot the proposed approach.

A pilot project with 5 Member States (LV, NL, PL, RO and SI) was conducted in 2019. COM developed a first proof of concept for an IT tool supporting the linking of LOs to skills.

A second pilot was organised in 2020. COM provided an improved version of the IT tool.

Objectives of the pilot

Testing the linking in different EU languages and for qualifications of different type and levels.

Gather verified data on the links between learning outcomes of qualifications and ESCO skills in order to further improve the underlying algorithms.

Test the improvements of ESCO v.1.1 and the application of the revised transversal skills structure in this domain.

Test how ESCO skill groups can be used to introduce a certain level of abstraction for qualifications from higher EQF levels.

Getting feedback on the ESCO skills pillar.

Technical Solution

Machine Learning Algorithm

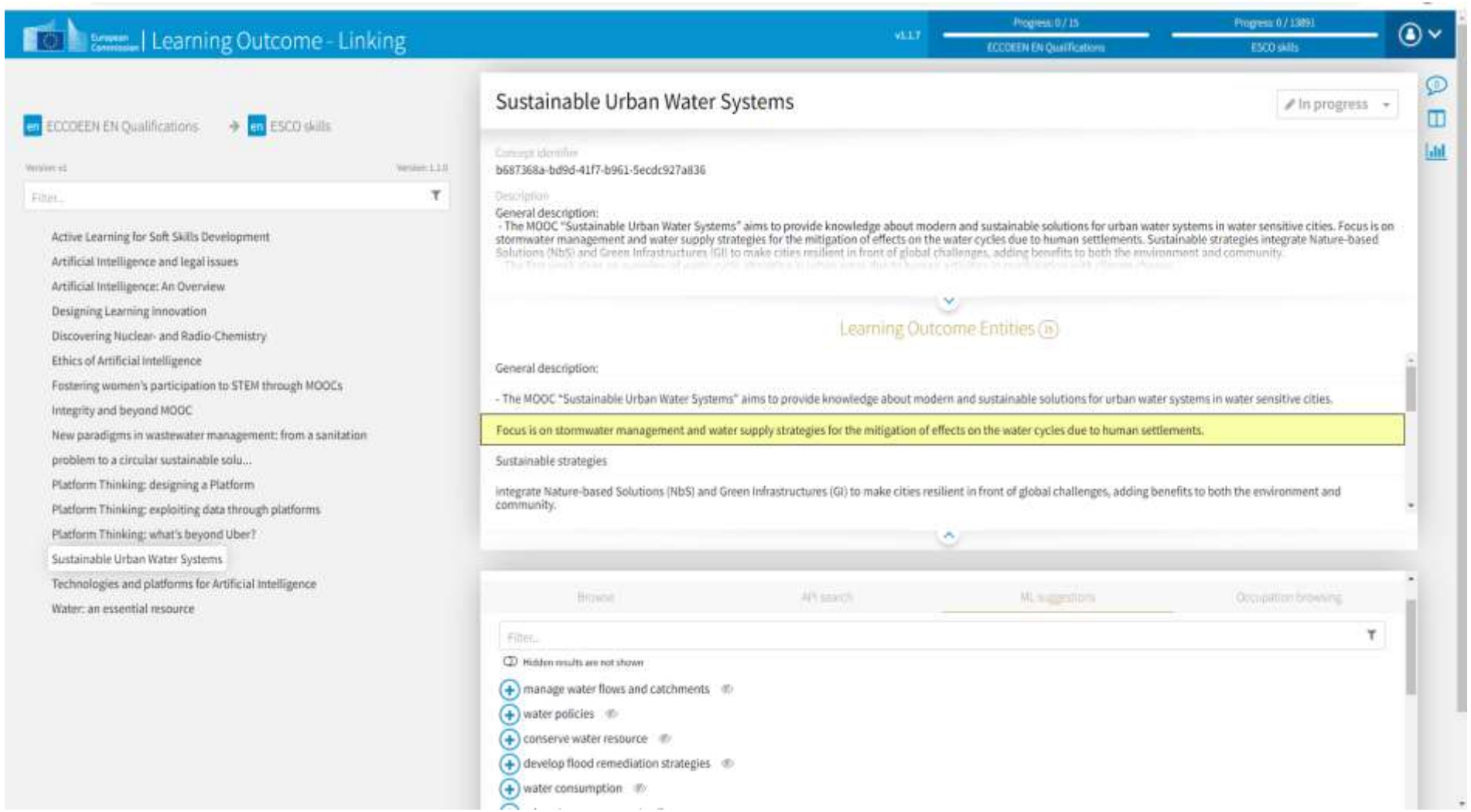
Expected Output:

Suggestions of ESCO skills based on the input text

Challenges:

- Input texts in several languages
- Input text variations: broad vs. detailed descriptions
- Relevant segmentation of the text
- Word ambiguity
- Concepts “compatibility”

ESCO linking pilot



European Commission

Features of the third phase

18 participants:

- 7 EU MS
- 1 EU Agency
- 5 training providers
- 4 private companies
- 1 third country organisation

Qualifications to be tested:

- Both higher education and VET
- Formal and non-formal.
- Private and Apprenticeships qualifications
- Covering EQF levels 3-8
- Min 30, max 250

Improvements on algorithm to suggest skills

Skill suggestions based on three algorithms in the new version of the tool:

- Word2vec model: English
- Semantic Embedding Mapping model: English
- Sentence BERT: Multilingual

Available validation data allow to compare performance and iteratively improve:

	All_esco_api	All_w2v	All_sem11	All_sem13	All_sem17	All_sem18	SBert1	SBert6	SBert7	SBert8	Combined
Unique Total Records	3232	3259	3213	3213	3213	3213	3240	3244	3244	3244	3283
Unique Top1	0.170482673	0.304081	0.16651105	0.2159975	0.2296919	0.2284469	0.2148148	0.2096178	0.212392	0.204377	0.2564727
Unique Top3	0.301670792	0.484198	0.28913788	0.3709928	0.3856209	0.3918456	0.3632716	0.3757707	0.372996	0.348952	0.4794395
Unique Top5	0.366955446	0.564284	0.35792095	0.4431995	0.4662309	0.4721444	0.4469136	0.4627004	0.45561	0.433724	0.5653366
Unique Top10	0.452970297	0.659712	0.44475568	0.5496421	0.5739185	0.5689387	0.5469136	0.573058	0.565351	0.544698	0.679866
Unique Top20	0.529393564	0.734581	0.53283536	0.6277622	0.660442	0.6495487	0.645679	0.6747842	0.660604	0.646424	0.7675906

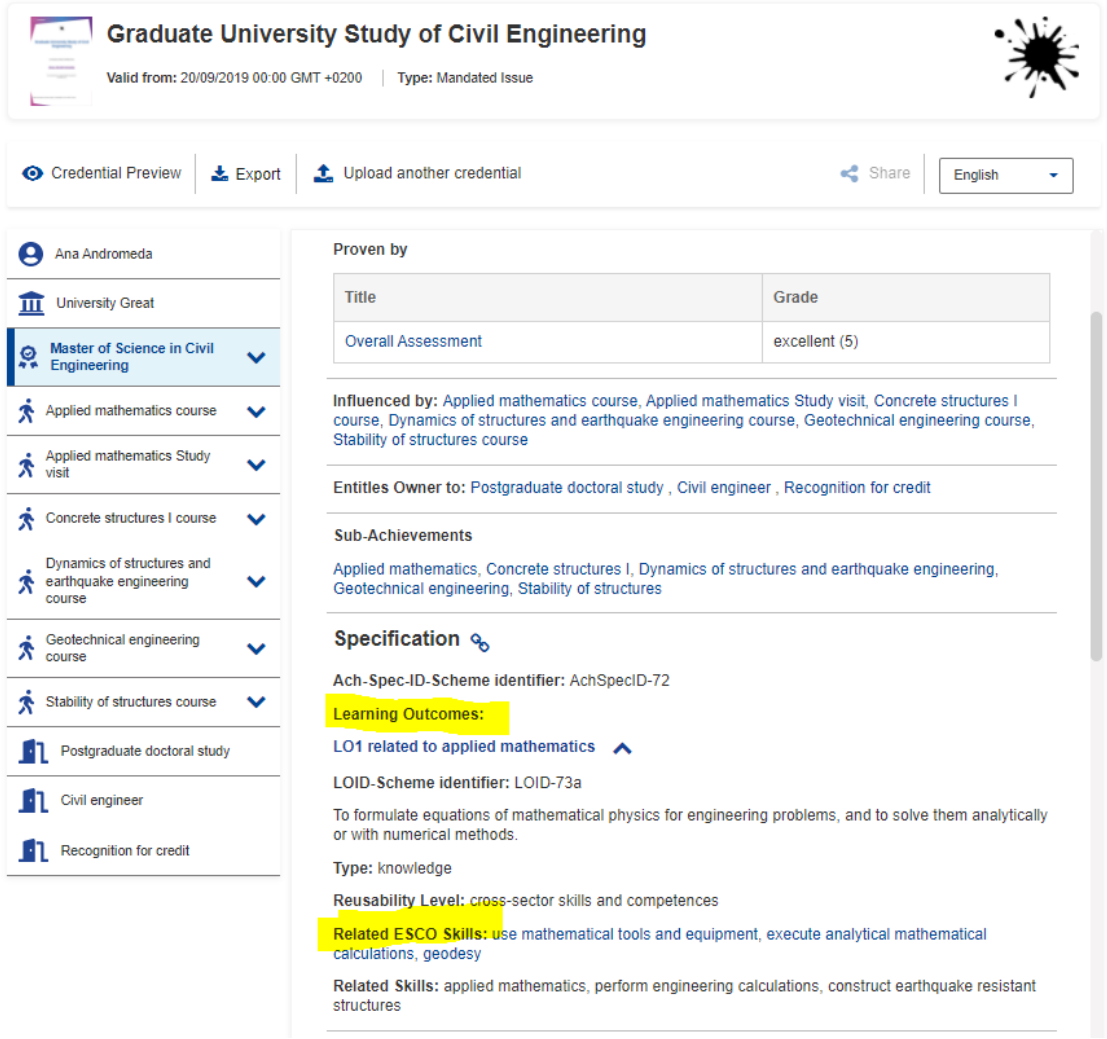
Lessons learned

- Linking learning outcomes to skills is done best in the native language.
- Human intervention is an important component for ensuring quality of linking.
- Further improvements of the AI algorithm will reduce the time and resources needed to perform the work.
- Level of granularity and sectoral coverage of ESCO skills can lead to different results according to type of qualifications tested.
- The structure of learning outcomes is a key factor for the functioning of the AI algorithm.

Lessons learned

- The ESCO skills hierarchy supports the search of relevant skills within the ESCO dataset.
- Linking to higher levels of the hierarchy and an improved transversal skills structure could further support qualitative linking, in particular for HE qualifications.
- On average, 1 to 3 ESCO skills or knowledge concepts are mapped to each learning outcome.
- The performance of the AI algorithm showed promising results, however more data are need to further improve quality of suggestions.

ESCO in practice: European Digital Credentials for



ESCO:

- *describing, identifying and classifying professional occupations and skills relevant for the EU labour market and education and training area*
- *systematically showing the relations between those occupations and skills*

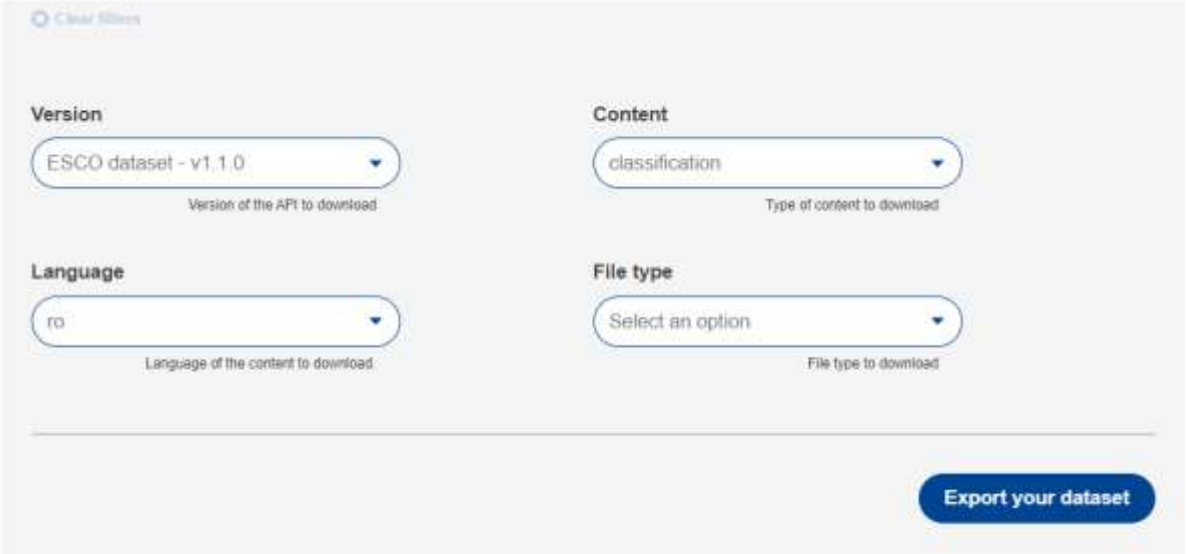
ELM allowing cross-references

European Commission

How to get started with ESCO?

DOWNLOAD
From the ESCO Portal

https://esco.ec.europa.eu/en/use-esco/download



UPON REQUEST
ESCO Secretariat
EMPL-ESCO-SECRETARIAT@ec.europa.eu

Technical support on how to use ESCO

European Commission


THANK YOU