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SKILLS ALIGNMENT FOR LIFELONG LEARNERS IN HIGHER EDUCATION: SMART CATALOGUES FOR RESKILLING AND UPSKILLING PATHWAYS

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Abstract

The future of work and the ever-changing skills demand in the labour market has been a constant debate and pressing challenge for higher education institutions (HEI's), governments and industry. In the current context, HEI's must increase the transformational effect of education on people's employability, on organizations' competitiveness and on society's progress. This paper presents the design and development of a mock-up career guidance tool to empower lifelong learners through digital reskilling and upskilling. We discuss the methods used for designing a skills alignment tool and a smart catalogue for identifying stackable training pathways in two specific disciplinary domains. The skills alignment methodology features a skill gap analysis (SGA) in the occupational domains of Data Science and Chemistry, linked to the evolution and demand of the European labour market through an ESCO compatible tool. The smart program catalog presents the necessary program information to facilitate the creation of stackable training pathways. Considerations are made for the importance of virtual career guidance tools for lifelong learners as we face the ever-changing demand of the labor market and as we continue to embrace online education, micro-credentialing and the digital transformation of higher education.

Keywords

Lifelong learning, Agile Continuous Education, Skills Alignment, Skills Gap, Skills Mapping, Upskilling, Reskilling

Introduction

The future of work and the ever-changing skills demand in the labour market has been a constant debate and a pressing challenge for higher education institutions (HEI's). Economic growth across all sectors has been driven by the digitalization of public organizations and private enterprise. According to a report from Gartner (2020) digitalization-driven skills shifts can be described by three central tendencies; (a) new skills are emerging driven by accelerating technological advancements; (b) skills are evolving through shifts toward big-data oriented tools and artificial intelligence; and (c) yesterday's skills are expiring as technology performs more and more tasks faster and cheaper than humans, exemplified by the enormous influence of ChatGPT at the beginning of 2023. Educational leaders need to interpret the current higher education zeitgeist and strategically respond to the need for agile continuous education and lifelong learning for new and working professionals.

In this dynamic context, lifelong learners need insights into the new and different skills they will need for career growth and the potential offerings that could support their goalsProviding guidance for lifelong learners in a labour market in continuous evolution has become a clear goal for governments and educational organizations. HEI's have a key role for empowering lifelong learning, and the development of novel forms of career guidance leveraged by data on skills demand. By implementing skills alignment methodologies, that is, methodologies that ensure that learners 'skills are well matched to current skill needs in their desired roles or occupations HEIs can

help individuals identify their skills, match them with relevant career paths, and make more informed decisions about their educational and professional development..

This paper presents the results of an Erasmus + project, D-Reskill, whose objective is developing the prototype of a learner-centric career guidance tool to support digital reskilling and upskilling for employability. To that end, the D-Reskill project consortium has put together a team of practitioners, educational leaders, labor market experts, policy-makers, technologists and innovators. The core motivations behind this work relate to empowering individuals to make informed career decisions; and create new learning and career pathways using digital career guidance tools, while ensuring that the qualifications and training pathways offered by HEIs match the evolving demands of the labour market.

D-Reskill responds to the "European Skills Agenda", which prioritizes equity and inclusivity as a key instrument of socioeconomic development and excellence. The Skills agenda assumes that public universities can play a pivotal role in providing innovative lifelong learning pathways and agile continuous education solutions to support employability in key economic sectors. The project aim is to be accessible, readily applicable, and responsive, thanks to its alignment with the European Skills, Competences, and Occupations (ESCO) database (European Commission, 2022) and the European Learning Model (ELM) (2023).

In this article we intend to contribute to the existing literature on skills alignment technologies for career guidance in HE in three ways: (1) by offering conceptual and methodological guidelines for a mock-up career guidance tool; (2) by emphasizing a user-centered design and UX research approach; and (3) by presenting two use cases for skills alignment in the field of Data Science and Chemistry.

Project Objectives and Justification

The D-Reskill project is based on the premise that individuals aiming to enter the workforce or grow their careers need effective and timely opportunities for reskilling or upskilling supported by novel forms of career guidance tools. Such tools should enable individuals to identify their skills, match them with relevant training pathways and career opportunities, and make informed decisions about their educational and professional development. Following a user-centred design approach, the project aims to:

- Design a proof of concept (mock-up) of a career guidance tool to support agile continuous education through digital reskilling and upskilling.

- Design the proof of concept of a tool for identifying stackable micro-credential compatible training pathways, based on an identified Skill Gap Analysis (SGA) in the occupational domains of Data Science and Chemistry and linked to the evolution and demand of the European labour market.

- Develop the conceptual, methodological, and technical guidelines for designing an ESCO-compatible smart digital course catalogue that can support skills alignment and the identification of training pathways through micro-credentialing for users.

- Maximize impact via an active dissemination plan to ensure visibility and continued project sustainability.

The DRESKILL@U project builds on the most recent policy agenda for the European Higher Education Area (EHEA), with a particular emphasis on the alignment between education and training systems and the labour market. It is based on and complements ongoing policy discussions related to lifelong learning and employability established in the July 2020 Skills Agenda and the 2022 Council Recommendation on a European Approach to Micro-credentialing (European Council, 2022), including the role of micro-credentialing for transformation and change management in higher education (Brown et al., 2023). D-Reskill also uses the multilingual classification of European Skills, Competences, and Occupations (ESCO) developed by the European Union (EU) to describe and categorize skills in a common format across EU countries. D-Reskill follows the ESCO handbook use case

of supporting and improving career guidance services through competence assessment and by matching skill profiles to new learning opportunities through micro-credentials (European Union, 2017).

As a collaboration across 4 distinct national education systems (France, Budapest, Italy, and Spain), D-Reskill uses policy tools developed for the EHEA, including the European Qualifications Framework (EQF), and the European Credit Transfer and Accumulation System (ECTS). According to Europass (2022), the EQF "is an 8-level, learning outcomes-based framework for all types of qualifications that serves as a translation tool between different national qualifications frameworks. This framework helps improve transparency, comparability and portability of people's qualifications and makes it possible to compare qualifications from different countries and institutions"(Europass, 2022). By using such EHEA policy mechanisms,   D-Reskill can operate in a transparent and comparable way across distinct education systems.

Conceptual and Methodological Guidelines

D-Reskill proposes a mock-up of a career guidance tool, that following a skills alignment methodology, is able to do the following:

Skill Assessment: First, the tool begins by assessing the skills of the user. Various methods can be used, such as self-assessment questionnaires, online tests such as the [ELM digital skills test](#), interactive exercises, or inferring the user´s skills based on work experience and occupation. The assessment should cover a wide range of skills, including technical, and transferable. This step recognizes that a lifelong learner has previous education and work experience and that this needs to be expressed as a standardised set of knowledge and skills, classified, as previously mentioned according to ESCO.

Occupation/Skills Database: Based on ESCO, the tool provides a comprehensive database of skills required in various occupations and sectors. To reflect the evolving nature of job roles and emerging skills in the labor market, the database should be updated regularly. The skills database allows the user to choose a targeted occupation and be assessed against the benchmarked knowledge and skills to perform it.

Skills Mapping: The tool compares users' skill assessment results with the skills needs in a targeted occupation or role. Based on the user skill profile, it would identify the skills that closely match the individual's proficiency and highlight areas where skill development may be needed.

Career Exploration: The tool allows to explore different occupations and roles and provides personalized career suggestions based on the skills mapping. Recommendations for specific occupations or industries would be made that align with the individual's skills and interests.

Learning Opportunities: Using a digital "smart catalogue" and advanced algorithms, the tool recommends relevant learning opportunities to bridge any skills gaps identified during the skills assessment and mapping process.

Figure 1 below provides a conceptual overview of the D-Reskill skills alignment methodology.
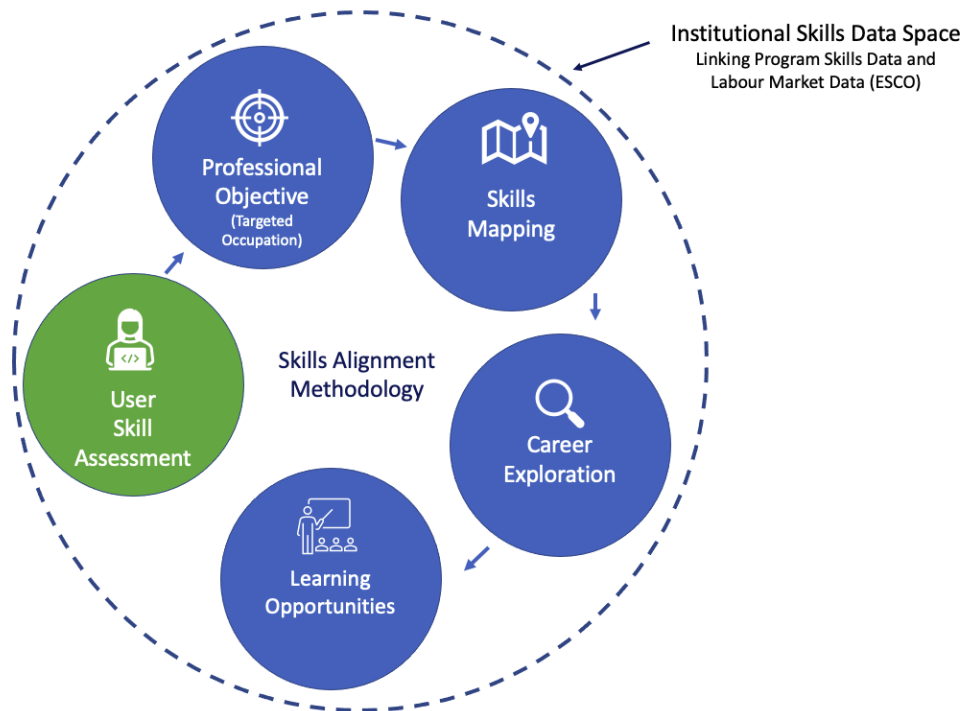
Figure 1 Conceptual overview of the D-Reskill skills alignment methodology

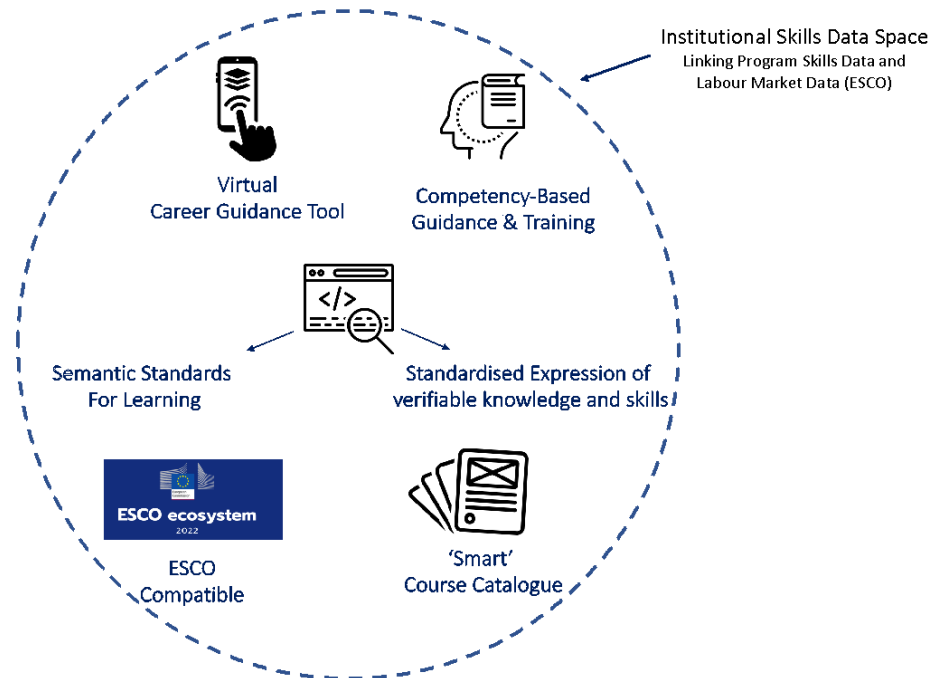The core conceptual features of this system are as follows (See also Figure 2):.

Figure 2 Core Conceptual Features of D-Reskill System

A *competency-based career guidance and training* approach focuses on developing and assessing specific skills and abilities required for success in a particular occupational domain or job role. It emphasizes the practical application of knowledge and the demonstration of specific competencies, rather than solely relying on traditional measures like educational qualifications or years of experience. The tool will be *ESCO* compatible, in line with the objective of serving as a common and interoperable tool across European countries to connect employment and education. While there are other skills ontologies, such as *ONET, or those from Lightcast or the World Economic Forum that could be used, ESCO has the desirable characteristics of being: European created, open source, well documented and updated regularly. Finally, *a smart catalogue of offerings* aligned with the objectives of the ELM. This includes implementing semantic standards for learning; i.e. standardized frameworks and formats used to organize and describe learning contents and outcomes and a standardized expression of verifiable skills and knowledge linked to academic programs and training pathways.

Skills Mapping and Defining Skills Gaps

Skills mapping is a process of identifying and assessing the skills possessed by individuals or organizations. It includes mapping out the specific skills and competencies required for various job roles or occupations and then benchmarking the skills of individuals or teams against common requirements. For individuals, skills mapping provides a comprehensive overview of an individual's professional profile, highlighting strengths, gaps, and areas for development. Thus, a major motivation for the "Skills Agenda" is the existence of a skills gaps for individuals throughout their careers, which has been described as:

"a fundamental mismatch between the skills that employers rely upon in their employees, and the skills that job seekers possess. This mismatch makes it difficult for individuals to find jobs and for employers to find appropriately trained workers" (Brookings Institute, 2022).

A Skill Gap Analysis (SGA) is a procedure central to the skills alignment methodological and technical specifications of the D-Reskill software, is defined as the disparity between a user´s current skills profile and the skill profile required to perform in the target occupation.

Skill Gap Analysis	The process of identifying the disparity between a user's:
	(a) current skill profile based on a skills assessment -skill self-assessment survey, online test, interactive exercises -inferred from current educational level, -inferred from current occupation and associated skill profile AND (b) a desired target occupation and associated skill profile

A core goal has been to develop methodological guidelines for identifying user skill gaps, most examples of SGA's come from the world of work and human resources development. SGA's are not commonly used in higher education and therefore we have developed two specific use cases for career transitions in the occupation of Data Scientist and Chemistry, as is throughout this article.

Core users of the D-Reskill system

The core users of the DRSKILL@U system are lifelong learners, teachers learning providers and industry partners (see Figure 3) The central user is a lifelong learner in need of agile continuous education to meet short- and long-term professional goals.

- Develop User-skill profile
- Competency-based training pathways
- Career Management Skills

Lifelong Learner

- LMI aligned Competency Based Training

Teacher Partners
Learning Providers

Industry Partners

Provide:
- Labour Market Intelligence
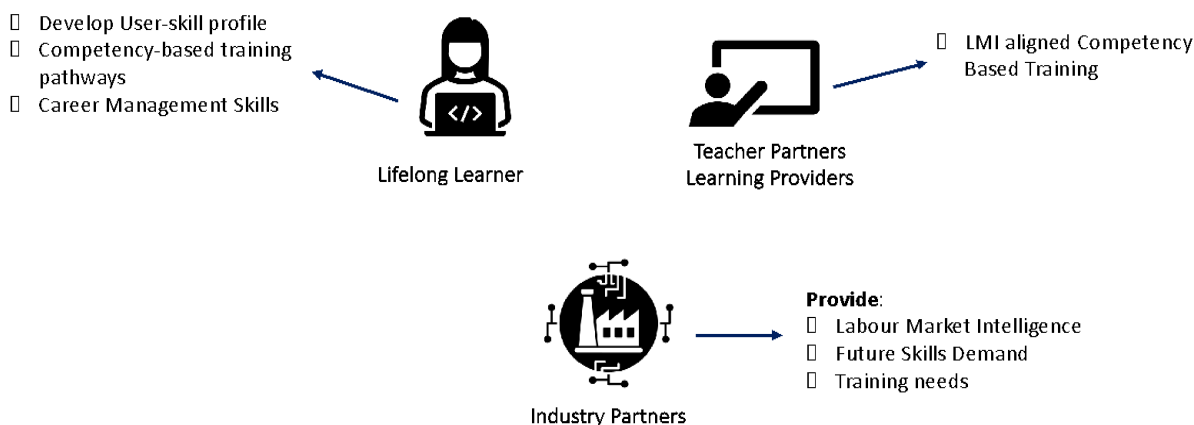- Future Skills Demand
- Training needs

Figure 3 Core users of D-Reskill

Lifelong learners engage with the tool to perform skills assessment, career exploration in relation to their professional objectives, and to access relevant learning opportunities that can address their skill gap. Teachers and learning providers use the system to upload training opportunities using a competency based approach. including relevant metadata such as learning outcomes, length and depth of learning etc., which can allow the tool to recommend learning opportunities in specific occupational domains. Finally, industry partners may use the system to provide real-time data on the skills demand in specific industries, for example data science or chemistry, based on current or extended ESCO skill profiles.

A User-Centered Design Approach

In line with project goals, D-Reskill follows a a user-centered design approach, incorporating some generative user-experience research techniques, including a user experience mapping technique (Gibbons, 2018) which is presented in Figure 4 below through user journey mapping. This serves to visualize the tasks and experiences that a learner goes through to accomplish the overall goal of using the D-Reskill system for receiving virtual career guidance.
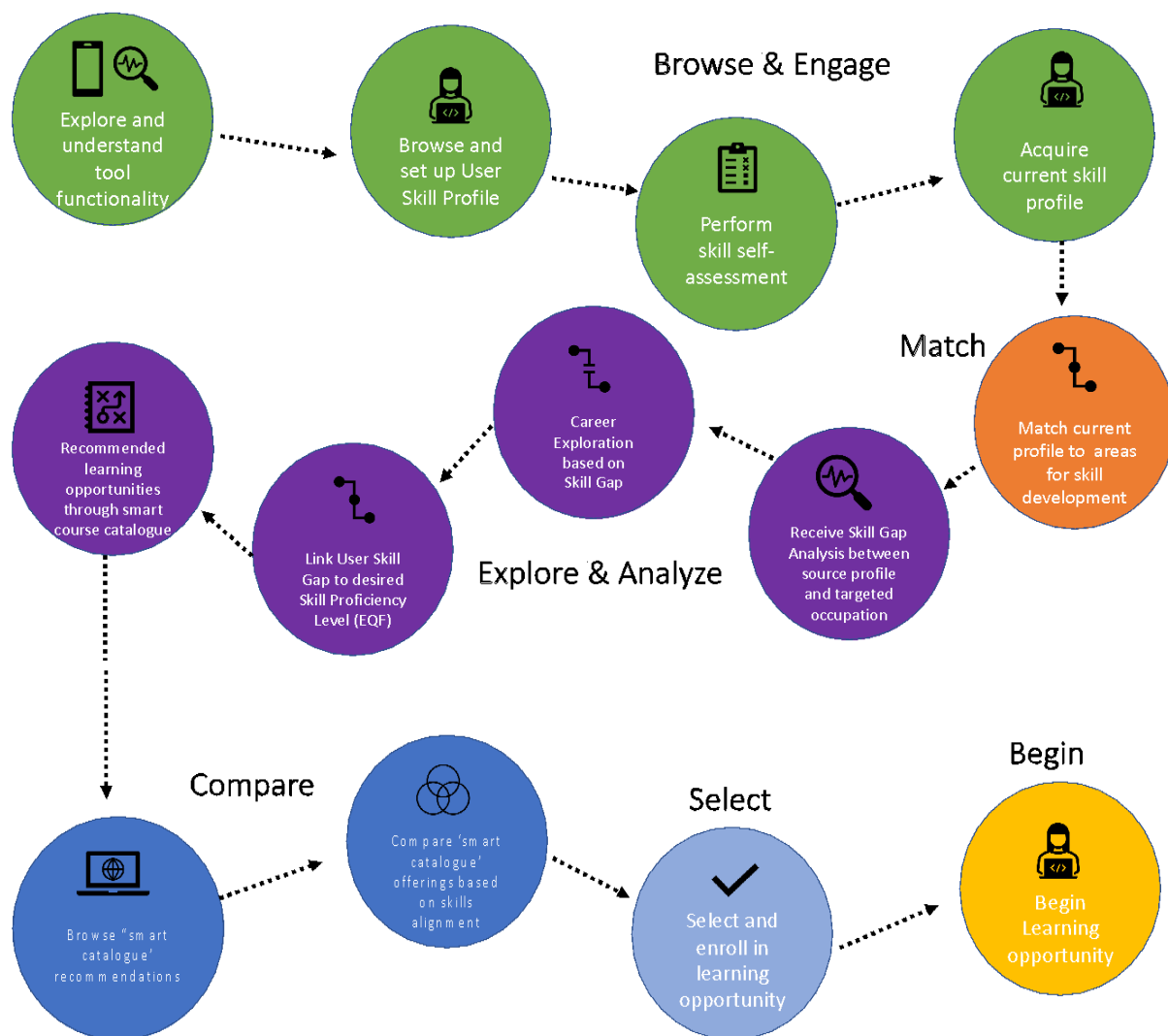
Figure 4 D-Reskill User Journey Mapping

Determining skill proficiency levels

Whether the skill alignment procedure allows identifying the skills that a learner requires to achieve a determined career goal, it does not provide an assessment of the level of proficiency needed for each skill.: Therefore, determining skill proficiency levels was a   a core challenge of the project. The project proposed a Skill Proficiency Scale (see Table 1), avital feature for the internal algorithms of the career guidance software. This scale has been adapted for precision and clarity from previous European projects, namely OpenSkimr (MCI, 2017), which aimed to match learners with in-demand skill development for career transitions, as well as from Entrepreneurship competence framework (Bacigalupo et al., 2016). The scale rates skill proficiency levels at different qualification levels and their associated educational levels, according to the European Qualification Framework. This proficiency scale is used for the learners´ skill-assessment, for the skills mapping exercise (stating at what level of proficiency each skill needed to carry out a given occupation or role needs to be performed) and for the course catalog (stating the level of skills proficiency achieved after undertaking a given program or course).

Table 1 D-Reskill Skill Proficiency Scale

D-Reskill Skill Proficiency Scale					
EQF Level	N/A	EQF-5 <-----------------------EQF6------------------------EQF7--------------EQF-8			
Example Educational Level	N/A	Undergraduate <--------------------- Masters ------------------------Doctoral			
Skill Proficiency Scale	No Experience/ Competence Level 0	Novice Level 1	Experienced Level 2	Advanced Level 3	Specialized Expert Level 4
Self-Assessment Survey Scale	N/A	User has limited skill/knowledge experience	User has some skill/knowledge autonomy, although some help may be required	User has full skill/knowledge autonomy, and is capable of coaching others	User is a recognized authority

Use Case I: Career transitions in Data Science

In Use Case I, we used ESCO's skills classification for Statistician and Data Scientist to conduct a SGA to analyze the disparity between the two skill profiles, as shown in Tables 2 and 3. Table 2 represents the skill profiles of target and source occupation. Many skills are common between the two occupations. Which implies that a person that makes this transition, will be able to reuse many of their existing skills. Table 3 presents the skill gap between source and target occupation.

Table 2 Skill pillar based on target and source occupation, based on ESCO's skills classification

Target Occupation: Data Scientist Skills/Competencies	Source Occupation: Statistician Skills/Competencies
apply research ethics and scientific integrity principles in research activities	apply for research funding
	apply research ethics and scientific integrity principles in research activities
build recommender systems	apply scientific methods
collect ICT data	apply statistical analysis techniques
communicate with a non-scientific audience	communicate with a non-scientific audience
conduct research across disciplines	conduct quantitative research
deliver visual presentation of data	conduct research across disciplines
demonstrate disciplinary expertise	demonstrate disciplinary expertise
design database scheme	develop professional network with researchers and scientists
develop data processing applications	disseminate results to the scientific community
develop professional network with researchers and scientists	draft scientific or academic papers and technical documentation
disseminate results to the scientific community	
draft scientific or academic papers and technical documentation	evaluate research activities
establish data processes	execute analytical mathematical calculations
evaluate research activities	gather data
execute analytical mathematical calculations	identify statistical patterns
handle data samples	increase the impact of science on policy and society
	interact professionally in research and professional environments
implement data quality processes	
increase the impact of science on policy and society	manage findable accessible interoperable and reusable data

interact professionally in research and professional environments

interpret current data

manage data collection systems

manage findable accessible interoperable and reusable data

manage intellectual property rights

manage open publications

manage personal professional development

manage research data

mentor individuals

normalise data

operate open source software

perform data cleansing

perform project management

perform scientific research

promote inclusion in research

promote open innovation in research

promote the participation of citizens in scientific and research activities

promote the transfer of knowledge

publish academic research

report analysis results

speak different languages

synthesise information

think abstractly

think analytically

use data processing techniques

use databases

write scientific publications

manage intellectual property rights

manage open publications

manage personal professional development

manage research data

mentor individuals

operate open source software

perform data analysis

perform project management

perform scientific research

process data

promote inclusion in research

promote open innovation in research

promote the participation of citizens in scientific and research activities

promote the transfer of knowledge

publish academic research

speak different languages

synthesise information

think abstractly

think analytically

write scientific publications

Table 3 Results of SGA between Statistician and Data Scientist

Skill gap between target and source occupation
build recommender systems
collect ICT data
deliver visual presentation of data
design database scheme
develop data processing applications
establish data processes
handle data samples
implement data quality processes
interpret current data
manage data collection systems
normalize data
perform data cleansing
report analysis results
use data processing techniques
use databases

Use Case II: Career transitions in Chemistry

Similar to Use Case I, in order to measure a skill gap between two occupations in the chemistry domain, a source and target occupation were considered. Use Case II included the source occupation of Chemistry

Technician (ESCO ID 3111.1) and the target occupation of Analytical Chemist (ESCO ID 2113.1.1). This is a typical case of upskilling frequently encountered in industry, corresponding to a transition from a junior role to a more senior role at the masters level.

A data table was produced with several columns in Excel, shown in Figure 6. For "chemistry technician" and "analytical chemist" w two columns collecting "essential or optional skills/knowledge" provided by the ESCO database. Each skill or knowledge (e. g. "handle chemicals") was assigned an "industry-ready proficiency level" defined on a scale from 1 to 4, as discussed before. Considering that the aim of the project is the design of a career guidance software, the industry-ready proficiency level was determined through consensus among a focus group of participating professors. The scale, and the measured skill-gaps seemed reasonable and sufficient for the exercise.

Chemistry Technician			Analytical Chemist			Skill gap	
essential skills required for the occupation							
analyse chemical substances	sector	3	analyse chemical substances	sector	4	analyse chemical substances	1
apply safety procedures in lab	sector	4	apply safety procedures in laboratory	sector	4	apply safety procedures in laboratory	0
handle chemicals	cross-sector	4	handle chemicals	cross-sector	4	handle chemicals	0
			apply statistical analysis techniques	cross-sector	4	apply statistical analysis techniques	4
			apply scientific methods	cross-sector	4	apply scientific methods	4
			execute analytical mathematical calculations	cross-sector	4	execute analytical mathematical calculations	4
			perform scientific research	cross-sector	3	perform scientific research	3
			perform laboratory tests	cross-sector	4	perform laboratory tests	4
			use chemical analysis equipment	cross-sector	4	use chemical analysis equipment	4
			identify purpose of analysis	cross-sector	4	identify purpose of analysis	4
use chemical analysis equipme	cross-sector	2	use chemical analysis equipment	cross-sector	4	use chemical analysis equipment	2
write work-related reports	cross-sector	2	write work-related reports	cross-sector	4	write work-related reports	2
	sector	2	analyse experimental laboratory data	sector	4	analyse experimental laboratory data	2
			develop scientific research protocols	cross-sector	4	develop scientific research protocols	4
mentor individuals	cross-sector	1	mentor individuals	cross-sector	3	mentor individuals	2
promote inclusion in research	cross-sector	2	promote inclusion in research	cross-sector	3	promote inclusion in research	1
perform project management	cross-sector	1	perform project management	cross-sector	3	perform project management	2
			disseminate results to the scientific community	cross-sector	3	disseminate results to the scientific community	3
			publish academic research	cross-sector	2	publish academic research	2
			manage personal professional development	cross-sector	3	manage personal professional development	3
			think abstractly	cross-sector	3	think abstractly	3
			think analytically	transversal	3	think analytically	3
essential knowledge required for the occupation							
basic chemicals		4	basic chemicals	cross-sector	4	basic chemicals	0
			analytical chemistry	cross-sector	4	analytical chemistry	4
			chemical processes	sector	4	chemical processes	4

Figure 6 Chemistry use case Skill-gap EXCEL Table

Discussion and Conclusion

This paper describes the design and guiding principles of a novel form of career guidance tool in higher education in the context of rapidly changing work and training environments. It argues that facilitating the matching of individuals skills and competencies with industry needs through the creation of skills alignment technologies can greatly enhance the effectiveness of career guidance and student support in HE. In addition to the development of the tool itself, this process requires significant organizational and educational change on the part of institutions and professors, by creating competency-based, semantic standards for learning contents and outcomes, This is essential to be able to match learners skills gaps to appropriate learning pathways. An emerging literature on institutional transformation and strategic responses to micro-credentialing (Brown et al., 2023; Olcott, 2022; Olcott et al., 2023) encourages educational leaders to interpret the current zeitgeist to set decision-action priorities, making strategic decisions about how they engage with digital transformations. We argue that one such strategic response is designing career guidance tools which incorporate skills alignment technologies and smart catalogues capable of identifying and recommending personalized and flexible training pathways through reskilling and upskilling.

There continues to be a strong debate about the need for embedding employability skills in higher education (Kornelakis & Petrakaki, 2020) and calls for more integrated approaches to studying employability (Römgens et al., 2020), including competency-based methods for teaching and career guidance. Our paper contributes to the debate for integrating skills alignment technologies for lifelong learners in higher education by; offering conceptual and methodological guidelines for a mock-up career guidance tool; by integrating this tool with EU policy agenda initiatives, such as the ESCO database and the ELM; by highlighting the need for UX research and design; and by presenting two illustrative cases of how to integrate this methodology to reskill and upskill in the field of Data Science and Chemistry.

As we continue to embrace online education, micro-credentialing and the digital transformation of higher education, the importance of virtual career guidance tools for empowering lifelong learners will only increase. It is crucial for institutional leaders, policymakers, educators, and industry partners to invest in the development and implementation of innovative career guidance tools and agile training pathways to ensure that everyone has access to the support they need to manage career growth and development. Research and development in this area can help advance our understanding of how best to support lifelong learners and their career trajectories through skills alignment technologies. As the labour market faces unprecedented challenges and shifting job market demands, the need for reskilling and upskilling has become more critical. Virtual career guidance tools can provide an effective solution to empower individuals when navigating these changes and remain competitive in the job market. By providing personalized guidance, ESCO compatible skill profiles, semantic standards for learning, up-to-date industry insights, and access to relevant training pathways, skills alignment tools can help individuals make informed career decisions and develop the necessary skills to thrive in their chosen field.

References

Bacigalupo, M., Kampylis, P., Punie, Y., & Van den Brande, G. (2016). EntreComp: The entrepreneurship competence framework. Luxembourg: Publication Office of the European Union, 10, 593884. https://eige.europa.eu/resources/lfna27939enn.pdf

Brookings Institute. (2022) Understanding the skills gap—and what employers can do about it. Available at: https://www.brookings.edu/research/understanding-the-skills-gap-and-what-employers-can-do-about-it/

Brown, M., McGreal, R., & Peters, M. (2023 in press). A Strategic Institutional Response to Micro-credentials: Key Questions for Educational Leaders. Journal of Interactive Media in Education, 2023(1). https://doi.org/10.5334/jime.801

Chiarello, F., Fantoni, G., Hogarth, T., Giordano, V., Baltina, L., & Spada, I. (2021). Towards ESCO 4.0–Is the European classification of skills in line with Industry 4.0? A text mining approach. Technological Forecasting and Social Change, 173, 121177.

Europass (2022) [online] [accessed: 19 October 2022]. Available at: https://europa.eu/europass/en/europass-tools/european-qualifications-framework

European Commission. (2022) [online] [accessed: 19 October 2022]. European Skills, Competences, and Occupations (ESCO). Available at: https://ec.europa.eu/social/main.jsp?catId=1223

European Commission. (2022) [online] [accessed: 19 October 2022]. European Skills Agenda. Employment, Social Affairs and Inclusion Available at: https://ec.europa.eu/social/main.jsp?catId=1223

European Council. (2022) Council recommends European approach to micro-credentials. https://www.consilium.europa.eu/en/press/press-releases/2022/06/16/council-recommends-european-approach-to-micro-credentials/

European Learning Model. (2023) [online] [accessed: 14 June 2023]. https://europa.eu/europass/en/news/launch-european-learning-model

European Training Foundation. (2023) [online] [accessed: 14 June 2023]. https://www.etf.europa.eu/en/what-we-do/skills-demand-analysis

European Union (2017). ESCO Handbook. European Commission. doi:10.2767/934956

Gartner (2020). Do More With Data to Close Critical Skill Gap. Available at: https://www.gartner.com/en

Gibbons, S., (2018) Journey Mapping 101. Neilson Norman Group. Retrieved: https://www.nngroup.com/articles/journey-mapping-101/

Kornelakis, A., & Petrakaki, D. (2020). Embedding employability skills in UK higher education: Between digitalization and marketization. Industry and Higher Education, 34(5), 290-297.

MCI. (2017). Annotation Guide Learnings Supporting learning providers and integrating learnings in the OpenSKIMR Annotation. Dept. Management , Communication & IT OpenSKIMR. Retrieved: https://openskimr.eu/pdf/Deliverable_2-2_learning.pdf

Olcott, D. (2022). Micro-credentials: A catalyst for strategic reset and change in U.S. higher education. American Journal of Distance Education, 36(1): 19–35. DOI: https://doi.org/10.1080/08923647.2021.1997537

Olcott, , Arnold, D. & Blaschke, L. (2023) "Leadership 2030: Renewed visions and empowered choices for European university leaders" European Journal of Open, Distance and E-Learning, vol.25, no.1, pp.74-92. https://doi.org/10.2478/eurodl-2023-0006

Römgens, I., Scoupe, R., & Beausaert, S. (2020). Unraveling the concept of employability, bringing together research on employability in higher education and the workplace. Studies in Higher Education, 45(12), 2588-2603.