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UNIVERSITIES AND THE CHALLENGE OF EMPLOYABILITY: LEVERAGING LABOR MARKET DATA FOR RELEVANT LIFELONG EDUCATION

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Abstract

The economy and society are experiencing significant transformations fueled by the emergence of new technological advancements. These changes are affecting not just the job market, but also social norms and interactions. In light of this, universities cannot confine themselves to the mere creation and dissemination of knowledge, as education alone does not assure employment prospects. Rather, universities must strive to enhance the transformative impact of education on both individuals' employability and organizations' competitiveness. To accomplish this objective, it is essential to leverage labor market insights and artificial intelligence technology.

The Universitat Oberta de Catalunya (UOC) is an online university that serves almost 90,000 students and has over 100,000 alumni. Its primary mission is to provide lifelong learning opportunities to people. However, due to the rapidly changing job market and evolving skill requirements, the UOC is currently implementing a university-wide strategy to prioritize employability. This strategy involves three main components. Firstly, the UOC is establishing a scheme to collect, store, generate, analyze, and present labor market data in a user-friendly manner that supports informed decision-making. This scheme will also connect educational programs to learning outcomes that can be linked to labor market information. Secondly, new organizational roles are being created to ensure that labor market information is integrated into the design of course offerings and career guidance services. Lastly, an interface is being designed for students to independently evaluate their position in the labor market and make better career decisions. This strategy builds on existing employability services and creates a foundation for relevant lifelong learning.

The purpose of describing the UOC experience is to elucidate the strategy that universities should implement to enhance employability by capitalizing on the potential of artificial intelligence and big data.

Keywords:

Employability, reskilling, lifelong learning, labor market data, career advice.

Introduction

The term "employability" refers to the knowledge, skills, and abilities that graduates must possess to effectively practice the professions for which their degrees qualify them. This definition emphasizes the responsibility of universities as the providers of this skill profile in ensuring its attainment. However, job placement - which encompasses the securing, maintaining, and advancement of quality jobs by students or graduates throughout their careers - is contingent not only on employability but also on various personal, environmental, and institutional factors, including the universities they attended. Hence, while universities bear direct responsibility for promoting employability, the realization of this potential in the form of quality job placement is subject to external factors beyond their control, such as the economic climate, local economic specialization, labor market structures, or systemic issues in the education system as a whole.

The economy and society are experiencing significant changes, driven largely by new waves of technology, that are impacting not just the labor market but also social behavior and relations. The magnitude and rapid pace of these changes are contributing to the complexity and significance of employability, both in terms of supply (new training profiles) and demand (new occupations). Despite the increased demand for jobs that require a university degree, even during periods of economic downturn, the number of graduates has outstripped this demand, diminishing their chances of securing quality employment¹. This trend is particularly pronounced in Spain, where a greater supply of skilled labor relative to demand and a productive specialization in low knowledge-intensive industries have resulted in a problem of overqualification.

Universities cannot simply limit themselves to creating and disseminating knowledge in today's social and economic landscape, which demands competent professionals. While education is undoubtedly crucial, it alone cannot guarantee employment. In the past, higher education institutions typically focused on training undergraduate students and catered to a relatively stable employment landscape. They also provided individual counseling for first employment, although scaling such personalized guidance is challenging. However, in the present work environment, characterized by multiple training stages and jobs across various industries, it is essential to equip individuals with the necessary tools to design their training and work paths and make timely decisions. As universities now train individuals beyond their first degrees and there is growing need for upskilling and reskilling, it is crucial to develop mechanisms for identifying reskilling opportunities by recognizing and creating adjacent skills.

Therefore, **higher education institutions must ensure that their graduates are prepared to manage their careers by providing: 1) relevant lifelong learning and 2) career self-management.** Accomplishing these goals, requires an updated and segmented understanding of the labor market, which can only be achieved through leveraging advanced technologies to gather and analyze big data on the labor market.

The aim of the paper is to describe the UOC strategy as an example of innovative models that universities can adopt to enhance employability. The organization of the document is as follows: Section 2 outlines conventional university approaches for enhancing employability. Section 3 presents the UOC's approach of complementing traditional approaches with an intense use of labour market data, the creation of new institutional roles, and the development of virtual professional guidance tools. Section 4 emphasizes the key takeaways, and the bibliography is provided at the end.

1. University strategies to promote employability

In addition to the intrinsic characteristics of the training offered (type of degree, specialization, learning outcomes, teaching staff, etc.), universities have developed their own particular strategies to promote greater and better employment prospects for their graduates. In this regard, career counseling centers, that used to support students and alumni in their career planning and job searches, have become dynamic networking centers. The transactional approach to career services has evolved into a 'connected communities' concept offering professionalized career development before, during and after the period of study.² This shift signifies an evolution towards a more proactive approach to career services.

Thus, what was once known as "career services" have become an integral educational resource that supports students during their entire training period, rather than a mere tool that students turn to when they are about to graduate or thereafter. The scope of these services and satisfaction with them is an increasingly important factor when it comes to attracting students. Consequently, these services have gone from occupying a peripheral place in strategic plans to holding a central position in many institutions.

¹ According to data from the Spanish National Statistics Institute (INE) (2017), the employment rate of university graduates is sensitive to the economic cycle, although to a lesser extent than that of those with a lower level of education. Still, according to data from the 2017 EPA (economically active population) survey, the difference in unemployment between those with the highest and lowest levels of education in Spain is 28 percentage points (for OECD countries as a whole, the difference is 7 percentage points).

² Dey, F., & Cruzvergara, C. Y. (2014). Evolution of career services in higher education. *New directions for student services*, 2014(148), 5-18.

Various studies³ have documented the experiences and strategies employed by universities – aside from those aspects related to programme design – to promote the employability of their students and graduates. These studies highlight activities such as career coaching, mentoring programmes, awards, industry-specific programmes, complementary training, career libraries, employment observers, employer engagement activities, career fairs, simulators, and many others. When well-integrated and connected, these services can certainly impact student satisfaction and recruitment, as well as the institution's final employment outcomes.

A study from the Valencian Institute of Economic Research (IVIE) analyzes universities' actions to increase graduate employability. The study includes the analysis of 63 universities (including the UOC) that were also part of the last edition of the U-Ranking (2017). By analyzing the information available on their websites, the study calculates a synthetic index of their employability services, made up of 10 indicators:

IND1	Pre-university guidance services	Information sessions, academic orientation events, vocational training course tours, etc.
IND2	Awareness-raising	Welcome days, career service information sessions, expert talks, employability skills sessions, etc.
IND3	Information	Career opportunity web portals, newsletters, talks, etc.
IND4	Training	Competencies for professional practice, job searches, etc.
IND5	Career and vocational guidance	Coaching, mentoring, etc., services
IND6	Internships	Internships and mobility programmes
IND7	Employment	Job boards, job fairs, public employment services, recruiting, etc.
IND8	Entrepreneurship	Business incubators, self-employment advice services
IND9	Observers	Labour observers, employment studies
IND10	Career service quality certifications	ISO and EFQM quality seals

The results indicate a significant correlation between the overall indicator of employability with the U-Ranking performance indicators.

1.1. Students Perceptions

The UOC is a digital native university that operates online, with a mission to provide lifelong learning opportunities to a global audience. With over 105,000 alumni and 87,000 students, UOC students are around 30 years old and have prior education and professional experience. They often have family responsibilities and aim to balance their studies with their careers. Seeking to enhance their skills and achieve professional and personal goals, they highly value UOC's flexible schedule and self-paced modality of learning.

According to reports evaluating the UOC enrollment process, over two-thirds of students indicate that they join to increase their job opportunities, whether it be through self-employment or as employees. Among master's degree students, a recent survey conducted during the 2020/21 academic year shows that 76.5% of respondents

³ Mitchell, et al. (2015). Case studies to enhance graduate employability: Careers services. *Australian Government Office for Learning and Teaching*, Sydney, Australia.

identified employability as their primary motivation for enrolling. In the 2020/21 graduate survey, 75.5% of students stated that the UOC's training had enhanced their job skills. Additionally, a report on the UOC's reputation and brand awareness from the Marketing Area (2019) commissioned from IPSOS found that improving employability is the second most important factor for prospective students, following fees, when selecting a university. Other factors considered include faculty prestige, pedagogical model, flexibility and personalization, learning resources, research capacity, and community.

While student expectations are similar to those of other distance universities, such as UNED, UNIR, and UDIMA, the UOC's employability orientation was judged as weak in comparison to private face-to-face universities and business schools. Based on the 2019 study on alumni perceptions of the value of services offered, it can be inferred that career services are highly valued by younger students. However, the study also revealed that services related to employment (such as career guidance and job search assistance) received lower ratings compared to other services. This suggests that expectations for these services are high, but not always met.

1.2. The employability opportunity

The analysis of the current situation, factors that determine it, and the expectations of both graduates in general and UOC graduates in particular, leads to several opportunities that should be considered:

- The UOC's mission statement emphasizes employability as it aims to provide lifelong learning opportunities to individuals and advance society. Given the current context, there are increasing societal expectations for universities to contribute to their students' employability.
- The fact that the majority of UOC graduates are employed does not mean that the university can rest on its laurels, as this employment may not necessarily be of high quality (i.e. fast, well-suited, stable, and well-paid) or sustainable over the long term.
- Given the challenge of providing both lifelong learning and career self-management training, the UOC has implemented initiatives that can enhance its potential to promote employability if effectively aligned with the demands of the job market.
- The UOC has a clear professionalizing focus in its portfolio, but it requires effective tools to connect its offerings with the current labor market demands. To address this, the university needs: Surveys that are better oriented towards assessing the employability potential of its degree programs; Systematic information about the status and evolution of the labor market; A guidance service that is responsible for career counseling; and A smart and customizable career guidance system.
- Expanding and enhancing the visibility of a career service that covers students' academic and professional life can potentially serve as a marketing tool to attract new audiences. This is particularly relevant for those individuals who are concerned about the risk of losing their current job or those who aspire to improve or redirect their career path amidst the ongoing trend of professional profile replacement.
- To establish effective career services, it is essential to establish stronger ties with the industry, thereby accumulating valuable relational capital with the UOC's graduates, their employers, and other relevant companies.

2. Connecting higher education to the labour market

In response to the continuously changing job market and skill needs, as well as to the 2019 alumni study, UOC implemented a comprehensive university-wide employability strategy. This initiative includes three pivotal components: firstly, the establishment of a system for collecting, storing, producing, analyzing, and visualizing labour market data. Secondly, the creation of new organizational roles dedicated to producing labour market insights for course design and career guidance services. And thirdly, the development of a virtual platform that enables students to independently assess their position in the job market and make well informed career decisions. When fully deployed, these three components work in tandem with the existing employability services, such as career counseling, job fairs, and an online job board, to improve the overall employability services.

2.1. The data opportunity

Given the uncertain, complex, and constantly evolving labor market, universities must adopt a comprehensive approach to employability if they want education to be a means of personal and professional advancement. An updated and targeted approach is particularly crucial for lifelong learning, as learners typically have existing qualifications and work experience. Therefore, the university must identify which skills are still relevant for employment and which ones need further development to provide value.

To address this, the university must equip itself with more rigorous measurement tools capable of monitoring, locating, and segmenting new labor requirements. Additionally, the university is committed to reskilling and upskilling people, and as such, these information systems must facilitate the identification of complementary competencies that can boost employment and competitiveness. With this timely and tailored data, highly efficient and personalized lifelong learning plans can be created by combining short-term, high quality programs that integrate existing skills and develop new ones while workers are still employed. These programs, that complement traditional long degrees ones, must be certifiable through recognizable, stackable, and portable digital micro-credentials.

We contend that the establishment of a system of these characteristics relies on data. The availability of large, structured databases on the competency requirements of the labour demand, coupled with technology that enables the personalized processing of these data, opens the possibility of integrating the labour market's requirements into program portfolio structures and student and alumni employability support services.

There are a number of potential data sources that provide insights about the skills required in the labour market. One notable source is the ESCO project led by the EU, which offers a comprehensive list of the knowledge, skills and competencies that are required to perform an occupation. This list is curated by committees of occupational experts. A second source comes from market data gathered from millions of vacancies posted in online job portals. Another potential source arises from performing interviews, or surveys to individual companies and workers. Different types of data have their strengths and weaknesses. ESCO skills data is very comprehensive regarding specific skills, but relies on the input of a relatively small group of experts; market data relies on the actual skill requirements aggregated from a large number of vacancies, albeit with a focus on transversal skills, as many specific, technical skills may be implicitly embedded into educational requirements. Finally, interviews and surveys provide valuable first-hand information, but their execution can be costly for higher education institutions given limited access to companies and workers. Combining different sources of information can be a way of enhancing their relative strengths and minimizing their costs. Therefore, the first part of the strategy involves defining processes to gather, store, process, analyze, visualize and share this information with different stakeholders within the institution.

2.2. The organizational integration of employment data within UOC

In order to effectively fulfill its mission, the university must bridge the gap between the employment reality and the various processes and services that influence the employability of its future graduates. This involves designing relevant program portfolios, providing counseling to students on their initial choice of program, deciding on individualized training paths, offering guidance on teaching activities with a professional impact (such as internships and final projects), and identifying the need for complementary training for certain professional profiles, among other things. A comprehensive understanding of the employment reality is essential to accomplish these objectives.

To meet the need for labor market information and guidance on a large scale, the UOC has established a set of figures and roles at the organizational level. These figures and roles ensure that the evolution of the labor market is taken into account in course and program design and when providing career support for students and alumni.

This structure is presented in Figure 1

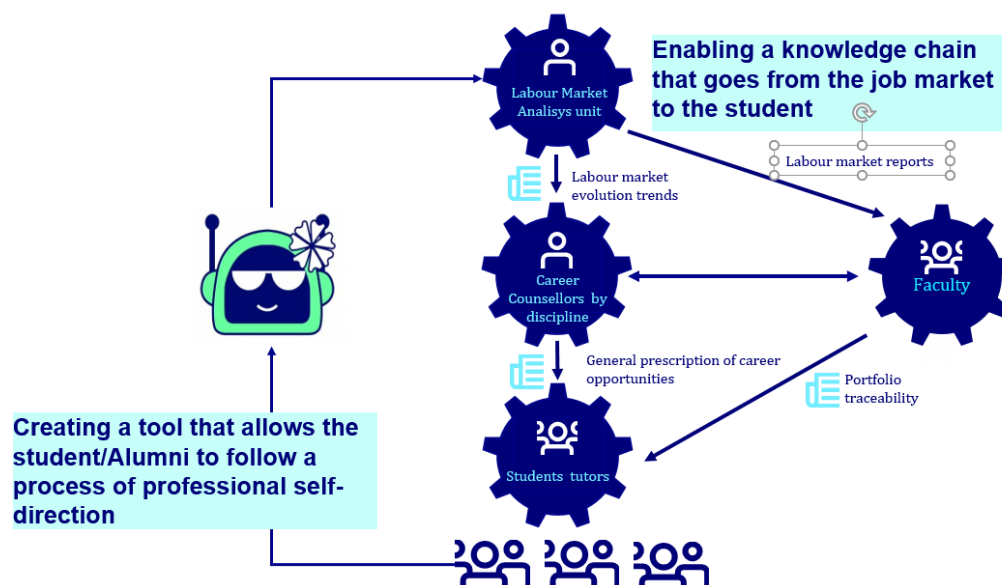


Figure 1: New university structure for employability

This framework involves augmenting the university staff with the following human resources: a newly formed unit for Labor Market Prospecting and Analysis, a new team of professional career orientation personnel, and a bolstered team of tutors. Their respective mandates are as follows:

The **Labour Market Prospecting and Analysis** unit's mandate is to generate scientific knowledge about the labour market and the demand for skills and return this knowledge to the UOC community (students, faculty, administration staff and society) in ways that support better decision-making.

The **Career Counselors' team** converts the insights generated by the analysis unit into tailored information for the students. The information is disseminated to the student and alumni body through recommendations, courses, workshops, infographics, and other channels. Additionally, the professional counselors cater to the personalized needs of students and alumni who seek specific guidance.

On its part, **tutors**, each one of whom has a group of students assigned, are responsible for the dynamization of the information and activities developed by the Career Counselors' team. Their role is to ensure that all the effort invested by the previous links in the chain achieves the intended purpose for which they were established.

The Labour Market Prospecting and Analysis Unit

As previously stated, the Labour Market Prospecting and Analysis Unit (LMPAU)'s role is to gather, produce, analyse, visualize and share timely labour market information to different audiences, in a format that is conducive to better decision making by part of students, faculty and university staff. Data is gathered and analyzed through a combination of qualitative and quantitative research methods. The main objective is to attain a better understanding of people's needs, motivations and preferences regarding lifelong learning, as well as of employers' skills needs. As mentioned before, the availability of big data sets originated from job postings on online search portals allows the identification, almost in real-time, of in-demand occupations and skills, with a great degree of granularity. This information is complemented with ESCO data, and information coming from surveys, in-depth interviews, and focus groups with employers and sectoral experts. Similarly, on the learners' side, data on their motivations to engage in lifelong learning and their preferences regarding the best formats to do so, are also collected through surveys, focus groups and in-depth questionnaires. As it is the case with other

research groups at a university, it is expected that this knowledge is shared at conferences and through peer-reviewed publications.

A key piece in the university's labor data strategy is establishing a link between labor market and program offerings data. Higher education institutions in Spain record information on programs' learning outcomes in text-based documents. Moreover, existing program data tends to be organized around supply-side variables, such as teaching modality (online or face-to-face), number of credits/hours, assessment criteria, or the department responsible for provision. Instead, labor market data gathers information on knowledge, skills and competencies, and is organized by occupations and industries. This makes it difficult to relate each program to its labor market or to create personalized educational pathways that complete a person's existing set of knowledge, skills and competencies. The cross-walk of the two data sets requires recording learning outcomes and program prerequisites in the same language used in the labor market data: that is the language of knowledge, skills and competencies. This has been highly unusual in the context of higher education institutions, although recent regulatory developments are beginning to facilitate it.

Labor market Information is organized in a data model and analyzed and fed to different audiences through different channels:

Labour Market information for program directors, faculty and administration staff.

Each School or Faculty within the university receives an interactive dashboard-style report that presents information on labour market trends and skill needs tailored to that particular School. These reports equip program directors with specific information relative to their particular programs. This includes an analysis of the vacancies that specifically requested professionals with the skills imparted by a particular program. The report also includes Information on labour market trends and skill needs at the occupation level and at the level of individual skills. This allows for an assessment of the occupations, industries and locations that demand a particular skill, or bundle of skills. These reports serve to revise and update existing programs and to create new ones that align with labor market needs.

Labour market Information for tutors and career orientation staff.

Improving the employability and career development of students also requires strengthening professional orientation initiatives. The objective is to shift from a focus on solely assisting on first job placement, to empowering students to recognize who they are, what knowledge, skills and competencies they already have, where they want to take their careers, and what knowledge, skills and competences they need to get there, throughout their professional lives. While career counselors are skilled at supporting learners to identify their interests, strengths, values and career goals, they may lack the up-to-date knowledge on the skill needs that are required to thrive in different roles across economic sectors, in a constantly evolving labour market. This is where labour market data can be a valuable tool to enhance career guidance. By providing up-to-date information to individuals on in-demand roles and occupations, skill needs, local labour market opportunities or earnings potential, they may be inspired to consider different roles or occupations, pursue upskill or reskilling or relocate to other areas to unlock new opportunities.

Labour market information is provided to career orientation staff in the form of an interactive style dashboard-style report, similar to the one provided to program directors. While the underlying data is the same as for the faculty reports, the information is presented and visualized in a way that supports and augments one-to-one, virtual, synchronous career orientation conversations between a professional career coach and a learner.

2.3 A virtual career orientation service

While it would be ideal to offer face-to-face or online synchronous career orientation to every student, providing personal orientation for 90,000 students and more than 100,000 alumni may prove to be unrealistic. However, leveraging data and technology provides the opportunity to offer high-quality, virtual autonomous career orientation services at scale. To that end, the university is currently developing a virtual orientation tool with the objective of providing labour market information to students and alumni via web and phone-based interfaces. These tools are designed to simulate online personal coaching, facilitating self-reflection about the learner's needs and wants, and providing the required information to help them to identify the skills they already possess and the ones they need to achieve their goals. Additionally, the tool will provide recommendations for learning pathways based on the assessed skill gap, utilizing the data infrastructure described earlier.

Conclusions

The rapid changes in technology and the economy are not only affecting the labour market, but impacting social behavior and relations. As a result, universities like the open university of Catalunya, need to move beyond just creating and transmitting knowledge to ensure their student's employability. To support this goal, UOC is employing a three-pronged strategy to bring employability to its core, including gathering and analyzing labour market information, creating new roles at the organizational level that can provide and use this information, and designing an interface for students to analyze their position in the labour market. At the core of this strategy is the use of large databases on the competency requirements of the labour market to integrate labour market evolution into portfolio offerings and student and alumni employability support services. The ultimate goal is to provide learners with relevant lifelong learning education and services that help them achieve their life and career goals.