STRATEGIC STACKING: THE INTEGRATED MODULAR APPROACH TO INDUSTRY-DRIVEN LIFELONG LEARNING

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ABSTRACT

This paper examines two innovative advanced master's programmes in West Flanders within the context of University Lifelong Learning at KU Leuven, focusing on both strategic content and structural design decisions. The integration of the Research and Innovation Strategies for Smart Specialisation (RIS3) framework into curriculum development forms the starting point. The content of the new programmes is strategically aligned with regional economic priorities, targeting state-of-the-art technologies to digitally transform local industries, resulting in the specific master's programmes in 'Artificial Intelligence in Business and Industry' and 'Smart Operations and Maintenance in Industry.' A collaborative model of 'advisory groups,' comprising both academic and industrial regional stakeholders, ensures ongoing alignment with industry needs while also not overlooking a broad perspective on research and education. Regarding programme structure, the paper advocates for the adoption of 'postgraduate certificates' as stackable credentials within a standardised pathway towards a full master's degree. This approach aims to offer flexibility without compromising the educational goal of ensuring comprehensive understanding. Initial outcomes are presented, along with challenges such as student recruitment and sustainable funding.

INTRODUCTION AND OVERVIEW

University Lifelong Learning (ULLL) has undergone significant evolution, manifesting in various forms over the years (Bengtsson, 2013; de Viron and Davies, 2023). When developing their lifelong learning (LLL) strategies, universities should consider their unique contexts and tailor their approaches accordingly. This paper frames, describes, and critically assesses an implementation strategy for ULLL at KU Leuven, with a specific focus on West Flanders. We introduce two innovative advanced master's programmes and highlight two strategic design decisions.

At a higher contextual level, we examine the decision concerning programme content. This involves aligning the master's programmes with regional economic spearheads, particularly state-of-the-art technologies aimed at digitally transforming traditional local industries. Section 1.1 situates this decision within the broader framework of research and innovation policies, specifically exploring the 'Research and Innovation Strategies for Smart Specialisation' (RIS3) framework, which may be less familiar in educational circles.

Section 1.2 details the practical application of this approach to the master's programmes. We propose a representative advisory group model that includes both academics and regional industrial stakeholders. This collaborative model balances demand-driven (short-term industry needs) and supply-driven (ongoing research) approaches to ULLL.

At an educational level, the paper examines the decision regarding programme structure. This involves making the master's programmes more flexible by 'unbundling' them into smaller units. This discussion contributes to the well-known debate on the role of microcredentials in ULLL, as briefly outlined in section 2.1. Section 2.2 expands on our critical application of this trend to the master's programmes. Here too, we advocate for balance: a stackable yet standardised pathway to a master's degree that is comprehensive enough to qualify as a 'postgraduate certificate' in the Flemish context. In the reflections section, we address the challenges and limitations of this approach before concluding.

BACKGROUND

Flanders has long promoted LLL with extensive supportive policies, yet performance remains suboptimal. OECD data confirms that participation in LLL in Flanders is notably low, including in higher education (HE). Only a small proportion of (working) adults engage in LLL initiatives after obtaining their degrees (OECD, 2019; VLOR, 2021; Flemish Government, Work and Social Economy Department, 2021).

To boost LLL in HE, the Flemish government launched a targeted initiative at the end of 2019 specifically for West Flanders, a region historically underserved in educational offerings. This initiative involved a one-time financial allocation of €6.5 million for HE institutions in West Flanders to develop a LLL offering. Within this funding framework, KU Leuven, the largest university active in West Flanders, took the lead in designing two new *advanced* master's programmes, aimed at (working) adults who already hold a master's degree.[1]

STRATEGIC DESIGN DECISIONS FOR CONTENT AND STRUCTURE OF TWO NEW ADVANCED MASTER'S PROGRAMMES

As mentioned, the funding allocated by the Flemish government for the development of new master's degrees was regionally focused, specifically earmarked for programmes to be established in West Flanders. However, in terms of content and curriculum (1) as well as programme structure (2), there was freedom and flexibility.

1. Content: from the RIS3 framework to masters in the high-tech domains of artificial intelligence and smart manufacturing

1.1 The RIS3 framework
The guiding strategic framework applied in selecting the fields for these new master's programmes was the 'Research and Innovation Strategies for Smart Specialisation' (RIS3), which originates from European research and innovation policies. RIS3 is a place-based approach promoted by the European Union to boost economic growth by focusing on a region's strengths and competitive advantages in specific areas of research and innovation. The idea is to identify and prioritise domains where a region has the greatest strategic potential to excel and then concentrate resources and efforts in those domains to stimulate innovation, economic development, and job creation. Each region develops its own RIS3 strategy based on its unique strengths and opportunities (European Commission, 2014, p. 2).

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[1] For the sake of brevity, from now on we will refer to them simply as 'masters' rather than 'advanced masters' or 'manama's', the Flemish term ('master-na-master', Dutch for 'master-after-master').

Universities are key stakeholders in RIS3, often concentrating on investments in research projects and infrastructure, such as incubators and technology parks, rather than primarily focusing on 'human capital.' As a result, RIS3 is not typically linked to the creation of new LLL programmes. However, by integrating RIS3 with an LLL perspective, universities have the potential to strengthen their research and innovation missions and underpin their specific contribution to LLL with research (as already recommended in the European Universities' Charter on LLL of 2008).

1.2 Masters in high-tech domains

West Flanders has a historically strong industrial ecosystem, with numerous innovative industrial and manufacturing companies, many of which are SMEs, based in cities like Kortrijk and Bruges (POM West Flanders, 2023, p.61). Notably, the region's mechanical engineering sector is a pioneering high-tech economic cluster in the Flemish industry.[2] This unique economic strength or 'smart specialisation' domain, as referred to in the RIS3 framework, is supported by joint efforts from all 'triple helix' stakeholders (Suarsana et al., 2023, p. 17 sqq.). For example, there has been investment in high-end infrastructure, such as five dedicated labs for mechanical engineering, mechatronics, and industrial systems engineering. These labs are a collaboration between KU Leuven Bruges Campus, Ghent University Kortrijk Campus, Howest University of Applied Sciences and Sirris, with support from the POM West Flanders (Regional Development Agency), TUA West (Technical University Alliance for Economic Transformation in West Flanders), and financial support from the ERDF. Moreover, Flanders Make, one of the four Flemish Strategic Research Centres dedicated to modernising the manufacturing industry, recently established a new high-tech center in Kortrijk, serving as an experimental hub for industrial companies.

Aligned with the RIS3 framework, the strategic decision was made to focus the masters on the industrial modernisation of this regional ecosystem, specifically the digital transformation of the (manufacturing) industry. This has concretely translated into two master's programmes that focus on teaching digital technologies to highly skilled technical profiles (such as engineers):

- 'Smart Operations and Maintenance in Industry' focuses on different state-of-the-art technologies that enhance industrial production environments.
- 'Artificial Intelligence in Business and Industry' concentrates on the transversal technology of artificial intelligence.

For curriculum refinement, we continued to operate within the RIS3 framework, actively involving regional stakeholders. Such a multi-stakeholder approach also aligns with policy literature on successful ULLL strategies, which emphasise the need for designing programmes that are not developed in a vacuum but embedded within the local ecosystem. Scholars suggest triple helix collaborative activities with regional organisations to facilitate the implementation of ULLL (Varadarajan et al., 2023, p. 12 sqq.; UNESCO, 2023, p. 28).

Given the strong technological orientation of the masters, it is imperative to involve regional industrial stakeholders not only in designing the new programmes but also in their ongoing operation. This ensures that the curricula, which feature industry-linked characteristics (such as guest lectures, company visits, and industrial thesis topics), remain up-to-date with the fast-paced evolution of industrial practices. To maintain this consistent alignment with the professional field, we have established 'advisory groups.' These groups, though, include not only industrial companies and practitioners but also academics and researchers, to achieve a

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[2] According to a recent study, 42% of Flemish wage earners within the mechanical engineering and mechatronics sector are employed in West Flanders. West Flanders accounts for 59% of the total number of self-employed and 29% of the active companies in the sector across Flanders (POM West Flanders, 2023).

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balanced mix of representatives. This collaborative model ensures that sufficient industry-driven (demand-driven) characteristics are incorporated while also maintaining a research-driven (supply-driven) approach, which is a distinctive feature of ULLL.

We strived for a similar balance in the format of the new master's programmes, which is reflected in the structure of the masters, as the next section will show.

2. Structure: from microcredential to macrocredential

2.1 The microcredentials debate

At the educational level, regarding programme structure, there is a general demand from the market to make the delivery of ULLL programmes more flexible (e.g., Atchoaerana, 2021). As stated by Unesco (2022, p. 2):

> "*In order for HEIs to transform into LLL institutions, they must undergo a fundamental shift, from soliciting the participation of young students coming from secondary schools to welcoming a diversity of learners who are (re)entering higher education at different ages and stages of their personal and professional lives (…) Offering more flexible provision is key to accommodating non-traditional students' diverse backgrounds, professional and personal commitments, and individual learning styles and life experiences.*"

Flexibility can be incorporated into university curricula in various ways, such as through multimodal delivery, blended approaches, and the use of technology (e.g., Atchoaerana, 2021, p. 313). One of the most global trends in ULLL is the introduction of 'microcredentials' as flexible trajectories into and within HE, as also advocated in the Education 2030 Agenda of the United Nations. In recent years, scholarly research on microcredentials has increased significantly (e.g., Varadarajan et al., 2023). However, much of this burgeoning literature is conceptual rather than empirical: the main challenge remains the lack of a universally accepted standard. Nonetheless, delving into this discussion is beyond the scope of this practice paper.[3]

Microcredentials, as the name implies, are a much shorter form of qualification than a degree programme. They are said to have the potential to become a common provision of learning for professional development because they provide standalone chunks of learning that can deliver up-to-date knowledge and skills in a timely and flexible way (Golding and Rossade, 2022). In short, microcredentials enable more versatile and personalised learning, allowing learners to choose their course credentials from different programmes and providers and to learn at their own pace (Cowie and Sakui, 2022, p. 21).

However, critics from educational and societal perspectives argue that this '(cherry-)picking' format might result in fragmented and incoherent learning, thereby undermining the mission of universities to offer education of a holistic nature. Ralston (2021, p. 8) fervently criticises this pervasive demand-driven approach. He argues that universities risk prioritising business interests and market demands over educational integrity by quickly unbundling degrees to generate revenue. Kušić et al. (2022, p. 155) similarly view microcredentialing as an outgrowth of "the neoliberal learning economy."

2.2 A stackable yet standardised learning path towards master´s degrees: 'postgraduate certificate'

For the structure of the new masters, our starting point was the complete conception and development of the 60 ECTS master's programme. Within each comprehensive master's

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[3] For systematic recent overviews of the microcredentials debate, see Cowie and Rakui, 2022; Thi Ngoc Ha et al., 2022; Golding and Rossade, (2022), and Varadarajan et al., 2023.

programme, we then unbundled/clustered a number of core courses, totaling about 20 ECTS. These basic packages of master's courses together serve as a solid foundation in the domain. We also had these integral subsets of master's courses accredited as separate programmes, namely 'postgraduate certificates.' The term 'postgraduate' may be misleading in the international educational context, for in the Flemish context, 'postgraduate' does not refer to the continuation after an undergraduate degree. Instead, it is a formally certified form of HE training, typically aimed at professionals, and consisting of a minimum of 20 ECTS credits.
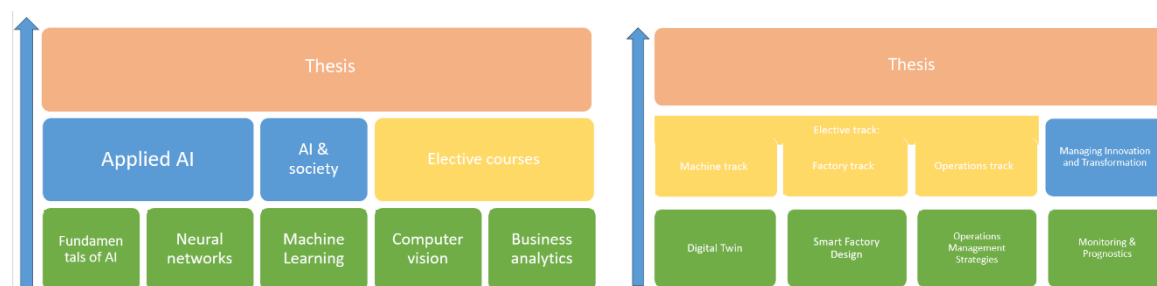

Figure 1: The postgraduate certificates (courses in green) embedded in the Master's programmes

This design intervention enables students to progress stepwise and sequentially. Students who are not ready to commit to a full degree programme can initiate their learning journey with the 'embedded' postgraduate certificate. In the second year, they can pursue the remaining courses (20 ECTS). In the third year, they can complete a master's thesis (20 ECTS) as the capstone of the full master's degree, which remains the point of reference. By doing so, we offer a standardised three-year model pathway from 'microcredential' to 'macrocredential,' with educational experts setting this standard.

REFLECTIONS

Brief operational period
Before discussing the results, it is important to note a primary limitation: the relatively brief operational period – 'Artificial Intelligence in Business and Industry' has been running for three academic years (2021-2024), and 'Smart Operations and Maintenance in Industry' only two (2022-2024). This short duration necessitates caution in drawing significant conclusions.

A partial success story
The 'embedded postgraduate certificate' design decision appears to be an effective strategic move: a significant majority of professionals begin their learning journey by enrolling in the postgraduate programme, and most successfully obtain this certificate. Initial evaluation surveys reveal that, although this certificate is not at the degree level, it holds significant value for professionals, particularly in enhancing their personal CVs[4]. Employers also report being satisfied with the knowledge and skills acquired by graduates. The bigger challenge, however, lies not in covering participation fees but in freeing up key employees – often essential figures in industrial companies – to attend.

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[4] According to a recent survey by Acco Learn (2024, p.22), a Flemish educational and scientific publisher, 50% of the active population in Flanders consider it important to obtain an official certificate when they pursue additional training. However, it is still too early to draw definitive conclusions about the further career steps of the alumni of the two master's programs.

What professionals found particularly valuable was the chance to build a strong network of peers with shared expertise and interests. This networking opportunity serves as a powerful motivator, yet it is often overlooked in microcredentialing, where learning paths are typically highly individualised. The clustering of smaller courses into a postgraduate programme offers students not only a cohesive and stepwise trajectory but also a collective, cohort-based one.

In light of the full master's degree programme, we must nuance this success. While most professionals who start the programme do succeed in obtaining the postgraduate certificate, they do not continue along the proposed three-year path. Approximately 80% 'drop out' at this stage. It is difficult to determine whether they would have begun the programme *at all* if the embedded postgraduate certificate did not exist. Of course, this may be because the programme is an *advanced* master, and they already possess a master's degree, so the added value of an additional master's degree might seem limited.

A select cohort of students

The programmes are indeed designed for a rather select cohort: both masters are aimed at students who have completed an initial master's programme in a technological area, such as engineering. This highly skilled technical target audience is in high demand in the industry, making them very busy profiles, especially those working in SMEs, of which the region is rich. Moreover, both programmes are of a specialised nature, partly due to the strategic decision to align the content of the new masters closely with specific economic priorities outlined in the RIS3 framework. This necessitates extensive outreach efforts to attract a sufficient number of students.

A sustainable business model

The limited number of students certainly poses challenges to the financial viability. In the Flemish context, advanced masters are not typically subsidised, unlike initial masters (VLOR 2021, p. 11). One possible solution is to explore alternative funding sources, such as sponsorship from industry partners (similar to endowed chairs for research). This approach makes sense given the strong industrial involvement, but it must be implemented in a way that ensures that the neutrality and objectivity of the course content remains uncompromised. Nevertheless, the uncertainty of what will happen when the seed funding runs out is a major concern for the upcoming years.

CONCLUSION

One size of ULLL strategy does not fit all. This paper focuses on two new master's programmes within the specific context of West Flanders as part of the implementation of ULLL at KU Leuven. More specifically, it examines two strategic design decisions regarding content and structure, both of which can be summarised as 'balanced':

- In terms of content, the programmes align closely with regional economic priorities outlined in the RIS3 framework. To operationalise this, we established advisory groups comprising both regional industrial and academic stakeholders, which serve as an example of a model where a more short-term demand-driven (primarily industry-led) and supply-driven (research-driven) approach nicely collide.
- Regarding structure, we diverge from a purely 'market-driven' discourse of unbundling the degrees down to granular levels. Instead, from the supply side, we propose a stackable, standardised cohort-based trajectory ('embedded postgraduate certificate') leading towards the full master's degree.

We acknowledge that these strategic design decisions were feasible primarily because we could essentially start from scratch. Adapting existing programmes poses different

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challenges. Integrating regional economic priorities and local industry embeddedness, such as through RIS3, and flexibility, such as through micro-credentials, into established degrees and programmes within the HE system is a pertinent and frequently posed question (Golding and Rossade, 2022).

Nevertheless, while increasing student enrolment numbers and developing a sustainable business model post-funding are critical for the long-term effectiveness of the 'Artificial Intelligence in Business and Industry' and 'Smart Operations and Maintenance in Industry' masters, these programmes do show promise in initiating professionals into specialised fields aligned with regional economic spearheads and achieving comprehensive certification success.

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