2023-10-10

European And National Strategies Supporting The Implementation And Development Of Continuing Engineering Education At Scandinavian Universities

Ida Marie LYBECKER KORNING
Aalborg University, Denmark, lmlk@plan.aau.dk

Bente NØRGAARD
Aalborg University, Denmark, bente@plan.aau.dk

European and National Strategies Supporting Development and Implementation of Continuing Engineering Education at Scandinavian Universities

I.M. Lybecker Korning [1]
Aalborg University
Aalborg, Denmark
ORCID: 0009-0005-2504-0097

B. Nørgaard
Aalborg University
Aalborg, Denmark
ORCID: 0009-0002-7331-0854

Conference Key Areas*: Engineering Skills and Competences, Lifelong Learning for a more sustainable world*
Keywords*: Continuing engineering education, lifelong learning, engineering education, strategy, future*

ABSTRACT

Lifelong learning (LLL) and continuing engineering education (CEE) have been on the European Union's agenda for almost three decades, formally initiated by the *European Year of Lifelong Learning* in 1996 and reinforced with several initiatives targeted at LLL since then. The current initiative, the European Year of Skills 2023, aims to promote a mindset of reskilling and upskilling. Nonetheless, before 1996, some universities were already developing diverse CEE activities and collaborating with external stakeholders such as the local industry. Many of these activities, however, have been initiated by passionate university staff or based on personal relationships within the organization. CEE activities have therefore, for most universities, been an unregulated and sideline area, and at some institutions, it is organized in private units associated with the university. This is despite the fact that the individual Scandinavian countries have national education policies regarding continuing education (CE), and each university has more or less explicit visions and strategies for CE activities.

[1] *Corresponding Author*
I.M. Lybecker Korning
imlk@plan.aau.dk

This research aims to answer the question of how European initiatives and Scandinavian national strategies support the implementation and development of CEE. Additionally, it will attempt to predict the future of CEE in Scandinavian countries by examining the beliefs of actors in CEE. The study will document the current state of initiatives and strategies and will be based on twenty interviews from ten Scandinavian universities.

1 INTRODUCTION

The grand challenges of the 21st century underscore the need for knowledge and competence development in Western societies, especially in the field of engineering. The increasing threat stemming from the environmental crisis has led to a push from both political leaders and broader society for engineers to help ensure a turn to sustainable production. These demands are reflected in the United Nations SDGs, which include goals regarding the implementation of green energy and climate actions [1] (United Nations, 2015).

At the same time, the evolving role of technology, as marked by the development of Industry 4.0, has changed engineering practices. Especially, the need for professional engineers to possess an ever-changing range of digital and technological skills has received political attention. This is reflected in the goals of the *European Year of Skills 2023*, where one of the main goals is the up- and reskilling of workers to implement green and digital transformations to secure sustainable economic growth in Europe.

At the same time, individuals are spending a greater part of their lifespan in the workforce, which is why formal learning activities are no longer bound to students participating in traditional formal education. The traditional cycle of education, employment, and retirement may be replaced with active employment supplemented with periods of participation in formal and informal CE, thereby securing LLL. This trend is emphasized by the objectives put forward by the commission behind the European Skills Agenda, where one of the goals states that in 2024, 50% of adults aged 25-64 should participate in learning over a period of 12 months. In 2016, that level was 38% [2] (European Commission, 2020).

Not surprisingly, Higher Educations Intuitions (HEIs), e.g., universities, are expected to play an important role in the ongoing transformations. The participation of universities as an actor in the field of LLL is not a new one. Yet, the development and facilitation of CEE varies greatly between European universities. From formal accredited courses, such as masters, to short informal activities such as MOOCs, from being partly state financed to being financed by employers or participants, the political and institutional framework has a vital influence on the development of LLL through CEE.

The focus of this paper is to examine the political strategies for the development of CEE at both an international (European) and national level, with a specific emphasis on the Scandinavian countries. This will be set against visions of the future of CEE put forward by academic staff at ten Scandinavian universities. This leads to our research question:

How are European initiatives and Scandinavian national strategies supporting the implementation and development of CEE, and what will be the future?

This paper will consist of a description of the methodology behind the data collection, which consists of interviews and document analysis. This will lead to the analysis, which builds upon a description of initiatives implemented at a European, national,

and institutional level. Lastly, the different initiatives and imaginaries will be compared and utilized as a basis for a discussion of the future directions of CEE at European HEIs.

2 METHODOLOGY

This study employs a qualitative research approach to explore and comprehend the development and implementation of CEE at Scandinavian universities. The study employs document analysis and interviews to gather data, including reports, white papers, articles, and other relevant documents related to EU aims, national strategies and legislation, and university practices on CEE. Ten universities were included in the study, and two participants from academic staff were interviewed in each university, selected based on their experience and practice in the field of CEE. The participants were informed about the study's purpose, and their consent was obtained before data collection. To ensure consistency and coverage of the research question, a semi-structured interview guide [3] (Kvale 2004) was used to structure the data collection. How actors in CEE perceive, understand, and implement activities within their respective institutions, a loosely structured interview guide was used, with the following headline questions:

1. Background Check: Are you aware of national strategies for LLL? Does your university have an explicit strategy for CEE initiatives?
2. Future Needs: In your opinion, what are the future needs or challenges that require new approaches in the context of CEE? How do you anticipate disruptive changes influencing the field of CEE?
3. Awareness of Initiatives: Are you aware of any ongoing initiatives or experiments within your institution that are exploring new approaches to CEE?
4. Crystal Ball: What do you envision for the future of CE, particularly in terms of new paradigms for knowledge flow between industry, universities, and professional engineers?

Due to the Corona pandemic, all interviews were conducted online, and audio recording was done with the participants' consent. NVivo software was used for data analysis, which involved coding the interviews and identifying themes. An inductive approach was used, developing themes and categories from the interviews, rather than using theories or a framework. Ethical considerations were taken into account throughout the research process. Participants were informed of the study's purpose, and their consent was obtained before data collection. Participants were also informed that they could withdraw from the study at any time without hesitation. Participants' anonymity and confidentiality were ensured, and data was stored securely. The study was conducted in compliance with relevant ethical guidelines and regulations of Aalborg University.

3 FINDINGS

Since the *European Year of Lifelong Learning* in 1996, various political motivations and organizational strategies have led to the initiation of diverse forms of CE aimed at facilitating LLL for professional engineers. The purpose of this chapter is to document the different transnational, national, and institutional initiatives, aims, etc., shaping the development and implementation of CEE in Scandinavia.

The importance of LLL has received renewed political attention, as the EU marked 2023 as the *European Year of Skills*. Specifically, there has been a renewed focus on the upskilling and reskilling European workers, especially in the fields of environmental and digital technologies, with the hope of securing sustainable development, innovation, as well as economic competitiveness for European companies. Another goal put forward on the agenda is to counteract the problem of a lack of skilled workers available for small and medium-sized European companies. More than three-quarters of all companies in the EU report problems finding employees with the necessary skills. In addition, already in 2021, more than 28 occupations, including engineering and IT, announced shortages in skilled workers. [4] (European Commission 2022). All of this points to the need for further development in the field of CEE.

A range of both financial and political initiatives have been implemented to support this development at a European level. Firstly, there has been a growing focus on the importance of collaboration between EU commissions, member states, HEIs, and companies to ensure the relevance of initiatives in place to secure the up- and reskilling of workers. The need for collaboration between different political and educational institutions was emphasized by T. Breton, Commissioner for the European internal market: "*Europe's strength resides in its talent, including engineers, researchers and entrepreneurs. To achieve our Digital Decade and Green Deal goals, we want to support our companies, in particular SMEs, in hiring, training and keeping talent*."

One way to promote LLL in Europe is to continue ongoing initiatives such as the *European Skills Agenda* and the *European Strategy for Universities*, which propose actions to secure skill development and facilitate LLL. Additionally, a large sum of EU funds is being utilized to support the implementation of LLL and training initiatives, such as through the Erasmus+ fund.

At the national level, the need for LLL, including Continuing Education and Training (CET), is widely recognized by political institutions in Scandinavia. Similar to the basis for the European agenda, there is a strong focus on the need for collaboration between HEIs and the labor market to meet the need for skilled workers, particularly in the fields of STEM and ICT. In 2019, the *Nordic Network for Adult Learning*, a collaboration between Nordic countries supported by national ministries, put forward sustainability, equality, and digital skills at the core of their 2030 goals for further education (European Commission 2020).

Although there is collaboration between Scandinavian countries in the field of CE, there are different legal frameworks in place across the countries to help individuals develop their competences through their professional careers. For example, in Denmark, HEIs are legally required to plan CE activities in a way that allows participants to work alongside their studies. In Norway, employees after three years of employment have the right to receive up to two years of educational leave.

Overall, there is a strategic focus in Scandinavia on ensuring as many people as possible have access to upskilling and reskilling activities that fit the needs of the labor market, although the strategy behind how this is facilitated differs. One recurring strategic focal point in Scandinavian policies is the need for flexible LLL opportunities, primarily facilitated through digital platforms, making them accessible across time and space. Another use of digital tools to make learning accessible, brought forward in both EU and Scandinavian universities, is using digital micro-credentials, through which individuals can receive the needed knowledge over a short time span.

Another political strategy implemented to ensure the accessibility of CET is through the recognition of prior learning. In Sweden, Norway, and Iceland, individuals' prior

learning gained through formal education or work experience is taken into consideration when granting admission to LLL activities, making upskilling through CET accessible to individuals with a non-traditional or vocational background. Lastly, the availability of accessible and relevant guidance to professional adults who wish to further their education is emphasized as a necessary strategy to secure relevant competence development in Scandinavian societies. Traditionally, guidance related to CET has been delivered by the individual universities, making them partial to their own offerings. In the future, individuals should have access to an overview of existing LLL activities, as well as guidance that takes their personal and professional goals into consideration.

A constant factor in Scandinavian countries is the significant influence of political institutions, primarily the educational ministry, on the development and facilitation of CE, including CEE. Due to the strategic goal of making further education accessible to the broader population, many CEE activities are partially funded by the government, which limits the financial burden on individuals or companies participating in such activities. To be eligible for government funding, educational activities must be ECTS accredited, which is why many CEE activities at Scandinavian universities fall under the category of "open-university" courses, such as formal, scheduled courses like Masters, MBAs, or single-subject courses. In practice, this means that many CEE activities span over longer periods and have limited flexibility. However, many Scandinavian institutions, such as universities or private companies, also offer commercially based CEE activities. These activities do not receive government funding, which is why the legal framework for these activities is more flexible than that of accredited courses, making them more open for collaboration with external stakeholders. The commercial CEE initiatives make up a broad spectrum of programs, such as commercial Masters, shorter courses, or MOOCs.

The strategy for LLL at HEIs is apparent in how Scandinavian universities facilitate CEE, but there is not a singular approach. Some universities primarily offer LLL through internal units or decentralized structures, with individual departments handling CEE activities. Other institutions have set up external units, such as holding companies. Similarly, in some institutions, the majority of activities consist of Open University courses, often with individual enrollment and a close link to BS.C and MS.C curricula, while in others, commercial programs created in collaboration with companies constitute the bulk of activities.

According to *The Nordic STEM report* (2021), which is based on interviews with 20 members of academic staff from Danish, Finnish, Icelandic, Norwegian, and Swedish universities, there are many diverse organizational strategies and visions for the future of CEE [6] (Nordic Engineering Hun (NordEnHub) 2021). Generally, the interviews reflect the belief that in the future, CEE will play an important role across HEIs and the labor market: " […*], if we're going to work until we're 70 we have to have a system that can handle 45, 50-year-old engineers coming back and taking a one-year master's degree to re-skill, because what they studied 25 years ago isn't valid anymore.*"

Therefor many universities points to a need for a stronger collaboration between university staff and companies, when facilitating CEE: "*I think in a field of engineering is [important] that that we sit down with the company […] to recognize the learning, what they need*". Likewise, some interviewees underscore the need for flexibility when facilitating learning aimed at professional needs "*One of the aims of this Department is to be in very good coordination with the industry and we want to be. I don't know how we expect to be quick to adapt because there's a lot of speed in the industry now*".

Some of the restraints that prevent flexibility in the future development of CEE derive from the legal framework connected to the Open University courses: "*If we take out one module from an ordinary course, we are not allowed to deliver that for payment. They have to change that, so it gets easier for us to deliver what the market needs.*" In this way, the political actions aimed at making CEE more accessible also limit the potential developments in the field. Additionally, internal planning and the lack of incentive structures are put forward as reasons that may hinder the implementation of CEE: "*It is really, really difficult, because our model is that people [academic staff] have a full schedule, and then, we must try and push more teaching into it."* This statement recurs in most interviews with staff from Scandinavian universities: "*So, you know what is it payback of this? So, I said that there has to be very clarified, so I don't see that happening. And I don't see that happening over the next five years either to be honest*".

Likewise Scandinavian universities point to the need for flexibility to ensure that the outreach activities meet the needs of professionals. This is reflected in the pedagogical- and didactical framework "*[…] would probably need to develop the university pedagogic courses that our teachers take to look into the peculiarities of conditions and education of professionals, people working full time. Because it has to be slightly different, it has to be time efficient for the participants, not for KTH."* One way to create more flexibility is through the utilization of digital teaching. Generally, there is a wide belief that online learning activities would play a larger role in the future: "*More and more people would like to attend workshops online*". For some universities this is connected to new course types: *"[…] in the coming years, we will have to establish lot of smaller courses, you know, that gives, what is it called, microcredits"*.

There are clear differences in the imaginations of the future of CEE across Scandinavian universities, especially in the perceived required learning outcomes from the outreach activities. While some organizations prioritize the need for skill sets in technological fields such as engineering or IT, which are also prioritized in the European and national strategies, other universities give precedence to a completely different set of competencies.: "*[…] Yeah, so mostly of our own organize our own engineers come to university look for more project management, for more leadership education. They are not actually looking for education in the field of technology or in their own field,*". This understanding highlights the importance of collaborating with companies and interest groups while developing CEE courses, to ensure that the activities developed meet professional demand.

The common thread in all the above statements is the belief that CEE will have a larger role to play in the future. However, to facilitate this development, Scandinavian universities need to rethink their role in the broader society: "*[…] the borders between university courses, some programs and the industry and the continuous education programs and courses, that will have to become much more fuzzy, and dissolved. We have to be dealt with as one thing, not as three different things."* But if the organizations succeed in this change, it will result in great possibilities for institutional development: *"[…] we have been involving a person from KTH, the University in Stockholm where we had some persons that also dig a little bit deeper into the future of continuous learning so we have a report from him and he says, that maybe in the future we have as much students as like ordinary students as we have continuous learning students and from the working industry.*"

4 SUMMARY AND FUTURE DIRECTIONS

Overall, there is a great belief that LLL through CEE will play an important societal role across European and Scandinavian political institutions as well as in Scandinavian universities. This is reflected in the transnational and national strategic support and initiatives, such as the financial support to the institutions facilitating CEE and the highlighting of the importance of collaboration between HEIs, political actors, and companies. As emphasized by the goals of The *European year of Lifelong Learning* and the *Nordic Network for Adult Learning*, there is a specific focus on skills needed in the fields of IT and technology to help companies transition to sustainable production.

The political support for LLL is not new in the Scandinavian political sphere. To further the accessibility of CEE, financial initiatives are set in place to minimize the monetary burden of the participants. Likewise, policies regarding flexible structures and recognition of prior learning aim to make it possible for individuals to participate in both formal learning activities and active employment. Future strategies for furthering participation in CE include supporting flexible learning through digital learning platforms and individual guidance.

Generally, the actors facilitating CEE at Scandinavian universities possess the same beliefs as those found in the transnational and national political spheres. There exists a belief that in the future, CEE activities will make up a large part of the universities' outreach activities, facilitated in close collaboration with external partners, such as companies. Yet for this development to take place, the institutions underscore the need for flexible structures when developing new outreach activities, including delivery, teaching, and incentive structures, to meet market demands. Also, there is a need for better communication with companies and the broader society to ensure the relevance of the learning facilitated through LLL activities. But if universities succeed in this transformation, the outcome will lead to institutions available to facilitate learning throughout engineers' work life.

REFERENCES

[2] European Commission. 2020. “Commission presents European Skills Agenda for sustainable competitiveness, social fairness and resilience”. Last modified July 1, 2020. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1196.

[5] European Commission. 2020. “Towards becoming the most integrated and sustainable region by 2030: Nordic collaboration in adult education – how can we support social inclusion?”. Last modified December 16, 2020. https://epale.ec.europa.eu/en/blog/towards-becoming-most-integrated-and-sustainable-region-2030-nordic-collaboration-adult.

[4] European Commission. 2022. “Commission kick-starts work on the European Year of Skills”. Last modified October 12, 2022. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6086.

[3] Kvale, Steiner. 2004. *Interview: En introduction til det kvalitative forskningsinterview*. Copenhagen: Hans Reitzels Forlag.

[6] Nordic Engineering Hun (NordEnHub). 2021. “*Nordic Stem: Mapping of STEM continuing education*.” https://www.nordenhub.org/dissemination/

[1] United Nations. 2015. “Transforming our world: The 2030 Agenda for Sustainable Development”, last modified Septemper 15, 2015. https://sustainabledevelopment.un.org/post2015/transformingourworld.