

# AN INTERNATIONAL UNIVERSITY PERSPECTIVE ON BARRIERS AND ENABLERS FOR LIFELONG LEARNING IN ENGINEERING

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## ABSTRACT

This paper extends the use of a framework identifying four types of barriers to lifelong learning (LLL): institutional, situational, dispositional, and informational. Initially applied to Nordic universities, the framework is now used to interview a broader set of international stakeholders about LLL provisioning. The study explores commonalities and differences across regions, and the framework's potential to highlight key barriers and enablers, informing strategic and policy changes. The countries involved are Denmark, Norway, Finland, The Netherlands, and Singapore. Following the description from each country, it identifies institutional, situational, dispositional, and informational barriers, which are interrelated and influence LLL in an international context. Challenges include funding, balancing job and family commitments, and the need for a learner-centric approach. The study reveals that LLL plays a minor role in universities, with insufficient encouragement despite being included in strategies. Major obstacles include restrictive legislation, bureaucratic boundaries, and unstable funding models. Overcoming these could enable nationwide or transnational platforms for LLL.

## KEYWORDS

Lifelong learning, framework evaluation, enablers and barriers for lifelong learning, Standards: 2, 3, 9, 10

## INTRODUCTION

Lifelong learning (LLL) is a political priority in most parts of the world, focusing on workforce upskilling and reskilling to enhance national competitiveness and productivity. Universities are expected to play a central role in leveraging LLL, but they often struggle to establish sustainable models due to challenges, e.g., economic unpredictability, resource scarcity, market understanding, academic capacity, and motivation. LLL also plays a role for the CDIO Initiative ([www.cdio.org](http://www.cdio.org)), with a focus on the ability of a learner to learn through life.

## FRAMEWORK FOR BARRIERS AND ENABLERS FOR LLL

Previous studies have shown that barriers that influence the behaviour of lifelong learners can be broadly characterised along four different axes (Cross, 1981, Darkenwald and Merriam, 1982). Moreover, recent work by Bennedsen and Øien (2023) has indicated that the same four classes of barriers are highly relevant for understanding the challenges of educational institutions when it comes to LLL provisioning. They are:

- **Institutional** (or structural) barriers – institutional, political, or structural practices and procedures that may discourage or prevent either learners' participation or universities' provision of LLL offerings.
- **Situational** barriers – practical barriers which arise due to a person's life situation at given points in his or her family or working life cycle.
- **Dispositional** barriers – personality traits or personal qualities which influence a person's intrinsic motivation to engage in LLL.
- **Information** barriers – referring to the (lack of) availability and awareness of information regarding LLL opportunities.

Bennedsen and Øien used these four axes as a framework to interview Nordic university stakeholders on their views, experiences, and strategies on LLL, thereby both collecting information about the state of LLL in the Nordics, as well as evaluating the usefulness of the framework as a tool for analysing Nordic and Baltic universities' strategies and priorities regarding LLL (Bennedsen and Øien, 2023). In this work, the use of the framework was also expanded to not only discuss barriers but also uncover potential *enablers and opportunities* characterized along those same four axes. The work started at the CDIO conference in 2023 as a working group.

This paper expands the geographical boundaries of the evaluation of the above framework from Nordic countries (with very similar cultures and educational systems) to a broader context. This is done by using the framework to interview stakeholders at international CDIO member universities involved in LLL about barriers and enablers experienced in their work on LLL provisioning. Afterwards, the results are used to reflect on the framework's usefulness regarding barriers and enablers for LLL. Common denominators, similarities, and differences across country borders and continents are discussed. The usefulness lies in the systematic insight into root causes and important levers such a framework can provide, potentially pointing to strategy and policy changes that may serve to lower the most important barriers and exploit the most important enablers.

## RESEARCH DESIGN

To gain a more international perspective, semi-structured interviews are carried out with relevant stakeholders at six universities in five countries: Singapore, The Netherlands, Finland, Norway, and Denmark. At each university, the authors selected persons to interview. The selection was based on the authors' personal connections and knowledge of the “right” person to interview.

Table 1. Number of interviewee(s) and their roles for each country.

Country	Interviewee(s)	Roles
Denmark	two	teacher, administrative
Finland	one	administrative/manager
The Netherlands	four	professor, director, manager (nationwide), researcher
Norway	two	head of an engineering department, administrative manager of a lifelong learning support unit
Singapore	four	program owner (also doing teaching), administrator seeking personal upgrading, academic director, manager (involved in teaching and managing a course)

The respondents received this message before the interview:

*The focus of this interview is Lifelong Learning (LLL). It is done as one out of a series of interviews for a newly established working group within the international CDIO network trying to obtain more insight into barriers and enablers for university-level lifelong learning as seen from an education provider's perspective, with an emphasis on the engineering field. LLL is a broad term that presents a challenge when it comes to defining it in a specific manner. Its association with other similar concepts, including but not limited to lifelong education, permanent education, recurrent education, continuing education, adult education, learning organizations, and the learning society (a society where learning is all-encompassing), adds to this difficulty. In this interview, I will have a narrower focus, on formal learning taking place after a learner's initial education and offered as credit-giving activities by our institution. It will be done in English to enable sharing of good practices, showstoppers etc.*

The interviews were semi-structured with the following headlines:

- **Background information:** Personal and institutional background.
- **Context:** What is the main focus of the organization with respect to LLL
- Short introduction of the framework (the four dimensions)
- **Institutional barriers and enablers:** The most prominent institutional barriers and enablers, as seen from the institutional and learners' side?

- **Situational barriers and enablers:** The most prominent situational barriers and enablers, as seen from the institutional and learners' side?
- **Dispositional barriers and enablers:** The most prominent dispositional barriers and enablers, as seen from the institutional and learners' side?
- **Information barriers and enablers:** The most prominent informational barriers and enablers, as seen from the institutional and learners' side?
- **Additional comments:** Are there other aspects of enablers and/or barriers that we have not talked about so far – if so, which? Did the categories we defined here help you to think about LLL – why or why not?

The interviews were recorded, and notes were taken during the interview. The notes were used as pointers in the interviews to find relevant points of interest.

The analysis was done in the following order:

1. After the interviews, one of the paper authors generalized the findings of the specific country, structured around the four axes.
2. A “harmonizing phase” was done to balance the descriptions from the different countries.
3. All descriptions were considered carefully, and commonalities were noted.
4. The commonalities were generalized into the four areas by a pair of authors.

In the following sections the generalized results of the interviews per country are briefly introduced and discussed. In the discussion and conclusion section of this paper the international commonalities regarding the LLL barriers and enablers are stated.

## DENMARK

In Denmark, like in many other countries, universities are state-run and financed. Part of university's funding is based on the number of credit hours a student “earns”. “Traditional” (i.e. full-time) university educations are “free”, LLL has some participant payment and some payment from the state. Some state institutions (like IT-vest) support LLL (gives the universities support for development and operation).

LLL at universities are accredited like all other educational offerings. It is, at the university level, typically implemented as a part-time degree (a master's degree consisting of 60 ECTS (= one year of full-time studies) done as part-time). In many cases, it is expected that the students take the entire programme, but there are also examples of programmes where the students can take parts of a programme (the smallest element is typically 5 ECTS). Universities can make commercial courses (but need to be on “fairgrounds”).

The data gathering is based on interviews with two persons from Aarhus University (AU) – one administrative and one “teacher”. The administrative person has been at the university for more than 10 years (and before that also been involved in LLL). She has been working with enrolment, marketing, internal processes and accreditation of LLL at AU. The other interviewee is an associate professor at the Department of Computer Science. He has been teaching LLL for the last 10+ years and he is THE “LLL teaching” person at the department.

In general, both interviewed persons found the framework useful and understandable since it gave structure to the interview and the dimensions made sense.

Institutional: The provision of LLL does not have a high priority at the University of Aarhus. In the strategy for 2025, it is stated:

*“Sub-goal – Development of the continuing and further education of the future: The university’s goal is to contribute to meeting society’s increasing demand for the continuing education of the workforce through research-based further and continuing education, for example in connection with the increased digitalization of society. The existing continuing and further education models are currently under pressure. To this end, the university wants to work with new models that can meet the need for new competencies on the part of both graduates and the labour market, now and in future.”*

There has been an effort to make it attractive for the teachers to develop new formats of education from top management using incentives like financial support for development, extra salary, and administrative support when courses are “for sale”. From the teaching side, there is an acceptance that the associate professor uses his resources on LLL (checkbox is marked by the management) but not much focus. Other teachers are NOT interested in LLL, it does not give them the possibility to expand their research group by “picking” new PhD students.

Situational: Both interviewees stress that the learners are often people with busy jobs, family etc. The students struggle with finding time to do their LLL, and the employer typically pays and allows for the student to take one or two days of class hours per month but nothing more (the typical workload for a LLL student is 15 ECTS per 9 months; the legislation focus on students who will study for a full master’s degree).

The main motivation for the learners is to gain new knowledge that can be applied in their job directly. This is done by, for instance, actual written tasks that use “data” from their daily job. It is also important to offer the possibility of online courses in combination with physical meetings and networking with the other participants, teachers and researchers.

Dispositional: Education takes time, and it is important that the employer is engaged in the learner’s participation in further education and that there are clear conditions and agreements about this. The funding of education is also important – is it financed by the employer or by the employee? What kind of funding is available? In Denmark, there is national funding e.g., “Omstillingsfonden” but that is mostly for public employed persons - and something that was negotiated during the general payment negotiations.

Informational: At Aarhus University there is a central website, which offers information on all kinds of LLL, but in general not much is done on a central level. A national, official website exists with all Danish universities’ offerings; the “feeling” is that not a lot of potential learners know/use it to search for possible LLL offerings. The individual departments make promotions of the specific offers e.g., an MBA for company CEOs, but there is no central marketing or promotions for e.g. specially chosen and relevant target groups. One such example is the promotion of industry related conferences.

The use of alumni as a target group is relevant and recently, a survey among the alumni has been deployed to investigate the needs, wishes and conditions for participation in LLL. A closer cooperation and dialogue with employers’ organizations and with relevant unions could strengthen the knowledge of the customers’ needs.

## FINLAND

Different aspects of continuous and lifelong learning are being widely discussed also in Finland. A new National Higher Education Strategy for Lifelong Learning was published in December 2022 (Ministry of Education and Culture Finland, 2022). The strategy aims at strengthening and clarifying the role of higher education institutions as providers of different types of courses and activities contributing to the life-wide competence development of both individuals as well as to the further development of different organizations.

According to Eurostat (2022), adults in the Nordic countries participate in education and training rather actively compared to the EU average. There is, for instance, a long tradition of offering university courses to adult learners via the so-called open university concept in Finland. There are national plans to change the funding model of LLL in the future, but most of the costs are currently covered by state funding, which enables competence development at a very reasonable price. However, participation in these courses is strongly connected to the field of profession and, especially, Engineering and Science professionals are underrepresented. The universities are not playing a major role in the LLL efforts in this domain.

The framework for barriers and enablers for LLL in the Finnish context was tested only with one interviewee who had been working a long time in the field of adult education. The concepts and details of the framework were easy to understand, perhaps partly because of the background of the respondent. Nevertheless, the framework provided added value to the discussion and facilitated a deeper analysis of the different perspectives. Especially in the field of Engineering, there is a need to define and redefine LLL in the higher education context, and the framework may provide a useful tool to guide the way and to create common ground between the different actors.

Institutional: According to the interviewee, the most crucial institutional issue in terms of both barriers and enablers relates to finance. Very few participant groups have neither the ability nor the motivation to pay the real expenses of what a course or programme costs to deliver. That is, the funding issue needs to be resolved for the LLL to be viable. Another institutional barrier is that there is, after all, surprisingly little cooperation between traditional degree-oriented education programs and education/training aimed at those active in working life.

Situational: Flexibility in terms of time aspects and scheduling of training programmes was mentioned as an important situational enabler. That is, it is important to find flexible study arrangements, such as combining education and work in terms of time with flexible distance learning solutions.

Dispositional: However, the interviewee was not convinced that the question about dispositional barriers and enablers is as relevant a question in terms of LLL as the other aspects. Personal characteristics and qualities as obstacles and enablers seem, according to his/her opinion, not to have the same importance in the discussion about LLL.

Informational: Efficient exchange of information is highly important, particularly in terms of recruitment to different LLL courses and programmes, but also in terms of the organisation and implementation of studies. Guidance and counselling services should undoubtedly be further developed. Creating psychologically safe conditions for study paths for adult learners is a key issue. This is probably most effectively achieved through clear communication and good information.

Finally, the interviewee concluded that “Lifelong and continuous learning have been national battle cries for many years, and it is depressing how little progress has been made and how few well-functioning models have been developed and tested.” More creative models should be courageously piloted. Such experimentation could be carried out within international cooperation.

## **THE NETHERLANDS**

Four representatives have been interviewed for this research: First, the professor from the research group “Innovative and effective education” and academic director of Master Educational Leadership. Second, the managing director of the National Program-team LLL and former academic director of Saxion Parttime School. Third, the academic director of Life Science, Engineering & Design. And last, a Human Capital researcher from TechYourFuture and research group Employability Transition.

The results show the multifaceted landscape of Lifelong Learning (LLL) development in the Netherlands, particularly within Saxion University of Applied Sciences, offering a nuanced understanding of challenges and successes in educational innovation. The results identify three layers of LLL development, starting with the recognition of the need for change and a shift towards prioritizing learning activities over traditional education. The second layer emphasizes innovation and new perspectives, while the third layer underscores collaboration and the emergence of key skills regionally.

Despite LLL being a longstanding presence in Dutch educational discussions, progress has been moderate, with some initiatives at Saxion facing challenges such as inappropriate products and overestimation of employee interest. The involvement of key figures from the business community is highlighted as crucial for success in LLL initiatives. Learning Communities (LCs) are discussed as hubs fostering interdisciplinary collaboration and seamless learning experiences (Gelten, 2023). The definition of LLL encompasses continuous skill development, seizing growth opportunities, and making informed career shifts.

Successful LLL activities at Saxion include the Part-time School for formal training, the Academy for employees, and the Community of Practice for informal learning. The structured nature and flexibility of these initiatives contribute to their success. Examples like the Smart Solutions Semester, a multidisciplinary assignment with the business community, demonstrate effective engagement. However, challenges exist, such as unclear expectations and varying student motivations.

Institutional barriers include the absence of legal mandates, funding issues, and bureaucratic complexities. The importance of abolishing training course licenses for flexibility and fostering collaboration with companies is emphasized.

Situational barriers for learners involve time constraints, while institutional challenges include coordinating learning paths and addressing the need for flexible start times. Solutions include offering sub-modules and customization to accommodate individual responses to life changes.

Dispositional barriers encompass feedback literacy and the traditional mindset of educators. The importance of a shift towards a coaching role in personal learning paths is highlighted.

Informational barriers involve prescribed rules, lack of transparency, and competition between programs. The proposed solution is a centralized information point and proactive engagement to showcase opportunities directly to companies.

In conclusion, the study advocates for collaboration, forward-thinking approaches, and tailored learning experiences in the development of LLL. Flexibility, regional needs assessments, and increased awareness through active engagement with the professional field are crucial. The results provide valuable insights into the barriers and enablers of the different areas within LLL, emphasizing the need for flexibility in accredited education, transparent information, and a departure from traditional views of companies through joint development of LLL activities for further and better development of LLL in the Netherlands.

## **NORWAY**

Two representatives from NTNU, Norway's largest university, were interviewed. One has a faculty and leadership background and has been involved in continuing and further education within cyber security for almost 20 years. The other interviewee works in NTNU's Continuing Education Department and has been working with continuing and further education from an administrative perspective for more than 20 years.

Institutional: Among the institutional barriers mentioned by the interviewees, the following is seen as the most important from the provider's point of view: the university's main focus is on regular degree education, so the organization is not dimensioned for LLL – there is a lack of both organizational capacity and of institutional economic incentives. Moreover, perceived market uncertainties, regulatory complexities, and a possible lack of organizational adaptability (agility) also complicate the work on LLL provisioning. From the learners' perspective, market aspects also yield complex differences in financial models that can be hard to understand. Industry is also often pushed for time, making continuing and further education hard to prioritize.

Situational: The situational barriers mentioned from the provider's perspective are most often: individual professors lack time and are not personally incentivized to do LLL. Moreover, some professors see the mixing of mature and regular students in the same class as a pedagogical challenge. When it comes to hybrid online - campus teaching (which may be of interest due to the flexibility this offers for learners), many professors also fear that the learning environment may suffer if some students only participate online and are demotivated by this. Taking the individual learner's perspective, the interviewees' experience was that many find it tough juggling work, studies, family time, and spare time. Also, the experience is that individual employers experiencing an economic downturn can't afford to send people – while if a company's economy is good, employees often don't have time to participate in continuing and further education.

Dispositional: Regarding dispositional barriers, the fact that many teachers feel pedagogically challenged when facing mature students, is something that pushes them out of their comfort zone. This can be detrimental to teachers' motivation. The experience is also that some of the more academically inclined teachers see LLL as an 'academic downgrade'. In sum, these factors contribute to the fact that many teachers prefer to spend their time on research and on regular degree education rather than in LLL provisioning.



Informational: The interviewees see the following as the most important information-related barriers from the provider's point of view: The university is not currently tuned to find ways to understand and reach out to the market. Also, for engineering specializations in particular, it can be hard to find interested learners and match them with specific themes/courses that may be relevant for them. Similarly, from the individual learner's perspective, it can be challenging for people to find 'the right course for me', since the university's menu of courses is so broad.

Regarding the use of the 'institutional – situational - dispositional – information-related' framework as a scaffolding tool during interviews, the interviewees responded that the framework is useful. However, 'study environment' is missed as a more explicit topic.

Finally, the interviewees pointed out that transnational collaboration on LLL to alleviate some of the barriers mentioned may be challenging, due to differences in e.g., terminology, requirements, funding models, and regulatory aspects.

## **SINGAPORE**

Using the suggested framework proved to be very useful for both interviewers and interviewees, as it provided guidance in a structured manner. The framework also helped the authors in organizing the results and reporting in the reflections. The following narratives summarize the results, in accordance with the four dimensions of the framework.

Institutional: The effort towards lifelong learning is largely driven by the Singapore Government, under its SkillsFuture Singapore Initiative (<https://www.skillsfuture.gov.sg/>). For academics, the faculty can also upgrade themselves using funding allocated by the Ministry of Education. One can say that it had been institutionalized for the polytechnics. From the budget perspective, these are strong enablers, especially in programs related to improving teaching and learning (T&L), which often is free, if offered within the institution by its T&L Unit. However, the budget is still insufficient for technical or professional causes, and this is the area where most complaints were heard, and where significant justifications are needed. There is also a requirement for faculty to fulfil a minimum of training hours every year (100 hours), but the budgetary constraints meant that most faculty strived to meet the hours by opting for the free T&L programs, and still felt inadequate professionally. One even opined the irony of the very same system that was to be the enabler is also the barrier to LLL.

Situational: The main challenge appears to be timing, especially when it relates to the faculty's current stage of a career. A person rising the rank may be more preoccupied with addressing work challenges and portraying a favourable impression among superiors and put LLL in the backseat. On the other hand, one who is starting a family during mid-career, or caring for ageing parents will likewise sacrifice career development. This is seen in colleagues who opted for no-pay leave to focus on family matters, or some who opted for transfer for non-teaching administrative job functions for "more stable" working hours, pointing to the white elephant in the room that academics often work long hours. On the part of the Singapore Government, much effort has been expended towards addressing the challenge posed by balancing professional development and raising a family, and numerous schemes are available; especially with the help of technologies, e.g. bite-size podcasts, to company "day release" schemes.

Dispositional: The Singapore Government again is leading the effort to encourage its citizens to continually upgrade themselves, especially in today's digital age. Dispositional barriers, much like situational barriers, are a very personal matter influencing one's commitment towards LLL. In Singapore's context, one is quite open to the idea of LLL, given the recognition that most citizens understand that human resources are the country's only competitive asset. However, this often conflicts with the human longing for another pursuit in life as one approaches retirement age. One may not be constrained by a fixed mindset per se ("I am too old for this.") but fell "entitled" to "slower-pace to enjoy one's fruits of labour from earlier efforts". It can be cognitive dissonant when one is told that "there are still new challenges ahead" and to see the retirement age extended; at a time when one would long for the more leisurely lifestyle observed in one's parents.

Informational: It can be said that, at least in Singapore, there is information overload on LLL for potential learners. There are various programs offered by many approved training organizations (ATOs) which include educational institutions and private-sector training providers. It is a case of too many ATOs that had jumped into the "LLL bandwagon", offering a plethora of virtually indistinguishable, "me too" courses, especially those revolving around self-improvement, office productivity, "Management 101", etc; often heavily subsidized under the SkillsFuture Singapore Initiative. There is a lack of professional (technical) programs from ATOs. There are also too many generalities and insufficient clarity, for example on specific requirements, eligibility criteria, and application processes for lifelong learning programs. One consequence is that despite the high level of awareness of the need for LLL, the utilization of SkillsFuture credits for the courses remained low: only 38.8 percent of the eligible individuals aged between 30 and 39 have utilized their credits (CNA, 2023). Again, the enabler had become the barrier.

## **DISCUSSION AND GENERALIZATIONS OF THE EVALUATION IN THE COUNTRIES**

The four barriers – institutional, situational, dispositional, and informational – are not mutually exclusive, i.e. they influence one another. Funding remains a common institutional challenge to all, which has to be negotiated against situational factors and mediated by dispositional ones. Balancing job demands and family commitment against LLL is a common thread. In addition, there is a greater need to tackle the LLL challenges from the perspective of the learners, not just "top-down", and also take into consideration these enablers and barriers in a holistic, integrative manner. Connecting what was learned at LLL to the job role is important. The common challenge here is LLL in a professional (technical) nature, which often faces high financial barriers. The duality of demand on an academic staff to become both solidly grounded in a technical discipline and well-versed in teaching and learning practices, often led to a "training budget paradox<sup>1</sup>". It is already very challenging for faculties to continue developing domain mastery and developing competencies in imparting certain skills and/or attitudes.

At the universities covered in this study, LLL still plays a relatively minor role. Most have LLL included in their strategy, but it is in most cases insufficiently encouraged. The countries have all started to focus on LLL, with Singapore as the one with actions on both strategic, tactical and operational levels. In Europe, the focus is more on political statements whereas the actual operational implementation is often not in place. From the viewpoint of the individual professor, LLL is not seen as something that promotes their career - there is thus a need to expand the focus beyond research as the most dominant indicator for success if LLL is to be strengthened.

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<sup>1</sup>budget insufficient for technical PD but more than enough for T&L PD

**Error! Reference source not found.2.** Condensation of the findings from each country.

	Institutional	Situational	Dispositional	Informational	Country summary
Denmark	Very little strategic focus. Funding almost 100% dependent on number of attendees.	The students struggle with finding time to learn. Learning typically done in spare-time.	Typically paid by the employer. Some funding schemes for groups of employees (part of the agreement).	Central university and a central national website with all offerings. Very little “push” marketing.	Clearer and more central role of LLL at the universities needed. Longer lasting funding model needed. Better and more targeted marketing.
Finland	Funding needs to be resolved for the LLL to be viable. There are limited connections between degree education/ faculty and offerings aimed at LLL audience.	Finding proper arrangements in terms of time, place and flexible distance learning solutions is vital.	This aspect is not considered to be as relevant as the other aspects – at least when it comes to those individuals who are motivated to develop their competences.	The university is not tuned to find ways to understand and reach out to the market. It is hard to match the learners with relevant LLL-offerings and vice versa.	Funding, flexibility in learning methods and arrangements, better match between needs and offerings, clearer role of LLL in universities.
The Netherlands	Institutions need flexibility for lifelong learning, but there is a mismatch in module registration. Main barriers are legal, customization, funding, and record-keeping.	Tailored adult education, accommodating personal circumstances. Main obstacles are time, engagement, logistics, cultural differences. Focus on flexible delivery methods and support.	More focus on mindset, adaptability, and collaboration. Main challenges are balancing work-life, embracing change, teacher's role shift. Feedback literacy can influence collaborative learning.	Inconsistent rules hinder part-time courses. Lack of transparency in knowledge institutions. LLL should meet regional needs without competition.	Flexibility, regional needs assessments, and increased awareness through active engagement with the professional field are crucial.
Norway	Lack of capacity and economic incentives for universities. Market uncertainties, regulatory complexities, and lacking organizational agility. Industry pushed for time; employee LLL hard to prioritize.	Professors lack time and personal incentives. Pedagogical and learning environmental challenges. Tough for learners to juggle work, studies, and personal life. In bad times employers can't afford LLL time for employees.	Teachers pedagogically challenged when facing mature students - pushed out of their comfort zone. Academically inclined teachers may see LLL as an 'academic downgrade'.	University not tuned to understand and reach out to market. Hard to find interested learners and match them with specific themes/courses - and for learners to find the 'right' courses.	Current university organization, recruitment, and funding models not well adapted to LLL needs. Lack of capacity, time, and incentives for university professors to engage in LLL. Information barriers both for providers and learners.
Singapore	Funding of deep technical learning still inadequate, while that for T&L are adequately handled within an institution.	Starting a family or caring for aging parents is prioritized over advancing one's career.	Dilemma of “postponing” one's retirement in view of new challenges, cannot afford to “slow down”.	Case of too much information, lack of clarity among many training providers with similar contents.	Support of upgrading of technical nature often focused on helping one to move into new growth area.

## CONCLUSIONS

The used four-dimensional framework seems to provide a rather well-functioning tool to analyse the LLL conditions in different countries and provide ground for mutual understanding of the different aspects of it. It gave a good structure for the interviews and provided ground for mutual understanding of the different aspects of LLL.

The four barriers – institutional, situational, dispositional, and informational – are not mutually exclusive, i.e. they influence one another but serve as different lenses useful in observing and analysing LLL. Not many additions to the framework were suggested, but one interviewee missed “study environment” as a focus point: LLL is often seen as something that provides the students new networks, a chance to discuss their problems with peers, not necessarily something that they can do in the normal professional setting. From the teacher side, the more mature students give the teacher a unique opportunity to have an applied focus on their research (and establish research collaborations between companies and the university), but also new pedagogical challenges.

From the interviews, the major obstacles that withhold LLL from expanding at university level in all the five countries covered by our study seem to be:

- Universities are restricted by current legislation and capacity constraints in offering education outside the conventional frameworks.
- Bureaucratic boundaries within the knowledge institutes tends to slow down and frustrate LLL initiatives.
- The current funding models are unstable and provide few strong incentives for universities and staff to do LLL.

If these obstacles can be solved, there might be good chances of combining LLL activities from different knowledge institutes nationwide, or even developing a nationwide or even transnational platform for both educational providers and participants.

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## BIOGRAPHICAL INFORMATION

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