The Transition of Higher Education for Continuous Lifelong Learning: Expert Views on the Need for a new Infrastructure

Peter Mozelius[1], Martha Cleveland-Innes[2,3], Marcia Håkansson Lindqvist[3] and Jimmy Jaldemark[3]

[1]Mid Sweden University, Östersund, Sweden
[2]Athabasca University, Canada
[3]Mid Sweden University, Sundsvall, Sweden

Peter.Mozelius@miun.se
martic@athabascau.ca
Marcia.HakanssonLindqvist@miun.se
jimmy.jaldemark@miun.se

Abstract: In the contemporary need for continuous upskilling and reskilling, higher education has an important role to play. While the traditional university programmes are designed for students in their early twenties our knowledge society has a demand for lifelong learning in a wider age span. This paper is a part of a Delphi study on the ongoing transformation of higher education for lifelong learning. A qualitative Delphi study has been carried out in the four steps of 1) A literature study to explore the chosen topic, with the selected publications sent out to an expert panel, 2) A survey with questions to the experts based on the findings in the literature study, 3) Email interviews to dig deeper into the answers from the survey, and finally 4) Focus group interviews. The aim of the paper is to analyse, present and discuss the international expert panels' views on the infrastructural needs in the transformation of higher education. Data gathered from the three first steps, with a focus on the email interviews, have been analysed according to the Grounded Theory concepts of open, axial coding and confirmatory coding. The categories from the Open coding analysis were later, in the axial coding, grouped around the central axis of 'Higher education transformation for lifelong learning'. The confirmatory coding found the common denominator of 'Infrastructure', and its interrelationships with the attributes of 'Multimodal delivery', 'Pedagogical change', 'Quality and organisation', 'Equity, diversity and inclusion', 'Digital literacy', 'Accessibility', and 'Financial aspects'. Findings align to the Anna Karenina principle in the sense that a happy and healthy infrastructure for continuous lifelong learning in higher education, depends on all the attributes listed above. This leads to the Tolstoyan conclusion that every variation of failing attributes would result in its own state of unhappiness.

Keywords: Higher education reform, Lifelong learning, Technology enhanced learning, Inclusive education, Delphi study

1. Introduction

Lifelong learning and its place in higher education has been frequently debated in the 21st century. In the new knowledge society today, most countries face a high demand for retraining and reskilling. This requires a continuous professional development where the traditional university programmes are redesigned to support a continuous lifelong learning. This is a transition that higher education has to address (Lang, 2023), a reform that also must ensure inclusion and support equitable quality education (Atchoarena, 2021). The study presented in this paper is part of a larger Delphi study on the ongoing transformation of higher education for continuous lifelong learning. The aim of the study is to analyse, present and discuss the views on the infrastructural needs in the transformation of higher education, based on structured interviews with the Delphi expert panel.

The complete Delphi study was carried out with the four steps of 1) A literature study to explore the chosen topic, with the selected publications sent out to an expert panel, 2) A survey with questions to the experts based on the findings in the literature study, 3) Email interviews to dig deeper into the answers from the survey, and finally 4) Focus group interviews, extended with a pre- and a post step. Data from the three first steps of this Delphi study, and with a strong focus on the email interviews in Step 3, have been analysed according to the Grounded Theory concepts of Open, Axial coding and Confirmatory coding. The results from the Open coding were used as an input to the Axial coding and the results from the Axial coding have been refined in the Confirmatory coding phase.

2. The Transition of Higher Education for Continuous Lifelong Learning

The transition of higher education for lifelong learning has been in focus during several decades. This research field was initiated long before the Covid-19 pandemic outbreak (Schuetze & Slowey, 2013). However, the pandemic has acted as a catalyst for the transformation of lifelong learning and higher education, and highlighted the need for technology-enhanced lifelong learning (Davidović, 2020; Ivenicki, 2021; Mozelius, 2021). A development that involves the adjustment of lifelong learning structures within higher education in

regard to educational design and the model of content distribution. Reflected and well-designed changes in the structure of lifelong learning could provide beneficial outcomes. At the same time, there are critical aspects of the higher education transformation that are crucial to address for a successful lifelong learning in a digital era.

As the contemporary societies become increasingly dynamic, socio-economically complex, and globally connected, the need for technology-enhanced lifelong learning in virtual environments grows stronger (Nygren et al., 2019; Hansen et al., 2020). This is one of many challenges that higher education institutions must address. Jarvis (2014) defines lifelong learning as a process in which humans of any age, and with a broad range of needs and interests, together should acquire new knowledge and skills. To establish well-designed teaching institutions such as universities might be seen as one source of delivery, but are not the only one (Jarvis, 2014). In the growing field of lifelong learning, higher education institutions could take on two different roles. One role would be to ensure that graduates of formal, credit, and accredited programs are empowered with the skills required for a lifelong learner. At the same time higher education institutions can also offer continuous and adapted courses and programs designed for meeting the specific needs of prospective and lifelong learners. In both scenarios, higher education will play a main role, but together with other important actors.

3. Method and Materials

The Delphi method is a structured communication strategy to capture an expert panel's view of complex phenomena (Okoli & Pawlowski, 2004). This study was based on the adapted four-step Delphi method described in (Mozelius et al., 2023), as ' The Alberta approach'. A four-step approach that also involved a pre- and a post-step as listed in Table 1 below.

Table 1: The Steps in the Adapted Delphi Approach

Pre-step	**2020-2021**	**Literature review** **Invitation to experts**
Step 1	Dec, 2021	Online survey
Step 2	Jan, 2022	Reading assignment
Step 3	May, 2022	Structured email interviews
Step 4	June/July, 2022	Focus group interviews
Post-step	September, 2022	Validation of focus group summary Preliminary conceptual framework

4. Data Collection

This study was based upon the data from the answers to the email interviews in Step 3, in which eight selected experts on lifelong learning answered a questionnaire with open ended questions. Experts have been selected with the idea of a purposive expert sampling (Rai & Thapa, 2015), involving informants that all have a long experience of teaching in higher education. All experts have several research publications in the field of lifelong learning and lifelong education. Moreover, these experts have a wide geographical spread, and are representing five countries and three continents. A geographical spread that resulted in a variation of socio-cultural contexts. Before the email interviews the experts in the Delphi panel were given a reading assignment with the five texts in Table 2. The texts have been analysed in detail in an earlier literature study on lifelong learning and higher education (Håkansson Lindqvist et al., 2020).

Table 2: The Reading Assignment in Step 2

Publication and authors	Relevant topics for the Delphi study
Santos, L., Bago, J., Baptista, A. V., Ambrósio, S., Fonseca, H. M. and Quintas, H. 2016. Academic success of mature students in higher education: a Portuguese case study. *European journal for Research on the Education and Learning of Adults*, *7*(1), 57-73.	Presents European lifelong learning policy for economic development, personal development, social inclusiveness and democratic understanding
Kasworm, C. 2020. Adult Workers as Learners in the USA Higher Education Landscape. In *Inequality, innovation and reform in higher education* (pp. 221-235). Springer, Cham.	Discusses a rethinking of the mission of higher education with a specific focus on adult undergraduate students who more often are both workers and students
Boyadjieva, P., and Ilieva-Trichkova, P. 2018. Lifelong learning as an emancipation process: A capability approach. In *The Palgrave international handbook on adult and lifelong education and learning* (pp. 267-288). Palgrave Macmillan, London.	Presents a theoretical outline of the heuristic potential of the capability approach in conceptualising lifelong learning and the capacity of this approach to guide empirical studies on lifelong learning
Weil, M., and Eugster, B. 2019. Thinking outside the box. De-structuring continuing and higher education. *Disciplinary Struggles in Education*.	Promotes a stronger relationship between higher education research and continuing education training (CET). More collaborative engagement between higher education and CET is necessary to include the importance of an applied, practitioner research in professional fields
Jamaludin, R., McKAY, E., and Ledger, S. 2020. Are we ready for Education 4.0 within ASEAN higher education institutions? Thriving for knowledge, industry and humanity in a dynamic higher education ecosystem?. *Journal of Applied Research in Higher Education*.	Presents challenges that have been identified in higher education and the need for a new dynamic higher education ecosystem. The concept of Education 4.0.

5. Data Analysis

Interview answers have been analysed according to the Grounded theory method of data being 1) fractured and labelled, 2) conceptualised around a central category, and 3) integrated with a description of their interrelationship for further theory building (Moghaddam, 2006). In the first analysis phase, referred to as Open coding, data were broken down into units of meaning to label and conceptualise data as outlined by Khandkar (2009). The open coding was conducted with an investigator triangulation approach where three of the authors collaborated in a 'triangulating analysis' to find preliminary categories based on codes and subcodes that were identified in the interview answers. The next phase of Axial coding was guided by the idea of *"coding that treats a category as an axis around which the analyst delineates relationships and specifies the dimensions of the category"* (Bryant & Charmaz, 2007, p. 603). The first version of preliminary categories were built around the most frequent codes, but later some categories were merged and renamed.

In the Axial coding the preliminary categories from the Open coding were reassembled into more abstract conceptual categories around the central axis of 'Higher education transformation for lifelong learning'. Finally, the third phase that sometimes is referred to as Confirmatory coding (Cleveland-Innes and Campbell, 2012), and sometimes as the phase of Selective coding (Walker and Myrick, 2006). In this study the choice was to use the term Confirmatory coding, but with the same fundamental approach as when Vollstedt and Rezat (2019, p. 89), described Selective coding as "the process of choosing the core category and relating it with the other categories from axial coding". This third analysis phase should also involve a strive to answer the important questions "What seems to be going on here?" and "What is the research all about?" (Corbin and Strauss, 2008; Teppo, 2015; Vollstedt & Rezat, 2019).

6. Findings and Discussions

With the Grounder theory idea of an iteratively refined analysis data, have been reread and discussed among the authors in the phases of Open coding, Axial coding and Confirmatory coding. The overall aim was according to the main idea in the Gioia method to begin the development of "a theory that explains, at a broad conceptual level, a process, an action, or interaction about a substantive topic" (Magnani & Gioia, 2023).

6.1 Results from the Open Coding

In the Open coding data were broken down units of meaning or subcodes. Out from the subcodes or data extract, codes and preliminary categories were created in three different analyses conducted separately by three of the Delphi study researchers. Later, the results from the different analyses were discussed in research team meetings where the preliminary categories were split, merged and renamed. An example of how subcodes and codes aggregated the category of 'Pedagogical change' is illustrated in Figure 1 here below.

Pedagogical change Codes: ***Pedagogy - Instructional design – Interaction - Social presence – Learner centred design***
Subcodes / Data extracts: Improved learning design based on affordances of digital technology/ digital interaction instead of converting f2f modes into digital pedagogy. have transformed their pedagogy to make it more focused on students' learning, by using in their course synchronous and asynchronous activities. They also were able to provide their students with the advantages described in the literature on blended and online courses: flexibility, accessibility, complementarity between synchronous and asynchronous activities using pedagogical approaches such as problem-based or project-based learning by integrating technologies and in particular Internet research. However, in some developing countries, these resources are weaker or even non-existent problem-based or project-based learning, emphasize the acquisition of skills and

Figure 1: A Preliminary Category Aggregated by Codes with Some Examples of Subcodes/Data Extracts

The final categories in the Open coding phase were aggregated into 1*) ' Digital literacy'* with the subcategories (or codes) of 'Rich media tools', 'Learner digital literacy ' and ' Teacher digital literacy¸ 2) *'Multi-modal learning delivery'* with the subcategories of 'Content development', 'Instructional design', and 'Rich media tools, 3) *'Infrastructure'* with the subcategories 'Blended learning', 'Policies', 'MOOCs', 'Instructional design', 'Open Source', 'Open learning' and 'Internationalisation', 4) *'Quality considerations'* with the subcategories 'Aim', 'Outcomes', 'Credits', 'Certificates', and 'Quality assessment', 5) *'Pedagogical change'* with the subcategories 'Pedagogy - Instructional design – Interaction - Social presence – Learner centred design as in Figure 1 above, 6) *'Continuous lifelong learning'* with the subcategories 'Lifelong learning', 'Work-integrated learning', 'Lifelong learning' 'Collaboration with society', 'Social aspects', and 'Employability', 7) *'Accessibility'* with the subcategories 'Anytime-Anywhere', 'Older adults', 'Inclusion policies', 'Open Educational Resources', 8) *'Equity, diversity, inclusion (EDI)'* with the subcategories 'Inclusion', 'Open Education', 'The Mathew Effect', 'Older adults', 'Women', 'Disaffected youth' and 'Diversity', and finally 9) Miscellaneous.

All categories and subcategories had a relation to the central theme for the Delphi study, 'The Transition of Higher Education for Continuous Lifelong Learning'. However, their focus and their interrelationship needed to be further analysed in the Axial coding phase.

6.2 Results from the Axial Coding

In the Axial coding the Open coding category 'Continuous lifelong learning' was merged with parts of the category 'Miscellaneous', and extended to the new axial category. This new central category for the analysis was 'Higher education transformation for lifelong learning'. A central axis connecting the categories of, 'Multimodal delivery', 'Pedagogical change', 'Financial aspects', and 'Quality and organisation', 'Infrastructure', 'Digital literacy', 'Accessibility', and 'Equity, diversity and inclusion (EDI)' as depicted in Figure 2.

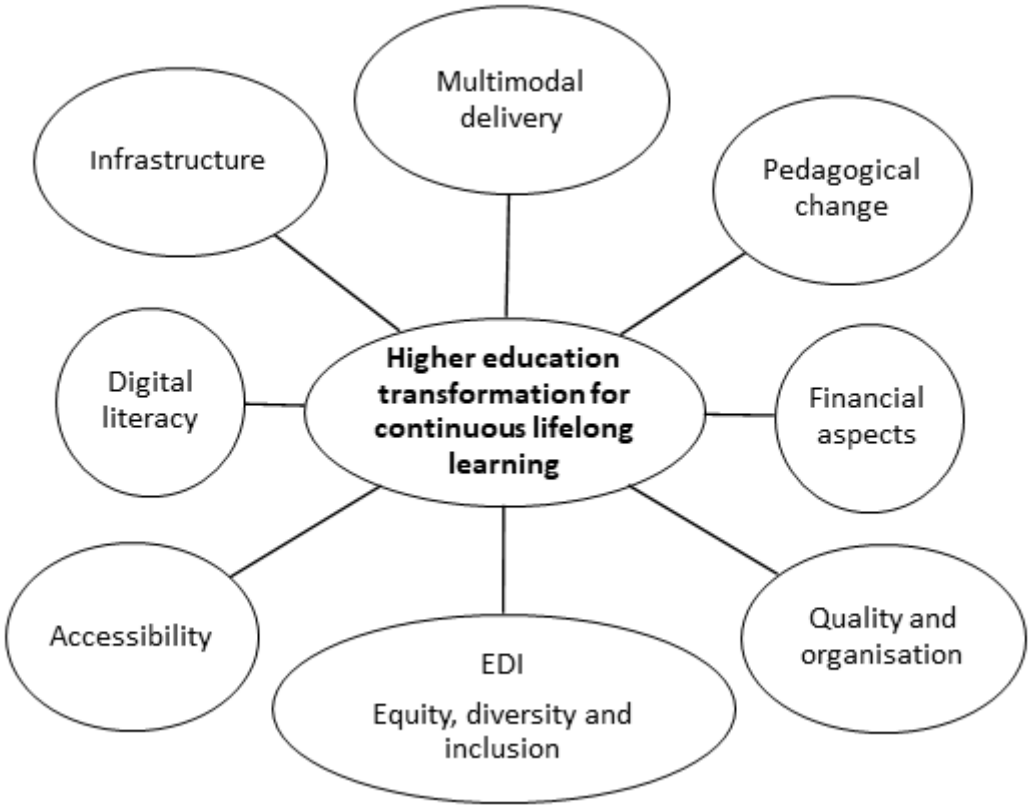

Figure 2: Critical Aspects of 'Higher Education Transformation for Lifelong Learning' and its Dependencies

6.3 Higher Education Transformation for Lifelong Learning

The found central category, that the axial coding focused on was Higher education transformation for lifelong learning. A new category that is a merge of the earlier category of 'Continuous lifelong learning' and its subcategory of 'Transformation of higher education'. Several experts brought up the pandemic as a catalyst for this transition, and as expressed in an interview answer *"I think we have learned a number of important lessons during the pandemic, some of which provide insights about future drivers for change in HE"*. Another transition driver mentioned by some experts were the new demands in the contemporary knowledge society and the labour market. There were comments on the currently huge needs for reskilling and upskilling. One of the experts highlighted the importance of a more demand driven lifelong learning, and to *"increase research-led education to focus on innovation, increase engagement, and focus on capability"*. Furthermore, one expert brought up the ongoing climate change as a driver *that "will continue to be a backdrop for many initiatives, policy shifts, etc"*. An essential part of the transition is that lifelong learning in higher education has to use more of technology and online learning in the future. However, as pointed out by an expert:

> *"I don't think it's wise to say that technology is itself a driver. Better to say that improvements in the capabilities of affordable digital devices + enhancements to networking infrastructures are entangled with changing habits and expectations"*

The implementation of educational technology is an ongoing process, but what might be more important, and mentioned by the experts is the effort to enrich the traditional higher education with other experiences such as work-based experiences, and work integrated education. Another trend that was brought up was the request for shorter courses, smaller modules or so-called micro credentials. There were also comments on MOOCs and non-credit offerings, and that these already are pushing the boundaries between academy and industry, with

the aim of employability and 'job readiness'. An advice from an expert was to "*Be clear about the added value of education in the context and meaning of lifelong learning. Re-define what educational institutions are in the context of emerging corporate training and industry academies"*. Another given advice was *about "favoring the integration of practice into training, such as, internships in companies or in the industry, projects carried out in partnership with industry and joint supervision between university faculties and professionals"*, with the idea of a *"focus on both the development of the canonical knowledge required, for instance a set of occupational capacities, but also some variations of how that knowledge will be applied, for instance in a particular workplace setting."*

Moreover, there was several remarks on the importance of opening up the university to a hybridity where the professional development and lifelong learning are built around the evolving needs in companies and societal organisations. A constantly evolving field mentioned in the interview answers is healthcare, with a need for continuous lifelong learning, involving the fact that *"healthcare workers must keep up to date with this new knowledge, and must quickly integrate it into their practices''*. The expert panel recommendation was to build courses around *"These kinds of activities that individuals face every day in their working life, and having the capacities to respond to them both those that are routine and those that are none routine"*. Panel experts point out many challenges in the transition of lifelong learning, but there is also answers with positive expectations and of hope that *"the deeper structures and values of lifelong learning as well as the long history of how to do technology-enhanced learning in ways that foster human flourishing, learning fulfilment and worth-while fusions of academic and professional development*".

To foster this human flourishing the expert recommendation was to involve both the aspect of lifelong education for improved employability, and lifelong learning for personal development. This should be "thought about in ways that encompass the whole life course", comprising the idea of enriching participants daily life and to empower participants. These two aspects should be combined, and as expressed by one of the experts: *"on the one hand, functional lifelong learning in the form of upskilling with a focus on socio-economic value, and, on the other hand, personal lifelong learning in the form of 'life-world becoming'"*. Finally, experts raised the idea of a human centred lifelong learning, and: *"putting human flourishing before efficient or smart tech set-ups, worth-while learning before technological upskilling of the workforce the deeper purpose of lifelong learning before the construction of massive technology-enhanced lifelong learning courses*".

To outline a continuous lifelong learning that is not only about professional development and employability is also the recommendation by Boyadjieva. and Ilieva-Trichkova (2018), a publication that was part of the earlier mentioned reading assignment.

6.4 Results from the Confirmatory Coding

In the beginning of this phase the aspects in Figure 2 were discussed among the authors in online meetings. An emerging idea was that all the categories around 'Higher education transformation for lifelong learning' could be classified as 'Infrastructure'. This idea was later confirmed in the coding, and that 'Infrastructure' was one of the largest and dominating categories early in the Open coding. In the Axial coding 'Infrastructure' was aggregated and presented as below.

6.5 Infrastructure

The transformation of higher education for lifelong learning seems to be clearly dependent on the transformation of the overall infrastructure. According to one of the panel experts this should be developed as an "open learning environment where new formats, forms and formations emerge". Another expert's opinion was to *"Hybridizing learning experiences and interactions through opening up learning environments for the public"*, with the lifelong learners *"participating in courses with people in different roles, contexts and localities or having institutions that are open to all and offer valuable knowledge or products for the public"*. An ongoing transition at several universities in many regions of the world. However, as one of the experts pointed out, this could be met with *"the idiotic but often repeated claims that university education hasn't changed since the middle-ages"*. Attitudes are different in different parts of the world, and many politicians and policy makers in other continents could have the diametral opinion to *"In Australia, we had a prime minister asserting that only face-to-face classes really 'count' as education; 'screen time' is wasted time"*. There are certainly some identified advantages with technology enhanced learning, and an expert highlighted the global aspect of *"Educational provision for international students interacts in an interesting way with use of online/blended learning"*.

Other possibilities with a user-friendly technology enhanced redesign of the infrastructure could be what one of the experts expressed as the "*development of a computed curriculum and further automation of the delivery of*

education", and that this could *"likely further increase in the area of educational consumption and supply driven individualised learning pathways"*. In all transition, the aim must be to combine de desired individualisation and accessibility with new forms of collaborative learning based on, what was brought up in an answer as *"technological systems and tools to technology-enhanced learning communities"*. The main objective ought to be what an expert expressed as to *"foster technology-enhanced places for lifelong learning that 'vibrates' and make learners flourish"*. Several experts mention that ongoing technology enhancement, and the general digitalisation of society definitely will change the way higher education is outlined and practised. One of the interview answers brings up the OECD vision from 2020 for education systems in the future. An expert vision involves four alternative scenarios: schooling extended, education outsourced, schools as learning hubs, and learn-as-you-go. Each of these sketched scenarios would require infrastructural changes, where the expert sees that:

> *"The first two scenarios would require less transformation of the school system, while the latter two would require greater change in how we design and deliver education — and unless institutions are able to adapt agilely to this change, other providers will step in to fill the gap"*

'Infrastructure' is depending on 'Quality and organisation' with the two subclasses of 'Pedagogical change' and 'Multimodal delivery'. A hasty and careless transition could result in lower quality and an organisation that would not benefit either learners or teachers. Furthermore, there is a dependency on 'EDI – equity, diversity, and inclusion' and its two subclasses 'Accessibility' and 'Digital literacy'. Finally, as depicted in Figure 3, all infrastructural categories are depending on 'Financial aspects'.

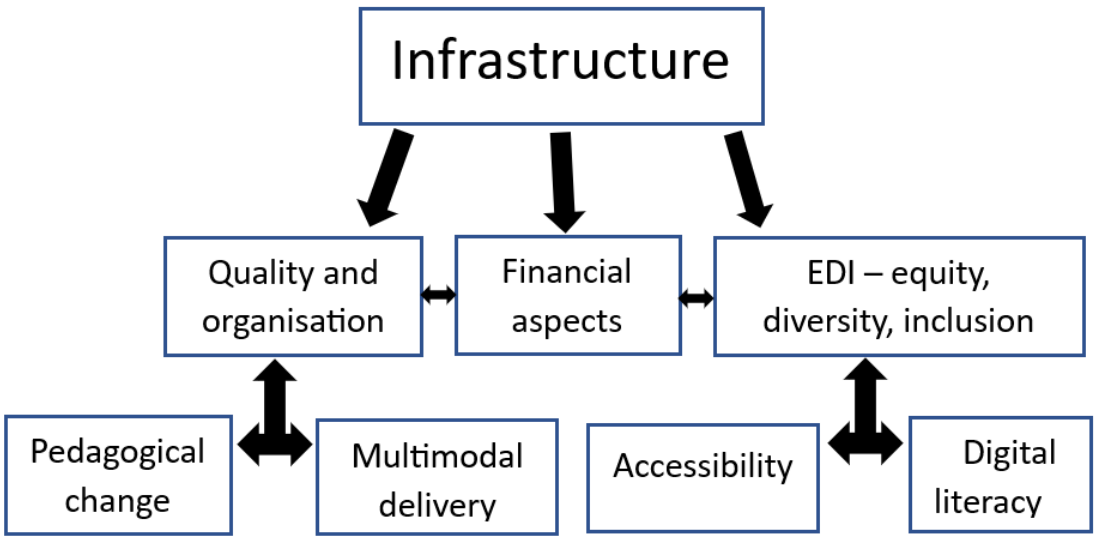

Figure 3: Important Aspects of a New Infrastructure for Continuous Lifelong Learning

7. Conclusion

To answer the questions posed in the end of the method chapter "What seems to be going on here?" and "What is the research all about?". The transition of higher education for continuous lifelong learning has started and is an ongoing process, and the umbrella phenomenon that needs attention is a transformed infrastructure adapted to the need for a continuous lifelong learning for all. A quality transformation will not be for free, but probably with a decent return on investment in the longer perspective. The categories and their interdependencies in the presented conceptual model align to the Anna Karenina principle: "success in complex undertakings does not depend on a single factor but requires avoiding many separate causes of failure" (McClay and Balciunas, 2005, p. 197). A happy and healthy continuous lifelong learning in higher education, depends on a successful transformation of all the involved aspects. All in all, this leads to the Tolstoyan conclusion that every variation of failing attributes in this relationship would result in its own state of unhappiness, and in this case dysfunctional lifelong learning.

8. Future work

With the Grounded theory idea of developing hypotheses and theory, the results from this study should be further elaborated in Step 4 and the Post-step of this Delphi study (see Table 1).

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