

Future Skills and the Future of Higher Education

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Abstract

The report „Future Skills – Future learning, Future Higher Educaion“ (read full report here www.nextskills.org) focusses on empirically determining futre skill demands for higher educaion. Research on future skills is the current hot topic of the day in management and organizational research. In times of global networked organizations, and steadily accelerating product cycles, the model of qualification for future jobs seems in question. The vast majority of employers surveyed for the “Future of Jobs Report” of the World Economic Forum (WEF 2018), released in 2018, expects that in short term, by 2022, the skills required to perform most jobs will have shifted significantly: “While these skill shifts are likely to play out differently across different industries and regions, globally, our respondents expect average *skills stability*—the proportion of core skills required to perform a job that will remain the same—to be about 58%, meaning an average shift of 42% in required workforce skills over the 2018–2022 period”. Can graduates really be prepared for the future through knowledge acquisition? Are we already having adequate concepts for competence development in higher education? Or is something new, something radical needed?

Keywords

Future Skills, higher education, Learning, Competence, Delphi Survey, Education Research

I - Introduction to the Field of Future Skill Research

Research on future skills is the current hot topic of the day in management and organizational research. In times of global networked organizations, and steadily accelerating product cycles, the model of qualification for future jobs seems in question. The vast majority of employers surveyed for the “Future of Jobs Report” of the World Economic Forum (WEF 2018), released in 2018, expects that in short term, by 2022, the skills required to perform most jobs will have shifted significantly: “While these skill shifts are likely to play out differently across different industries and regions, globally, our respondents expect average *skills stability*—the proportion of core skills required to perform a job that will remain the same—to be about 58%, meaning an average shift of 42% in required workforce skills over the 2018–2022 period”. Can graduates really be prepared for the future through knowledge acquisition? Are we already having adequate concepts for competence development in higher education? Or is something new, something radical needed? Research on future skills becomes more prominent, either compiling lists of skills for broad purposes of how to live and work in 2030 (OECD, 2018) or analyzing job field related qualifications (Deming, 2017). However, the time is ripe to go a step further and conduct in-depth research.

What plays out in the future depends on decisions taken today, which can critically narrow the room for maneuver over time. That is why it is important to factoring the long term into decision-making in higher education today. Starting point for research on future skills is an analysis of factors, which influence our lives, the way we work and live, learn and develop. On the one hand, we cannot predict

what the future will look like, whereas, on the other hand we notice that changes are underway and leave us with a changed environment demanding different behavior, and adaptation to more complex situations in our lives and work contexts. An analysis of such changing factors is available in a multitude of volumes, in many forms, shapes and perspectives. The nature of such descriptions, studies and analyses is – as they are dealing with the future – naturally carrying a certain degree of vagueness, while being as precise as possible in order to capture aspects, which can be taken as factors of influence for the future: future ways of living, future ways of work, future ways of learning, etc. (e.g. OECD 2019, 2018, 2017a, 2017b). Analyzing the currently existing writings dealing with the question of which skills and abilities will be important for the future work life, at least two converging primary factors crystallize:

- Ever faster technological advancements and their penetration and infusion of all spheres of our lives, work and societies, leading to an excess of information and options. This can be compared to the point in time, when Gutenberg invented the printing machine for books, and for which our society is only starting to develop ways of coping with it.
- Increased global cooperation, exchange, and communication, which moves from being an option to being a necessary ingredient of every process of society, work and individual life.

Resulting from that, a number of connected changes can be observed, which we believe to be secondary effects, building on the foundations of the two prior ones:

- Resulting from the tectonic shifts in the structure of work and its development, a new demand for (higher) education study and learning pathways and qualification structures including certification and credentialing schemes will be needed. Educational institutions need to understand these forces in order to develop a changed vision of future education to inform their strategies.
- Fostered through these changes an ever-larger demand for higher educational attainment is induced evoking industrialized societies to turn into learning/ educational societies in which life risks primarily can be mitigated through education.
- And lastly, a changing nature of the very essence of what learning (in school) and studying (in higher education) is aiming at can be observed, leading to a new ‘lead-orientation’ for concepts like knowledge – shifting from static knowing to knowing & reflection in action in complex and open situations.

It is important to note that no cause-effect model can be applied to these developments. In order to find reference models which are capable of capturing the intertwined and networked nature of these developments with factors mutually influencing each other, we turned to eco-systems theory and cybernetics. The dynamic nature of these approaches able to deal with and describe system dependencies provides grounds for theoretical description of reality. The eco-systemic approach is based on the assumption that changes and developments in one system are causing effects in a connected system. Building on this approach, combining it with an education science point of view, as well as with a sociological perspective, our research is rooted in the assumption that there are ongoing changes within the structure, nature, and profile of the abilities and skills. Individuals will need these skills for their professional lives in order to cope with the demands and requirements of their respective work contexts and tasks. In our research we found, that these changing skill requirements can be described and analyzed.

Notably, policy and especially research, pays increasing attention to analyzing in-depth changes and trends for the future world of work and for future job markets (OECD 2018a, 2018b, WEF 2018, Playfoot & Hall 2009). However, most approaches fall short of two perspectives, which we call the “iceberg phenomenon” and the “future education gap”:

The first blind spot is the iceberg phenomenon: The iceberg phenomenon of future skill research refers to the fact that future skill research is often focusing on technological change (World Economic Forum 2018, Hirsch-Kreinsen 2016, CEDEFOP 2012, Deloitte 2018, PwC 2018, McKinsey & Company 2018, Balliester & Adam 2018), which is only one side of the coin. Our research shows that this is just the tip of the iceberg. Only very few studies try to elicit changes, which go along with it and which lie underneath the surface of the iceberg: dealing with future work concepts, the tectonic shifts throughout an entire business or public organizations, the way collaboration is organized, and the impact it has on organization culture, new leadership concepts, more decentralized, smaller units, and a need to organize shared creativity and shared cognition in a global setting.

The second blind spot (future education gap) is the future skills education concepts gap, which refers to a lack of research with regards to the demand and shape of future higher education concepts, which meet the need for future skills. It is still unknown how higher education institutions can organize their academic programs in a way that they specifically are sensitive to supporting the development of future skills for their future graduates. Although many promising attempts and pilot trials are underway, there is no overarching forum for discussing possible future higher education and its institutions.

Both issues, the iceberg phenomenon of future skill research and the future education gap are predominant issues in future skill research today. In order to overcome this shortfall and to be able to research the articulation, extent, nature and contexts of such future skills – and not limited to digital skills but future skills with a broader scope, we designed a threefold long-term research project, starting in 2015, called “Future skills – future learning and future higher education”.¹ The research focus is on identifying future skills in a broad and holistic sense, incorporating digital skills but going beyond them, and determining which changes are caused in work environments leading to these new skill demands. Moreover, we asked how higher education institutions would have to reorganize their academic programs in order to support development of such future skills for future graduates.

There are complex feedback loops between new technologies, job creation, education organizations’ attempts to prepare individuals for present and future jobs, and their skill development. New technologies can drive business growth, job creation, and demand for specialist skills, but they can also displace entire roles when certain tasks become obsolete or automated. Well-developed links between higher education institutions and labor markets in order to share and exchange information about these often short-term developments, do not exist at large scale.² Skill gaps—both, among workers and among the leadership of organizations—can speed up the trends towards automation in some cases but can also pose barriers to the adoption of new technologies and therefore impede business growth.

Part 1 of the research initiative is about identification of innovative and future, advanced organisations. We identified organizations, which we call for the purpose of this research study ‘future organizations’ due to their advanced thinking on learning and competence development. In part 2 of the research, we analyzed the nature of these competence concepts and the competence demands of these organisations on a deep level through in-depth interviews and were able to model a set of sixteen competence profiles which we refer to as ‘future skills’. Each competence profile contains an array of a number subcompetences. The data led us to be able to identify a three-dimensional competence frame around the 16 competence profiles, so that they can be categorized according the three future skill dimensions. In order to validate our approach and findings, and to determine the impact the

¹ Notably the first European country, which had a national higher education strategy mentioning the term “Future Skills” was Ireland (<http://hea.ie/assets/uploads/2017/06/National-Strategy-for-Higher-Education-2030.pdf>).

² Good practices for frameworks of university business cooperation have been analyzed in the frame of the HAPHE Project (<http://haphe.eurashe.eu>)

demand of future skills has on higher education, we designed – in part 3 – the presented Delphi study on the basis of our findings, drawing on the assessments and opinions of almost 50 experts from all over the world.

The Delphi study involves experts into reasoning and evaluation of statements and scenarios about future higher education. The experts were asked to engage into reflection and evaluation within three areas, which were identified as important for future higher education: (1) drivers of change shaping future higher education, (2) scenarios of future higher education, and (3) future skills. For each of the areas we were interested in the degree of relevance of the respective issues, as well as in the experts' opinion about when they would gain relevance.

Methodological Design and Research Context of the Delphi Study

Since 2015, we have been conducting research to shed some light on the future of skill demand. We focus our efforts on identifying what we (and others) refer to as future skills, as well as how we can support their development. As has been demonstrated by other studies, too³, research in this area is of vital importance as future graduates need to adapt to an increasingly changing and complexity-gaining environment that demands agility and innovativeness. To address this complex, intertwined field systematically, we pose three questions within three different, but interrelated areas:

- Future skills: Which skills are necessary for future employees? Which skills are/ will be necessary to shape the future and society in a sustainable way?
- Future learning concepts: How can organizations and firms support the development of future skills (learning and management approaches)?
- Future higher education: How can we design higher education concepts such that they support the development of future skills?

We approach these questions from an education theoretical point of view, combining it with a socioecological perspective on competences. Before conducting the Delphi on which we will elaborate in more detail here, we want to provide a brief overview on two past projects that we carried out in advance of the current research effort.

We started the first project in June 2015. In this first step, we identified and analyzed competence concepts in more than 120 German organizations.⁴ Through an expert screening and analysis, we were able to identify main dimensions of action competence within the overall concepts submitted by the participating organizations. According to the expert's opinion, about 20 organizations proved to have very advanced, developed, and elaborated conceptions and documented approaches for competence development with their employees and advanced learning architectures. Within these documents, experts also found evidence of skill and competence descriptions, which are seen as important and essential for individuals' and organizations' performances in future markets and activities.

The research team chose 17 organizations from this group of advanced organizations to conduct further research into finding dimensions and structures of future skills from the perspectives of advanced organizations. To gain further insights into the specific skill set, organizational approaches to promote them as well as for the purpose of identifying drivers leading to the changed skill demand, we interviewed 17 representatives from such advanced organizations. These 17 interviews were conducted with eleven organizations from the set of the advanced organizations identified beforehand. The interviews resulted in more than 700 minutes of interview material addressing the

³ See for instance Deming (2017), Noweski, Scheer, Büttner, von Thienen, Erdmann, and Meinel (2012), OECD (2017).

⁴ These had been identified through a tender offer – the Dual Partner Award. To win this award, organizations were asked to provide details about their competence models and trainings offered to promote their employees' skill formation. Winners were then invited to participate in a qualitative interview study.

above questions. Based on the material, two researchers coded all interviews independently using the inductive coding technique (Thomas, 2006) and the software MAX QDA (VERBI Software, 2017). After coding, passages lacking unanimity were discussed among the researchers to gain inter-operator reliability in coding.

As a result, we have obtained

- a) a set of future skills,
- b) insights into dimensions of change in organizations through digital and networked global collaboration processes,
- c) and have specified a number of scenarios of future higher education.

The international Delphi study we are reporting on here is based on these results. Having gained insights into future skills, cultural and organizational changes, as well as organizations' reactions to these new demands, the Delphi's main intention was fourfold:

1. To gain insights into the main drivers of change and factors resulting from these drivers,
2. to capture the likelihood for different scenarios about the organization of higher education in the future, about
3. important skills for future graduates, and
4. learning design and study experiences of future higher education.

In round one of the Delphi, we engaged the experts into clarifying concepts and asking for the importance of each concept presented (see Delphi Questionnaire at nextskills.org).

In round two of the Delphi, experts were asked about their estimations on potential time of adoption of the aforementioned topics (see Delphi Questionnaire at nextskills.org).

We invited 53 international experts from different organizations and institutions. They worked within higher education institutions, as researchers in the field of pedagogy, networks concerned with learning and skill formation topics, the digitalization of higher education or within NGOs. It was important to us, to consider the perspectives of both, representatives from higher education institutions as well as from consultants and practitioners from the economy. Further, we paid close attention to the fact that within the two sub-samples, people occupying different positions were included in order to capture the plurality of opinions on the topics surrounding the future of learning, skills and higher education. Almost 50 international experts participated in round 1, representing 17 different countries (Australia, Austria, Belgium, Canada, France, Germany, China, Italy, Lithuania, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom). Although the sample predominantly represents European views, some experts also came from North America, Asia and Oceania, with Europe representing 89% of the overall respondents.

As illustrated by Figure 1, most of the European respondents came from Germany (27%), followed by Austria (17%), and France (12%). Gender-wise, the sample consisted of 30 male and 16 female respondents in the first round, as compared to 14 female and 26 male participants in round 2, leading to a slightly lower overall participation in the second round (-17%). The round two sample consisted of participants from 14 different countries with the majority of participants still coming from Europe. This allowed bridging geographical boundaries, thus considering the expertise of an international sample, which suggests that the results obtained in the survey extend beyond national boundaries and reveal general trends within higher education that might also be relevant especially to other European countries or maybe even globally.

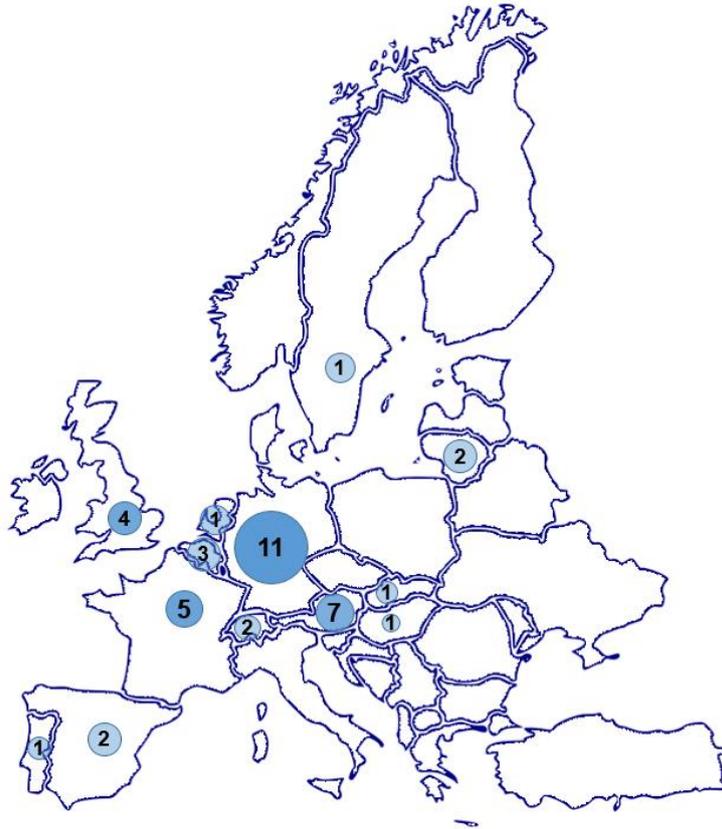
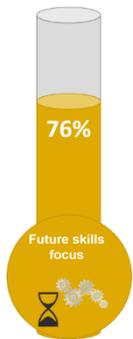
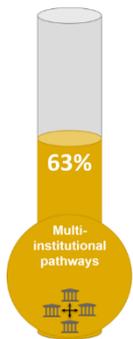


Figure 1. Residence of the European Delphi participants

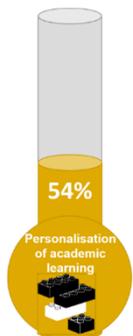
To reduce response bias, participants remained anonymous to each other during the phase of data collection. Only after completion of both rounds, we asked the respondents for permission to name them as part of our international expert board, thereby acknowledging their participation in our publication (see table A in the Annex for those who gave their permission).



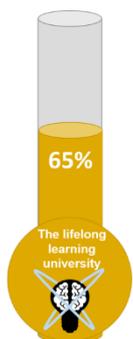
An emerging focus on future skills radically changes the current definition of graduate attributes in higher education.
 $M = 3.81, SD = 1.22$



Higher education increasingly becomes a multi-institutional study experience.
 $M = 3.72, SD = 1.12$



Students build their own personalized curriculum.
 $M = 3.68, SD = 0.98$



Higher education institutions turn towards providing offerings for lifelong higher learning services.
 $M = 3.72, SD = 1.33$

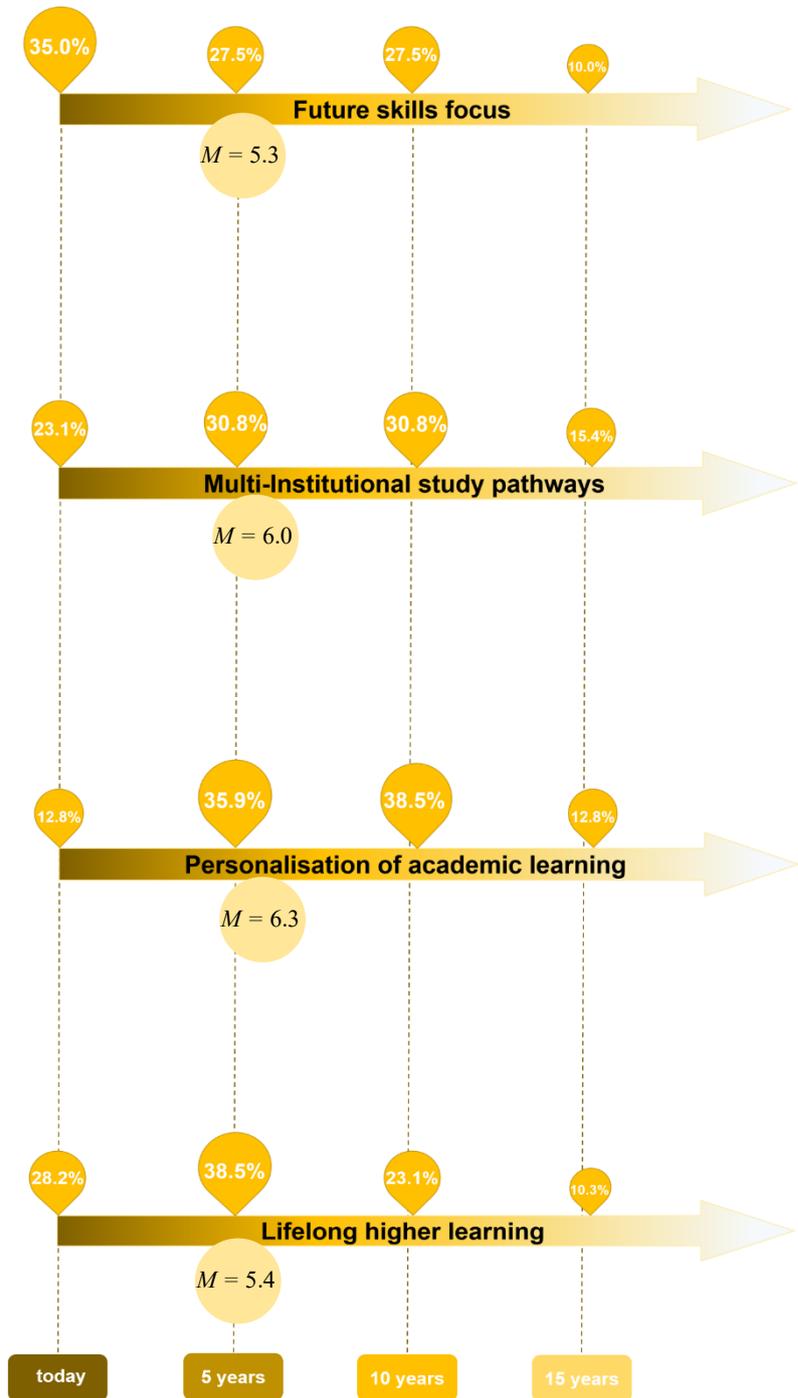


Figure 2. Overview on agreement levels and adoption times of the four pillars of change in future higher education ($N_{Round1} = 46$; $N_{Round2} = 39$)

II – A Three-Dimensional Model for Future Skills

The analysis resulted in a reconstruction of factors which are underlying future skills and reveals insights into the form and importance of learning in today's and future professional work environments of advanced "future" organizations, as well as a reconstruction of those specific individual abilities and skills which will be necessary to deal with challenges in professional future work environments. We found that the inherent structure of future skills could be classified according to its inherent inner structure into three dimensions: subject – object – and environment. The three dimensions allow to allocate skills according to their relation to subject – object – world. All three dimensions are interrelated. We are introducing this threefold distinction (fig. 3) because any kind of ability or action can either be an expression to shape

- a. an individual's relation to itself in past present or future (time dimension)
- b. an individual's relation to a certain thing or object (object dimension)
- c. an individual's relation to somebody else or a group in the world (social dimension)

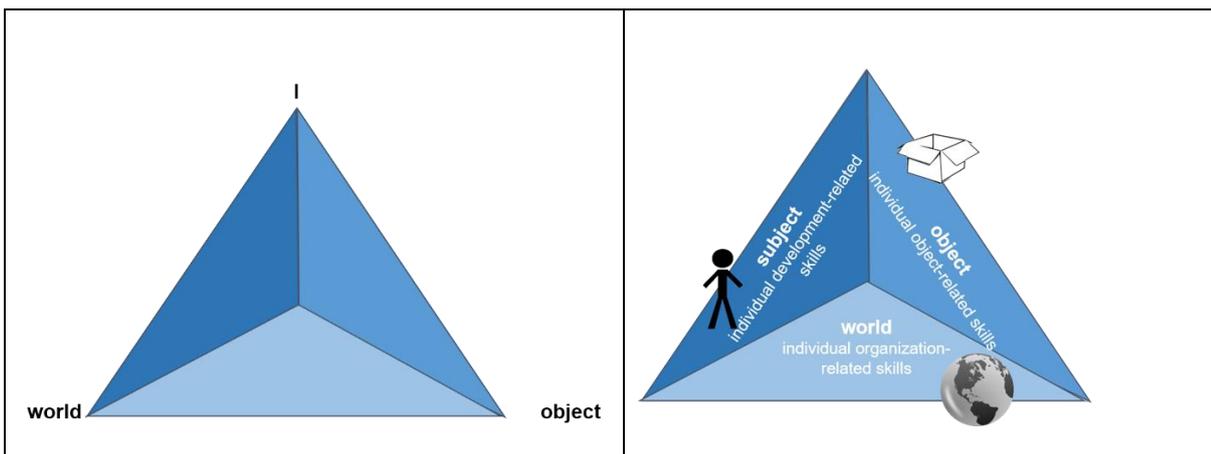


Figure 3. The threefold future skills model

This threefold distinction goes back to Meder (2007, also Roth 1971) which are presenting a foundational, constitutive structure for education as a threefold relation.

It thus allows to differentiate skills which are related to individual perception, individual reflection and development of awareness (subject related) and skills which are related to things which can be experiences (objects), and thirdly related to the social world (world). The three dimension allow to describe more precisely which we refer to future skills instead of just calling them skills. In all of the three dimensions shifts are going on. The interview data reveal a clear change in nature of what is demanded in the future in comparison to the past and in parts the present.

1. Subject related individual skills: Whereas in the past individuals could rely on following requirements, the future will demand more self-organization instead.

2. Object related individual skills: Whereas in the past individuals could rely on applying knowledge, methods and tools, the future will demand original creative development of new knowledge, methods and tools.
3. World/ organizational related skills: Whereas in the past organisations were organized and management according to clear structures, the future will demand fluid, enabling, agile cultures.

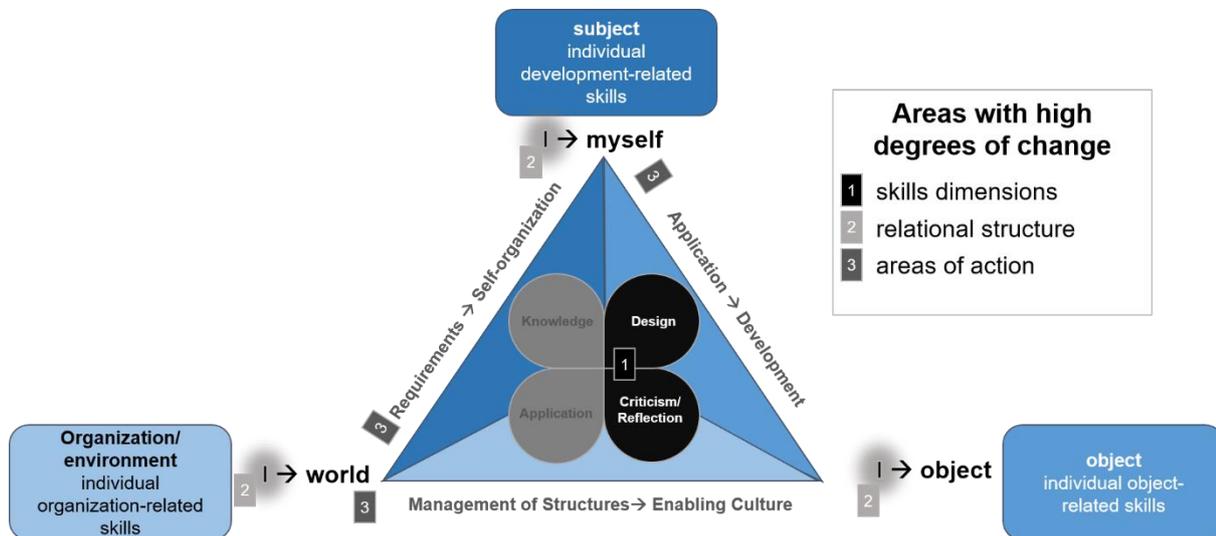


Figure 4. Linking the Structural Education Model and the Skills Model as Conceptual Framework for the Future Skills Model

The figure shows that shifts take place in all three dimensions (third area of change). In addition, data reveal shifts in different fields as well by emphasizing the greater importance of individually responsibility for their own development, competence management and autonomous navigation through an ever faster changing environment. Whereas in the past external structures were the scaffold which provided guidance to individuals, external scaffolding will be less perceivable in the future. Thus, individuals will have a greater role to be navigators themselves (second area of change – relational structure). And, finally, the skills dimensions which will be important in the future are also changing. Although the term skill is referring to a compound of elements (e.g. knowledge, skills, attitudes), the data emphasize certain elements with more importance of the future and certain elements which will be providing basic foundation but will not be sufficient for the future. The figure shows that knowledge and application of knowledge will be such foundational elements which will however, in the future not be sufficient for successful performance. Much more importance were given to the two elements “design” and criticism/ reflection” for future performance.

All three dimensions interact with each other and are not sole expressions of isolated skill domains. Subjective aspects influence outlook on objective aspects as well as social aspects impact subjective and objective aspects. The presented future skill model is thus going beyond a static model of listing a set of defined skills. It is secondly going far beyond digital or technical skills which will no doubt be important but represent just one ingredient. Their values lie in the personal development of dispositions to act self-organized in the respectively described domain.

III - Future Skill Profiles

The term “future skills” is defined as the ‘ability to act successful on a complex problem in a future unknown context of action’. It refers to an individuals’ *disposition* to act in a self-organized way, visible to the outside as performance.

As described above the future skills model divides future skills into three interrelated dimensions and is capable of describing the wide array of future skills in a clearly structure and well described set of dimensions (fig. 2):

1. The first Future Skill dimension is the subjective dimension of futures skills profiles. It is relating to an individuals’ subjective, personal abilities to learn, adapt and develop in order to improve their opportunities to productively participate in the workforce of tomorrow, actively shape the future working environment and involve themselves into forming societies to cope with future challenges. It contains seven future skill profiles.
2. The second Future Skill Dimension is relating to an individual’s ability to act self-organized in relation to an object, a task or a certain subject matter related issue. It is emphasizing a new approach which is rooted into the current understanding of knowledge but is suggestion to take knowledge several steps up the ladder, connect it to motivation, values and purpose and impregnate it with the disposition to act self-organized in the knowledge domain in question. It is not just a quest for more knowledge but for dealing with knowledge in a different way which is resulting into professionalism and not into knowledge expertise.
3. The third Future Skill Dimension is relating to an individual’s ability to act self-organized in relation to its social environment, the society and organizational environment. It is emphasizing the individuals dual role as the curator of its social portfolio of membership in several organizational spheres and at the same time having the role of rethinking organizational spaces and creating organizational structures anew to make it future proof. It contains an array of five skill profiles.

Within the three dimensions, sixteen skill profiles have been defined. A skill profile is an array containing further subskills. A full report and description can be accessed at www.nextskills.org.

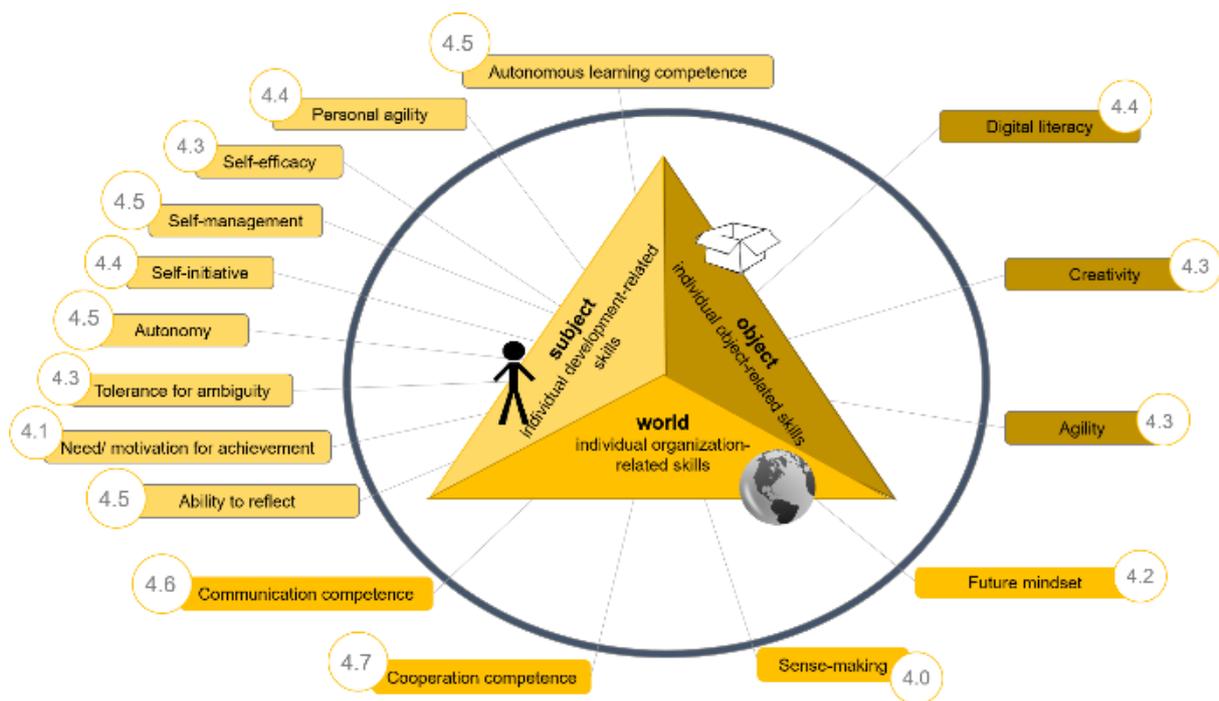


Figure 5: Future Skills

IV - Future Learning

The Delphi resulted into hallmark indications on the shift from academic education and teaching to active learning of choice and autonomy. Higher education institutions in the future will provide a learning experience which is fundamentally different than the model of today. Timeframe for the time of adoption vary but for many aspects a close or mid-term timeframe has been estimated through the Delphi experts. The dimensions of future learning in higher education will comprise (1) **structural aspects**, i.e. academic learning as episodal process between biographical phases professional and private episodes throughout life, learning as institutional patchwork instead of the current widespread one-institution-model of today, supported through more elaborated credit transfer structures, micro-qualifications and microcredentials, as well as aspect of (2) **pedagogical design of academic learning**, i.e. changing practices of assessment, also peer-validation, learning communities, focus on future skills with knowledge playing an enabling role in interactive socio-constructive learning environments). In general experts estimate structure changes to become relevant much later than changes related to academic learning design.

V - Drivers of Change in Higher Education

Four key drivers in the higher education market can be described. Each driver has a radical change potential for higher education institutions and together they mutually influence each other and span the room in which higher education likely will develop.

There are 2 content and curriculum related drivers (i.e. (1) personalized higher education and (2) future skill focus) and 2 organization-structure related drivers (i.e. (1) multi-institutional study pathways, (2) Lifelong Higher Learning)

The profile, shape and nature of higher education in the future will be most probably a certain pattern of configuration along the impact each of the four key drivers, called “pillars of change” has, and will influence the development of higher education strategies.

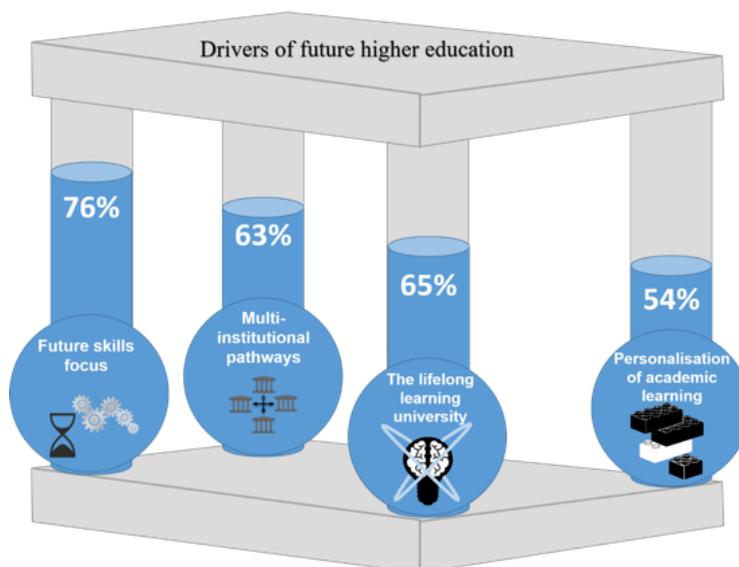


Figure 6: Drivers of Change in Higher Education

1 - An emerging focus on future skills radically changes the current definition of graduate attributes in higher education: The focus on a “next mode” of studying (focus on future skills: autonomous learning, self-organization, applying and reflecting knowledge, creativity and innovation, etc.) gradually replaces a reduced/ narrow focus on academic and valid knowledge acquisition as a means to provide correct answers for known questions based on a curriculum which is focused on defined skills for fixed professions.

2 - Higher education increasingly becomes a multi-institutional study experience: The provision of higher education increasingly moves from a ‘one-institution’ model to a ‘multi-institution’ model in which higher education is provided through alliances of several institutions.

3 - Students build their own personalized curriculum: The elements of choice in academic programs enlarge. The curriculum of academic programs moves from a fully predefined and ‘up-front’ given structure to a more flexible, personalized and participatory model in which students actively cooperate with professors/ teachers/ advisors in curriculum building of higher education programs.

4 - Higher education institutions turn towards providing offerings for lifelong higher learning services: The current model of higher education, to prepare students (up front) for a future profession, is equally complimented with higher lifelong learning offerings.

VI - Four Scenarios for Future HE

The Delphi survey made a point to view future higher education from a students’ perspective and envisioned future learning experiences. Four scenarios for future higher education can be described as gravitation centers of organizational development: (1) the future skill university scenario, (2) the networked multi-institutional study scenario, (3) the my-university scenario, (4) the lifelong higher learning scenario.

Three out of four scenarios score with a time of adoption of more than 10 years from today with the majority experts. Only the lifelong higher learning scenario scored for a time for adoption within the next 5 years with the majority of experts.

1 - The 'future skill' university: The 'future skill' scenario suggests that higher education institutions would leave the current model that focusses on knowledge acquisition. Instead, new profiles would be developed that emphasize graduates' future skill development. In this scenario, HE would mainly be organized around one key objective: to enable the development of graduates' future skills, i.e. complex problem solving, dealing with uncertainty or developing a sense of responsibility, etc. This would not replace but go beyond the current emphasis of knowledge acquisition and studying based on defined curricula for fixed professions.

2 - The networked, university: This scenario views higher education as a networked study experience. It will not be down to a single institution providing a student with a certain program, but that this role would be split among multiple institutions. This means that 'digital import' and 'digital export' of parts of the curriculum would play a significant role. The standard HE study structure and experience would shift from a "one-institution" model to a "multi-institutional" model.

3 - The "My-University" scenario: This scenario describes HEIs as spaces where the elements of choices enlarge, and students can build their own curricula based on their personal interests. The curriculum of academic programs in this scenario would move from a fully predefined and 'up-front' given structure to a more flexible, personalized and participatory model in which students actively cooperate with professors/ teachers/ advisors in curriculum building of HE programs.

4 - The lifelong higher learning scenario: In this scenario, seamless lifelong higher learning would be as important as initial higher education. Learners in the workplace would be the main type of student, choosing their portfolio of modules according to their personal skill needs and competence demands with high autonomy throughout their lifetime. Institutions thus would offer micro-credentials, which students assemble individually based on their own interests. Recognition of prior study achievements and practical experience would enable permeable shifting between different providers, which offer to bundle prior learning experience into larger certifications.

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I would like to thank Sarah Kellermann for her assistance in research and publication of the findings. In addition, I would like to acknowledge the contribution of all experts who have participated in the Delphi Survey. All reports can be accessed in full length at the projects web site www.nextskills.org as open access publications.

Delphi Questionnaire Round 1:

Round 1 asked participants to assess the relevance of scenarios and statements about future skills, studying and learning and higher education in the future.

To access Annex B, please follow the link:

https://nextskills.files.wordpress.com/2019/03/2019-03-Future-Skills-Delphi-Annex_B.pdf

Delphi Questionnaire Round 2:

Round 2 asked participants to evaluate the speed of adoption of scenarios and statements about future skills, studying and learning and higher education in the future, which had been presented in the first round, and were reformulated according to participants' qualitative remarks afterwards.

To access Annex C, please follow the link:

https://nextskills.files.wordpress.com/2019/03/2019-03-Future-Skills-Delphi-Annex_C.pdf

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